INTERNATIONAL COURT OF JUSTICE

CASE CONCERNING
AERIAL HERBICIDE SPRAYING

ECUADOR
v.
COLOMBIA

REPLY OF ECUADOR

VOLUME III

ANNEXES

31 JANUARY 2011

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LEGISLATIVE DECREE, MARCH 17, 1995, No. 194

IMPLEMENTATION OF THE DIRECTIVE 91/414/CEE IN MATTERS OF MARKET ENTRY OF PHYTOSANITARY PRODUCTS

PRESIDENT OF THE REPUBLIC

Whereas articles 76 and 87 of the Constitution;

Whereas the law February 22, 1994, no. 146, and, specifically articles 1, 2 and 31;

Whereas the directive of the Council 91/414/CEE of July 15, 1991, related to the market entry of the phytosanitary products;

Considering the directive 93/71/CEE of the Commission of July 27, 1993, modifying the directive 91/414/CEE;

Considering the directive 94/37/CE of the Commission of July 22 nd 1994, modifying the directive 91/414/CEE;

Considering the directive 94/43/CE of the Council of July 27 th 1994, that defines Annex VI of the directive 91/414/CEE;

Whereas the decisions of the Cabinet of Ministers, adopted in the meeting of February 17, 1995;

After acquiring the opinions of the competent Commissions from the Chamber of Deputies and the Senate of the Republic;

Whereas the decision of the Cabinet, adopted in the meeting of March 16, 1995;

On the Ministers' proposal for the coordination of the European Union policies and health, together with the Ministers of foreign affairs, of leniency and justice, of the Treasury, of agriculture, food stuffs and forestry resources, of industry, commerce and crafts, of labor and social welfare and the environment;

The following legislative decree
IS ENACTED:

Art. 1
(Field of application)

1. This decree governs:
   a) The authorization, the market entry, the use and the control of the plant health products, introduced in their commercial form;
   b) The market entry and the control of the active ingredients intended for the uses defined in article 2, paragraph 1, letter a);
   c) The authorization to introduce into the market the plant health products containing or constituted by genetically modified organisms, for which the deliberate release into the environment has formed the object of the formal provision of assent via legislative decree of March 3, 1993, no. 92.

2. Exceptions are made for the provisions of:
   a) The decree of the President of the Republic, May 24, 1988, no. 223, implementing "Realization of the EEC directive numbers 78/631, 81/187 and 84/291, concerning the reconciliation of the legislations of

members States related to the classification, to the packaging and labeling of the hazardous preparations (parasiticides), pursuant to article 15 of the law of April 16, 1987, no. 183";

b) The law May 29, 1974, no. 256, implementing "Classification and regulation of the packaging and the labeling of hazardous substances and preparations", and subsequent modifications and incorporations;

c) The regulation (EEC) of the Council no. 2455/92 of July 23, 1992, related to the exports and imports of some hazardous chemical products.

Art. 5

(Authorizations of plant health products: release, renewal, modification, re-examination and withdrawal)

1. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

2. Repealed by art. 43, paragraph 1b) of the D.P.R April 23, 2001, no. 290

3. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

4. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

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15. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

16. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

17. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

18. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

19. Repealed by art. 43, paragraph 1b) of the D.P.R. April 23, 2001, no. 290

20. For the purpose of protecting the vulnerable water resources or for other reasons of sanitary or environmental preservation, including the preservation of the useful entomological fauna and the other useful organisms, the Minister of Health, on documented request by the autonomous Regions or Provinces, after consulting with the Commission referring to article 20; can set limitations or exclusions of usage, also temporary, in specific areas of the territory, for authorized plant health products; the autonomous Region or the Province can request that the experts themselves are consulted by the Commission.

21. Within one year from this decree's date of entry into force, the Minister of the environment, after consulting with the autonomous Regions and the Provinces, defines the criteria for the identification of the vulnerable areas, in which the autonomous Regions and the Provinces can request the application of the limitations and exclusions of usage referenced in paragraph 20.

22. The autonomous Regions and the Provinces, for the authorized plant health products pursuant to paragraph 1, regulate:
    a) the usage for non agricultural purposes such as those of herbicidal uses;
    b) the treatment by aircraft in exceptional cases and cases of demonstrated necessity, by those authorized for the specific purpose.

Annex 9

DECRETO LEGISLATIVO 17 MARZO 1995, N. 194

ATTUAZIONE DELLA DIRETTIVA 91/414/CEE IN MATERIA DI IMMISSIONE IN COMMERCIO DEI PRODOTTI FITOSANITARI

IL PRESIDENTE DELLA REPUBBLICA

VISTI gli articoli 76 e 87 della Costituzione;

VISTA la legge 22 febbraio 1994, n. 146, e, in particolare, gli articolo 1, 2 e 31;

VISTA la direttiva del Consiglio 91/414/CEE del 15 luglio 1991, relativa all'immissione in commercio dei prodotti fitosanitari;

TENUTO CONTO della direttiva 93/71/CEE della Commissione del 27 luglio 1993, recante modifica alla direttiva 91/414/CEE;

TENUTO CONTO della direttiva 94/37/CE della Commissione del 22 luglio 1994, recante modifica alla direttiva 91/414/CEE;

TENUTO CONTO della direttiva 94/43/CE del Consiglio del 27 luglio 1994, che definisce l'Allegato VI della direttiva 91/414/CEE;

VISTA la deliberazione del Consiglio dei Ministri, adottata nella riunione del 17 febbraio 1995;

ACQUISITI i pareri delle competenti Commissioni della Camera dei Deputati e del Senato della Repubblica;

VISTA la deliberazione del Consiglio dei Ministri, adottata nella riunione del 16 marzo 1995;

SULLA proposta dei Ministri per il coordinamento delle politiche dell'Unione europea e della sanità, di concerto con i Ministri degli affari esteri, di grazia e giustizia, del tesoro, delle risorse agricole, alimentari e forestali, dell'industria, del commercio e dell'artigianato, del lavoro e della previdenza sociale e dell'ambiente;

E M A N A
il seguente decreto legislativo:

Art. 1
(Campo di applicazione)

1. Il presente decreto disciplina:
   a) l'autorizzazione, l'immissione in commercio, la utilizzazione ed il controllo dei prodotti fitosanitari, presentati nella loro forma commerciale;
   b) l'immissione in commercio ed il controllo delle sostanze attive destinate agli usi definiti nell'articolo 2, comma 1, lettera a);
   c) l'autorizzazione ad immettere in commercio i prodotti fitosanitari contenenti o costituiti da organismi geneticamente modificati, per i quali l'emissione deliberata nell'ambiente abbia formato oggetto del provvedimento formale di assenso di cui al decreto legislativo 3 marzo 1993, n. 92.

2. Sono fatte salve le disposizioni di cui:
   a) al decreto del Presidente della Repubblica 24 maggio 1988, n. 223, recante "Attuazione delle direttive CEE numeri 78/631, 81/187 e 84/291, concernenti il riavvicinamento delle legislazioni degli Stati membri relative alla classificazione, all'imballaggio e all'etichettatura dei preparati pericolosi (antiparassitari), ai sensi dell'articolo 15 della legge 16 aprile 1987, n. 183";
   b) alla legge 29 maggio 1974, n. 256, recante "Classificazione e disciplina dell'imballaggio e dell'etichettatura delle sostanze e dei preparati pericolosi", e successive modificazioni ed integrazioni;
   c) al regolamento (CEE) del Consiglio n. 2455/92 del 23 luglio 1992, relativo alle esportazioni ed alle importazioni di taluni prodotti chimici pericolosi.

Annex 9

Art. 2
(Definizioni)

1. Ai fini del presente decreto si intende per:
   a) prodotti fitosanitari: le sostanze attive ed i preparati contenenti una o più sostanze attive, presentati nella forma in cui sono forniti all'utilizzatore e destinati a:
      1) proteggere i vegetali o i prodotti vegetali da tutti gli organismi nocivi o a prevenirne gli effetti;
      2) favorire o regolare i processi vitali dei vegetali, con esclusione dei fertilizzanti;
      3) conservare i prodotti vegetali, con esclusione dei conservanti disciplinati da particolari disposizioni comunitarie;
      4) eliminare le piante indesiderate;
      5) eliminare parti di vegetali, frenare o evitare un loro indesiderato accrescimento;
   b) residui di prodotto fitosanitario o semplicemente residui: una o più sostanze, inclusi i loro metaboliti e prodotti di degradazione o di reazione, presenti in o su vegetali o prodotti di origine vegetale o prodotti animali destinati al consumo, o altrove nell'ambiente, e costituenti residui dell'impiego di un prodotto fitosanitario;
   c) sostanze: gli elementi chimici ed i loro composti, allo stato naturale o sotto forma di prodotti industriali, inclusa qualsiasi impurezza derivante dal procedimento di fabbricazione;
   d) sostanze attive: le sostanze o i microrganismi, compresi i virus, aventi un'azione generale o specifica sugli organismi nocivi o su vegetali, su parti di vegetali o su prodotti vegetali;
   e) preparati: le miscele o le soluzioni composte da due o più sostanze, delle quali almeno una sostanza attiva, destinate ad essere utilizzate come prodotti fitosanitari;
   f) vegetali: le piante vive o le parti vive di piante, compresi frutti freschi e sementi;
   g) prodotti vegetali: i prodotti di origine vegetale non trasformati o sottoposti a trattamenti semplici quali la macinazione, l'essiccazione o la compressione, esclusi i vegetali definiti alla lettera f);
   h) organismi nocivi: i parassiti dei vegetali o dei prodotti vegetali, appartenenti ai regni animale o vegetale, nonché i virus, i batteri, i funghi o altri agenti patogeni;
   i) animali: gli animali di specie normalmente alimentate e allevate o consumate dall'uomo;
   l) immissione in commercio: l'importazione di un prodotto fitosanitario nonché qualsiasi consegna a terzi, sia a titolo oneroso che gratuito, esclusa la consegna per il magazzinaggio e la successiva spedizione fuori del territorio comunitario;
   m) autorizzazione di un prodotto fitosanitario: l'atto amministrativo mediante il quale il Ministero della sanità, a seguito di una domanda inoltrata da un richiedente, autorizza l'immissione in commercio e l'utilizzazione di un prodotto fitosanitario nel territorio italiano o in una parte di esso;
   n) ambiente: l'acqua, l'aria, il suolo, le specie selvatiche della flora e della fauna e relative interrelazioni, nonché le relazioni tra tali elementi e gli organismi viventi;
   o) lotta integrata: l'applicazione razionale di un complesso di misure biologiche, biotecnologiche, chimiche, colturali o di selezione vegetale, con le quali si limita al minimo indispensabile l'impiego di prodotti fitosanitari contenenti sostanze chimiche per mantenere i parassiti a livelli inferiori a quelli che provocano danni o perdite economicamente inaccettabili.

Art. 3
(Disposizioni generali)

1. Fatto salvo quanto previsto dall'articolo 22, i prodotti fitosanitari possono essere immessi in commercio ed utilizzati solo se sono stati autorizzati dal Ministero della sanità, conformemente alle disposizioni del presente decreto.

2. Sono vietati la produzione, il magazzinaggio ed il trasporto di prodotti fitosanitari non autorizzati, salvo che i prodotti stessi siano rispondenti a tutte le seguenti condizioni:
   a) siano destinati ad essere utilizzati in un altro Stato membro, che ne abbia autorizzato l'impiego a scopo fitosanitario in conformità alle norme comunitarie o siano destinati ad uno Stato non appartenente all'Unione europea, che ne abbia autorizzato l'impiego a scopo fitosanitario, fatte salve le disposizioni di cui al regolamento (CEE) n. 2455/92 del Consiglio, del 23 luglio 1992, e successive modificazioni;
   b) siano prodotti in stabilimenti autorizzati, previa comunicazione al Ministero della sanità da parte del direttore tecnico responsabile;
   c) siano etichettati conformemente alla normativa vigente nello Stato di destinazione e racchiusi in apposito imballaggio o muniti di etichettatura aggiuntiva da cui risulti la loro condizione;
   d) *siano trasportati nel rispetto delle* cautele prescritte in relazione alla natura del prodotto, accompagnati dalla documentazione prevista dalle norme vigenti e nel rispetto delle disposizioni vigenti in materia di sicurezza e di controllo.

5. Il riconoscimento degli enti e degli organismi di cui al punto 2.2 dell'introduzione all'allegato III è effettuato con decreto del Ministro delle risorse agricole, alimentari e forestali, su richiesta documentata degli interessati attestante il possesso dei requisiti prescritti.

6. Il Ministro delle risorse agricole, alimentari e forestali, con decreto da adottarsi di concerto con i Ministri della sanità e dell'ambiente, disciplina l'applicazione dei principi di buone pratiche per l'esecuzione di prove in campo finalizzate alla determinazione dell'entità dei residui di prodotti fitosanitari, nonché i requisiti necessari per il riconoscimento degli enti e degli organismi che possono eseguire tali prove.

7. Il riconoscimento degli enti e degli organismi che possono eseguire le prove di cui al comma 6 è effettuato su richiesta documentata, con decreto del Ministro delle risorse agricole, alimentari e forestali.

8. Il mantenimento del riconoscimento di cui ai commi 5 e 7 è subordinato all'esito favorevole di ispezioni periodiche e regolari, effettuate da ispettori iscritti in apposita lista nazionale, approvata con decreto del Ministro delle risorse agricole, alimentari e forestali, di concerto con i Ministri della sanità e dell'ambiente, entro sei mesi dalla data di entrata in vigore del presente decreto; gli oneri per l'espletamento delle attività ispettive sono posti a carico dei richiedenti secondo modalità definite con decreto del Ministro delle risorse agricole, alimentari e forestali.

Art. 5

(Autorizzazione dei prodotti fitosanitari: rilascio, rinnovo, modifica, riesame e ritiro)

1. **Abrogato dall'art. 43, comma 1b) del D.P.R. 23 aprile 2001, n. 290**

2. **Abrogato dall'art. 43, comma 1b) del D.P.R. 23 aprile 2001, n. 290**

3. **Abrogato dall'art. 43, comma 1b) del D.P.R. 23 aprile 2001, n. 290**

4. **Abrogato dall'art. 43, comma 1b) del D.P.R. 23 aprile 2001, n. 290**

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19. **Abrogato dall'art. 43, comma 1b) del D.P.R. 23 aprile 2001, n. 290**

20. Allo scopo di proteggere le risorse idriche vulnerabili o per altri motivi di tutela sanitaria o ambientale, inclusa la tutela dell'entomofauna utile e degli altri organismi utili, il Ministro della sanità, su documentata richiesta delle Regioni o delle Province autonome, sentita la Commissione di cui all'articolo 20, può disporre limitazioni o esclusioni di impiego, anche temporanee, in aree specifiche del territorio, per prodotti fitosanitari autorizzati; la Regione o la Provincia autonoma possono richiedere che propri esperti siano sentiti dalla Commissione.

21. Entro un anno dalla data di entrata in vigore del presente decreto, il Ministro dell'ambiente, sentite le Regioni e le Province autonome, definisce i criteri per l'individuazione delle aree vulnerabili, nelle quali le Regioni e le Province autonome possono chiedere l'applicazione delle limitazioni e delle esclusioni di impiego di cui al comma 20.

22. Le Regioni e le Province autonome regolamentano, per i prodotti fitosanitari autorizzati ai sensi del comma 1:
    a) l'impiego per scopi non agricoli di quelli ad attività diserbante;
    b) il trattamento con mezzi aerei in casi eccezionali e di dimostrata necessità, per quelli autorizzati per lo scopo specifico.

Art. 6
(Iscrizione delle sostanze attive nell'allegato I)

1. L'iscrizione di una sostanza attiva nell'allegato I, per un periodo non superiore a dieci anni, le condizioni eventualmente connesse a detta iscrizione, le modifiche e la cancellazione dell'iscrizione sono disposte con decreto del Ministro della sanità, in conformità a disposizioni adottate in sede comunitaria.

2. L'iscrizione di una sostanza attiva nell'allegato I è effettuata solo se si può ritenere che i prodotti fitosanitari che la contengono soddisfino i seguenti requisiti:
    a) assenza di effetti nocivi sulla salute dell'uomo e degli animali, nonché sulle acque sotterranee, e di effetti inaccettabili sull'ambiente, correlati ai residui derivanti da un'applicazione del preparato in conformità alle buone pratiche fitosanitarie, nonché la possibilità di determinare detti residui, se significativi dal punto di vista tossicologico o ambientale, con metodi analitici di applicazione corrente;
    b) assenza di effetti nocivi sulla salute dell'uomo e degli animali e di effetti inaccettabili sull'ambiente, associati all'impiego dei preparati, secondo un'applicazione conforme ai principi delle buone pratiche fitosanitarie, come stabilito dall'articolo 4, comma 1, lettera b), punti 4) e 5).

3. Per l'iscrizione di una sostanza attiva nell'allegato I si tiene conto, ove occorra, dei seguenti elementi:
    a) dose giornaliera accettabile per l'uomo;
    b) un livello ammissibile di esposizione dell'operatore;
    c) stima del destino e della distribuzione nell'ambiente, nonché dell'impatto sulle specie non bersaglio.

4. L'iscrizione di una sostanza attiva nell'allegato I può essere assoggettata a condizioni concernenti:
    a) il livello di purezza minima della sostanza attiva;
    b) la natura ed il tenore massimo di talune impurezze;
    c) le restrizioni che tengono conto delle condizioni agricole, fitosanitarie e ambientali, comprese quelle climatiche;
    d) il tipo di preparazione;
    e) le modalità d'uso.

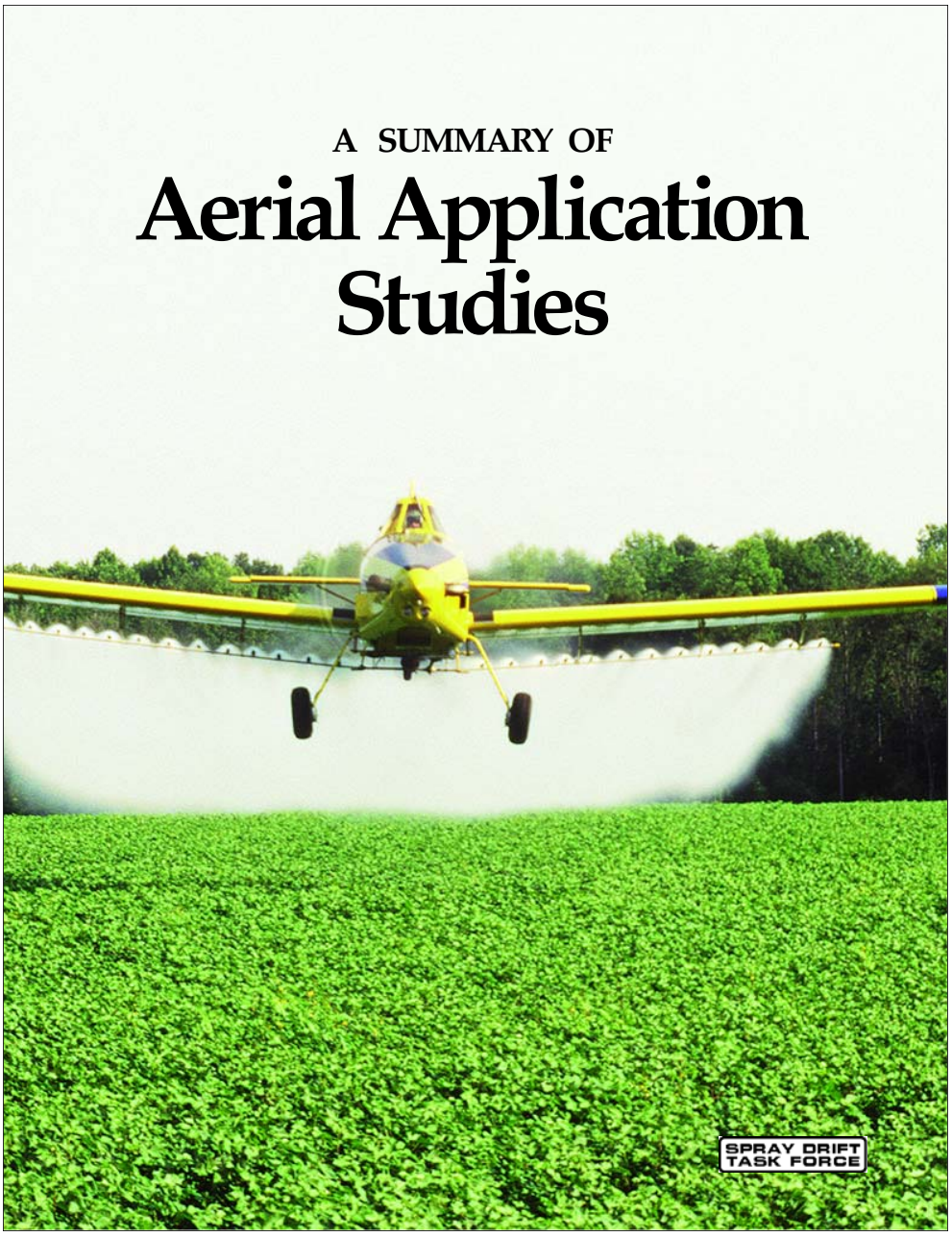
5. I soggetti interessati all'iscrizione di una sostanza attiva nell'allegato I possono presentare domanda al Ministero della sanità, il quale, dopo averne valutata, senza ritardo ingiustificato, la conformità ai requisiti previsti dall'allegato II, invita il richiedente a trasmettere agli altri Stati membri ed alla Commissione europea la domanda stessa unitamente ad un fascicolo conforme ai requisiti previsti dall'allegato II e ad un fascicolo conforme ai requisiti previsti dall'allegato III, concernente almeno un preparato contenente tale sostanza attiva; le modalità di presentazione e di valutazione delle domande sono stabilite con decreto del Ministro della sanità in conformità a disposizioni adottate in sede comunitaria.

6. I soggetti che hanno chiesto l'iscrizione di una sostanza attiva nell'allegato I possono chiedere il rinnovo della iscrizione stessa almeno due anni prima della scadenza del periodo di iscrizione.

7. Il Ministero della sanità, in attuazione di disposizioni comunitarie relative ai programmi di riesame delle sostanze attive già in commercio alla data del 26 luglio 1993, provvede a:
    a) incaricare la Commissione di cui all'articolo 20, per la realizzazione dei programmi comunitari di valutazione, ponendo i relativi oneri carico degli interessati, ai sensi dell'articolo 20, comma 5;

Annex 10

Spray Drift Task Force, *A Summary of Aerial Application Studies* (1997)


A SUMMARY OF
Aerial Application Studies
SPRAY DRIFT TASK FORCE

Introduction

The incidence and impact of spray drift can be minimized by proper equipment selection and setup, and good application technique. Although the Spray Drift Task Force (SDTF) studies were conducted to support product registration, they provide substantial information that can be used to minimize the incidence and impact of spray drift. The purpose of this report is to describe the SDTF aerial application studies and to raise the level of understanding about the factors that affect spray drift.

The SDTF is a consortium of 38 agricultural chemical companies established in 1990 in response to Environmental Protection Agency (EPA) spray drift data requirements. Data were generated to support the reregistration of approximately 2,000 existing products and the registration of future products from SDTF member companies. The studies were designed and conducted in consultation with scientists at universities, research institutions, and the EPA.

The purpose of the SDTF studies was to quantify primary spray drift from aerial, ground hydraulic, air blast and chemigation applications. Using a common experimental design, more than 300 applications were made in 10 field studies covering a range of application practices for each type of application.

The data generated in the field studies were used to establish quantitative databases which, when accepted by EPA, will be used to conduct environmental risk assessments. These databases are also being used to validate computer models that the EPAcan use in lieu of directly accessing the databases. The models will provide a much faster way to estimate drift, and will cover a wider range of application scenarios than tested in the field studies. The models are being jointly developed by the EPA, SDTF and United States Department of Agriculture (USDA).

Overall, the SDTF studies confirm conventional knowledge on the relative role of the factors that affect spray drift. Droplet size was confirmed to be the most important factor. The studies also confirmed that the active ingredient does not significantly affect spray drift. The physical properties of the spray mixture generally have a small effect relative to the combined effects of equipment parameters, application technique, and the weather. This confirmed that spray drift is primarily a generic phenomenon, and justified use of a common set of databases and models for all products. The SDTF developed an extensive database and model quantifying how the liquid physical properties of the spray mixture affect droplet size.

The SDTF measured primary spray drift, the off-site movement of spray droplets before deposition. It did not cover vapor drift, or any other form of secondary drift (after deposition), because secondary drift is predominantly specific to the active ingredient.

Prior to initiating the studies, the SDTF consulted with technical experts from research institutions around the world and compiled a list of 2,500 drift-related studies from the scientific literature. Because of differing techniques, it was difficult to compare results across the studies. However, the information from these references was useful in developing test protocols that were consistently followed throughout the field studies.

The objective of the aerial field studies was to quantify drift from the range of application practices common in the early 1990s. Since some practices may have changed since then, it is important to recognize that the aerial model will use inputs based on current practices.

The information being presented is not an in-depth presentation of all data generated by the SDTF. Use of pesticide products is strictly governed by label instructions. Always read and follow the label directions.

Procedures

Test site location and layout

Two sites were chosen in Texas because they provided open expanses, up to one-half mile downwind from the application areas, and a wide range of weather conditions. Wind speeds varied from 2 mph to 17 mph, with an average of 10 mph across all applications. Air temperatures varied from 32˚F to 95˚F and relative humidity varied from 7% to 94%.

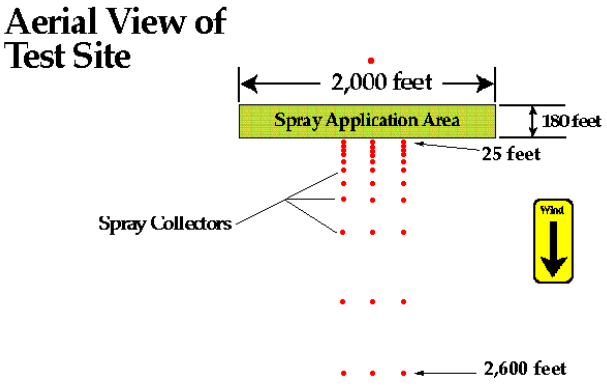


figure 1

The test application area measured 2,000 feet in length and 180 feet in width (figure 1). Four, 45-foot wide parallel swaths were sprayed going from left-to-right and right-to-left. Three lines of horizontal alpha-cellulose cards (absorbent material similar to thick blotting paper) were placed on the ground at 12 selected intervals from 25 feet to 2,600 feet downwind from the edge of the application area. These collectors simulated the potential exposure of terrestrial and aquatic habitats to drift. Acollector was also positioned upwind from the application area to verify that drift only occurs in a downwind direction.

Relating droplet size spectra to drift

All agricultural nozzles produce a range of droplet sizes known as the droplet size spectrum. In order to measure the droplet size spectrum that was applied in each field study treatment (and that represent those produced from commercial applications), the critical application parameters (nozzle type, orifice size, pressure, angle, and air speed) were duplicated in an extensive series of atomization tests conducted in a wind tunnel. The controlled conditions of the wind tunnel allowed the droplet size spectrum to be accurately measured using a laser particle measuring instrument.

The volume median diameter (VMD) is commonly used to characterize droplet size spectra. It is the droplet size at which half the spray volume is composed of larger droplets and half is composed of smaller droplets. Although VMD is useful for characterizing the entire droplet spectrum, it is not the best indicator of drift potential.

A more useful measure for evaluating drift potential is the percentage of spray volume consisting of droplets less than 141 microns in diameter. This value was selected because of the characteristics of the particle-measuring instrument, and because it is close to 150 microns, which is commonly considered a point below which droplets are more prone to drift.

The cut-off point of 141 microns or 150 microns has been established as a guide to indicate which droplet sizes are most prone to drift. However, it is important to recognize that drift doesn't start and stop at 141 microns. Drift potential continually increases as droplets get smaller than 141 microns, and continually decreases as droplets get bigger.

The wind tunnel atomization tests verified that a broad range of droplet size spectra was applied in the field study treatments. These measurements were critical to understanding the differences in spray drift that were measured for each field study treatment.

Other factors affecting drift

Other variables that were tested include: nozzle heights from 6 feet to 31 feet above the ground; boom lengths of 69% and 84% of the wingspan; oil as a carrier for the ultra low volume (ULV) applications; the effects of liquid physical properties of the pesticide spray mixture; and the effects of crop canopy.

Weather-related factors including wind speed and direction, and air temperature were recorded during the field trials at four separate heights between 1 and 30 feet. Relative humidity, solar radiation, barometric pressure, and atmospheric stability were also recorded.

Experimental design

The varying weather conditions encountered during multiple-application field studies presented a good opportunity to evaluate their effects on drift. However, these variations complicated efforts to measure the effects of equipment-related factors. For example, if a treatment using 8002 nozzles (producing a fine droplet spectrum) was run during low wind speeds, and then a treatment using D8 nozzles (producing a coarse droplet spectrum) was run during high wind speeds, the amount of drift would have been affected both by the change in droplet size and the wind speed.

To factor out the meteorological effects, the SDTF used a covariate experimental design, which is a commonly accepted statistical technique for this type of study. The design entailed a control treatment that was always applied immediately after an experimental treatment. The control treatment was a medium droplet size spectrum produced with D6-46 nozzles at a 45˚ angle on a fixed-wing airplane traveling at 110 mph. It was always applied in exactly the same manner. The experimental treatment differed from application to application in nozzle type, nozzle orifice size, aircraft speed, etc.

The primary test airplane, a Cessna Ag Husky®, was equipped with a dual application system (tank, pump and boom) that permitted successive applications of the control and experimental treatments without landing. The two booms were never used simultaneously in order to avoid any potential interference between the sprays.

Four swaths of the experimental treatment were applied first, beginning at the downwind side. The control treatment was then immediately applied over the same area. The total elapsed time for both applications was 12 minutes. Continuous weather monitoring showed no appreciable changes in atmospheric

conditions during the 12 minute periods. The downwind collectors were analyzed for both diazinon (the tracer used with the control treatment) and malathion (the tracer used with the experimental treatment).

Using this experimental design, differences between replications of the control treatments are due only to atmospheric conditions, since the application procedures were always the same. Differences between experimental treatments are due to changes in the atmospheric conditions and application procedures. Consequently, differences between experimental and control treatments are due to application procedures. This allowed direct comparisons to be made among all the experimental treatments by factoring out the effects of weather (as measured by the control applications).

Atotal of 90 experimental (45 treatments, 2 replicates each) and a corresponding 90 control applications were made. Besides providing a means of adjusting for atmospheric conditions, the 90 applications of the control treatment also provided an extensive database for evaluating the effects of meteorological parameters on drift.

Aerial drift model

Due to the complexity of evaluating all possible interactions of the numerous application variables, a computer model is the most practical way to conduct spray drift risk assessments. For aerial application, a highly sophisticated simulation model had been developed previously by the USDA Forest Service for forestry applications. The SDTF, EPAand USDA worked together to adapt and validate this model for agricultural applications using the data generated in the SDTF field and atomization studies. After final review and acceptance by the EPA, this model will allow evaluation of a much wider range of applications than those tested in the field studies. Its use will help ensure that SDTF assessments reflect current application practices.

Because so many interacting factors affect aerial spray drift, this report only offers examples of how the major variables affect drift.

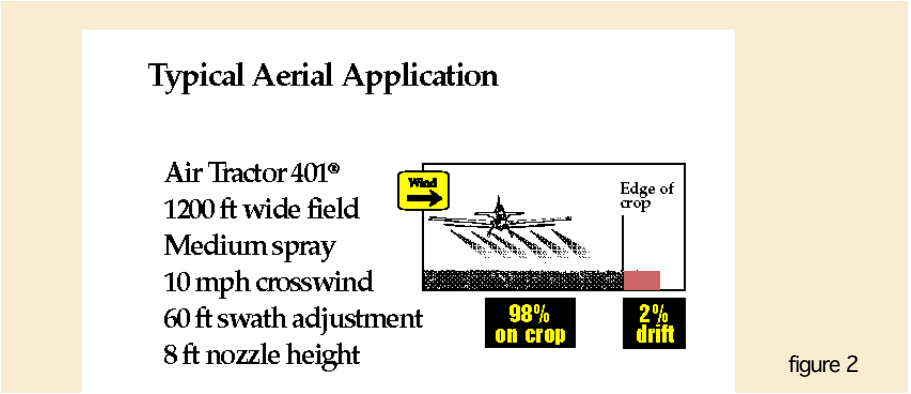


figure 2

Findings

Typical drift levels from aerial application

The goal of aerial applicators is to protect crops from diseases, insects and weeds while keeping drift as close to zero as possible. The SDTF studies show that drift can be kept very low by using good application procedures.

Based on data generated by the SDTF, in a typical full field aerial application, 98% of the total applied active ingredient stays on the field and only 2% drifts (figure 2). Atypical application was defined as a 1200-foot wide, 20-swath field (suggested by EPA) using an Air Tractor 401® set-up to produce a medium droplet spectrum, in a 10 mph crosswind (typically the maximum allowable wind speed), a 60-foot swath adjustment, and 8-foot nozzle height (application height).

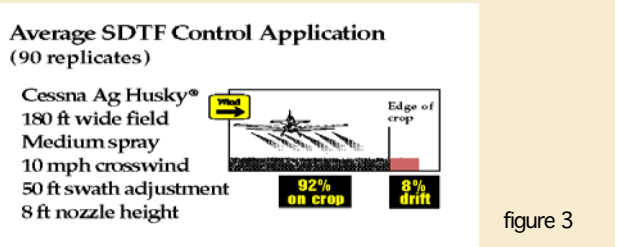


figure 3

Although aerial applications typically consist of twenty or more swaths, using fields of this size was not practical. Instead, a four-swath (180 feet wide) application area was used in the field studies. This design generated data that represented drift from a
20-swath field since most drift originates from the farthest downwind swaths.

Because the application area was smaller than is typical for commercial applications, and because most drift comes from the outer swaths of the field, the percentage of the active ingredient leaving the field in the SDTF studies was 8% rather than 2% (figure 3). This percentage of drift is artificially high due to the relative size of the

application areas. The 8% drift is the average of the 90 applications of the control treatment. The SDTF control application differed from the typical application only in the aircraft used, swath width, and the size of the application area.

Figure 4 shows how the 8% of the control treatment that left the field deposited downwind. The amount of material that deposits on the ground decreases rapidly with distance and is already approaching zero at 250 feet downwind. Ground deposition was measured out to one-half mile downwind, but the amount of material was normally too low beyond 250 feet to illustrate any differences between treatments.

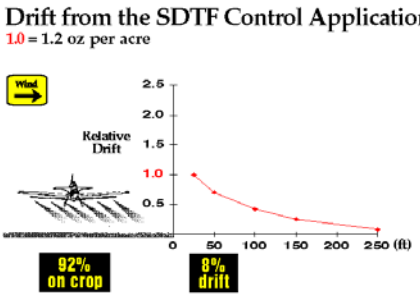


figure 4

Ground deposition measurements began 25 feet downwind, which represents a reasonable distance from the edge of a crop to the effective edge of a field where drift would begin to be of concern.

Ascale of Relative Drift is used in this and all subsequent graphs to facilitate comparisons among treatments. Since the control treatment will be used as a standard of comparison, it was set to 1.0 at 25 feet. For an application of one pound of active ingredient per acre, this represents 1.2 ounces per acre deposited on the ground at 25 feet. ARelative Drift value of 0.5 indicates that one-half as much was deposited. Avalue of 2 would indicate twice as much was deposited. In subsequent graphs the deposition profile for the control treatment is shown in red in order to facilitate comparisons.

How swath adjustment reduces drift

When the wind is low, virtually all of the spray is deposited directly under the aircraft allowing the pilot to fly close to the edge of the field (figure 5a). With a crosswind, the spray swath is displaced downwind (figure 5b). Pilots typically compensate for this swath displacement by adjusting the position of the aircraft upwind (figure 5c). The amount of swath adjustment can vary from one half, to more than two swath widths, depending upon wind speeds and proximity to sensitive areas.

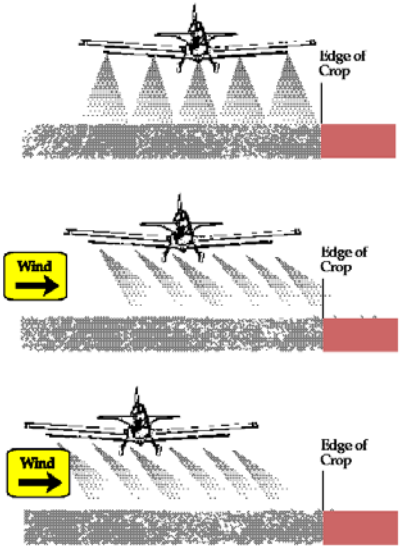


figure 5a

figure 5b

figure 5c

In order to maintain consistency across all applications in the SDTF field studies, the pilot made no swath adjustment. However, in this report a swath adjustment was applied by mathematically shifting the deposition curve upwind by 50 feet. This would be a typical swath adjustment in a 10-mph crosswind, the average wind speed in the field studies.

The effects of swath adjustment are illustrated in figure 6 for no adjustment, a half swath adjustment, and a full swath adjustment as applied for the control treatment. With no swath adjustment, the amount of spray material depositing at 25 feet downwind is approxi-mately three and a half times that from a full swath adjustment. Swath adjustment substantially reduces drift, especially in the first 100 feet. These results are for a medium droplet size spectra from the control

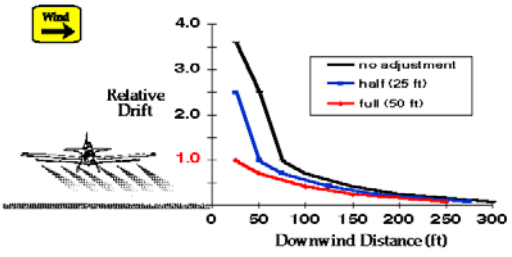


figure 6

treatment. The effects would be even more dramatic with a finer droplet spectrum.

How nozzle and droplet size affect drift

The effect of droplet size on downwind ground deposition is illustrated in figure 7. It shows that drift decreases dramatically as the percent of volume in droplets smaller than 141 microns decreases due to the use of different nozzles, nozzle angles, and/or air speeds.

The control treatment had 15% of the spray volume in small droplets (less than 141 microns). The smaller D4-45 nozzle at the same angle produced twice the volume of small droplets and twice the amount of drift at 25 feet. The solid stream nozzle (D8) at a 0° angle produced a much lower volume of small droplets and substantially less drift than the control.

How nozzle and droplet size affect drift

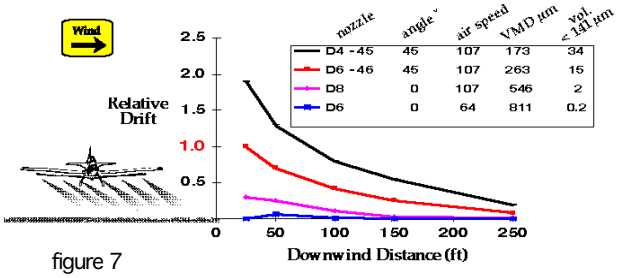


figure 7

Although droplet size was the primary factor affecting drift, the data for the D6 at 64 mph are not directly comparable because they were obtained with a helicopter instead of a fixed wing airplane. The helicopter data are included to illustrate that it is possible to reduce the percentage of small droplets to very low levels with a corresponding decrease in drift. The results show that pilots can minimize drift by managing the factors affecting droplet size.

How air shear affects droplet size and drift

Air shear across the nozzle tip, which is a function of both nozzle angle and aircraft speed, significantly affects droplet size. When nozzles are pointed toward the back of the plane, air shear is less than when the nozzles are pointed downward (figure 8). Air shear across the nozzle tip also increases with faster aircraft speeds, resulting in smaller droplets. The effect of air shear on droplet formation and drift was studied by

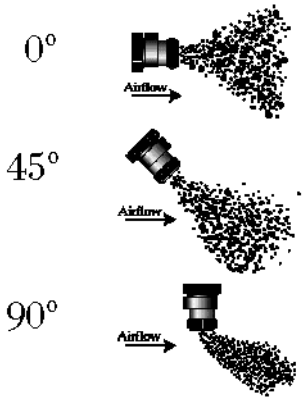


figure 8

setting up identical nozzles and nozzle angles on three aircraft: a helicopter, which flew at 64 mph; a piston-powered, fixed-wing airplane at 107 mph; and a turbine-powered, fixed-wing airplane at 156 mph. The nozzle height was 8 feet.

When the same nozzles (D6-46) were positioned at a 45° angle on all three aircraft, there were differences in drift due to air shear (figure 9). At 156 mph, 39% of the droplet volume was less than 141 microns. As speed and subsequent air shear decreased, the volume percent less than 141 microns decreased to 6% with a corresponding decrease in drift.

It must be emphasized that figure 9 illustrates the effect of air shear on droplet size and drift. It does not indicate that these are typical droplet spectra for each aircraft. Normally the sizes and/or angles of the nozzles are changed to compensate for the air shear at higher speeds.

How air shear affects drift

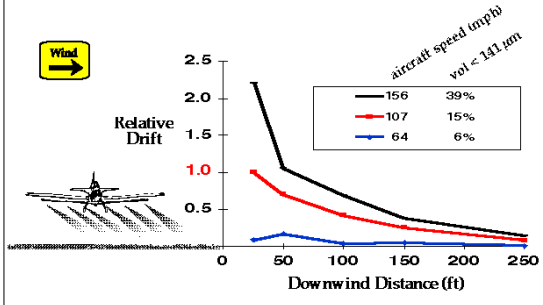


figure 9

How nozzle height affects drift

In aerial applications over agricultural crop areas, spray is typically released when the nozzles are about 8 feet above the ground or crop, compared with forestry and rangeland applications which are sometimes made at 20 feet or higher. Figure 10 compares drift from the control treatment when the nozzle height is changed from 8 feet to 22 feet. It shows that the higher nozzle height results in approximately 2.5 times more drift at 25 feet downwind.

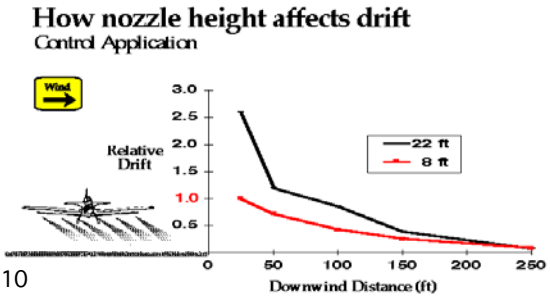


figure 10

With a finer droplet spectrum, this difference would have been greater; with a coarser droplet spectrum, the differences would have been less.

How boom length affects drift

Turbulent air, referred to as vortices, is created by the wings. Wing or rotor tip vortices exist on all aircraft. When the length of the boom is too long, spray droplets are caught in these vortices. The smaller droplets follow the air movement up and over the wing or rotor which effectively increases the application height and increases the potential for drift. When boom lengths are shortened, fewer droplets enter the vortices and drift is reduced.

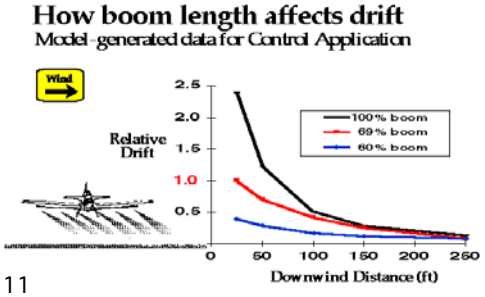


figure 11

Although the SDTF did not extensively test the effects of boom length on drift, the computer drift model affirms that the common practice of maintaining boom length at 70% or less of the wingspan minimizes drift (figure 11). The effect of boom length is more important when spraying a fine versus coarse droplet size spectrum.

How dynamic surface tension affects drift

Physical properties of the tank mixture can influence the formation of droplets by agricultural nozzles, although this effect is most important at higher levels of air shear.

The SDTF examined dynamic surface tension, shear viscosity, and extensional viscosity. Of these three physical properties, dynamic surface tension usually has the greatest influence on droplet size. Figure 12 represents the maximum range of drift attributable to dynamic surface tension for the SDTF control treatment. The
72 dynes/cm represents water, 32 dynes/cm represents the most extreme case, and 45 dynes/cm represents a large percentage of commercial pesticide tank mixtures.

These curves were generated by the computer drift model. Field study data confirmed that for the control treatment, physical properties had a very small effect on drift compared to equipment and application procedures.

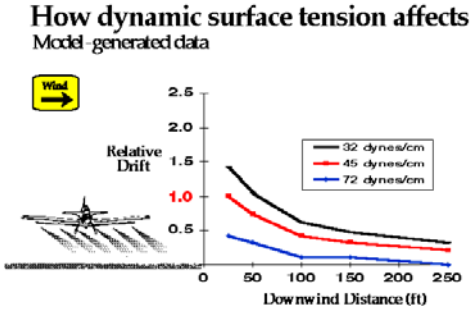


figure 12

How wind speed affects drift

The 90 replicates of the control applications clearly established that wind speed was the most important atmospheric factor affecting drift (figure 13). Although it is commonly accepted that hot, dry conditions accelerate droplet evaporation, which results in smaller droplets, this was not found to be as important as wind speed.

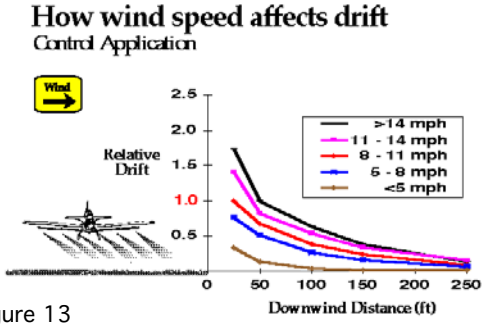


figure 13

How crop canopy affects drift

Ground cover in the application and drift collection areas consisted of short grass. Alimited number of treatments were conducted over cotton to determine if there was a significant effect due to the presence of a more developed canopy. These treatments indicated a small decrease in downwind ground deposition over cotton.

Because the effect of canopy was extremely small, and because it was not practical to evaluate the infinite number of canopy shapes, heights, and densities, additional testing was not conducted. However, the treatments on cotton suggest that the SDTF field studies may slightly over-estimate drift for applications that are typically conducted over a well developed canopy.

Conclusions

The results from the SDTF studies confirm present knowledge concerning the role of factors that affect spray drift. In many cases the studies quantified what was already known qualitatively. As expected, droplet size was shown to be the most important factor affecting drift from aerial applications. Logically, the results also confirm that drift only occurs downwind. Waiting until the wind is blowing away from sensitive areas is an effective application practice. Although drift cannot be eliminated totally with current technology, there are many ways to minimize drift to levels approaching zero. The SDTF studies confirm that when good application practices are followed, all but a small percentage of the spray is deposited on target.

Drift levels can be minimized by:

a. Applying the coarsest droplet size spectrum that provides sufficient coverage and pest control.

b. Continuing the standard practice of swath adjustment.

c. Controlling the application height.

d. Using the shortest boom length that is practical.

e. Applying pesticides when wind speeds are low.

Except at high levels of air shear, the physical properties of the spray mixture have only a minimal effect on drift. The SDTF studies show that the pattern and magnitude of drift results from a complex interaction of many factors. The drift model is an effective means of predicting aerial spray drift and permits the evaluation of a much broader range of variables than those tested by the SDTF.

When accepted by the EPA, the SDTF model and databases will be used by the agricultural chemical industry and the EPAfor environmental risk assessments. Even though active ingredients do not differ in drift potential, they can differ in the potential to cause adverse environmental effects. Since drift cannot be completely eliminated with current technology, the SDTF database and models will be used to determine if the drift from each agricultural product is low enough to avoid harmful environmental effects. When drift cannot be reduced to low enough levels through altering equipment set up and application techniques, buffer zones may be imposed to protect sensitive areas downwind of applications.

Mention of a trademark, vendor, technique, or proprietary product does not constitute an endorsement, guarantee, or warranty of the product by the authors, their companies, or the Spray Drift Task Force, and does not imply its approval to the exclusion of other products or techniques that may also be suitable.

For more information contact David Johnson at Stewart Agricultural Research Services, Inc., P.O. Box 509, Macon, Missouri 63552. (816) 762-4240 or fax (816) 762-4295. (Area code changes to 660 after 11-97)

Annex 11

Sweden, Environmental Code 808 (last amended 2009) (1998)

PREFACE

The Swedish Environmental Code was adopted in 1998 and entered into force 1 January 1999. The rules contained within 15 acts have been amalgameted in the Code. As many similar rules in previous statutes have been replaced with common rules, the number of provisions has been reduced. The Environmental Code is nonetheless a major piece of legislation. The Code contains 33 chapters comprising almost 500 sections. However, it is only the fundamental environmental rules that are included in the Environmental Code. More detailed provisions are laid down in ordinances made by the Government.

The translation takes account of amendments that have been made since the Code entered into force up to 1 August 2000. References to the laws adopting the amendments are given in parantheses and show the reference number of the law in question. However, laws regulating transitional arrangements or dates of entry into force have not been included.

The two annexes specifying the environmental classes of petrol and diesel fuels are not included in the translation.

The Ministry of Environment publishes the translation as a service to interested persons but takes no legal responsibility for the translation or for any consequenses arising from its use.

Annex 11

THE ENVIRONMENTAL CODE

PART ONE

GENERAL PROVISIONS

Chapter 1. Objectives and area of application of the Environmental Code

Section 1 The purpose of this Code is to promote sustainable development which will assure a healthy and sound environment for present and future generations. Such development will be based on recognition of the fact that nature is worthy of protection and that our right to modify and exploit nature carries with it a responsibility for wise management of natural resources.

The Environmental Code shall be applied in such a way as to ensure that:

1. human health and the environment are protected against damage and detriment, whether caused by pollutants or other impacts;
2. valuable natural and cultural environments are protected and preserved;
3. biological diversity is preserved;
4. the use of land, water and the physical environment in general is such as to secure a long term good management in ecological, social, cultural and economic terms; and
5. reuse and recycling, as well as other management of materials, raw materials and energy are encouraged with a view to establishing and maintaining natural cycles.

Precautions in connection with the use of pesticides

Section 17 Chemical products or biotechnical organisms other than those approved for placing on the market and use as chemical or biological pesticides or exempted pursuant to sections 13 to 16 may only be used as control agents where it is established that their use does not involve any risks to human health or the environment.

Spreading of pesticides

Section 18 Chemical or biological pesticides shall be spread in such a way as not to damage human health or the environment or cause other detriment and to minimize the environmental impact. Measures shall be taken to prevent the pesticide being spread outside the designated area of spreading.

Chemical or biological pesticides must not be spread from aircraft. In exceptional circumstances, the Government or the authority appointed by the Government may grant exemptions from this prohibition in individual cases.

Section 19 Chemical or biological pesticides used for the purpose of controlling deciduous brush must not be spread over forest land. Individual tree-trunks must not be treated with such agents.

The Government or the authority appointed by the Government may grant exemptions from this prohibition where necessary for scientific experiments.

Section 20 Unless otherwise is provided in the second paragraph, the authority appointed by the Government may grant exemptions from section 19, first paragraph, where the requirement imposed by section 6 of the Forest Conservation Act (1979:429) concerning forest regeneration cannot reasonably be satisfied by mechanical clearing methods. The situation and nature of the forest land, the composition of the forest stands, the effects of spreading on wildlife habitats and other public interests shall be taken into account in this connection.

A municipality may decide not to grant an exemption pursuant to the first paragraph for an area within the municipality in view of the importance of the area for outdoor recreation, nature

Annex 11

Annex 12

A. J. Hewitt et al., "Development of the Spray Drift Task Force Database for Aerial Applications", *(ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY Vol.21 No.3 (2002))*

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Hazard/Risk Assessment

DEVELOPMENT OF THE SPRAY DRIFT TASK FORCE DATABASE FOR AERIAL APPLICATIONS

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Abstract—This article is part of a series describing the development of the Spray Drift Task Force (SDTF) database and its application to agricultural chemical exposure risk assessment modeling. The series describes the development of a large generic database (assuming that active ingredient rate is not a factor affecting physical drift) and its use in estimating spray movement immediately following application by aerial methods. The components of the database are described. In agreement with field trials in the open literature, the database shows that the major variables affecting off-target spray deposition are droplet size, spray release position (boom height and length), and wind speed and direction. In addition, secondary parameters that can affect these variables and drift are also discussed.

Keywords—Drift Aerial spraying Pesticide application Physical properties Droplet size

INTRODUCTION

The Spray Drift Task Force (SDTF) is a joint development project of 40 agricultural chemical companies that was formed in 1990. The U.S. Environmental Protection Agency (U.S. EPA) Office of Pesticide Programs (OPP) required agricultural chemical manufacturers to provide droplet-size spectrum measurements and field-drift evaluations when adverse effects to nontarget organisms were possible (CFR 40.168.202.1 and 202.2). Submission of spray drift data for individual product registrations were, however, both expensive for the manufacturers and of limited value in evaluation of potential exposure of organisms off-site over the wide range of application variables. The primary goal of the SDTF studies was the provision to OPP of a comprehensive database on the off-site drift of crop protection chemicals during agricultural-spray applications. This database was developed to improve the data for regulatory decision-making and provide a basis for the evaluation of risk mitigation strategies. Although over 40 separate field-trial studies of crop-protection chemical drift were identified in the open literature [1], these studies do not form a systematic dataset for analysis of off-site drift. In addition, these open-literature studies were not collected using Good Laboratory Practice Standards, 40 CFR Part 160 in the Federal Register, as required for regulatory data submissions. A few registrant companies had run very limited range aerial drift and atomization studies.

The fundamental premise of the cooperative SDTF effort was that off-site drift is primarily a function of application techniques, environmental conditions, and the physical properties of a tank mix and that, after the formation of the spray droplets, is independent of the specific active ingredient. As such, spray drift for different tank mixes applied using the same application equipment can be presumed to be generically related to physical solution properties and not the chemistry of the active ingredient. Therefore, a comprehensive database of off-site drift and deposition phenomena could be developed independent of specific active ingredients. This generic approach rests on three general assumptions. The first is that degradation and volatilization of the active ingredient analyte during the spray and deposition timeframe is negligible. Near-field drift and deposition occur within a short time frame (<30 min). Loss of the active ingredient either through degradation or volatilization must be much slower than this to assure efficacy of the compound within the field. The second assumption is that the physical properties should be measured in the tank mix and tracer levels would correlate to full active-ingredient rates. It should also be noted that adjuvants were not tested completely in the SDTF studies but rather only a subset of tank mixes. The third assumption (U.S. EPA policy/science) is that the risk to nontarget organisms can be evaluated as a two-stage process where environmental concentrations are used to estimate exposure to the contaminant and then combined with measurements of biological activity to determine risk [2].

In the development of the database, spray drift was viewed as a series of physical processes, i.e., atomization, movement, evaporation, and, finally, deposition of droplets. Laboratory and field experiments were performed to analyze and quantify each of these physical components important in the spray drift process. The SDTF reviewed over 800 published and internal company reports on spray drift. Several prior studies had identified droplet size as the primary application variable controlling drift from low-flight agricultural spraying [3–6]. Droplet size is also one of the most important variables affecting spray

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efficacy, along with placement, timing, coverage, and chemical toxicity [7,8]. Many application parameters including nozzle type, nozzle orientation, pressure, aircraft speed, and tank mix formulation affect droplet size. Development of a database to quantify atomization as a function of these application variables and the physical properties of the tank mix was a central effort in the SDTF studies. Additional laboratory studies were performed to quantify the physical properties of tank mixes used in both atomization and field studies as well as the evaporation rate of droplets.

The overall objective of the SDTF studies as required by the U.S. EPA was quantification of downwind sedimentation deposition for a wide range of label conditions and atomization characteristics. Meteorological variables such as wind speed and direction, atmospheric stability, and relative humidity have a significant impact on off-target movement and deposition [3–5,9,10]. The field studies were designed to quantify the response of drift to meteorological variables, resolve discrepancies in the historical studies on the relative importance of application parameters, and account for the confounding effects of the meteorology on these application variables.

This article summarizes the development of the SDTF database in the areas of aerial field, atomization, and physical property studies, summarizes the major results of the aerial field studies, and presents results on off-target deposition. These studies were used to verify and modify existing drift models, thus providing a tool to evaluate a wider range of application and meteorological scenarios than could be tested. Accompanying articles describe the model development and evaluation [11,12]. While the present article focuses on the SDTF aerial database, information on the SDTF ground rig studies can be found elsewhere [13].

The SDTF field, atomization, and physical property studies involved hundreds of treatments. It is beyond the scope of the present article to present all of the data and findings from those studies; however, additional information is available at the U.S. EPA web site for scientific advisory panel reviews at www.epa.gov/scipoly/sap or from the U.S. EPA Office of Pesticide Programs docket.

MATERIALS AND METHODS

Aerial field studies

An application practices matrix was developed based on a survey of registered labels and knowledge of use patterns in the United States to encompass the range of significant application practices. To determine typical application practices, a survey of about 20% of aerial applicators was conducted by the SDTF and summarized by the National Agricultural Aviation Association [14]. Survey results showed that aerial spray application volume rates range from ultralow volume (≤0.8 L/ha) through low (>0.8–3.0 L/ha) and medium (>3.0–7.7 L/ha) to high volume (>7.7–38.0 L/ha) and are made using fixed- and rotary-wing aircraft. Flight speeds range from low-speed helicopters (11–33 m/s) through medium-speed fixed-wing piston aircraft (>33–50 m/s) to high-speed turbine engine fixed-wing aircraft (>50 m/s). Typical applications are made using water as a carrier, with an application volume rate in the medium-volume range. Spray pressures are typically around 2 bar. Most aerial applications are made at a height of 1.5 to 3 m above the canopy, with a swath width of 15 to 18 m. Different nozzle types and operational parameters may be used within each combination of application volume rate and flight speed. Appropriate combinations for testing were selected for the SDTF studies. The aerial survey showed that nozzles were usually oriented 45° backward on booms positioned below and/or behind the trailing edge. Surfactants and/or drift control adjuvants are often used for tank mixing. Swath displacement, offset, or adjustment is nearly always used by aerial applicators to compensate for using finer sprays or spraying under conditions of higher wind speeds. This practice involves offsetting the application by different swath proportions to allow for the wind carrying the droplets downwind. Applications typically cease when conditions favor high drift levels (exact conditions will vary depending on proximity to sensitive areas and other drift mitigation practices, but often 10 mph represents an upper wind speed), especially when close to sensitive or occupied areas. Although the SDTF aerial application studies were developed based on typical application practices for the early 1990s and reasonable worst case meteorological conditions, it should be noted that aerial application is a dynamic industry and application practices change based on available technology, information, and regulations. In particular, new nozzles and global positioning satellite systems are becoming more common place. However, the SDTF database covered a wide range of conditions providing resources for the development of the AgDRIFT® model (Spray Drift Task Force, Stewart Agricultural Research Services, Macon, MO, USA), which can predict drift for a wider range of conditions than actually tested.

Test site locations

Test sites were selected in the high plains of Texas, near Plainview, and in the Rio Grande Valley of south Texas, near Raymondville, USA. These two sites provided a wide range of temperature, relative humidity, and wind speeds. Each test site comprised an area large enough to allow several test areas usable regardless of wind direction. At the Plainview site, applications were made to a level field of mowed grass (height = 10–15 cm). The absence of a crop provided a reasonable worst case scenario for drift (because there was no vegetation to intercept droplets) and also allowed a comparison among all treatments without the confounding effects of a crop canopy. At Raymondville, the applications were made over rough, disked, bare ground or grain sorghum stubble mowed to a height of 25 cm. Two of the variable treatments at Raymondville were applied to a cotton canopy in the green boll stage (height = 104 cm).

Covariate approach

Off-target deposition is a function of application scenario (treatment) and meteorological effects. Since meteorological variables continually change, the ideal experimental design is to apply all treatments simultaneously. However, this is not practical. The SDTF used a covariate approach that provided a reasonable solution to this by always applying two treatments almost simultaneously. One treatment, referred to as the standard treatment, always involved the same application scenario (i.e., the test substance and application parameters remained constant), while the second treatment, referred to as the variable treatment, included a change of those variables being studied. Diazinon (Aventis Crop Protection, Raleigh, NC, USA) was used for all the standard treatments, and malathion (Platte Chemical Company, Greeley, CO, USA) was used for all the variable treatments. A covariate analysis was performed using the standard treatment as the covariate for facilitating comparisons among treatments without the confounding ef-

Table 1. Summary statistics of spray period wind speeds during Spray Drift Task Force field trials

Study	No. of trials	Mean (m/s)	Median (m/s)	Minimum (m/s)	Maximum (m/s)
Plainview 1992	74	3.70	3.62	1.57	6.92
Plainview 1993	48	4.76	4.85	2.27	7.72
Raymondville 1993	60	4.86	5.05	1.34	6.56
Overall	182	4.36	4.54	1.34	7.72

fects of meteorology. The covariate analysis approach is detailed in many statistical texts [15,16]. Data from the standard treatments provided a means for quantifying the effects of meteorological variables on drift through a multiple regression analysis of all meteorological variables (temperature, relative humidity, wind, etc.) and off-target deposition.

Meteorological monitoring

Meteorological data were collected at four heights on a tower near the spray area and were used to extract the mean wind speed and aerodynamic roughness length by fitting the wind speed measurements to a logarithmic profile as

$$U = U_r \frac{\ln(z/z_0)}{\ln(z_r/z_0)}$$

where the reference height, z_r, is assumed to be 2 m (its value is arbitrarily chosen and does not affect the vertical dependence) and the reference wind speed at that height, U_r, and aerodynamic roughness length, z_o, were recovered from a least squares analysis of the wind speed recorded during the run.

Meteorological variables affect spray drift, mainly through the evaporation and transport of droplets following emission from a sprayer. The wind speed, wind direction, and air temperature were measured at heights of 0.3, 1.8, 3.05, and 9.1 m above the ground throughout the study. Richardson number, a dimensionless measure of atmospheric stability, was calculated using

$$\mathrm{Ri} = \frac{\frac{g}{T}\left(\frac{dT}{dz}\right)}{\left(\frac{dU}{dz}\right)^2}$$

where Ri = Richardson number, g = acceleration due to gravity in m/s^2, T = mean temperature in layer dz in °C, dT/dz = temperature gradient in layer dz in °C/m, and dU/dz = horizontal wind velocity gradient in layer dz in s^{-1}.

Richardson numbers were calculated for the layer between 0.3 and 9 m (layer dz). The values showed that the atmospheric conditions were neutral or unstable for nearly all of the trials (Richardson number near or <0).

Relative humidity and barometric pressure were recorded at a height of 1.8 m above the ground. The upwind fetch was unobstructed and properly represented the area of the drift and deposition. Tables 1 and 2 show summary statistics for wind speed, temperature, and relative humidity for each set of studies.

Sprayer setup and use

A Cessna Ag Husky® (Cessna Aircraft Company, Wichita, KS, USA) piston engine-powered aircraft flying at 47 to 52 m/s was used for all applications of the standard treatment and most of the variable treatments. This aircraft had been modified to allow application of two tank mixes through separate sets of spray tanks, pumps, booms, and nozzles. The two booms were never used simultaneously in order to avoid any potential interference between the sprays. Applications were also made using an Air Tractor 502 (Air Tractor Corporation, Olney, TX, USA) turbine engine-powered fixed-wing aircraft and a Wasp (Bell Textron, Houston, TX, USA) rotary-wing aircraft (helicopter). These two aircraft represented typical relatively high (66–71 m/s) fixed-wing and low-speed (22–29 m/s) rotary applications, respectively.

Setting the width of the application area required careful consideration of the carrying capacity of the spray equipment relative to the size and time required to spray the area. A relatively large application area was needed to accurately simulate a full field application. However, it takes longer to spray larger areas, increasing the potential variability in meteorological conditions between the variable and standard applications.

Four parallel swaths (flight-line passes), the maximum number that could be applied by the modified Cessna Ag Husky® aircraft without reloading, were used in the aerial studies, for an overall spray block width of 50 m. The on-target application rates were verified using 1,000 cm^2 horizontal alpha-cellulose strips on the ground perpendicular to the line of flight. The alpha-cellulose strips spanned 20% of the total swath width (where swath width is the width of the spray deposition from flight passes), producing samples that covered in-swath variation.

The application scenarios (treatments) are summarized in Table 3. The treatments included different sprayer setups (nozzle types, nozzle angles, spray pressures, and tank mixes) for investigating effects on off-target spray movements. The nozzle types (supplied by Spraying Systems, Wheaton, IL, USA) and mean $D_{v0.5}$ and %vol < 141 μm values included flat fan nozzles 8002 (with $D_{v0.5}$ = 160; %vol < 141 μm = 45.1%) and 8003 ($D_{v0.5}$ = 178–332 μm; %vol < 141 μm = 6.4–40.4%); disc-core (swirl) nozzles D4-45 ($D_{v0.5}$ = 107–173 μm; %vol < 141 μm = 33.8–69.9%), D6-46 ($D_{v0.5}$ = 178–359 μm; %vol < 141μm = 15.0–33.8%), and D8-46 ($D_{v0.5}$ = 340 μm; %vol < 141μm = 6.0%); solid stream (jet) nozzles D6 ($D_{v0.5}$ > 811 μm; %vol < 141 μm < 0.2%) and D8 ($D_{v0.5}$ = 413–546 μm; %vol < 141 μm = 2.1–6.5%), where $D_{v0.5}$ is the

Table 2. Summary statistics for temperature and relative humidity during field trials

Study	No. of trials	Mean (°C/%)	Median (°C/%)	Minimum (°C/%)	Maximum (°C/%)
Plainview 1992	74	27.0/63.2	26.4/62.2	21.1/35.6	32.8/92.6
Plainview 1993	48	13.4/39.9	12.7/35.5	0.2/7.1	29.0/91.4
Raymondville 1993	60	30.7/63.9	31.5/58.6	24.2/43.1	35.1/93.8
Overall	182	24.7/57.3	27.1/57.3	0.2/7.1	35.1/93.8

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Table 3. Summary of spray parameters for Spray Drift Task Force aerial field studies

Nozzle type/ angle down (°)	Spray pressure (kPa)	Application volume (L/ha)	Boom height[a]	Boom length[b]	Carrier (water/ soybean oil)	$D_{v0.5}$ (μm)	Spray volume < 105 μm (%)	Spray volume < 141 μm (%)
Rotary-wing aircraft (21–25 m/s)								
8003 (45)	200	12	VL	73	Water	332	2.0	6.4
D4-46 (45)	200	25	VL	73	Water	339	2.1	6.2
D4-46 (45)	200	26	MH	73	Water	339	2.1	6.2
D6 (0 back)	200	57	VL	73	Water	811	0.1	0.2
D6 (0 back)	200	56	MH	73	Water	811	0.1	0.2
Piston engine-powered fixed-wing aircraft (47–52 m/s)								
8002 (90)	214	2.8	L	68	Oil	160	35.3	45.1
8002 (90)	214	2.8	H	68	Oil	160	35.3	45.1
D4-45 (45)	214	15	L	68	Water	173	17.6	33.8
D4-45 (45)	214	13	H	68	Water	173	17.6	33.8
D6-46 (45)	214	28	H	68	Water	263	7.8	15.0
D8-46 (0 back)	214	63	L	68	Water	340	2.0	6.0
D8-46 (0 back)	214	65	H	68	Water	340	2.0	6.0
D8 (0 back)	214	70	L	68	Water	546	0.7	2.1
D8 (0 back)	214	67	H	68	Water	546	0.7	2.1
D6-46 (45)	214	30	L	82	Water	263	7.8	15.0
D6-46 (45)	214	29	L	68	Water	263	7.8	15.0
D6-46 (45)	214	30	L	68	Water	178	18.9	33.8
D6-46 (45)	214	30	L	68	Water	318	13.8	20.3
D6-46 (45)	214	33	L	68	Water	256	8.5	15.3
D6-46 (45)	214	35	L	68	Water	325	12.8	19.1
D6-46 (45)	214	30	L	68	Water	235	12.4	20.6
D4-45 (45)	214	16	L	68	Water	173	17.6	33.8
D4-45 (45)	214	16	L	68	Water	173	17.6	33.8
D4-45 (45)	214	14	L	68	Water	173	17.6	33.8
D8 (0 back)	214	74	L	68	Water	546	0.7	2.1
D8 (0 back)	214	69	H	68	Water	546	0.7	2.1
D8 (0 back)	214	73	L	68	Water	546	0.7	2.1
D6-46 (45)	214	30	L	68	Water	263	7.8	15.0
D6-46 (45)	179	32	L	68	Water	359	17.8	31.2
D8 (0 back)	214	74	L	68	Water	546	0.7	2.1
D4-46 (45)	214	14	L	68	Water	173	17.6	33.8
D6-46 (45)	214	30	L	68	Water	263	7.8	15.0
D6-46 (45)	193	30	L	68	Water	200	16.3	26.6
D6-46 (45)	200	30	L	68	Water	241	10.8	18.8
8002 (90)	214	3.2	L	68	Oil	160	35.3	45.1
8003 (30)	200	5.1	L	68	Oil	178	28.6	40.4
Turbine engine-powered fixed-wing aircraft								
D6-46 (45)	214	36	L	68	Water	163	22.6	38.8
D8 (0 back)	214	68	L	68	Water	413	3.2	6.5
D4-45 (45)	214	12	L	68	Water	107	49.2	69.9
D6-46 (45)	214	35	L	68	Water	163	22.6	38.8
D8 (0 back)	214	72	L	68	Water	413	3.2	6.5

[a] VL = very low (1.6–1.8 m); L = low (2.2–2.9 m); MH = medium high (4.0–5.4 m); H = high (6.9–9.3 m).
[b] Percent of wing semispan.

volume median droplet diameter, i.e., the diameter within the droplet size spectrum at which half of the droplets by volume are contained in larger droplets, and %vol < 141 μm is the percentage of the spray volume contained in droplets with diameter below 141 μm (considered by many to be close to the droplet sizes more likely to drift under unfavorable conditions [7]).

The treatments also included boom lengths of 69 and 82% of the wing span since the spray release position relative to the wing-tip vortices affects droplet movements. Boom length expresses the percentage extent of nozzle positions across the spray boom relative to the length of the aircraft wingspan or helicopter rotor diameter. Spray release height treatments varied from 1.8 to 9.4 m above the ground. The use of oil as a carrier for the ultralow volume applications, the effects of tank mix physical properties, and crop canopy effects on spray movements were also studied.

Verification of application rates

The on-target application rates were established by careful mixing of the required volumes (see Table 3) of the active ingredient tracers (diazinon, malathion—at 10% of commercial rates), carrier liquid (water or oil), and any adjuvants (surfactants/polymers). The application rate was established through calibration of the spraying system (number of nozzles, flow rate through nozzles, flight speed) and effective swath width. As a check in the field, tank samples were taken prior to and following the application for analysis for tracer concentrations and were frozen until analysis.

Collectors

The selection of collectors for field studies depends on many issues such as suitability for collecting and extracting the tracers, ease of use, and representativeness for the sur-

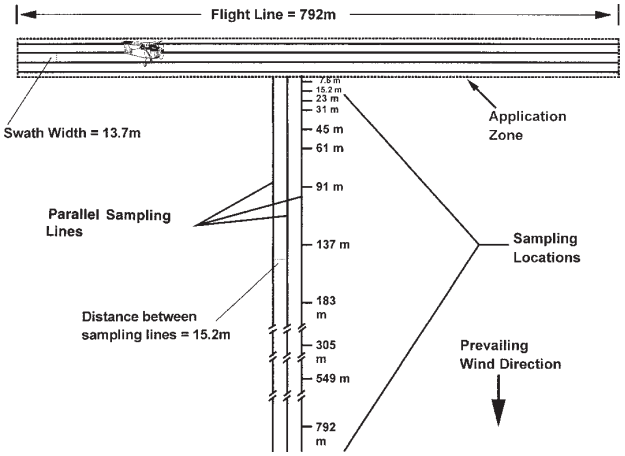

Fig. 1. Layout of test site for aerial field studies showing flight and sampling lines and sample station locations from 8 to 792 m downwind. Although not shown here, a sample station was also located at a distance of 10 m upwind of the spray block. Four swaths were flown on field for each application.

face(s) that are being simulated. Collection efficiency is related to the shape and dimensions of the collector with respect to the drift particle flow field, the local wind speed, and the size and velocity of the droplets in the spray cloud [17,18]. Computer modeling indicates that turbulence intensity may also be important for some conditions [19]. Droplet collection occurs by impaction and sedimentation. Impaction predominates on vertical surfaces, while sedimentation is the main mechanism of collection by fallout onto horizontal surfaces.

The SDTF reviewed the available techniques and selected four types of collectors. Other reviews of field drift sampling techniques exist elsewhere (e.g., [20]). The primary collector used in the development of the database and subsequent models was alpha cellulose (type GR512, Procter & Gamble, Cincinnati, OH, USA), a cotton pulp product thick and stiff enough to facilitate handling under field conditions. The absorbent texture of the alpha-cellulose samplers enabled droplets to be captured while maintaining tracer stability and allowing efficient analytical extraction. Alpha cellulose samplers were fixed horizontally on the ground at all collection sites. Each sampler consisted of a 1,000 cm^2 surface area. There were three of these samplers at each downwind distance, separated by approximately 15 m. The data from these collectors were a measure of deposition primarily by sedimentation, representative of spray collection on ground and aquatic surfaces. Being fibrous in nature, the alpha-cellulose samplers collect some material by impaction, though the primary collection is sedimentation deposition.

Sampling layout

All studies were set up with distinct application and off-target drift areas. The American Society of Agricultural Engineers standard procedure for drift studies S-561 [21] suggests that the application length should be at least 0.6 times the length of the collection area. The ratio in the SDTF aerial field studies was 0.8 (application length = 650 m; drift sampling area = 850 m length).

The layout of the field sites is shown in Figure 1. Sampling stations were located at 7.6, 15.2, 23, 31, 45, 61, 91, 137, 183, 305, 549, and 792 m downwind of the edge of the spray block. Distances were close together immediately downwind from the application area because this area is where most of the differences among treatments would occur and where most of the driftable material would fall and are important in considering buffer zones, a potential regulatory use of the SDTF data. Three collector stations were established 15.2 m apart, at each distance perpendicular to the application area. A single sampling station was also located at a distance of 30 m upwind of the spray block to confirm that drift does not occur in the upwind direction and to check for any background contamination. Since the closest collector to the edge of the field was 7.6 m, meaningful data on deposition closer to the field than this cannot be inferred. The drift sampling lines were set up to be perpendicular to the flight line. Adjustments for deviations from this direction during actual applications, including considerations of effects on the most distant sampling stations, are discussed in the model evaluation article in this series [12]. No account was taken of possible contamination of the samplers by tracer-loaded soil particles that might be blown by the wind, which means that the deposition data might be slightly higher than expected if this did occur for any of the applications under higher wind speed conditions.

Sample handling

Following the application of the standard and variable treatments, the drift cloud was allowed to completely pass the furthest sampling stations prior to sample collection (calculated based on droplet release height and wind speed and then doubled to give a maximum of 25 min after application). The samples were then collected, sealed in clear plastic bags, placed on dry ice, and taken to a freezer for storage and shipment. At the analytical laboratory, malathion and diazinon tracer analytes were extracted from the alpha-cellulose collectors and simultaneously analyzed by gas chromatography.

Canopies

The SDTF field studies involved applications over bare ground, representing worst case conditions for spray drift. The presence of a canopy would be expected to reduce drift as the droplets are intercepted by vegetation. Studying the effects of crop canopy on drift can be difficult due to the large variety of vegetation types and structures (height, density, orientation, etc). Two treatments involving a cotton canopy were included in the SDTF database only as a means of demonstrating that canopy is a significant factor in drift. The cotton canopy comprised 104-cm-tall plants in 76-cm rows. The plants were at the green boll stage of development and provided a full canopy. Two cotton canopy treatment comparisons were included in the study. One treatment involved a four-swath application starting at the edge of the cotton field (outside treatment). The second treatment involved a four-swath application beginning 59 m (four swaths) in from the edge of the field (inside treatment).

Atomization studies

The measurement of droplet size spectra under field conditions introduces many sources of variability and uncertainty compared with the controllable and easily monitored environment of a wind tunnel. Field assessments of droplet size typically involve collection of a sample of the spray cloud and subsequent measurement of the droplet sizes [22,23]. Such techniques are intrusive and may not sample the smallest droplets efficiently. Furthermore, the droplets are measured after

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evaporative and other effects may have caused them to change in size following emission through the nozzle. Some success has been found measuring droplet size on aircraft sprayers using optical array probes [24]. However, such measurements are relatively difficult, expensive, and time consuming compared with using a wind tunnel to simulate the sprayer. Highly accurate laser-based instruments are used to measure droplet size in wind tunnels. Wind tunnels have been successfully used for several decades at research facilities around the world to make such measurements. Previous studies have shown good agreement between droplet size spectra data measured in wind tunnels and on fixed-wing aircraft (e.g., [24]).

It was assumed that generic phenomena such as droplet size effects on drift from aerial applications can be covered for a wider range of nozzles than were tested in the field. At the initiation of the SDTF studies, disc-core nozzles were most common. However, during the course of the SDTF studies, a deflector nozzle (CP nozzle, CP Products, Mesa, AZ, USA) was introduced to the market and quickly became widely used. Therefore, the SDTF conducted droplet size measurements for this nozzle type to provide a more complete database. By knowing the droplet size spectrum for any aerial nozzle, drift potential can be predicted from the existing database and models. In cases where other factors influence drift, e.g., with applications using electrostatic or wing-tip modification systems, additional tests may be needed to demonstrate drift potential.

An underlying objective of the SDTF atomization studies was to evaluate a wide range of droplet size spectra through the use of a range of typical commercial practices. Within each aircraft speed, the different spray volumes and droplet size spectra were achieved by changing nozzle type, orifice size, and/or orientation. The nozzle types, application volume rates, and summary droplet size spectra statistics are shown in Table 3.

Equipment

The SDTF atomization studies were conducted using wind tunnels at New Mexico State University (Las Cruces, NM, USA) and at SpraySearch, Werribee, Australia. The SDTF atomization studies measured droplet size spectra of simulated aerial sprays using Malvern (Malvern Instruments, Malvern, Worcestershire, UK) and Sympatec (Princeton, NJ, USA) laser diffraction particle size analyzers in wind tunnels. Details of the measurement procedures are described elsewhere [25]. Representative sampling for the nonuniform sprays was achieved using a continuous scan technique or multiple measurements at different heights within the spray plume [26].

The wind tunnel studies included airstream velocities representing those encountered in applications with helicopters (18–36 m/s) and fixed-wing piston engine- (36–54 m/s), and turbine engine- (54–72 m/s) powered aircraft. The major nozzle types used for commercial applications and tested in the wind tunnel studies include simplex swirl (disc-core), jet (solid stream), hollow and full cone, flat fan, deflector, rotary cage, rotary drum, spinning disc, air shear, and preorifice twin fluid (including air inclusion and air induction). Several different designs and sizes were tested for many of these nozzle types. The measured droplet size spectra were used to develop models for predicting droplet size and drift for aerial spray applications. The study findings were too numerous to be comprehensively reported here, so only major findings are discussed.

Physical property studies

For database and modeling developments, the SDTF also measured droplet size spectra for combinations of application variables and liquid physical properties encompassing a wide range of possible aerial spray applications. These data, in conjunction with the model, yield drift data for a much wider range than those of typical or normal agricultural tank mixes.

The physical properties of agricultural tank mixes can affect drift mainly through their effect on the initial droplet size spectra emitted from the sprayer and through subsequent decreases in droplet size from evaporation. The SDTF developed a database on physical properties for the tank mixes that were sprayed in the field and atomization studies. Atomization was shown to be related to several physical property parameters that can be measured using various techniques. These included the dynamic surface tension at surface lifetime ages representative of the atomization process for typical hydraulic agricultural nozzles (e.g., 20 ms) and shear and extensional viscosity. Dynamic surface tension was measured using a maximum bubble pressure technique [27]; shear and extensional viscosity were measured using a Rheometrics RFX instrument [28] (this instrument is no longer being manufactured). Shear viscosity was assessed at shear rates up to 10,000/s, with low and high shear viscosity being represented by shear rates of 1 and 8,000/s, respectively. Extensional viscosity was represented by the maximum inertia-corrected value measured at strain rates up to 20,000/s. The ratio of extensional to shear viscosity, referred to as effective Trouton ratio, was an appropriate way to represent viscous forces for modeling atomization/physical property relationships [29].

Evaporation rates were measured using a video-imaging technique that assessed the rate of change of droplet mass over time for different conditions (e.g., temperature and relative humidity, formulations, and droplet diameters [30,31]).

SUMMARY OF RESULTS

Aerial field studies

Calculation of application rate. Ideally, the tank mix samples would agree with the application volume rate established from the tank mix preparation. However, there was a discrepancy between these two values. For malathion, the mean pre- and postapplication tank mix samples were 85 to 106% of the target concentrations from the mixing recipes. For diazinon, the mean was 91 to 108%. Although there were differences in tank sample concentrations between studies and treatments, there was no significant difference between tracer concentration rates for the pre- and postapplication samples within a given treatment. This supports the concept that there was no degradation of the tracers during application. The difference between the target recipe and tank sample tracer application rates could be due to several factors.

Since the tank mixes included emulsifiable concentrate formulations, the active ingredient was held in suspension and subject to a somewhat heterogeneous mixture. Study protocols specified that the tank mixture must be continually agitated. However, it is possible that the small sample volumes (10 ml) relative to the total tank mix (110 L) may not have been totally representative of the entire tank mix. Prior to analysis, the samples were serially diluted, which can magnify (or compound) small deviations. Finally, the exact amount of active ingredient withdrawn is subject to variation from the type of pipette used. During the initial phases of testing, the SDTF

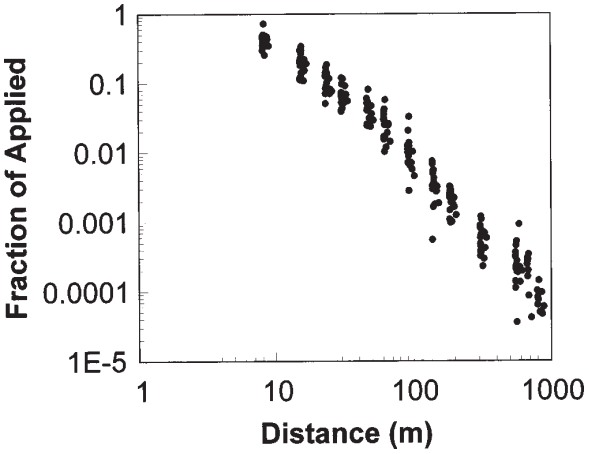

Fig. 2. Deposition with distance from edge of spray block. Example for standard applications with wind speeds of 9 to 11 m/s.

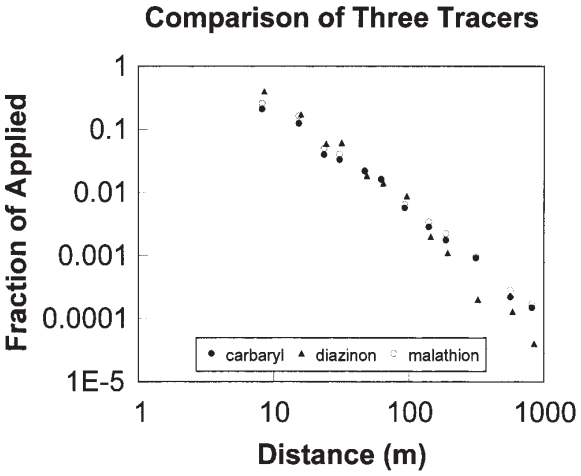

Fig. 3. Spray deposition against downwind distance from edge of spray block for different tracers.

determined that pipettes or syringes with small inlet orifice diameters could produce a bias toward the withdrawal (sampling) of aqueous solution.

The actual application rates were based on the measured average flight speed and flow rate, lane separation of 13.7 m as the swath width, and a tank mix concentration based on the field mixing recipe. A data logger was installed on the aircraft to monitor these parameters. Aircraft flight speed was measured using a radar gun.

Deposition. This section describes deposition data on horizontal alpha-cellulose collectors. It should be noted that the deposition rates measured for applications with sprays finer than coarse and applications at relatively high wind speeds were higher in the SDTF studies than would be expected in real-world situations because the SDTF data were not adjusted for swath adjustment, which is a common practice in most aerial applications [14]. Swath adjustment can, however, be applied with drift assessments using the AgDRIFT® model.

Overall, the SDTF results were consistent with observations in previous drift studies [1]. Off-target deposition rates were always highest within a relatively short distance of the edge of the application area and decreased rapidly with distance (Fig. 2). This figure is a set of standard case applications in a narrow range of wind speeds (9–11 m/s) and illustrates the declining deposition with distance from the edge of the field (distance = 0 m) as droplets deposit by sedimentation (and, to a much lesser degree for horizontal collectors, impaction) on surfaces. The wide range of deposition values at each measurement distance shown in Figure 2 cannot be directly explained by any of the variables observed during the trials. This level of variability is consistent with variability observed in other field trials.

The selection of tracer, diazinon or malathion, did not have a large effect on deposition rate measurements and so was not a major source of variability, as shown on Figure 3. However, diazinon did generally show lower deposition rates beyond 300 m from the edge of the field. This is probably due to volatile losses of diazinon at far-field distances due to its greater volatility than malathion.

Flight speed. Aircraft flight speed is one of the most important variables affecting droplet size. Different aircraft types can operate at different speeds. The SDTF field studies included rotary-wing aircraft and piston and turbine engine-powered fixed-wing aircraft. These were operated at increasingly high speeds for the SDTF studies, in the respective order 28, 48, and 68 m/s mean flight speed. The increasing air shear associated with these higher speeds results in finer sprays. This can be partly offset through the selection of different nozzle types and uses such as lower operational pressure that can increase droplet size. Figure 4 shows the off-target deposition that was measured in the field for these three aircraft types. All of these applications were made using D6-46 or D4-46 disc-core nozzles with spray pressure around 200 kPa and a medium-volume application rate. As explained above, the higher speed applications produced higher downwind deposition rates primarily because they produced finer sprays. The sprays showed droplet size spectra using D6-46 nozzles of, for high-speed application, $D_{v0.5}$ = 163 μm and %vol < 141μm = 38.8%; for medium-speed application, $D_{v0.5}$= 263 μm and %vol < 141μm = 15.0%; and for low-speed application,

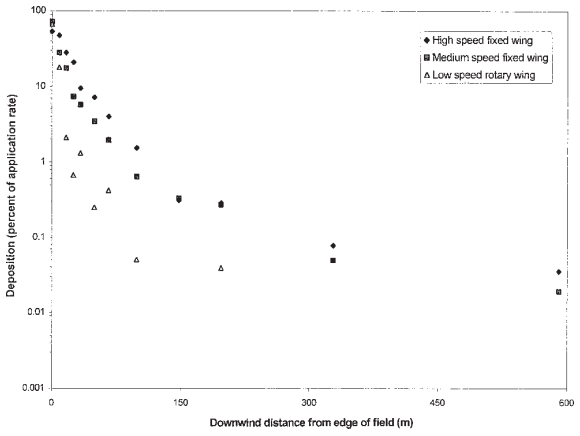

Fig. 4. Mean deposition rates for applications with different aircraft (high-speed fixed-wing producing fine spray, medium-speed fixed-wing producing medium spray, and low-speed rotary-wing producing coarse spray) with medium volume rate. Rotary-wing aircraft data only plotted to 200 m because deposition beyond 200 m was less than the level of quantification.

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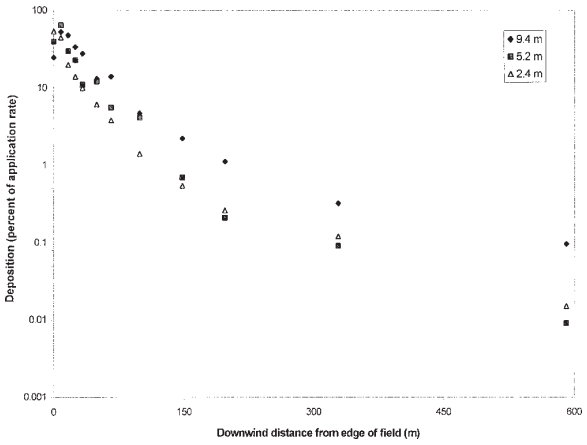

Fig. 5. Deposition rates for different spray release heights (2.4, 5.2, and 9.4 m above ground) with low volume rate, fixed-wing aircraft application.

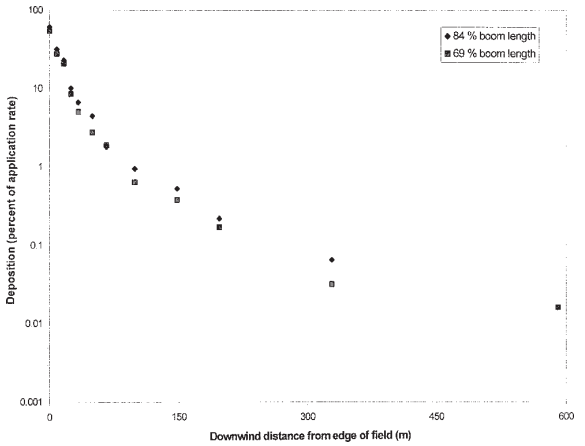

Fig. 6. Deposition rates for different boom length (84 and 69% of wing semispan) with medium volume rate, fixed-wing aircraft application.

$D_{v0.5}$= 339 μm and %vol < 141μm = 6.2%. Using the British Crop Protection Council (BCPC) [32] and American Society of Agricultural Engineers S-572 [33] spray classification schemes, these were fine, medium, and coarse sprays, respectively. Data for deposition with the rotary-wing aircraft application at distances beyond 200 m were not plotted because recovery rates were lower than the level of quantification, indicating extremely low deposition rates at these far-field distances.

Spray release height. Sprays are applied in the field at release heights that are appropriate for obtaining effective spray coverage in flight swaths while maintaining a safe distance from the ground. For a low application volume rate with the fixed-wing piston engine aircraft, drift potential at distances up to 200 m from the edge of the sprayed field increased with greater spray release height (Fig. 5) due to the greater fall distance and opportunity for wind displacement prior to sedimentation deposition. At distances beyond 200 m, the greatest release height always produced the highest off-target deposition rates. Beyond 200 m, the lowest release height deposition rate was not significantly different from the medium release height.

Boom length. The movement of aircraft tends to cause a roll-up of air into trailing vortices from each wing or rotor tip. If droplets become entrained in the vortices, they may be displaced vertically and laterally, often increasing the potential for drift. Boom length can be adjusted relative to the wing semispan to offset this effect. Figure 6 shows the slight decrease in off-target deposition when the boom length was decreased from 84 to 69%. The missing data point for the 84% boom length at a distance close to 600 m reflects the fact that the deposition rate for this location was lower than the level of quantification. The data shown on Figure 6 are for an application of a medium spray at a medium flight speed (piston engine fixed-wing aircraft). Further decreases might be expected for finer sprays and shorter boom lengths than 69%, based on model predictions using AgDRIFT® [34,35], which supports the suggestion that shorter boom length is important in practical drift management with aerial spray applications.

Wind speed. Wind speed is an important meteorological variable affecting spray drift potential. Figure 7 shows deposition for different wind speeds for the standard application. Off-target deposition increased with higher wind speeds due to droplet transport to greater lateral distances prior to sedimentation deposition. The wind speeds were measured at a height of 3 m above the ground.

Canopy. Two cotton canopy treatment comparisons had been included in the drift studies. One treatment involved a four-swath application starting at the edge of the cotton field (outside treatment). The second treatment involved a four-swath application beginning 59 m (four swaths) in from the edge of the field (inside treatment). There was no significant difference in downwind deposition between the no-canopy (bare ground) standard treatment and the outside treatment (see above). However, downwind deposition appeared to be reduced by a canopy when the tracer was applied in the inside treatment scenario in which drift moved across and through four swaths of cotton canopy (Fig. 8). It should be noted that these results do not reflect downwind deposition with swath adjustment (offsetting the aircraft position to compensate for cross wind). If appropriate swath adjustment had been applied, then the canopy may have intercepted a relatively greater

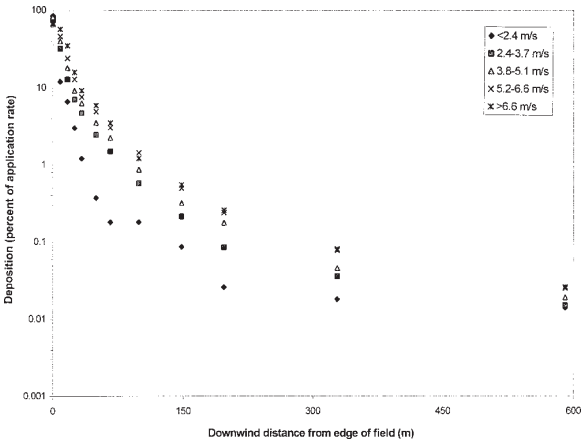

Fig. 7. Deposition rates for different wind speed ranges (wind speed measured at 10 ft. above ground) with standard treatment conditions.

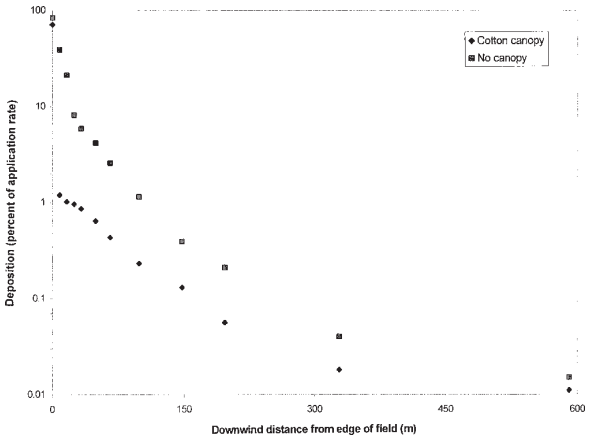

Fig. 8. Deposition rates for application with and without cotton canopy. Same equipment setup with and without canopy—piston engine fixed-wing aircraft, $D_{v0.5}$ = 263 μm and %vol < 141 μm = 15%.

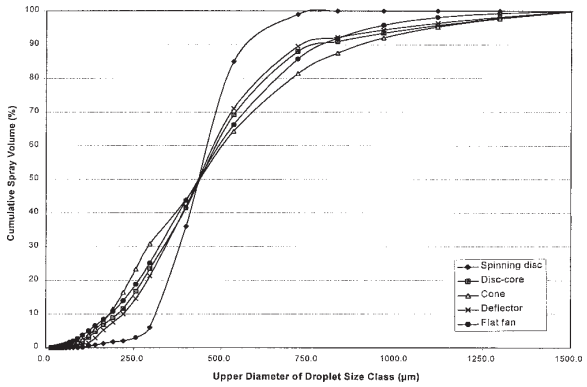

Fig. 9. Examples of cumulative volumetric droplet size spectra with same $D_{v0.5}$ (volume median diameter) values but different distributions for different nozzle types spraying water.

amount than the no-canopy treatment. These results also probably do not represent all canopy types. Different trends might be expected with different canopy types and locations.

With no swath adjustment, the cotton canopy only slightly decreased downwind ground deposition when applied near the downwind edge of the canopy. However, it reduced downwind exposure from airborne droplets. There was a substantial decrease in ground deposition for treatments applied further inside the cotton canopy. The results also indicate that the worst case drift scenario is associated with low-growing vegetation or no vegetation, the standard condition for most of the SDTF applications. It should be noted that these canopy effect treatments were very limited in replication and scope and so only illustrate general trends.

Atomization. With a few noted exceptions, the droplet size spectra produced by the hydraulic nozzles generally became coarser with lower airstream velocity, larger orifice diameter (within a nozzle type), lower liquid pressure (except with solid-stream jet nozzles at small angles to airstream), and lower nozzle angle relative to the airstream. Solid-stream nozzles and some nozzles described by the manufacturers as being low drift produced relatively coarse sprays. Examples of the droplet size spectra with the same $D_{v0.5}$ for different nozzle types within the thousands of atomization data sets are shown on Figure 9. These were data sets that could be closely matched for liquid flow rate. The data show that substantial differences in droplet size spectra occurred with different nozzle types. Solid-stream nozzles generally produced the coarsest sprays (largest droplets), and the full cone nozzles produced relatively fine sprays (small droplets).

The sprays produced by flat fan nozzles became coarser (general increase in droplet size) with narrower spray angle. Spray angle is the angle formed by the spray plume as it leaves the nozzle. Going from 110 to 80, 65, and 40° spray angles, the flat fan nozzles produced coarser sprays. A comparison of flat fan and deflector nozzle tips produced by different manufacturers for similar flow and spray plume angle specifications showed that some sprays were similar while others differed. Differences, where observed, were due to differences in the nozzle designs. The sprays produced by the rotary atomizers became coarser with lower airstream velocity, lower rotation rate, and higher liquid flow rate. A spinning disc atomizer produced very narrow droplet size spectra (relative span = 0.42–0.48) compared with hydraulic nozzles, which generally produced relative span values >1. Relative span is a useful parameter for describing the width of a droplet size spectrum by volume, with a smaller value indicating that the droplets are contained in fewer size classes. It is calculated by $(D_{v0.9} - D_{v0.1})/D_{v0.5}$, where $D_{v0.9}$, $D_{v0.5}$, and $D_{v0.1}$ are the respective droplet diameters at which 90, 50, and 10% of the spray volume is contained in droplets with smaller diameter. Most of the trends observed in SDTF studies agreed with those reported in the literature (e.g., rotary atomizer tests [36] and hydraulic nozzle tests [37]).

Physical properties studies

Liquid physical properties were not as important as application variables for determining droplet size. The SDTF studies had investigated dynamic surface tension (at very short surface ages) and shear and maximum extensional viscosity. With a few exceptions, sprays tended to become coarser with higher dynamic surface tension, extensional viscosity, and shear viscosity. Droplet size produced by many non-Newtonian test substances containing a polymer was sensitive to agitation rates. The type and rate of agitation can be important for such substances [38]. Droplet size trends for the SDTF sprays have been summarized and confirmed elsewhere [39].

Evaporation was found to occur at a constant rate within a given temperature/relative humidity regime. The only effect of physical properties on droplet evaporation was the final droplet size achieved (i.e., the nonvolatile fraction). More discussion of evaporation effects from the SDTF database is provided elsewhere [30,31,40].

Further information on the SDTF atomization and physical property studies is provided in the following publications. The SDTF atomization study designs and measurement techniques were described earlier [25,39,41]. The results are summarized in several articles [39,42]. The analysis of the data to develop atomization models is explained [29,43,44], and the inclusion of the atomization data and models within the AgDRIFT model is discussed [45].

DISCUSSION AND CONCLUSIONS

The SDTF field drift studies and associated atomization and physical property studies showed that spray drift is af-

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fected by many variables associated with the application, droplet size spectrum, meteorological conditions, and spray release position. Drift tended to be greater with the application of smaller droplets, greater release heights, greater wind speeds, and greater boom lengths. The findings of the SDTF studies were very extensive. More information on the studies and detailed description of the protocols and techniques are included in other reports [46,47]. The results have been used to develop and validate modeling tools that are described in the two other articles in this series [11,12].

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C. N. Boutin, C. Elmegaard and C. Kjaer, "Toxicity Testing of Fifteen Non-crop Plant Species with Six Herbicides in a Greenhouse Experiment: Implications for Risk Assessment", in *Ecotoxicology*. 13:349–369 (2004)

Ecotoxicology, 13, 349–369, 2004

Toxicity Testing of Fifteen Non-crop Plant Species with Six Herbicides in a Greenhouse Experiment: Implications for Risk Assessment

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Abstract. Estimation of risk to plants not targeted by herbicides when used in agricultural or forestry situations requires appropriate data on multiple species. Currently, many questions remain unresolved as to the adequate type and number of species to be tested. This paper presents the result of a unique greenhouse experiment where testing was performed with 15 non-crop plant species sprayed with 6 herbicides. The herbicides were chosen because of their different modes of action and because they are widely used in several countries. The plants favoured were species commonly found in field margins of Europe and/or North America. This dataset (called thereafter Danish/Canadian) was compared to the crop species that had been submitted to the US EPA for the same herbicides. In general, the selected plant species in the Danish/Canadian database were easy to grow and maintain in the greenhouse. The Danish/Canadian plants were overall more sensitive than the species tested in the US EPA data, yielding to a 5% protection threshold ($HC5_{(50)}$) that was always more conservative. There was a large variability in plant responses among herbicides. Recommendations are provided on species that should and should not be used for risk assessment of non-target plants.

Keywords: terrestrial plants; herbicide toxicity; risk assessment; pesticide regulation; guidelines

Introduction

Pesticides are increasingly used in developed countries where modern intensive agriculture requires that productivity is optimised; in general, pesticide sales have continued to rise worldwide (Pesticide company profits – 1998, panup-dates@igc.apc.org). North America and Europe are the predominant market for herbicides (Schwinn, 1988). In Canada and Denmark, 70–80% (volume) of all pesticides used are herbicides. (Statistics Canada, 1992; Miljøstyrelsen 2002). In Canada a threefold increase in herbicide use has been observed since the mid-seventies (Statistics Canada, 1992).

Habitats adjacent to cultivated fields, although not targeted during application, may be affected by pesticides. This exposure is likely to occur through direct overspray (mainly when applied by aircraft), through spray drift from application on target crops to adjacent wildlife habitats, and through

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runoff or washoff. Pesticides can travel considerable distances with aerial equipment, e.g. 500 m downwind (Conacher and Conacher, 1986; Davis and Williams, 1990). With ground equipment, it has been estimated that under certain conditions, more than 10% of herbicide application rates can drift from a single swath, from the point of application to adjacent non-target habitats (Nordby and Skuterud, 1975; Maybank et al., 1978). Low doses of herbicides affecting plants have been documented from nonpoint sources (Felsot et al., 1996) or from vapour drift (Poster, 1986). Some studies suggested that many agricultural pesticides are rapidly lost from fields by processes such as volatilisation and plant evapo-transpiration. Herbicides used throughout an area may then become entrained in local convective clouds, and are redistributed by rainfall over the agricultural landscape (Al-Khatib et al., 1992).

Many insecticides, and to a lesser extent fungicides, are acutely toxic to animals (Thomson, 2000, 2001). In contrast, the most prominent impact of herbicides is undoubtedly through adverse lethal effects on plants, by changing plant species composition and diversity, or sublethal impact by modifying plant development, growth and morphology. (Boutin, 1999). Most herbicides may adversely impact wildlife through reduction of food sources and diversity and by modifying cover needed to survive and reproduce (Freemark and Boutin, 1995). Low doses of herbicides may affect host plant quality to herbivores (Kjær and Elmegaard, 1996). A community of plants composed largely of grass crops (maize, wheat, barley, oats) and grass weeds (*Bromus*, *Elytrigia, Setaria, Echinochloa, Poa, Panicum,* etc.) has become the norm with modernisation of agriculture where herbicides primarily eliminate broad-leaved species in already impoverished monotypic cultures of intensive farming areas. Modifications in plant species composition of noncrop field edges sprayed with herbicides has been documented in Europe (Marrs et al., 1989) and more recently in Canada (Jobin et al., 1997; Boutin and Jobin, 1998). In the latter studies more annual grass species of weedy propensity were inventoried in habitats adjacent to herbicide treated fields. These may have a marked effects on invertebrate populations (Lagerlöf et al., 1992) with consequences for vertebrate wildlife (Potts, 1970; Potts, 1985; Sotherton and Robertson, 1990; Dennis and Fry, 1992; Rodenhouse and Best, 1994; Elmegaard, et al., 1999). In countries and areas where most of the land is devoted to farming, e.g., Denmark, south-eastern Canada and the Canadian prairies, recurrent adverse herbicide effects on habitats associated with agriculture become significant.

Risk assessment of herbicide phytotoxicity, apart from exposure evaluation, requires appropriate data on the toxicity of herbicides to a number of plant species. In Denmark, risk assessment for terrestrial plants is not a part of the current legislation. In Canada and the USA, data on 6 to 10 crop species are submitted to regulators for risk assessment of non-target crops or other non-target plants that ought to be protected within agroecosystems. In some countries, efficacy data for weed and crop species are provided to pesticide regulators as part of a readily available package, but largely only qualitative endpoints have been measured (Boutin and Rogers, 2000; Fletcher, et al., 1985). The question as to whether or not the recommended surrogate species in current guidelines (Holst and Ellwanger, 1982; Organisation for Economic Co-operation and Development, 1984) represent an adequate safeguard for environmental protection against herbicide impact is debatable. If conservation of native species (and other plants important for wildlife) is the goal, then ecologically relevant test species/groups should be favoured, unless it can be demonstrated (and this has not been established so far) that crop species are representative of noncrop species found in nature.

The objectives of this study were (1) to investigate the pattern of sensitivity of several types of plant species to six herbicides with different modes of action, and (2) to explore the feasibility of using non-crop plants commonly found in field boundaries as test species for herbicide risk assessment. Data were gathered on 15 non-crop plant species tested with six herbicides, and results were compared to data required by the US EPA regulatory agency and the Pest Management Regulatory Agency in Canada.

Material and methods

The experimental part was performed in the greenhouse at the National Environmental Research

Institute at Silkeborg, Denmark, between August and December 1998.

Plants selected

Fifteen plant species were selected for the experiment (Table 1), five species from the Asteraceae family (daisy family), four from the Lamiaceae family (mint family), two from the Polygonaceae family (buckwheat family) and the rest from four other families. Except for *Polygonum convolvulus* and *Sinapis arvensis*, which were collected in Denmark, all species were ordered from seed suppliers in Canada or the US. Among the 15 species tested, seven were short-lived species and eight were perennial species (Table 1). Most species are native from Europe, commonly found in open regularly disturbed habitats. Two species grow in wet areas, *Inula helenium* and *Mentha spicata*. The overall morphology of the different species varies considerably. Seed size was significantly related to growth rate ($r = -0.578$, $p = 0.024$) with a few notable exceptions (Table 1). Seed size and early growth rate may be criteria to take into account for selecting non-crop species to be tested. One species, *Polygonum convolvulus*, needed vernalisation to germinate. Because they also needed light to germinate, all species were sown at the soil surface in large trays and later were transplanted into individual 11 cm pots at early seedling stage. Mortality rate was very low at transplanting. The soil used during the experiment was a commercial potting soil with high peat content.

Table 1. Characteristics of the plant species selected for the experiment (P = perennial, A = annual, B = biannual, WA = winter annual)

Species	English Common names	Family	Life cycle	Origin	Habitat	Average seed size (mg/seed)	Days between sowing to 2 leaf-stage
Bellis perennis L.	English daisy	Asteraceae	P	North Europe	Lawn, open habitats	0.17	23
Centaurea cyanus L.	Cornflower	Asteraceae	A or WA	Mediterranean	Fields, roadsides	4.93	11
Inula helenium L.	Elecampane	Asteraceae	P	Europe	Moist, disturbed sites	1.29	18
Rudbeckia hirta L.	Black-eyed Susan	Asteraceae	B or P short-lived	North America (Prairies)	Disturbed habitats	0.29	23
Solidago canadensis L.	Canada goldenrod	Asteraceae	P	North America	Pasture, secondary succession	0.08	22
Leonorus cardiaca L.	Motherwort	Lamiaceae	P	Asia	Open habitats	0.75	19
Mentha spicata L.	Spearmint	Lamiaceae	P	Europe	Moist habitats	2.21	25
Nepeta cataria L.	Catnip	Lamiaceae	P	Eurasia	Disturbed habitats	0.54	17.5
Prunella vulgaris L.	Self-heal	Lamiaceae	P	Europe & North America	Disturbed habitats	0.58	20
Polygonum convolvulus L.	Wild buckwheat	Polygonaceae	A	Europe	Roadsides, open habitats	7.68	15
Rumex crispus L.	Curled dock	Polygonaceae	P	Europe	Roadsides, open habitats	1.38	21
Anagallis arvensis L.	Scarlet pimpernel	Primulaceae	A	Eurasia	Disturbed open habitats, roadsides	0.45	20
Digitalis purpurea L.	Foxglove	Scrophulariaceae	B or P	Europe	Open habitats	0.59	25
Sinapis arvensis L.	Wild mustard	Brassicaceae	A	Europe	Fields, open habitats	2.49*	15
Papaver rhoeas L.	Poppy	Papaveraceae	A	Eurasia	Fields, open habitats	0.16	16

*From seeds collected in Canada.

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Herbicides

Six herbicides with contrasted modes of action were tested (Table 2), and all are currently applied on major crops, e.g. maize, wheat, barley, soybeans, oats, peas, potatoes and tomatoes. They were selected because they are widely used in post-emergence applications in Canada and/or Denmark (except for metolachlor which is not on the Danish marked), and generally in North America and Western Europe, for the control of broad-leaved plants and grasses. Herbicides were obtained directly from the different companies originally making the herbicides: Saxo (20% octanoate-bromoxynil), Rhone Poulenc (now BASF); Banvel 4S (480 g/l dimethylamine salts of dicamba), Novartis (now Syngenta); Roundup Bio (360 g/l glyphosate with 480 g glyphosate-isopropylamin-salt), Monsanto; Dual Gold (87.3% S-metolachlor – 960 g/l), Novartis (now Syngenta); Ally (20% metsulfuron methyl), Dupont, sprayed with the 0.05% surfactant Citowett (100% alkylarylpolyglykolether); Stomp SC (36% pendimethalin – 400 g/l), Cyanamid (now BASF). All herbicides were used as formulated products thereby containing a number of surfactant compounds.

Bromoxynil (2,6-dibromo-4-cyanophenyl octanoate) is a selective herbicide with limited systemic activity (Thomson, 1989; Tomlin, 1997) formulated as an emulsifiable concentrate. It is absorbed by the foliage through cuticular penetration rather than stomatal or by the root system, both ways with poor translocation. Bromoxynil is a benzonitrile herbicide that kills by inhibition of photosynthesis in annual broad-leaved plants but the precise mode of action appears to remain unresolved. Bromoxynil degrades rapidly in most soil types, with a half-life in the order of two weeks that can be considerably enhanced at low temperatures. It is moderately water soluble (130 mg/l) thereby potentially harmful to fish and aquatic invertebrates for which it is toxic if it reaches waterbodies (Muir et al., 1991). A few crops have been made resistant to this herbicide through genetic modification (Stephenson et al., 1995; Freyssinet et al., 1996). Bromoxynil is used on monocot crops such as maize, cereals, onions, garlic, and on some dicot crops (alfalfa and mint) for the control of several broad-leaved species.

There are two forms of bromoxynil, the heptanoate and the octanoate esters. They are considered to be toxicologically similar to the pure bromoxynil phenol (US EPA fact sheet, www.epa.gov/pesticides/factsheets). Bromoxynil esters are absorbed by sprayed foliage and hydrolysed to the active herbicide bromoxynil by esterases in leaves (Eberlein et al., 1998).

Dicamba (3,6-dichloro-*o*-anisic acid) is a systemic selective herbicide absorbed by the leaves and roots of young plants, with ready translocation throughout the plant via both the symplastic and apoplastic system as well as through xylem and phloem (Frear, 1976; Worthing and Hance, 1991). Two forms of dicamba are commonly used as the active ingredient, the dimethylamine salt and the sodium salt (Pesticide Fact Sheet, US Department of Agriculture, Forest Service). Dicamba resembles the naturally occurring plant growth hormone auxin and thus causes similar but uncontrolled growth reactions that disrupt normal functions and death soon follows. Although auxinic herbicides have been

Table 2. Characteristics of herbicides used, label rates used in the range-finding experiment, and leaf stage at which plants were tested

Herbicide common name	Chemical family	Commercial name and content in active ingredient (a.i.)	Label rate g-ai/ha	Leaf stage tested	Mode of action
Bromoxynil	Benzonitrile	Saxo (20 % octanoate bromoxynil)	400	4	Photosynthetic inhibitor
Dicamba	Benzoic acid (auxin)	Banvel 4S (480 g/l dimethylamine salt of dicamba)	4440	2-3	Hormone auxine-like herbicide
Glyphosate	Organophosphate	Roundup Bio (360 g/l glyphosate)	1440	4-8	Biosynthesis inhibitor of aromatic amino acids
Metolachlor	Chloroacetamide	Dual Gold (87.3 % S-metolachlor)	2500	2	Lipid biosynthesis inhibitor
Metsulfuron	Sulfonylurea	Ally (20 % metsulfuron methyl)	4	4	Biosynthesis inhibitor of chained amino acids
Pendimethalin	Nitroaniline	Stomp SC (36 % pendimethalin)	2000	2	Cell division inhibitor

in use for over 50 years (e.g., chlorophenoxy 2,4-D, 2,4-DB and MCPA), their precise mode of action remains unclear. Dicamba is widely used on grass crops (maize and cereals) for the control of broad-leaved weeds. Persistence is high (half-life 5–6 months) and is enhanced in cases of drought and cold temperature. It is highly mobile in most soil with a water solubility of 6.5 g/l at 25 °C. Volatilisation occurs at high soil temperature and slow air movement. It is generally nontoxic to animals but adverse effects on aquatic algae have been documented (Caux et al., 1993).

Glyphosate [*N*-(phosphonomethyl)glycine] is a systemic non-selective soluble concentrate herbicide that will affect most plants. It is taken up by the leaves and then translocated through the plant from the point of contact towards the root system (Monsanto Canada, 1991). If properly applied, it will kill the entire plant including the roots and therefore prevent later root sprouts (Kennedy and Jordan, 1985). Absorption takes place through the waxy cuticle on leaves where it is then translocated through the plant by cell to cell diffusion and vascular transport primarily through the phloem (Ribo, 1985 1986; Carlisle and Trevors, 1988) where it is then transported to the main biochemical target: location of the enzyme 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase, situated largely within chloroplasts. The main mechanism of action of glyphosate is inhibition of the shikimic acid pathway (Liu et al., 1997), which is responsible for the production of the aromatic amino acids phenylalanine, tyrosine, and tryptophan.

Glyphosate is degraded by rapid microbial action, with a DT50 of three to five weeks. Otherwise it is non-volatile and does not degrade photochemically. The water solubility is high (11.6 g/l at 25 °C) but because it strongly binds to soil particles it becomes immobile unless transported with the soil. This herbicide, already widely applied worldwide, will see its use expanding with the emergence of genetically modified crops (maize, soybean, oilseed rape, cotton among others) that are made resistant to glyphosate.

Metolachlor [2-chloro-6'ethyl-*N*-(2-methoxy-1-methylethyl)aceto-*o*-toluidide] is a chloroacetamide herbicide considered to be a general growth inhibitor that impairs seedling growth of grasses (Gronwald, 1991). It is formulated as an emulsifiable concentrate. Even though in use for over 40 years, the primary mode of action of chloroacetamide herbicides has not been identified although recent findings indicate that the inhibition of lipid synthesis accompanied by the disruption of the integrity of cell membranes may likely be implicated (Gronwald, 1991; Matthes et al., 1998). Two isomers occur, the inactive R-enantiomer and the active S-enantiomer of metolachlor, which was the dominant form in the formulation used in the current Danish/canadian experiment. Metolachlor selectively controls numerous grasses and some broad-leaved species in several important crops such as maize, soybeans, cotton, sugar beets, potatoes, tomatoes, several types of beans, etc. (Thomson, 1989; Tomlin, 1997). Metolachlor is water soluble (488 mg/l at 25 °C) and exhibits residual phytotoxicity (half-life > 200 days), thus will conceivably move to waterbodies where it is toxic to fish and some aquatic plants (Peterson et al., 1994). It is volatile under certain conditions.

Metsulfuron methyl [2-(4-methoxy-6-methyl-1,3,5-triazin-2-ylcarbamoylsulfamoyl)benzoic acid] is a potent inhibitor of plant growth and is used on wheat and barley crops for the control of broad-leaf species and suppression of a few grasses. It is formulated as dry flowable. The herbicide is taken up by the foliage or the roots and translocated via xylem and phloem. Metsulfuron methyl is a selective herbicide that acts by inhibiting the enzyme acetolactate synthase (ALS inhibitor) which catalyses the synthesis of the three branched-chain amino acids valine, leucine and isoleucine (Moberg and Cross, 1990). The precise mechanism of action is unknown but soon after herbicide application, plant cell division stops, and death occurs within one to three weeks. Metsulfuron methyl is considered mobile in most soils and mobility is enhanced as pH increases (Beyer et al., 1988; Blair and Martin, 1988). It is degraded by two processes: chemical hydrolysis and microbial action and may be very persistent in alkaline soils. Photolysis and volatilisation are negligible at all pH levels. Sulfonylureas are increasingly known to inhibit the reproduction of several terrestrial and wetland plant species (Kjær, 1994; Fletcher et al., 1996; Boutin et al., 2000).

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Pendimethalin [*N*-(1-ethylpropyl)-2,6-dinitro-3,4,-xylidine] is a selective dinitroanaline herbicide that inhibits growth of the entire plant by altering the process of mitosis. It is an antimitotic substance but the exact mechanism of action is unknown (Tarkowska et al., 1994). Pendimethalin affects microtubule formation during cell division by binding to its main proteinic component, tubulin, eventually causing a complete loss of microtubules (Vaughn and Lehnen, 1991). Microtubules are required for cell division and cell wall formation. Pendimethalin is absorbed by roots and leaves and it initially limits root growth, especially the development of lateral or secondary roots (Tomlin, 1997). The formulated product is an emulsifiable concentrate made of the active ingredients and several adjuvants. The nitro group on the phenyl ring imparts the pronounced yellow orange colour of pendimethalin (Anderson, 1997).

Pendimethalin was developed for use as a pre-emergence or early post-emergence product, mostly for the control of grasses and several broad-leaved plants on numerous important crops, e.g., maize, wheat, soybeans, rice, cotton, potatoes, several beans and peas, etc. It will not control established plants. Pendimethalin is moderately persistent in moist sandy loam (half-life for dissipation time of 50 days) to highly persistent in moist silt soil (half-life 140 days) and in dry silty clay loam (250 days). Consequently it is a very stable herbicide except when it volatilises from moist soil surfaces (Barrett and Lavy, 1983). The water solubility being minimal (0.3 mg/l at 20 °C) it is unlikely to be transferred to other environmental compartments although it may move with soil particles to waterbodies where it is toxic to fish (Thomson, 1989; Tomlin, 1997).

Methods – Danish/Canadian database

First, in order to determine dosages at which plants were susceptible (post-emergence application only), a range-finding test was performed using between three to five plants per pot and two replicates per dosage. Four dosages plus control were sprayed, 0.01, 0.1, 1 and 5 or 10 times recommended label rates for agricultural use in Canada and Denmark. Label rates used for the range-finding test are indicated in Table 2. Plants were sprayed at various sizes that were determined by the herbicides most susceptible leaf stage as indicated on labels. An automatic sprayer (designed in Denmark by Jens Kristensen, 1994) was used whereby the herbicide application is achieved by a moving boom equipped with two ordinary hydraulic flat fan nozzles (Hardi 4110–16 nozzle). Two pots per spray event were placed in the middle of the spray chamber at 50 cm distance from the nozzle, delivering 200 l of water per hectare with the desired herbicide concentrations (working pressure = 2 bars, speed of spray boom = 4.7 km/h). The spraying was performed starting with the lowest concentration first, progressing towards the highest concentration. Between each herbicide, the sprayer was thoroughly rinsed several times with water. Two weeks after spraying, visual effects on plants were noted, using the rating chart described in Hamill et al. (1977) and Boutin et al. (1993); a rating of zero indicates full growth and vigour, nine, no growth/mortality.

The definitive test, aimed at obtaining dosage–response curves, was performed using four dosages as determined by the range-finding test, plus control. Immediately before spraying, a stock solution was prepared which consisted in the highest dosage tested and then dilutions were made to obtain the other lower dosages. A sample (60 ml) of the stock solution was kept for chemical analysis verification. Samples were analysed by the Laboratory Division of the Pest Management Regulatory Agency, Ottawa, Canada. High performance liquid chromatograhy was used for bromoxynil, dicamba, glyphosate, metsulfuron methyl while metolachlor and pendimethalin were analysed using a gas chromatograph.

In most cases, a geometric progression of 1.8 or 2 was used in the determination of dosages. For each spray event, six replicates were used with a single plant per pot (two pots per spray, times three independently prepared replicates). Three weeks after spray, the aboveground parts of plants was harvested, placed in a forced air dryer at 70 °C for 24–48 h until thoroughly dry, and total dry weight was recorded separately for each plant.

During both experiments, plants were watered from the bottom, the temperature in the greenhouse was maintained between 15 and 25 °C with variations due to external weather, and the pho-

toperiod was 16 h daylight. Some problems arose with the greenhouse thus for a short period plants underwent longer daylight exposure. This, however, should not affect the outcome of the experiment. The greenhouse was divided in different units, which allowed the maintenance of the control plants separate from the sprayed plants to avoid undesirable effects due to vapour drift.

The database created comprising the definitive results of effects of the six herbicides tested with the 15 plant species became the Danish/Canadian dataset.

The US EPA database

The US EPA database, which includes data submitted up to 1999, was kindly provided to us by the US EPA Office of Pesticide Programs, to carry out further analyses. Between three and 11 species have been tested and only crop plants are represented, except with metsulfuron methyl where several non-crop plants were included in the database. Testing was performed in the greenhouse, following the US EPA guidelines (Holst and Ellwanger, 1982) for vegetative vigour (spray post-germination). Quantitative endpoints were reported, e.g. dry weight, fresh weight, height, etc. Only the most sensitive endpoint was recorded in the database and thus used in these analyses. Testing was carried out with the active ingredient of each herbicide.

Statistical analyses

The EC_{50} is the effective dosage that results in 50% reduction in the test endpoint (in this case growth) being measured relative to control. For the calculation of the EC_{50} the linear interpolation method for sublethal toxicity, also called the inhibition concentration approach (IC*p*) was used (as described in US EPA report EPA/600/4/-89-001 and 001A). This method works by smoothing data that are not following a normal reduction with increased dosages in the selected endpoint – they are adjusted by averaging or pooling. It is assumed that any unexpected increases in the mean weight or other endpoints, at higher concentrations, are due to random variations. The calculation of the hazardous dosage (HD) was done using the E_TX program developed by Aldenberg and Slob (1993). All the analyses were performed using the Danish/Canadian and the US EPA databases separately.

Results

Chemical analysis

Tests done directly with the products provided by companies showed good accuracy, ranging from 95% to 107% of expected concentrations of active ingredients. In dilutions performed prior to spraying of the different herbicides, the amount of active ingredient was 102% and 120% for bromoxynil ($n = 2$), 95% to 96% for dicamba ($n = 3$), between 91% and 107% for glyphosate ($n = 5$), between 95% and 115% for metolachlor ($n = 5$) and between 95% and 107% for pendimethalin ($n = 3$). No result could be obtained for metsulfuron methyl because of damaged samples.

Phytotoxicity

Rank of species sensitivity was plotted separately for the six herbicides tested, using the EC_{50} for each of the 15 plant species examined (Fig. 1). Detailed results of both the range-finding and definitive tests are presented in Appendix 1. In many cases the EC_{50} calculated was situated slightly lower or in the low end of the dosages selected for the definitive test. This is due to the fact that, because of time constraint, effects were recorded after two weeks into the range-finding test where it appears that most herbicides were still actively impacting plants, whereas the definitive test was concluded after three weeks. This finding may be of prime importance for designing phytotoxicity test for regulatory purposes. Except for metolachlor and metsulfuron methyl, the four other herbicides followed a normal distribution (Shapiro–Wilk test for normality, $p > 0.05$). The bimodal distribution of metolachlor is due to the marked difference in sensitivity amongst the Asteraceae (five species) and the Lamiaceae (four species). In the case of metsulfuron methyl, *Polygonum convolvulus, Digitalis purpurea*, and

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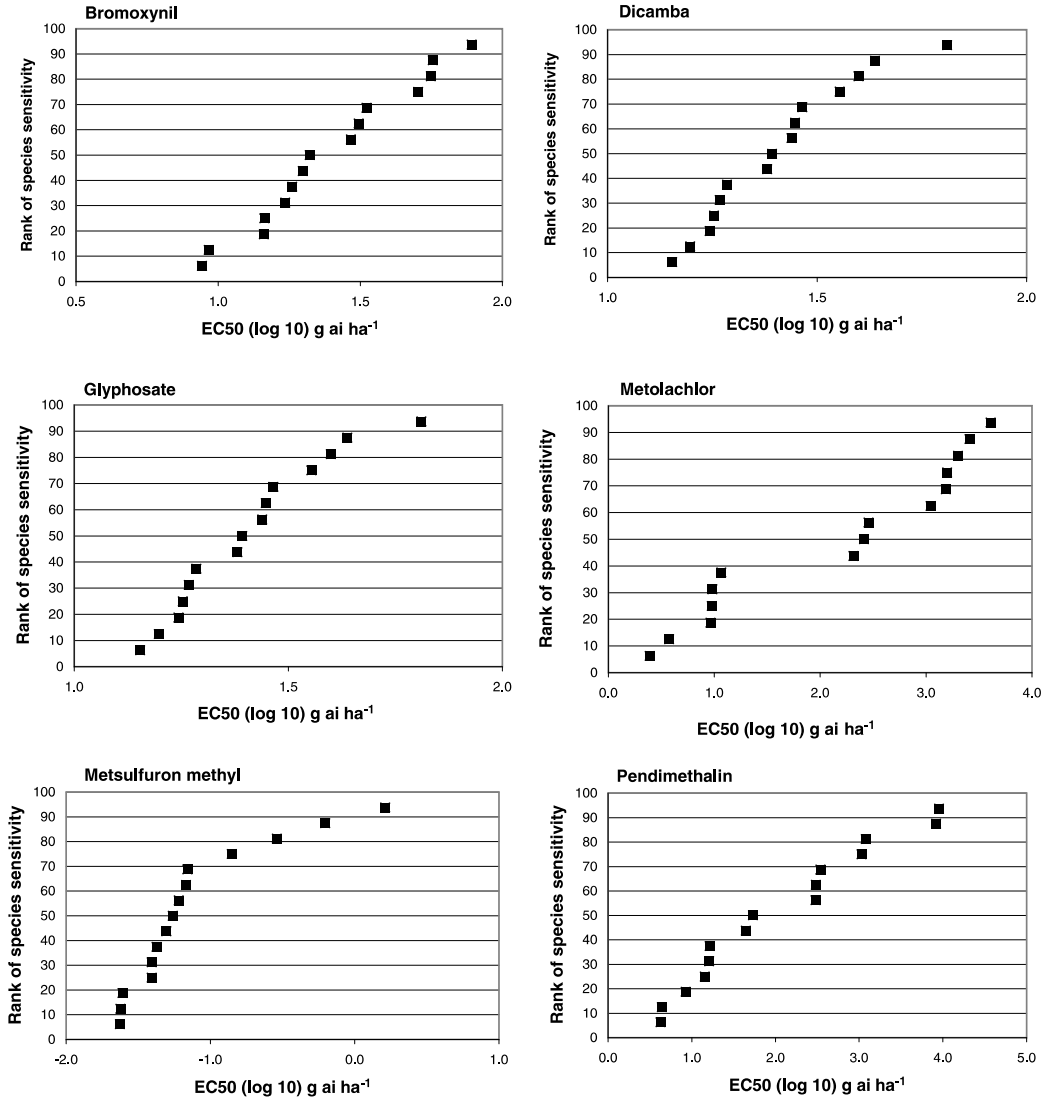

Figure 1. Rank of species sensitivities plotted for the 15 species tested with the six herbicides used in the Danish/Canadian database. Species names are provided in Table 1 and Appendix 1.

especially *Centaurea cyanus* exhibited little sensitivity as compared to other plant species.

The Danish/Canadian database is unique because it includes the same plant species tested with six herbicides. Results clearly indicate that species sensitivity varies considerably among herbicides. Yet three patterns seem to emerge. (1) Bromoxynil, dicamba and glyphosate induced similar toxicity to most species. No one family emerged as more or less sensitive. Consequently, when extrapolating from one genus to another within the two families, Asteraceae and Lamia-

ceae, in which more that two species were tested, an uncertainty factor of ten would capture all the variability. Likewise, when extrapolating from one family to another, a factor of 10 would suffice. (2) A second pattern was exhibited by metolachlor and pendimethalin, i.e., low sensitivity by plant species of the Asteraceae family, accrued sensitivity by species of the Lamiaceae family and large variability among species in general. (3) The third trend is manifested by metsulfuron methyl which stands alone whereby no consistency could be distinguished among the different species. For the latter three herbicides, a much larger uncertainty factor would be needed as will be seen below.

A few herbicides induced extreme results to one or a few species. *Solidago canadensis* ($EC_{50} = 30.76$ g ai ha^{-1}) was much less sensitive than any other species tested with dicamba, one order of magnitude difference from the most sensitive species *Inula helenium* ($EC_{50} = 3.32$ g ai ha^{-1}), two species from the Asteraceae family. *Centaurea cyanus* ($EC_{50} = 1.63$ g ai ha^{-1}) was remarkably insensitive to metsulfuron methyl, approaching two orders of magnitude difference with most other species. Likewise, *Centaurea cyanus* ($EC_{50} = 8280.72$ g ai ha^{-1}) and especially *Rudbeckia hirta* ($EC_{50} = 8966.44$ g ai ha^{-1}) displayed much lower toxicity then most other plant species tested with pendimethalin. *Mentha spicata* (77.84 g ai ha^{-1}) was the least sensitive species to bromoxynil, a close relative to the crop species (*Mentha* spp.) on which bromoxynil can be applied for the control of weeds.

In contrast to the Danish/Canadian database, the six herbicides examined in the US EPA database were tested with three to eleven different species for a total of 22 plant species. Ranks of species sensitivity are shown in Fig. 2. Ten species were tested with bromoxynil heptanoate, including five monocots (four grasses) and five dicots. The toxicity ranges from 12.32 g ai ha^{-1} for *Brassica oleracea* and 414.40 g ai ha^{-1} for *Avena sativa*. Crops on which bromoxynil has been registered for use (*Zea mays*, *Avena sativa*, *Allium cepa*), all monocots, were selected as test species for plant risk assessment. In another testing set (not shown), six plant species were tested with bromoxynil octanoate, including five broad-leaved species and one monocot from the Liliaceae family (*Allium cepa*).

Ten species were tested with dicamba acid in the US EPA database (as opposed to dicamba dimethylamine salt in the Danish/Canadian database) including four monocots (three grasses) and six dicots (Fig. 2). The toxicity ranged from 7.28 g ai ha^{-1} for *Glycine max* to 4368.0 g ai ha^{-1} for *Zea mays*. The three grasses tested in the US EPA database, *Zea mays*, *Lolium perenne* and *Avena sativa* were very insensitive, predictably since they are crops on which the herbicide can be applied for the control of weeds. The other monocot tested, *Allium cepa*, also exhibited a higher EC_{25} than most dicots except for *Brassica oleracea*.

In the US EPA database, plant species were tested with glyphosate containing 48.3%, 75.0% or 96.6% active ingredient. This is in contrast with the test performed in the Danish/Canadian database where plants were tested with the formulated product containing 41% active ingredient and 59% of other unspecified ingredients. A total of 19 species were tested with one, two or three concentrations of the herbicide. Some variations exist among species tested with the different concentrations. In the 48.8% presented in Fig. 2, the toxicity ranged from 82.88 g ai ha^{-1} for *Brassica campestris* to 851.20 g ai ha^{-1} for *Cyperus rotundus*.

Ten species were tested with metolachlor (no specification as to which isomers were present), including four monocots (three grasses) and six dicots (Fig. 2). The toxicity ranges from 22.40 g ai ha^{-1} for *Lolium perenne* to 4480.0 g ai ha^{-1} for *Glycine max*. Many insensitive species were tested in the US EPA database, including crops such as soybean (*Glycine max*), corn (*Zea mays*) and tomatoes (*Lycopersicon esculentum*). Species of the Brassicaceae family also seem rather insensitive, e.g., *Brassica oleracea* and *Raphanus sativus* tested in the US EPA database. *Sinapis arvensis* in the Danish/Canadian database also exhibited an elevated EC_{25} value. Six species were tested with metolachlor-S-isomer in the US EPA database (not shown), including four monocots (three grasses) and only two dicotyledonous species. *Lolium perenne* (23.52 g ai ha^{-1}) was the most sensitive and another monocot, *Allium cepa* was the least sensitive (571.0 g ai ha^{-1}).

Nine species were tested with metsulfuron methyl in the US EPA database, including four monocots (three grasses) and five dicots (Fig. 2).

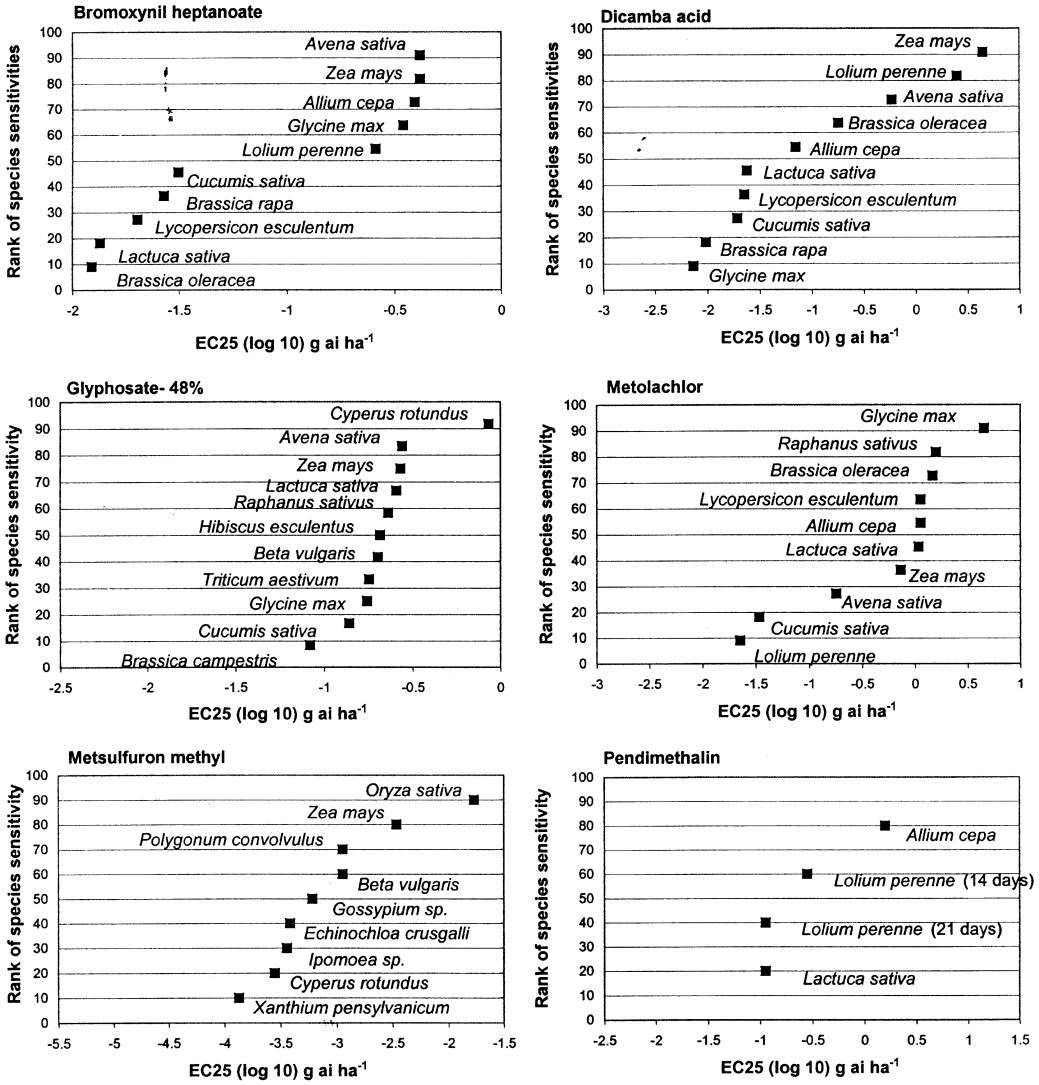

Figure 2. Rank of species sensitivities of the species tested in the US EPA database. *Allium cepa*, onion; *Avena sativa*, oats; *Beta vulgaris*, sugar beet; *Brassica campestris*, rape; *B. rapa*, turnip; *B. oleracea*, cabbage; *Cyperus rotundus*, nutsedge; *Cucumis sativa*, cucumber; *Echinochloa crusgalli*, barnyard grass; *Glycine max*, soybean; *Gossypium* sp., cotton; *Hibiscus esculentum* (*Abelmoschus esculentus*), okra; *Ipomea* sp., morning glory; *Lactuca sativa*, lettuce; *Lolium perenne*, ryegrass; *Lycopersicon esculentum*, tomato; *Oryza sativa*, rice; *Polygonum convolvulus*, black bindweed; *Raphanus sativus*, radish; *Triticum aestivum*, wheat; *Zea mays*, maize; *Xanthium pensylvanicum*, cocklebur.

The toxicity ranges from 0.134 g ai ha^{-1} for *Xanthium pensylvanicum* and 16.80 g ai ha^{-1} for *Oryza sativa*, over two orders of magnitude. The least sensitive species in the US EPA database is a crop, *Oryza sativa*, on which the herbicide can be used for the control of weeds.

Only three species were tested with pendimethalin in the US EPA database. Toxicity levels

were always higher with species of the Danish/Canadian database, except for pendimethalin and metolachlor-S where only three and six species respectively were available in the US EPA database.

The range of species sensitivity was plotted for both the Danish/Canadian data and the US EPA data for ease of comparison between the two datasets (Fig. 3). The EC_{25} was used because this was the only toxicity measurement provided in the US EPA database. In the Danish/Canadian dataset, the range of species sensitivity was narrow for bromoxynil, dicamba and glyphosate, the ratio of the least to most sensitive species barely reaching one order of magnitude (<10). In the case of the three other herbicides tested, the ratio of the least to most sensitive species was much broader, spanning from 73 for metsulfuron methyl, to 1651 for metolachlor, and 2668 for pendimethalin. The range of species sensitivity was higher in the US EPA database for bromoxynil, dicamba and metsulfuron methyl.

Species sensitivity distribution

Table 3 presents the calculation of the hazard concentration that will protect 95% of the species with 50% (median HC5 or $HC5_{(50)}$) and 95% ($HC5_{(95)}$) confidence levels, according to the method of Aldenberg and Slob (1993). The median confidence level should be favoured because it is considered the best estimate of the hazardous concentration (Aldenberg and Slob, 1993). Furthermore, the endpoint measured in both datasets were not mortality but sublethal effects. The more conservative 95% confidence level is, however, a safer value. With the Danish/Canadian database, calculations were performed with both the EC_{50} and the EC_{25}, the latter to allow a comparison with the US EPA data. In a few cases the data did not fit the log-logistic distribution, which implies that the calculations should not have been performed for metsulfuron methyl in the Danish/Canadian database (EC_{25}) and for bromoxynil heptanoate in the US EPA database.

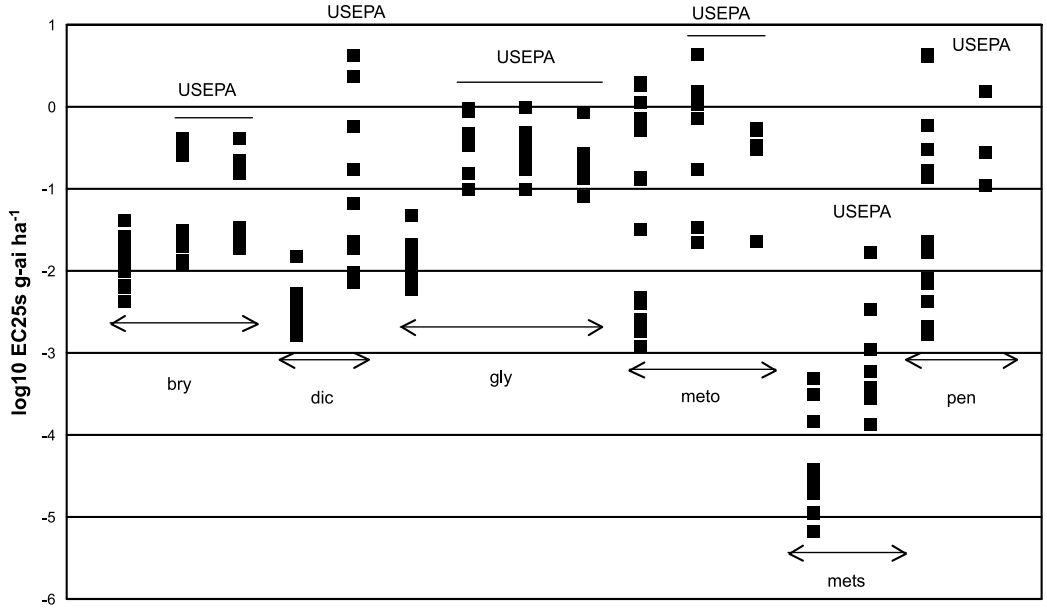

Figure 3. Range of plant species sensitivity for the six herbicides tested in the Danish/Canadian (left side for each herbicide) and US EPA databases. Each square represents the EC_{25} for individual plant species for any given herbicide. Bars denote squares grouped together. Bry = bromoxynil, dic = dicamba, gly = glyphosate, meto = metolachlor, mets = metsulfuron methyl, pen = pendimethadimethalin.

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Table 3. HC5s (Hazard Concentrations protecting 95% of species) calculated separately with the Danish/Canadian and the U.S. EPA databases. HC5s were calculated with 50% (HC5(50) and 95% (HC5(95) confidence levels.

			With EC_{25} (g-ai ha^{-1})				With EC_{50} (g-ai ha^{-1})		
	n	Logistic distribution	HC5(50)	HC5(95)	Ratio HC5(50/95)	Logistic distribution	HC5(50)	HC5(95)	Ratio HC5(50/95)
a) Danish/Canadian database									
Bromoxynil	15	Accepted	3.720	1.9056	1.95	Accepted	7.967	4.1354	1.93
Dicamba amine	15	Accepted	1.300	0.7630	1.70	Accepted	2.781	1.6038	1.73
Glyphosate 41%	15	Accepted	5.449	3.3248	1.64	Accepted	12.468	8.2314	1.51
Metolachlor (87.3% S-isomer)	15	Accepted	0.459	0.0285	16.11	Rejected	1.383	0.0992	13.94
Metsulfuron methyl	15	Rejected	0.005	0.0014	3.23	Rejected	0.010	0.0028	3.37
Pendimethalin	15	Accepted	0.626	0.0500	12.52	Accepted	1.228	0.0939	13.08

			With EC_{25} (g-ai ha^{-1})		
	n	Logistic distribution	HC5(50)	HC5(95)	Ratio HC5(50/95)
b) U.S. EPA database					
Bromoxynil heptanoate	10	Rejected	5.443	0.6696	8.13
Bromoxynil octanoate	6	Accepted	6.591	0.3823	17.24
Dicamba acid	10	Accepted	1.765	0.0830	21.27
Glyphosate 48.3%	11	Accepted	82.069	40.6030	2.02
Glyphosate 75%	10	Accepted	119.240	47.5740	2.51
Glyphosate 96.6%	10	Accepted	96.636	41.5670	2.32
Metolachlor (unspecified)	10	Accepted	25.350	2.4989	10.14
Metolachlor (S-isomer)	6	Accepted	29.786	2.4567	12.12
Metsulfuron methyl	9	Accepted	0.058	0.0071	8.16
Pendimethalin	3	Accepted	24.990	0.2943	84.91

The $HC5_{(50)}$ was always higher when calculated using the EC_{25} of US EPA database than when using the Danish/Canadian database (Table 3). This was expected because species tested in the Danish/Canadian database were generally more sensitive than those tested in the US EPA database. When considering the $HC5_{(95)}$, the Danish/Canadian data elicited a more conservative value in the case of bromoxynil and dicamba, while it was the opposite for glyphosate and metolachlor. The comparison was not possible with metsulfuron methyl in the Danish/Canadian data because the data did not follow a log-logistic distribution, nor with pendimethalin in the US EPA dataset due to the very low sample size.

An indication of the margin of error was estimated using the ratio between $HC5_{(50)}$ and $HC5_{(95)}$. Large differences between both values indicate considerable uncertainty and may be an indication that more species should be tested (Aldenberg and Slob, 1993). The ratio was always greater when calculated using the US EPA database, except for metolachlor.

Figure 4 shows that the $HC5_{(50)}$ calculated with the US EPA data would have underestimated the risk of adverse effects for several species of the Danish/Canadian database: all 15 species for glyphosate, 12 species metsulfuron methyl, eight for pendimethalin, six for metolachlor, three for bromoxynil and one for dicamba. When using the more conservative $HC5_{(95)}$, the risk would have been grossly underestimated for glyphosate with 14 species below the threshold, and to a lesser extent for metolachlor (three species) and metsulfuron methyl (one species).

Discussion

Limitations of the study

The current study was not designed to investigate a worst-case scenario. Herbicide applications were

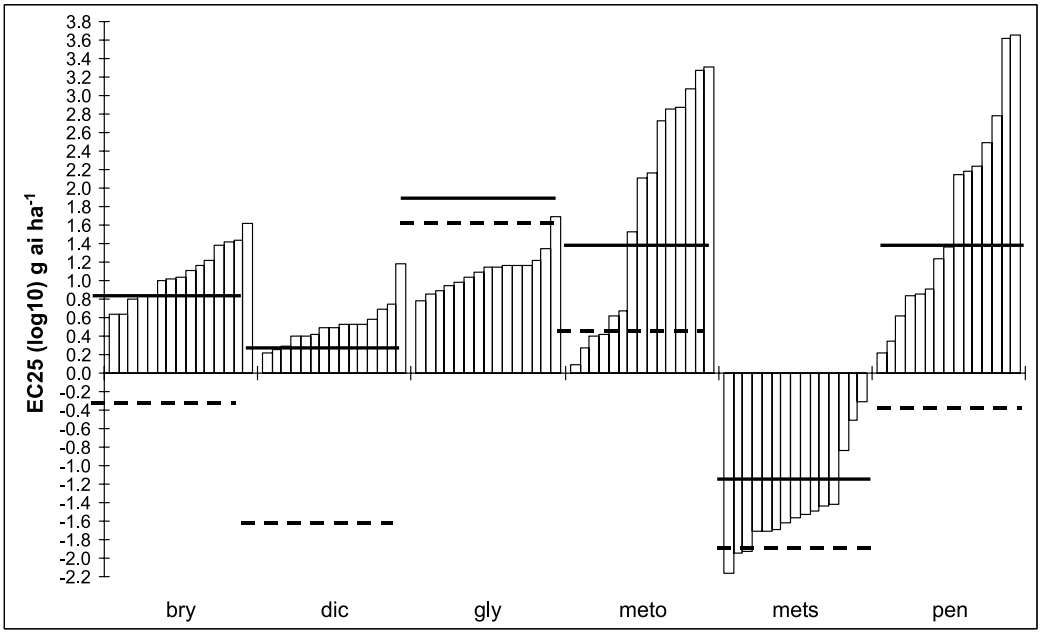

Figure 4. Risk assessment performed using the plant species tested in the Danish/Canadian database and the HC5 (Hazard Concentration protecting 95% of species) calculated with the crop species of the US EPA database. Histograms represent the log10 values of the EC_{25} for each of the 15 species tested with the six herbicides in the Danish/Canadian experiment. The two lines across for each herbicides represent the $HC5_{(50)}$ (full lines, 50% confidence level) and $HC5_{(95)}$ (dotted lines, confidence level) calculated using the US EPA data. Plant species of the Danish/Canadian database that would not be protected are situated below the lines. Bry = bromoxynil, dic = dicamba, gly = glyphosate, meto = metolachlor, mets = metsulfuron methyl, pen = pendimethalin.

only performed at the seedling stage, presumably the most sensitive one for each study herbicide, according to labels provided by registrants and documented in some studies (Marrs et al., 1991). Where effects on other growing stages have been documented, it appears that some herbicides may be equally or even more harmful, e.g., reproductive stages for plants sprayed with minute amounts of metsulfuron methyl (Boutin et al., 2000) and sulfonylureas in general (Fletcher et al., 1993; Felsot et al., 1996). Glyphosate is also more toxic to hard-to-kill perennial species in the fall than in the spring when plants are fully grown thus have a large contact surface for penetration of the herbicide that can be translocated into the storage organs (Dekker and Chandler, 1985). Glyphosate has been shown to affect seed germination when parent plants were sprayed during the seed development (Blackburn and Boutin, 2003). Pendimethalin may be more toxic to germinating seeds when applied preemergence or pre-planted incorporated. For most herbicides, effects at the vegetative and reproductive stages are largely unknown.

Another limitation inherent to our study rests in the fact that species were selected for availability from seed suppliers, and because documentation on germination and facility to grow under experimental conditions existed. Selected species were not representative of a particular ecosystem except that several plants were characteristics of open disturbed habitat. Ideally, the tested species should be chosen at random among all species of the target ecosystem they are assumed to represent, a prerequisite that can hardly be met in risk assessment. Testing was performed in the greenhouse with single species grown per pot. Whether results

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from these tests are representative of field situations where plants undergo more adverse conditions (wind, occasional drought, insect damage, competition) is debatable and is beyond the scope of this work but poses question on the legitimacy of extrapolating from greenhouse tests to natural ecosystems. Kjær et al. (1998) found that the combined effect of several stressors in the field increased the sensitivity of *P. convolvulus* to copper compared to laboratory tests. Further research is needed to tackle this question. It is likely that very conservative estimates of the potential phytotoxicity were generated in the Danish/Canadian database in relation to what could be observed in nature (Forbes and Forbes, 1993).

Phytotoxicity versus mode of action

The mode of action of the six herbicides tested includes general effects that are common to all plant systems, e.g., inhibition of photosynthesis, disruption of various amino acid synthesis, mitotic poison, suppression of lipid synthesis or auxin mimic. Consequently, it appears that plant selectivity is obtained by the timing and method of application or by the differential morphology, anatomy or physiology of the plants that are thus protected or affected by a given herbicide. Prior to the herbicidal active ingredient reaching the biochemical site of action within the plants, the herbicide must reach the surface of the plants, must penetrate the leaves or roots, must be translocated within the plants without killing plant parts at once, must remain toxic avoiding detoxification, and must remain active for a sufficient period of time to achieve effectiveness (Hess, 1987).

Effects obtained on terrestrial plants using the test methodology followed in the present study, deviates from effects found for other organisms such as birds and aquatic organisms, in that the dosage does not indicate the concentration in the organism, but merely how much of the chemical was applied per unit ground area. The actual herbicide uptake in an individual plant depends on species specific traits, individual conditions, timing and environmental factors. The ingredients that compose the formulation of a herbicide are crucial in the selectivity process as will be further considered below.

Choice of species and formulation

Species sensitivity varies greatly with the herbicide tested. As found in other studies (Marrs et al., 1989; Fletcher et al., 1990; Pestemer and Zwerger, 1999), no one species was the most or the least sensitive plant. In the Danish/Canadian database in the case of metolachlor, pendimethalin and to a lesser extent metsulfuron methyl, the Asteraceae family clearly exhibited less sensitivity and the Lamiaceae generally showed more sensitivity. In the US EPA database, monocotyledons (Poaceae and Liliaceae) were frequently less sensitive than dicotyledons. There was no overlap between the two datasets except for *Polygonum convolvulus* tested with metsulfuron methyl. Regardless, the overall toxicity of each herbicide was always higher in the Danish/Canadian database. Two factors may explain the difference in the magnitude of toxicity between the two datasets. First, in the US EPA database, species were tested with the active ingredients alone while in the Danish/Canadian database, all species were tested with the formulated product. The ingredients entering in the formulation of each herbicide is trade secret and is therefore largely unknown. What is known is that surfactants or additives form a significant amount of herbicidal compounds usually applied, and that they serve numerous functions, among them emulsifying, dispersing and wetting, or solubilisating (Deming and Magin, 1987; Knowles, 1995). These functions result in bioenhancement of herbicidal activity by improving spreading and retention on leaf surface, thereby increasing uptake or translocation within plants. For instance, this may be the primary reason why the formulation with glyphosate, a non-selective herbicide, yielded more toxicity with plants tested with the Danish/Canadian database than to those of the US EPA database. The active ingredient of Roundup^{R} is formed by 41% by volume of the monoisopropylamine salt of glyphosate, *N*-(phosphonomethyl) glycine (Ghassemi et al., 1982; Payne et al., 1987; Carlisle and Trevors, 1988). It also includes 59% by volume of inert (non-herbicidal) ingredients, including about 41% water and 15% of a polyethoxylated tallow amine surfactant that enhances the spreading of spray droplets when they contact foliage (Freedman, 1991).

Secondly, as mentioned earlier, species selected in the US EPA database were frequently insensitive, i.e. crop species on which the herbicide is to be used for the control of weeds. For example, bromoxynil selectivity between gramineous and broad-leaved plants is based mainly on differential retention by morphologically contrasting species due to difference in uptake (e.g. hairs, nature of waxy cuticle), movement within plants and also metabolism – monocots naturally possess a nitrilase gene capable of metabolising bromoxynil herbicides into non-phototoxic benzoic forms (Sanders and Pallett, 1987; Cuthbert et al., 2001). Likewise, Banvel is the formulated product containing dicamba and was used in the Danish/Canadian experiment – it likely contains both the dimethylaminesalt and related acids as well as a number of surfactants. This is in contrast with the US EPA test which was done with the active ingredient of dicamba acid only. Banvel is more toxic to dicots than to monocots. The anatomy of monocots and dicots is different with respect to the phloem arrangement; In monocots it is scattered in bundles surrounded by protective sclerenchyma tissue (Sterling and Hall, 1997). Other characteristics in the anatomy of monocots may explain the differential sensitivity, such as the absence of cambium and pericycle from the vascular bundle which is herbicide sensitive, and the presence of intercaly meristem in the stems and young leaves that may act as a barrier for the translocation of the herbicide dicamba (Sterling and Hall, 1997). Clearly, both bromoxynil and dicamba exhibit little toxicity to grasses and the monocot *Allium* as shown in the US EPA database and are exceedingly toxic to broad-leaved plants as demonstrated in both databases.

Dual, the formulated product containing metolachlor, is likely to contain both S-enantiomer (87.3% in Dual Gold) of metolachlor and its R-enantiomer. In the US EPA database, tests were performed with the S-isomer form of metolachlor as well as another form of metolachlor probably containing both isomers (but unspecified). The S-enantiomer is the herbicidal component, being very potent while the R-enantiomer is inactive (Matthes et al., 1998). In contrast to bromoxynil and dicamba it is known to be more potent on grass species, as shown in the US EPA results. Finally, only minute amount of metsulfuron methyl is necessary to cause toxicity on plants hence the need of a surfactant to be added for good spreading and penetration into leaves and to assist the translocation into the whole plants (Beyer et al., 1988).

It is quite clear that much uncertainty can be reduced by testing different species than those currently submitted at present to the US EPA and to many other countries. It seems almost unfeasible to select representative plants considering the massive variability in response and the large number of plant species in existence. Nevertheless, if what is intended is protection of both adjacent crop plants but also species in field margins and habitats interspersed within the agricultural landscapes, the selection of species should be done differently than what currently prevails.

By and large, all species used in the Danish/Canadian experiment were uncomplicated to grow, transplant and maintain in the greenhouse. Even the requirement for vernalisation necessary for *Polygonum convolvulus* did not constitute a major impediment as it merely consisted of placing in cold temperature for 8 weeks, seeds already sown in trays. Alternatively, more seeds could be sown as germination is not entirely prevented by a lack of cold treatment. Hitherto, it was found that *Centaurea cyanus, Nepeta cataria, Sinapis arvensis,* and *Papaver rhoeas* were the easiest to germinate and were fast growing, therefore should be considered preferred candidates for further experiments. *Polygonum convolvulus* has the disadvantage of being a climbing species which makes it more cumbersome to use. Other smaller species, e.g. *Bellis perennis, Mentha spicata, Prunella vulgaris* and *Anagallis arvensis* were slower to reach the required growth stage. Surprisingly, *Solidago canadensis*, a large species common in field margins and pastoral habitats, and *Rucbeckia hirta,* a common species in old fields, were rather slow growing species at first. Many other non-crop species have been used by researchers all over the world that could be good candidate test species in risk assessment testing for herbicide.

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Species sensitivity distribution

The $HC5_{(50)}$ is a conservative estimate of the threshold of toxicity (Okkerman et al., 1991; Aldenberg and Slob, 1993; Baril et al., 1994). In the Danish/Canadian study the $HC5_{(50)}$ for a given compound was always lower than the minimum EC_{50} or EC_{25} calculated for any species. In the US EPA database, only in two cases was the EC_{25} lower than the threshold $HC5_{(50)}$ calculated with the US EPA database. In marked contrast, using the threshold $HC5_{(50)}$ calculated with the US EPA database to estimate the risk to the Danish/Canadian species tested (assuming these represent native/wild plants to be protected within agricultural areas), showed that many species would be left unprotected, the extreme being glyphosate with 100% of species. This value, the $HC5_{(50)}$ is what is recommended for use in risk assessment in some countries (Van Straalen and Van Leeuwen, 2002). The HC5(95%) value calculated with the US EPA data would have protected 95% of the Danish/Canadian non-crop species for only three herbicides (Fig. 4).

Conclusion

It is very likely that the current suite of species prescribed in current guidelines will not be adequate for the protection of habitats, e.g., field margin species, in agricultural areas. The non-randomness in the current selection of species favoured in the US EPA and other countries (Holst and Ellwanger, 1982; Organisation for Economic Co-operation and Development, 1984) causes an unacceptable bias with consequences that risk is underestimated. Some basic rules should be followed in the selection of plants: (1) No crop species on which products will be applied, (2) No known species for which the product is presumably not toxic, often revealed by efficacy data (see Boutin and Rogers, 2000; Boutin et al., 1995), (3) Mostly non-crop species and preferably species of field margins. Many non-crop species are easy to grow in greenhouses. Factors that could be considered in the selection of non-crop species to be tested are seed size, growth rate and requirements for germination. In this comparative analysis, however, it was not possible to distinguish between effects caused by the plant species selected and effects induced by the formulation of the herbicides tested, and this alone commands further research.

Acknowledgements

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Appendix 1. Result of range finding test, doses used for testing in the definitive test and EC_{50}s calculated with confidence intervals, using the dry weight of aerial parts as endpoint. Effects in the range finding test were recorded by visual assessment (see text)

	Range finding test (g ai ha^{-1})		Definitive test				EC_{50}	Confidence intervals	
Plant species	LOEL[a]	HOEL[a]	Concentrations tested (g ai ha^{-1})				(g ai ha^{-1})	Lower	Higher
(a) Bromoxynil									
Bellis perennis	40	400	40	72	130	240	33.28	27.84	44.68
Centaurea cyanus	4	40	4	8	16	32	17.22	13.98	21.54
Inula helenium	4	400	14	24	44	80	8.76	8.14	9.82
Rudbeckia hirta	4	40	6.8	12	22	40	9.26	6.00	12.88
Solidago canadensis	40	40	20	40	80	160	19.84	15.46	47.40
Leonorus cardiaca	4	2000	20	40	80	160	29.30	20.54	35.86
Mentha spicata	40	400	40	80	160	320	77.84	59.42	113.68

Appendix 1. Continued

Plant species	Range finding test (g ai ha^{-1})		Definitive test				EC_{50} (g ai ha^{-1})	Confidence intervals	
	LOEL[a]	HOEL[a]	Concentrations tested (g ai ha^{-1})					Lower	Higher
Nepeta cataria	4	400	20	40	80	160	50.46	39.64	60.28
Prunella vulgaris	4	400	4	8	16	32	14.54	11.74	18.38
Polygonum convolvulus	40	400	40	72	130	234	21.00	20.68	21.32
Rumex crispus	4	2000	10	20	40	80	18.20	13.50	23.70
Anagallis arvensis	4	400	10	20	40	80	14.48	9.74	18.96
Digitalis purpurea	40	400	40	80	160	320	56.02	46.50	61.50
Sinapis arvensis	4	40	25	50	100	200	31.24	23.94	39.16
Papaver rhoeas	40	400	40	80	160	320	56.88	39.22	78.00
(b) Dicamba									
Bellis perennis	44	4440	10	20	40	80	11.50	7.82	17.20
Centaurea cyanus	44	4440	5.5	11	22	44	3.90	3.60	4.74
Inula helenium	44	444	5	10	20	40	3.32	3.08	3.56
Rudbeckia hirta	44	44	5	10	20	40	6.52	4.32	8.20
Solidago canadensis	44	4440	44	88	176	352	30.76	27.76	38.26
Leonorus cardiaca	44	444	5	10	20	40	8.20	5.30	11.88
Mentha spicata	44	444	5	10	20	40	5.46	4.26	7.50
Nepeta cataria	44	444	10	20	40	80	9.96	8.08	25.02
Prunella vulgaris	44	444	7.5	15	30	60	7.68	6.58	11.26
Polygonum convolvulus	44	44	5.5	11	22	44	8.30	5.06	16.18
Rumex crispus	44	44	5	10	20	40	10.72	8.34	13.18
Anagallis arvensis	44	444	5	10	20	40	8.32	5.80	11.04
Digitalis purpurea	44	444	5	10	20	40	4.92	4.44	7.30
Sinapis arvensis	44	444	5	10	20	40	3.54	3.24	3.96
Papaver rhoeas	44	4440	5	10	20	40	5.76	4.04	11.72
(c) Glyphosate									
Bellis perennis	14.4	1440	20	36	64	116	14.26	13.22	16.02
Centaurea cyanus	144	144	18	36	72	144	29.18	23.32	37.34
Inula helenium	144	7200	70	140	280	560	43.46	38.42	51.36
Rudbeckia hirta	14.4	1440	20	36	64	116	24.70	15.86	29.98
Solidago canadensis	14.4	144	10	20	40	80	24.06	17.44	31.38
Leonorus cardiaca	14.4	7200	18	36	72	144	35.82	27.84	48.34
Mentha spicata	144	144	20	38	66	120	17.94	15.64	21.12
Nepeta cataria	14.4	1440	20	36	64	116	39.74	32.28	48.46
Prunella vulgaris	14.4	7200	9	18	36	72	28.00	22.10	33.34
Polygonum convolvulus	14.4	144	20	100	180	260	15.76	14.34	17.30
Rumex crispus	144	7200	40	80	160	320	27.50	24.92	29.92
Anagallis arvensis	14.4	144	9	18	36	72	17.52	15.06	26.40
Digitalis purpurea	144	7200	40	80	160	320	64.66	61.04	69.22
Sinapis arvensis	144	144	20	36	64	116	19.28	16.28	26.04
Papaver rhoeas	14.4	144	8	16	32	64	18.52	13.12	25.12
(d) Metolachlor									
Bellis perennis	2500	12500	1000	2000	4000	8000	1534.76	899.12	2419.14
Centaurea cyanus	2500	12500	4000	8000	12000	16000	4068.60	3326.12	6170.28
Inula helenium	2500	12500	1000	2000	4000	8000	1105.32	847.02	1660.24
Rudbeckia hirta	250	12500	1000	2000	4000	8000	1580.58	946.44	1773.76
Solidago canadensis	25	12500	400	800	1600	3200	2000.78	Not possible	
Leonorus cardiaca	25	2500	10	20	40	80	9.50	Not possible	
Mentha spicata	25	2500	4	8	14	25	3.76	3.18	5.58
Nepeta cataria	25	2500	7.6	13.8	25	45	9.62	6.84	14.20
Prunella vulgaris	25	2500	3.2	6.4	12.6	25	9.20	5.88	11.88
Polygonum convolvulus	250	2500	420	780	1380	2500	258.68	250.28	265.64
Rumex crispus	25	2500	40	80	160	320	205.84	143.12	262.20

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Appendix 1. Continued

Plant species	Range finding test (g ai ha^{-1})		Definitive test				EC_{50} (g ai ha^{-1})	Confidence intervals	
	LOEL[a]	HOEL[a]	Concentrations tested (g ai ha^{-1})					Lower	Higher
Anagallis arvensis	25	2500	3.4	6	12	20	11.64	4.80	15.54
Digitalis purpurea	25	12500	2.5	5	10	20	2.46	Not possible	
Sinapis arvensis	25	2500	1000	1800	3240	5840	2568.54	1879.02	3037.96
Papaver rhoeas	250	2500	300	600	1200	2400	285.68	230.36	425.06
(e) Metsulfuron methyl									
Bellis perennis	0.04	40	0.08	0.12	0.18	0.28	0.0550	0.0500	0.0638
Centaurea cyanus	0.04	40	0.6	1.2	2.2	4	1.6250	0.6796	2.8316
Inula helenium	0.04	40	0.04	0.08	0.16	0.32	0.0236	0.0228	0.0242
Rudbeckia hirta	0.04	40	0.04	0.08	0.16	0.32	0.0678	0.0430	0.0816
Solidago canadensis	0.04	0.4	0.06	0.09	0.136	0.2	0.0692	0.0536	0.0830
Leonorus cardiaca	0.04	20	0.04	0.08	0.16	0.32	0.1406	0.1112	0.1728
Mentha spicata	0.04	20	0.04	0.08	0.16	0.32	0.0392	0.0338	0.0614
Nepeta cataria	0.04	40	0.04	0.08	0.16	0.32	0.0392	0.0338	0.0614
Prunella vulgaris	0.04	20	0.02	0.04	0.08	0.16	0.0246	0.0164	0.0312
Polygonum convolvulus	0.4	40	0.5	1	2	4	0.2888	0.2794	0.3036
Rumex crispus	0.04	20	0.068	0.122	0.22	0.4	0.0604	0.0540	0.0706
Anagallis arvensis	0.04	20	0.01	0.02	0.04	0.08	0.0238	0.0120	0.0370
Digitalis purpurea	0.04	20	0.4	0.8	1.6	3.2	0.6252	0.5074	0.7532
Sinapis arvensis	0.04	400	0.04	0.08	0.16	0.32	0.0496	0.0374	0.0614
Papaver rhoeas	0.04	20	0.04	0.08	0.16	0.32	0.0424	0.0348	0.0584
(f) Pendimethalin									
Bellis perennis	2000	10000	2000	3600	6480	11664	1200.34	1122.00	1372.00
Centaurea cyanus	2000	10000	10000	15000	20000	25000	8280.72	7524.00	17254.00
Inula helenium	200	10000	400	800	1600	3200	304.34	274.00	342.00
Rudbeckia hirta	No result		15000	22500	33700	50500	8966.44	8362.00	10158.00
Solidago canadensis	200	10000	300	600	1200	2400	1068.56	Not possible	
Leonorus cardiaca	20	20000	25	50	100	200	44.24	24.88	65.80
Mentha spicata	20	20000	3	6	12	24	4.24	2.60	8.10
Nepeta cataria	200	10000	25	50	100	200	16.34	15.06	18.32
Prunella vulgaris	20	20000	10	30	90	270	8.46	7.48	11.48
Polygonum convolvulus	200	20000	500	1000	2000	4000	343.72	324.60	364.74
Rumex crispus	20	20000	40	80	160	320	53.54	39.90	65.78
Anagallis arvensis	20	20000	5	10	20	40	4.38	3.60	7.02
Digitalis purpurea	20	20000	10	20	40	80	16.06	10.96	19.44
Sinapis arvensis	200	20000	250	500	1000	2000	300.56	206.02	445.40
Papaver rhoeas	20	20000	20	40	80	160	14.32	12.60	16.24

[a]LOEL – low observed effect level = lowest dose where an effect occurred; HOEL – high observed effect level = highest dose where an effect occured before mortality.

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Annex 14

French Republic, Decree On the Use of Products Mentioned in Article L.253-1 of Rural Code (5 Mar. 2004)

24 March 2004 **OFFICIAL GAZETTE OF THE FRENCH REPUBLIC** 5631

Decree of 5 March 2004 regarding the aerial use of products mentioned in article L 253-1 of the Rural Code

NOR: ***AGRG0400670A***

The Minister of Ecology and Sustainable Development, the Minister of Health, Family and Handicapped Persons and the Minister of Agriculture, Food, Fishing and Rural Affairs.

Whereas the Rural code, and notably its articles L. 253 -1 to L. 254-2;

Whereas the Public Health Code, and notably its articles L. 1321-2. L. 5132-2 and R. 3167;

Whereas the Civil Aviation Code:

Whereas the Environmental Code, and notably its articles L. .331-1 to L. 331-25 and L. 332-1 to L. 332-27;

Whereas the Decree of February 25, 1975, as amended, establishing provisions regarding the application of antiparasitic products for agricultural use:

Whereas the Opinion of the Commission on Antiparasitic Products for Agricultural Use dated March 28, 2003.

Art. **2.** - Any aeria l tr eatment is subjec t to a pr ior declaration consisting of the following elements:

- the form provided for this purpose, duly completed;
- upon omitting an indication on this form specifying the replenishing points for the aircraft, a map at 25,000 specifying the location of these points;
- any other information judged useful by the initiator of the order or the operator.

Art. **7**. - When an aerial treatm ent takes place ove r a veg etal cov er that does no t perm it the aircraft pilot to assure himself of the

[PAGE 2]

absence of people in the zone to be treate d or over a space frequented by the public, the originator of the order must br ing the foregoing to the attention of the public, specifically by posting bills, prior to carrying out these treatments.

Annex 14

ARRETE

Arrêté du 5 mars 2004 relatif à l'utilisation par voie aérienne de produits mentionnés à l'article L. 253-1 du code rural

NOR: AGRG0400670A
Version consolidée au 01 mai 2010

La ministre de l'écologie et du développement durable, le ministre de la santé, de la famille et des personnes handicapées et le ministre de l'agriculture, de l'alimentation, de la pêche et des affaires rurales,

Vu le code rural, et notamment ses articles L. 253-1 à L. 254-2 ;

Vu le code de la santé publique, et notamment ses articles L. 1321-2, L. 5132-2 et R. 5167 ;

Vu le code de l'aviation civile ;

Vu le code de l'environnement, et notamment ses articles L. 331-1 à L. 331-25 et L. 332-1 à L. 332-27 ;

Vu l'arrêté du 25 février 1975 modifié fixant les dispositions relatives à l'application des produits antiparasitaires à usage agricole ;

Vu l'avis de la commission des produits antiparasitaires à usage agricole en date du 28 mars 2003,

Article 1 En savoir plus sur cet article...

Au sens du présent arrêté, on entend par traitement aérien toute utilisation au moyen d'aéronefs, tels que définis à l'article L. 110-1 du code de l'aviation civile, de produits mentionnés à l'article L. 253-1 du code rural à des fins de protection des végétaux.

Le donneur d'ordre est celui pour le compte duquel est effectué le traitement aérien, l'opérateur celui qui en assure la réalisation.

Article 2 En savoir plus sur cet article...

Tout traitement aérien est soumis à une déclaration préalable comportant les éléments suivants :

- le formulaire prévu à cet effet, dûment rempli ;

- à défaut d'avoir indiqué sur ce formulaire la localisation précise des points de ravitaillement de l'aéronef, un plan au 25000 précisant la localisation de ces points ;

- toute autre information jugée utile par le donneur d'ordre ou l'opérateur.

Article 3 En savoir plus sur cet article...

Modifié par Décret n°2010-429 du 29 avril 2010 - art. 6 (V)

Le donneur d'ordre et l'opérateur du traitement aérien adressent la déclaration visée à l'article 2 à la direction régionale de l'alimentation, de l'agriculture et de la forêt, service régional de la protection des végétaux, ou à la direction de l'agriculture et de la forêt, service de la protection des végétaux, pour les départements d'outre-mer.

Il tient également à la disposition des agents de ces services la liste des personnes concernées par chaque chantier de traitement aérien ainsi que les coordonnées cadastrales des parcelles faisant l'objet d'une déclaration

de traitement aérien.

Cette déclaration doit parvenir au service concerné au plus tard le jour ouvré précédant la date prévue du traitement aérien et 24 heures au moins avant le début de la réalisation du traitement déclaré.

Article 4 En savoir plus sur cet article...

Modifié par Décret n°2010-429 du 29 avril 2010 - art. 6 (V)

Dans les cinq jours qui suivent le traitement aérien, l'opérateur du traitement doit faire parvenir à la direction régionale de l'alimentation, de l'agriculture et de la forêt, service régional de la protection des végétaux, ou à la direction de l'agriculture et de la forêt, service de la protection des végétaux, le formulaire prévu à l'article 2 du présent arrêté, dûment rempli, ainsi que toutes informations jugées utiles par la direction régionale de l'alimentation, de l'agriculture et de la forêt, service régional de la protection des végétaux, ou à la direction de l'agriculture et de la forêt, service de la protection des végétaux, pour les départements d'outre-mer.

Article 5 En savoir plus sur cet article...

L'utilisation pour les traitements aériens de produits antiparasitaires classés "toxique" et "très toxique" au sens de l'article L. 5132-2 du code de la santé publique est interdite.

Article 6 En savoir plus sur cet article...

Lors des traitements aériens, l'opérateur doit respecter une distance minimale de sécurité de 50 mètres vis-à-vis des lieux suivants :

- habitations et jardins ;

- bâtiments et parcs où des animaux sont présents ;

- points d'eau consommable par l'homme et les animaux, périmètres de protection immédiate des captages pris en application de l'article L. 1321-2 du code de la santé publique ;

- bassins de pisciculture, conchyliculture, aquaculture et marais salants ;

- littoral maritime, cours d'eau, canaux de navigation, d'irrigation et de drainage, lacs et étangs d'eau douce ou saumâtre ;

- ruches et ruchers déclarés ;

- parcs d'élevage de gibier, parcs nationaux, ainsi que les réserves naturelles au titre respectivement des articles L. 331-1 à L. 331-25 et L. 332-1 à L. 332-27 du code de l'environnement.

Article 7 En savoir plus sur cet article...

Lorsqu'un traitement aérien a lieu sur un couvert végétal ne permettant pas au pilote de l'aéronef de s'assurer de l'absence de personnes dans la zone à traiter ou sur un espace fréquenté par le public, le donneur d'ordre doit porter au préalable à la connaissance du public, notamment par voie d'affichage, la réalisation de ces traitements.

Article 8 En savoir plus sur cet article...

Les articles 5, 6 et 7 de l'arrêté du 25 février 1975 susvisé sont abrogés.

Article 9 En savoir plus sur cet article...

Les agents mentionnés au I de l'article L. 251-18 du code rural sont habilités à rechercher et constater les infractions aux dispositions du présent arrêté.

Le fait de ne pas respecter les dispositions du présent arrêté, en particulier le défaut de déclaration ou la présentation de déclaration fausse ou incomplète, est puni des peines prévues au II de l'article L. 253-17 du code

rural.

Article 10 En savoir plus sur cet article...

Le directeur général de l'alimentation, le directeur de la prévention des pollutions et des risques et le directeur général de la santé sont chargés, chacun en ce qui le concerne, de l'exécution du présent arrêté, qui sera publié au Journal officiel de la République française.

Le ministre de l'agriculture, de l'alimentation, de la pêche et des affaires rurales,

Pour le ministre et par délégation :

Le directeur général de l'alimentation,

T. Klinger.

La ministre de l'écologie et du développement durable,

Pour la ministre et par délégation :

Le directeur de la prévention des pollutions et des risques,

T. Trouvé.

Le ministre de la santé, de la famille et des personnes handicapées,

Pour le ministre et par délégation :

Le directeur général de la santé,

W. Dab.

Annex 14

Annex 15

Las Palmas Ltda., Technical Department, *Glyphosate (10,4 l/ha) and Three Different Adjuvants, For Illicit Coca Crop (Erythoxylum spp.) Control, Agronomic Efficacy Testing of Doses of Glyphosate in Illicit Crops: Final Report* (July 2004)

Annex 15

GLYPHOSATE (10.4 L/HA) AND THREE ADJUVANTS,

FOR THE CONTROL OF ILLICIT COCA CROPS, Erythoxilum spp.

AGRONOMIC EFFICACY TESTING OF DOSES OF GLYPHOSATE IN ILLICIT CROPS

FINAL REPORT

(Seal) Las Palmas

TECHNICAL DEPARTMENT

Bogota, July 2004

Annex 15

GLYPHOSATE (10,4 L/HA) AND THREE DIFFERENT ADJUVANTS, FOR ILLICIT COCA CROP (Erythoxylum spp.) CONTROL
(AGRONOMY EFFICACY TESTING OF DOSES OF GLYPHOSATE IN ILLICIT CROPS)

1. INTRODUCTION

The United States Embassy Narcotics Affairs Section (NAS) supports the Colombian State's efforts in its strategic goal of reducing the drug supply by fighting drug production, trafficking, and distribution, including the destruction of existing illicit crops either manually or through aerial spraying with herbicides, as well as the illicit drug business support infrastructure.

Recently, the Government of the Republic of Colombia decided to **reinitiate** the eradication of illicit crops, using a dose of **10.4 liters** of a commercial formula (CF) of the herbicide glyphosate, along with an adequate adjuvant. That is why the need to forward agronomic efficacy testing became evident, in order to meet the standard requirements set by the Colombian Farming and Livestock Institute (ICA) and by the environmental authorities, as set forth in 1995 Ministry of Agriculture and Rural Development Resolution 3079.

The Colombian Government, along with the United States Government through its Narcotics Affairs Section (NAS), contracted Sociedad las Palmas Limitada's Technical Department to conduct and track the agronomic efficacy testing, using a dose of 10.4 L/ha. of a commercial formula of glyphosate and three different types of adjuvants in the provincial department of Guaviare, following the terms set forth in a Technical Protocol approved by ICA experts. The first phase of applying these treatments started on February 10, using the Colombia National Police (PNC) Anti-Narcotics Division Base located on the premises of the local airport, to spray commercial coca plots ***(Erythroxylum*** spp.).

Through the above-mentioned Protocol Efficacy Testing, we intended to evaluate the effectiveness of the different treatments with the three different adjuvants, test their effect on the environment, identify the main conditions that could improve the effect of the spraying and, thus, the efficacy of the Illicit Crop Eradication Program.

2. BACKGROUND AND JUSTIFICATION

The eradication of coca and other illicit crops is of major concern in all producing countries, and the fastest, safest alternative to controlling the harm caused by drugs, including deforestation and planting of new crops, is the eradication of the existing illicit crops.

The information obtained throughout the years while control has been enforced on illicit crops in Colombia using aerial spraying of glyphosate (30, 31) has demonstrated that the commercial formula of the herbicide glyphosate has been adequate, although it has raised some controversies. Sociedad Las Palmas Ltda.'s Technical Department was selected among the institutions invited to bid on doing the agronomic efficacy testing, and it was previously established that those tasks were to be carried out and performed following the parameters contained in a special Protocol to be approved and supported by ICA. All field testing was to be witnessed and supervised by ICA, National Directorate for Dangerous Drugs (DNE), and Ministry of the Environment, Housing and Territorial Development representatives, in addition to technical supervision by the United States Embassy NAS Office.

5.0 LITERATURE REVIEWED

There is no information or experience regarding illicit crop eradication using aerial spraying of herbicides from altitudes greater than 10 meters in international technical literature. As a matter of fact, the most updated information may well be the Colombian experience related to the treatments and aircrafts used by the Illicit Crop Eradication Program (Briñez, 5), (Helling, 13), (Revelo, 30, 31, 32), for spraying from altitudes greater than those traditionally used in phytosanitary agronomic programs. We found no experiences other than the above-mentioned ones and those indirectly related to the topic found in different unpublished isolated reports or whose distribution is restricted. In some cases, they are specialized articles and in many cases, they are not reliable signed sources.

There is a report of interest prepared by Sociedad Las Palmas Ltda.'s Technical Department, in charge of Gemsi Ltda. (Revelo, 31), which documents discharge and drift testing experiences in T-65 aircraft from maximum altitudes of 20 meters. Through the search engines available on Internet, there is no information regarding aerial spraying of illicit crops from more than 20 meters of altitude.

Notwithstanding the above, it is worth mentioning that there are some good contributions made by Eng. Orlando Briñez (5), experts L. E. Parra, Lake Ellis and M. Revelo P., Eng. Jairo Pérez, from Consulting Firm EPAM and several bulletins prepared by the Tennessee University Engineering Department (46), USA, WRK from Manhattan, and by Bishop Equipment MFG., INC, Steward Agricultural Research Services Inc. (Missouri) USA, Spray Drift Task Force (33a) (Missouri), in addition to other sources of reference. In the specific case of Colombia, there are some publications that are also useful, written a few years ago by Ciba Geigy (8, 9) as part of phytosanitary technical advice to be used in food and industrial crops), Hernández (14), Calderón (6) and Angel (2), to name a few.

In addition to the above, in all experiences similar to those of Colombia which have taken place in Peru, Bolivia, and Panama (Helling, 13), the spraying was done from very low altitudes and, therefore, the corresponding technical parameters cannot be used as applicable references for the spraying done in Colombia.

The Project Technical Director was concerned that the labor did not include studies related to the effect of certain properties of each adjuvant concerned, but, taking into account that the terms in the Technical Protocol could not be modified after approval, the discharge testing had to be done leaving various technical aspects out and without including any comparison spraying for data of a discharge using a formula with a 10.4-liter glyphosate mix without adjuvants.

Reviewing the data in the Charts and Graphs in Section 7.1.1 herein enabled us to identify various results of great importance for any spraying program. Among them, we highlight the following:

a) Although the environmental conditions under which the discharge, evaporation, and drift testing was done were not ideal, they were not outside the acceptable margins adopted in the Colombian National Police Anti-Narcotics Division Illicit Crop Eradication Program.

b) There was much variation in the "losses" of the product due to evaporation, drift or other causes, in the mixes being tested, but we have no adequate evidence to identify the magnitude and individual causes of such variation and, with no no facts to the contrary, we could think that some portion of the variations may be due to some of the physical-chemical characteristics of the adjuvants used, including the effect of differences in the quantities of the active ingredient applied in the tested mixes. Also, the lack of results of comparison to a glyphosate-based treatment without adjuvants does not enable us to know to what point the reducing effect of the surface tension of some or all of the adjuvants tested could have acted.

c) The greatest losses occurred in the glyphosate mix using the adjuvant Cosmoflux 411 F (the Commercial Control Treatment), representing losses of 72.67% and the least losses, based on the data available, was 32.69% using the glyphosate mix with the adjuvant Agrotin, according to the numerical data obtained. The mixes using the adjuvants Potenzol and Inex-A gave intermediate values, as may be appreciated by reviewing the average data on the actual discharges, which appears in the charts and graphs included in this section of the report.

d) The results of the testing enabled us to calculate that the theoretical spray discharge should be 0.250 mg/cm^2 of mix, in which 16% would correspond to the equivalent acid of glyphosate, that is to say, 0.0374 mg/cm^2, or 21.33 % of isopropylamine salt, that is to say, 0.04992

mg/cm^2. Reviewing the records of the original readings and analyzing the water-sensitive paper cards enabled us to calculate that this value was not reached in any of the spraying operations, as may be seen below.

CHART 7.1.1. d 1

DISCHARGE CALCULATED BY PROCESSING THE DATA FROM THE CARDS

	mg. of Recovery	**% of Recovery**
Glyphosate with Cosmoflux 411 F	0.06397 mg/cm^2	27.33% recovery
Glyphosate with Agrotin	0.15747 mg/ cm^2	67.31% recovery
Glyphosate with Potensol	0.11837 mg/cm^2	50.58% recovery
Glyphosate with Inex-A	0.07034 mg/cm^2	30.05% recovery

e) Based on the experiences of aerial spraying using pesticides in phytosanitary programs (Aerial Application of Agrochemicals, 1979), we already expected the spray particles with less than 200-micron average diameters to be very susceptible to the effect of evaporation, if the discharge from the spraying equipment is done from more than 5 meters of altitude, and especially if conditions of temperature, relative humidity, and rising or transversal air currents facilitate evaporation. This phenomenon appears to have occurred in some of the test spraying done at the beginning of the San José del Guaviare Airport runway, if we keep in mind that no stains less than 250 microns in diameter were identified on the water-sensitive paper cards. The experiences in phytosanitary handling also indicated to us that even in the most refined spraying equipment calibration processes (8, 8a. – Ciba-Geigy), a good portion of the particles of the sprayed material breaks down into particles smaller than 200 microns in diameter, which can evaporate in a few seconds while falling to the ground. Due to the above, it was not too adventurous for us to estimate that most of the particles smaller than 300 microns in diameter would not reach the surface of the water-sensitive paper cards and that they were lost due to evaporation or transversal drift during their fall, before reaching the ground.

f) In one part of the testing (Cosmoflux and Inex-A), without a doubt, we saw the phenomenon of drift evidenced by a lateral shift of some stains on the paper of up to 10 meters of distance, from the central axis of the spray swath, due to a transversal wind

8.0 CONCLUSIONS AND RECOMMENDATIONS

After concluding the field testing and laboratory tests stipulated in the Experimental Protocol designed to measure the efficiency of the spraying using 10.4 L/ha commercial formula of glyphosate with one of four adjuvants selected to be part of the 23.4 L/ha formula used, we drew the conclusions that we summarize below.

8.0.1 Calculation of Spray Deposit and Drift, Using 10.4 L./ha Commercial Formula of Glyphosate

a) We would like to say that the results foreseen in this objective could have been better if we had not had the limitations of resources, materials, and time stipulated in the Official Protocol. Despite the above, the results achieved were very satisfactory.

b) The glyphosate mix with Agrotín had least losses in the 30-meter fall from the spraying equipment nozzle to the coca plant leaves, followed by the glyphosate mix with Potenzol. However, with the results of the discharge, evaporation, and drift testing, we still cannot explain for certain why these two mixes were superior to the glyphosate mix with Inex-A and the glyphosate mix with Cosmoflux 411 F (27). Not having included a glyphosate mix without any adjuvant in the testing impeded us from being able to evaluate the effect of glyphosate without those adjuvants, because, even the commercial formula already comes with a special adjuvant.

8.0.2 Aerial Spraying of the Coca Crop Plots

a) Although all of the mixes used provided a degree of coca crop control superior to 85%, with the data available, we could not identify for certain which was the most or least effective. Nonetheless, we can affirm that the 10.4 L/ha dose of glyphosate was efficient and effective from an agronomic point of view.

b) Although we do not know the causes due to which the glyphosate mix with Agrotín so notoriously reduced losses from evaporation and drift and we still do not know the economic surfactance threshhold of that adjuvant, we could recommend adopting the glyphosate mix with Agrotín, as an alternative to the glyphosate mix with Cosmoflux, in spite of the fact that the treatment using the glyphosate mix with Cosmoflux provided degrees of mortality of the sprayed coca plants at percentages equal or superior to the glyphosate mix with Agrotín or the glyphosate mix with Potenzol.

8.0.3 Sampling and Evaluation of Bodies of Water and Soils Likely Contaminated with Glyphosate

We met this specific objective completely. In addition, we would like to mention that no harmful effects on the plants that could have absorbed water with glyphosate residues were identified.

8.0.4 Evaluation of the Effect of Glyphosate on Native Vegetation in Sprayed Plots

We met this specific objective satisfactorily and we can affirm that no degrading impacts on the soil or the flora in the coca plots treated with the glyphosate mixes were identified.

8.1 CONCLUSIONS AND SUGGESTIONS

The following comments may summarize the overall evaluation of the results of the research process called "Protocol for Agronomic Efficacy Testing of a Dose of Glyphosate with Three Different Adjuvants, for the Control of Illicit Crops".

ONE
The results of the CONTROL of the sprayed coca crops using the diferent glyphosate mixes are very good and overwhelmingly exceed 85% mortality of the sprayed crops, as may be appreciated by reviewing the summary of the Statistical Analyses. The AGRONOMIC EFFICIENCY (coca plant control) of the Illicit Crop Eradication Program is very good, although it could be better from another perspective.

TWO
Based on the results of the discharge, evaporation, and drift testing, the quantity of glyphosate that is deposited on the coca plant leaves, in some cases, is barely near one third part of the quantity discharged from 30 meters of altitude. In spite of the above, the quantity that is deposited on the plant leaves is sufficient to cause the mortality of the coca plants.

THREE
With the data from spraying the commercial coca crops, we believe that all of the mixes tested were very effective, including the glyphosate mix with Cosmoflux 411 F, corresponding to the Commercial Control Treatment, despite the fact that it is the mix using with losses of more than 70% of the quantity discharged from 30 meters of altitude.

FOUR

The results of the discharge, evaporation, and drift testing, do not enable us to recommend for certain the adjuvant that most contributes to coca crop control and, although there are several technical reasons that suggest that AGROTIN is the best, followed by POTENZOL, we cannot yet recommend them without any reservation, in spite of them being the most opted adjuvants to incorporate into the eradication program.

The technical data from the testing done as part of the Experimental Protocol indicates that, in addition to using the appropriate calibration for the spraying equipment, the adjuvants can also contribute to reducing losses from evaporation, drift, and other causes, to the benefit of the agronomic efficiency of the dose of glyphosate.

FIVE

If we take into account the NOEL or NOEC (Non Observable Effect Concentrations) values of 158 mg. of technical-grade glyphosate per kg. of soil and of 3.74 mg. per liter of water, the Eradication Program spraying using 10.4 L/ha of commercial-grade glyphosate does not cause soil contamination in the coca crop plots or in the water bodies in or near the coca crop plots and any residue that may possibly contaminate a lentic body is of a non-significant value and of no toxicological or environmental importance (29).

Annex 15

9.0 SUMMARY

We designed a Technical Protocol that was reviewed and appraised by ICA and NAS to individually measure the **Agronomic Efficacy** of aerial spraying from 30 meters of altitude using Cosmoflux under the Illicit Crop Eradication Program. The testing was done on the illicit coca crops located in the Provincial Department of Guaviare.

To have some reference estimates on the coca plants to be eliminated, we designed a test to measure the values of the discharge and losses from evaporation and drift in the operation base failities. This testing was done at the airport, not on the coca crops when they were sprayed for control purposes (which would have been the most desireable and appropriate thing to do), for security reasons and for not being in a position to do the testing on the commercial coca crop plots themselves.

As part of the objectives stipulated in the Experimental Protocol, we also evaluated the effect of possible glyphosate contamination of the soil and bosies of water, in addition to the vegetation covering in the sprayed illicit crops.

Another part of the Experimental Protocol was the task of measuring the losses of the mix sprayed from 30 meters of altitude due to evaporation, drift, and other causes. The results that we came up with were: using the glyphosate mix with the adjuvant Agrotín, the losses were 36.69%; using the glyphosate mix with Potensol they were 49.32%; using the glyphosate mix with Inex they were 69.95% and using the glyphosate mix with Cosmoflux (the treatment that we used as the Commercial Control Treatment) they were 72.67%. Using the glyphosate mix with Agrotín there were least losses, but we must clarify that, the particle recovery cards did not identify particles less than 300 microns in diameter using any of the mixes.

The cover of all of the plant species native to the ecological area where the illicit crops grow was not significantly affected and two to three months later the cover looked the same as it had before the spraying.

We saw the effect of drift using one of the mixes when the wind velocity exceeded tolerable limits. The spray particles traveled up to 10 meters away from the foreseen discharge point.(See datas and diagrams corresponding to Inex-A).

Annex 16

Republic of Slovenia, *Act on Plant Protection Products* (9 Sept. 2004)

Official Consoliated version of Act on plant protection product; OJ No. 11/01 and 37/04

ACT ON PLANT PROTECTION PRODUCTS

Official consolidated version

Official Gazette of the Republic of Slovenia, No. 98/2004
9. September 2004

I. GENERAL PROVISIONS

Article 1
(content)

This Act regulates the placing on the market and the control of active substances which are plant protection products (hereinafter: »PPP«), the authorisation of PPP, the issue of authorisations on the basis of this Act, the placing on the market, use and control of PPP, residues of PPP, the register of PPP and the register of legal and natural entities involved in the placing on the market of PPP, the delivery of data and the keeping the records associated with PPP, technical requirements for equipment for the application of PPP (hereinafter: »equipment«) and its elements, authorizations of bodies responsible for the implementation of this Act and for the monitoring thereof and for of the implementation of rules issued on the basis thereof.

This Act also regulates the authorization of PPP, containing or composed of genetically modified organisms, provided that the authorization for the release into the environment of genetically modified organisms has been granted after the risk to the environment has been assessed in accordance with provisions of the regulation on genetically modified organisms.

The import into and the export from the territory of the European Union (hereinafter: »EU«) is provided for with this Act and regulations, governing the import into and the export from the territory of the EU of certain dangerous chemicals.

PPP shall be classified, packed and labelled in accordance with this Act and with the regulations on chemicals.

Production of PPP, the related placing on the market, notification in relation to the content of safety data sheets and good laboratory practice, and their control are governed by the regulations on chemicals.

Wastes of PPP, their waste packaging and the state of immissions of PPP in the environment are governed by the regulations on environmental protection.

Article 2
(meaning of terms)

The terms used in this Act shall have the following meaning:

1. PPP shall be in final form active substances and preparations, which are intended to:
   - protect plants or plant products against harmful organisms or prevent the action of such organisms;
   - influence the life processes of plants, other than as a nutrient;

Official Consoliated version of Act on plant protection product; OJ No. 11/01 and 37/04
More detailed content and manner of keeping records and data communication shall be laid down by the minister in agreement with the minister of health.

Article 7
(sale of PPP)

PPP shall be placed on the market with regards to the classification, packaging and intended use:
- only in sales outlets specialised in PPP or;
- also in flower-shops and sales outlets with non-food goods or;
- also in a special section of sales outlets with foodstuffs.

A point of sale shall be specified by the competent authority by means of an authorisation upon the proposal of the commission for PPP (further on as the »Commission«).

PPP for which it is provided for with the authorisation to may be sold in specialised sales outlets only, shall be sold only to a user, who presents a valid certificate to meet the conditions as regards education or professional competence as provided for in the regulation laid down in Article 9 of this Act.

Article 8
(proper use of PPP)

PPP must be used properly.

Proper use of PPP shall mean compliance with the instructions for use and quotation on label, including preparation of PPP in the prescribed concentration, respecting the principles of good agricultural practice, of integrated plant protection, if possible, and the protection of environment and of non-target organisms.

Aerial application of PPP shall not be permitted.

The use of PPP in a manner so as to cause pollution of residential, business and similar premises, used by people or animals, and the neighbouring land and waters, shall not be permitted.

Users of PPP, who are performers of plant health pursuant to Article 9 of this Act, shall keep records on the use of PPP in the prescribed manner, provide for the proper storage of PPP and management of PPP waste, pursuant to regulations governing the waste management.

Only the use of authorised PPP may be advised, advertised or recommended, and only for the purposes as specified in the authorisation and in instructions for use, and in accordance with the wording stated on the label.

Obligations of users as regards the use of PPP and the more detailed content and the manner of keeping the record shall be prescribed by the minister.

Article 9
(operators of plant protection)

A legal or natural entity involved in agricultural activity and being a market producer may use PPP only if meeting the prescribed conditions as regards education or professional competence and if being equipped with corresponding equipment for the application of PPP.

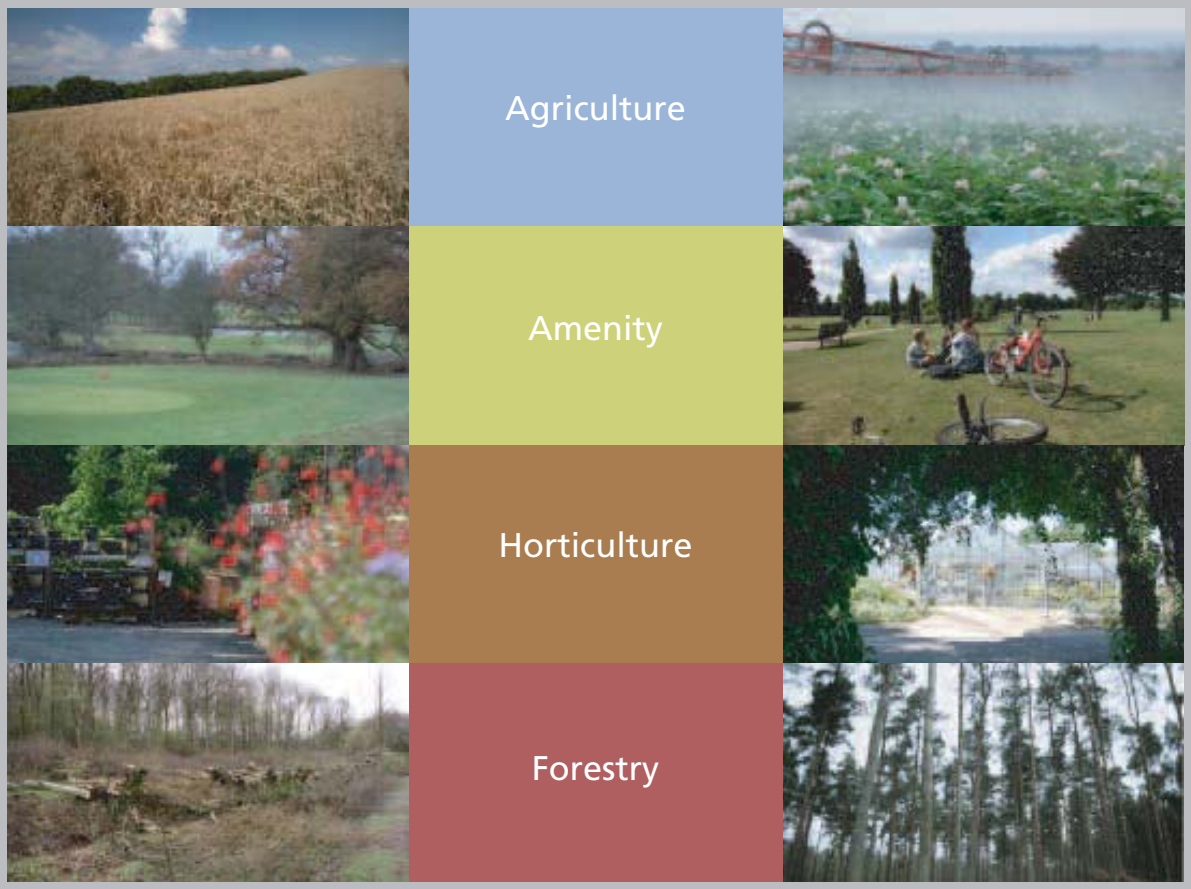
Annex 17

United Kingdom, Department for Environment, Food and Rural Affairs, *Code of Practice For Using Plant Protection Products* (2006)

Pesticides

Code of practice for using plant protection products

This code of practice has been prepared jointly by the Department for Environment, Food and Rural Affairs (Defra), the Health and Safety Commission (HSC) and the National Assembly for Wales Environment, Planning and Countryside Department.



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

HSE

PSD

defra
Department for Environment
Food and Rural Affairs

This code is also available on the PSD website
(www.pesticides.gov.uk/farmers_growers_home.asp#Codes_of_Practice)
and on the Defra website (www.defra.gov.uk///)

A Welsh language version of this code is available on the NAW website (//www.wales.gov.uk///).
Printed copies of the Welsh language version are available from:

Plant Health and Biotechnology Branch
Animal and Plant Health Division
Welsh Assembly Government
Department for Environment, Planning and
Countryside
Cathays Park
Cardiff CF10 3NQ

Biotechnoleg a Iechyd Phlanhigion
Is-Adran Polisi Iechyd Anifeiliaid a Phlanhigion
Llywodraeth Cynulliad Cymru
Adran yr Amgylchedd, Cynllunio a
Chefn Gwlad
Parc Cathays
Caerdydd CF10 3NQ

As a Scottish version of this code (approved by the Scottish Parliament) is being produced, this code is for England and Wales only. The Scottish version of the code will be available on the Scottish Executive website. Printed copies of the Scottish version will be available from:

APPP
Scottish Executive Environment and Rural Affairs Department
Pentland House, 47 Robb's Loan
Edinburgh EH14 1TY.
Phone: 0131 244 6356
E-mail: appp@scotland.gsi.gov.uk

Northern Ireland will produce their own updated version of this code in due course.

Department for Environment, Food and Rural Affairs
Nobel House
17 Smith Square
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Telephone 020 7238 6000
Website: www.defra.gov.uk

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Annex 17

Pesticides

Code of practice for using plant protection products

January 2006

defra
Department for Environment
Food and Rural Affairs

4.7.2 What causes spray drift?

A combination of factors may contribute to spray drift, including:

- the speed of the wind;
- the height of the spray nozzles, the design of the equipment and ground conditions;
- the spray quality (which will depend on the choice of nozzles and the spray pressure);
- the type of crop or other vegetation, if any;
- the speed of the vehicle the spray is being applied from;
- local atmospheric conditions;
- the condition of the equipment used to apply the pesticide; and
- the equipment settings.

4.7.3 Weather conditions

Do not apply pesticides in a way which may lead to drift. You should think about:

- if the wind direction and speed would cause the pesticide to drift away from the target; or
- there is a chance that air movement will carry spray droplets or vapour away from the target area.

This is especially important when spraying near sensitive areas.

Check the weather forecast before starting work. The Meteorological Office gives information on wind speed measured at 10 metres above the ground. When spraying a typical field crop or grassland, the wind speed at the correct height of the nozzle (an important factor affecting drift) will be roughly half the value measured at 10 metres. If there is no crop (for example, when spraying hard surfaces in amenity areas) the wind speed at the height of the nozzle may be more than half of the value at 10 metres above the ground. As wind speed and direction will be influenced by a variety of local factors (such as the presence of trees and buildings), it is important to assess the suitability of the conditions at the area you intend to treat.

When you arrive at the area you intend to treat, look for signs to show you the wind speed and direction. If you have a suitable wind-speed meter (anemometer), use this. However, you should take care to make sure that individual meter readings reflect the general situation as you see it.

Remember that hot, dry weather will reduce the size of spray droplets because of evaporation and increase the risk of spray drift.

The safest conditions in which to spray are when it is cool and humid with a steady wind of 2 to 4 miles an hour or 3.2 to 6.5 kilometres an hour (light breeze) blowing away from any sensitive areas or neighbours' land. Avoid spraying in the following weather conditions:

- when there is little or no wind under a clear sky in the morning or evening, when air layers do not mix, as any drift may hang over the treated area and unexpected air movements may move it to other places;
- when there are low winds on warm sunny afternoons when humidity is low;

- when temperatures are above 30˚C, as rising air currents may carry spray droplets and vapour in an unexpected way.

Whatever equipment you use, make sure that you do not use it when the wind will cause the pesticide to drift off target. In general, if you have low-drift spraying equipment, use this to improve the targeting of your pesticide and reduce (to the lowest possible level) the environmental effect.

The table below is a guide to assessing wind speed and recommendations for standard field crop sprayers. The relationship between the wind speed at the height of the spray nozzles and the wind speed (according to the Beaufort scale, measured at a height of 10 metres above the ground) assumes that there is a crop covering the ground. If there is no crop or grass cover, the wind speed at the height of the spray nozzle will be higher.

Table 6: A guide to wind speed and using field-crop sprayers with conventional nozzles

Beaufort scale (measured 10 metres above the ground)	**Description**	**Visible signs**	**Guide for using a standard crop sprayer**	**Approximate wind speed at the height of the spray nozzle**
Force 0	Calm	Smoke rises vertically	Use only 'medium' or 'coarse' spray quality	Less than 2 kilometres an hour (less than 1.2 miles an hour)
Force 1	Light air	Smoke drifts, showing the wind direction	Acceptable spraying conditions	2 to 3.2 kilometres an hour (1.2 to 2 miles an hour)
Force 2	Light breeze	Leaves rustle and you can feel the wind on your face	Ideal spraying conditions	3.2 to 6.5 kilometres an hour (2 to 4 miles an hour)
Force 3	Gentle breeze	Leaves and twigs are constantly moving	Increased risk of spray drift. Avoid spraying herbicides and take special care with other pesticides	6.5 to 9.6 kilometres an hour (4 to 6 miles an hour)
Force 4	Moderate breeze	Small branches are moved and dust and loose paper are raised	Do not spray	9.6 to 14.5 kilometres an hour (6 to 9 miles an hour)

4.7.4 How can off-target drift be prevented or controlled?

When using pesticides, take all reasonable precautions to prevent drifting off target. Reasonable precautions include using appropriate methods and equipment to apply the product, taking account of the weather conditions, taking account of neighbours' interests and protecting members of the public, wildlife and the environment. Consider the following points:

- Check the weather forecast and the conditions at the site you are treating before you start to apply a pesticide. Do not apply a pesticide if it is likely to drift off target or if there is a chance that wind will carry spray droplets or vapour away from the target area;
- Reducing the dose of the product you apply will reduce the amount of product which will drift off target;
- Use the coarsest appropriate spray quality at all times;
- When using a sprayer, keep the boom as low as possible, providing an even spray pattern at the correct target height. The correct boom height will depend on the spray pattern and the angle of the individual nozzles, the space between nozzles, the flatness of the area being treated and the design of the boom;

- When using a sprayer with hydraulic nozzles, reduce the spray pressure and speed of the vehicle (but make sure you maintain the intended dose, water volume and spray quality);
- Consider not treating an area closest to the downwind border of the area you are treating. For field crops, an untreated buffer zone will be most effective if the crop (or plants of at least the same height as the crop) continues into the buffer zone;
- In orchards, consider having appropriate natural windbreaks, such as other trees, around the treated area;
- Use one of the various spraying systems which are available to help reduce spray drift. Suitable drift-reducing systems may include twin-fluid nozzles, air-induction nozzles, rotary atomisers, pre-orifice nozzles, air-assistance for field crop sprayers, shrouded-boom sprayers for sports turf and other amenity areas, and re-circulating tunnel sprayers for spraying fruit bushes and trees. Sprayers and nozzles meeting the needs for low-drift equipment under the LERAP schemes will give lower levels of drift than conventional systems when used correctly;
- Use an authorised drift-reducing additive to pesticides in appropriate situations (depending on the type of equipment being used and the nature of the spray solution).

Section 4

Pesticide manufacturers and suppliers will be able to give you information on their nozzles and spraying systems.

You can get general advice on how to choose nozzles which will apply the pesticide effectively while reducing drift in the Voluntary Initiative stewardship leaflet 'Nozzle selection and maintenance', which includes the Home Grown Cereals Authority (HGCA) nozzle selection chart (see www.voluntaryinitiative.org.uk).

4.8 After working with pesticides

4.8.1 What you need to do after you have applied a pesticide

The following is a brief checklist of what you need to do when you have finished applying a pesticide.

✓	Clean the equipment you have used, inside and out, preferably before leaving the treatment area. Dispose of unused spray solution and sprayer washings safely and legally.
✓	After cleaning, store the sprayer (or other equipment) under cover.
✓	Return any unused pesticide concentrate to your pesticide store.
✓	Keep the appropriate records.
✓	Remove warning notices when they are no longer needed.
✓	If you have given warnings to beekeepers, tell them that you have finished applying the pesticide.
✓	Make sure that you: • dispose of used PPE safely and legally (if it is not designed to be used again or is unfit for further use); or • where appropriate, clean re-usable PPE before you store it and dispose of washings safely and legally; and • report any faults with engineering controls or PPE.
✓	Let the appropriate manufacturers know (either directly or through the supplier) if you have found any product-related, packaging-related or equipment-related problems when mixing, loading or applying the product.

Annex G

Applying pesticides from an aircraft

52 You must meet specific legal obligations before, during and after applying pesticide from the air. You can only use products which are specifically approved for this purpose, and you must regularly send details of all pesticides applied from aircraft to:

Pesticides Usage Survey Group (PUSG)
Defra
Central Science Laboratory
Sand Hutton Lane
Sand Hutton
York.

You must follow the conditions of use shown on the product label when applying pesticides from the air.

Everyone applying pesticides from an aircraft must hold a Civil Aviation Authority qualification (the aerial application certificate) and, in the case of contractors or people born after 31 December 1964, the appropriate certificate of competence in applying pesticides.

Under the Control of Pesticides Regulations 1986 (as amended) you must give notice to specific organisations before applying a pesticide from the air. You will also need to consult the following organisations (see below and table 6) and get their agreement before carrying out the treatment.

53 Consultation

Consultation means more than just giving notice to the relevant authorities. It should take place well before you intend to apply pesticide and certainly not after the minimum consultation period set by law. The person applying the pesticide will need to provide the information so the organisations consulted can comment in full. You will need to take account of the organisations' views when deciding how to apply the pesticide (or whether to apply it at all). If you are not sure what to do, talk to the organisations concerned for more advice.

Ideally, you will consult the relevant authorities when deciding to use a contractor to apply pesticides from the air. This will give the organisations consulted as much time as possible to consider the matter. They will then have reached a decision by the time you carry out the consultation you need to do by law.

When you give notice that you intend to apply a pesticide from the air, you must include the following information:

- The name, address and, where possible, phone number of the person applying the pesticide;
- The name of the pesticides you will use and their active ingredients;
- The date and time you intend to apply the pesticide;
- Confirmation that you have given the same details to the Chief Environmental Health Officer for the district.

54 Consultation and conditions for giving notice before applying a pesticide from the air

Under the Control of Pesticides Regulations 1986 (as amended) any person applying a pesticide from the air must do the following:

55 **At least 72 hours** before starting the treatment you must do the following:

- Consult the relevant conservation agency (English Nature or the Countryside Council for Wales) if any part of a local nature reserve, marine nature reserve, a national nature reserve or a site of special scientific interest lies within 1500 metres of any part of the land to be treated;
- Consult the appropriate area office of the Environment Agency if the land to be treated is next to, or within 250 metres of, water;
- Get permission from the Environment Agency if the pesticide will be applied to control weeds in water or on the banks of watercourses or lakes.

56 **At least 48 hours** before starting the treatment you must do the following:

- Give notice to the appropriate reporting point of the local beekeepers' spray-warning scheme running in the district.

57 **At least 24 hours** and (as far as reasonably possible) no more than 48 hours before starting the treatment, give notice to:

- the Chief Environmental Health Office for the district;
- the people occupying any property within 25 metres of the boundary of the land to be treated (or those people's agents); and
- the person in charge of any hospital, school or other institution with boundaries lying within 150 metres of the flight path intended to be used for the treatment.

58 **At least 24 hours** before starting the treatment you must do the following:

- Put sturdy and clear signs within 60 metres of the land to be treated to tell people about the place, date and time of the treatment.

You can find information on these and other legal conditions in the Civil Aviation Authority (CAA) booklet 'Information on requirements to be met by applicants and holders of the aerial application certificate' (CAP 414).

Annex 17

Annex 18

Costa Rica, *Executive Decree No. 34202-MAG-S-MINAE-MOPT-G-MSP* (21 May 2007)

No. 34202-MAG-S-MINAE-MOPT-G-MSP

THE PRESIDENT OF THE REPUBLIC

THE MINISTER OF AGRICULTURE AND LIVESTOCK

THE MINISTER OF HEALTH

THE MINISTER OF ENVIRONMENT AND ENERGY

THE MINISTER OF PUBLIC WORKS AND TRANSPORT

AND THE MINISTER OF THE INTERIOR AND POLICE
AND PUBLIC SAFETY

In exercise of the powers conferred by Article 140, paragraphs 3) and 18), and Article 146 of the Political Constitution and based on the provisions of paragraph 50 of the Political Constitution, as well as Articles 2, 4, 239, 240, 244, 278, 298 and 299 of the General Law of Health, No. 5395 of 30 October 1973 and its amendments, Articles 2 and 6 of the Organic Law of the Ministry of Health, No. 5412 of 8 November 1973 and its amendments, Articles 1, 2, 3, 4 and 5 of the Organic Law of the Environment No. 7554 of 4 October 1995, Article 5, paragraph o), 8 paragraphs b), e) and j), 23, 25, 30, 32, 35, 39 and 72 of the Law of Plant Protection No. 7664 of 8 April 1997, the Law for Establishment of the Ministry of Public Works and Transport, No. 4786 of 5 July 1971 and its amendments, the Law of Civil Aviation No. 5150 of 14 May 1973 and its amendments and the General Law of Public Administration, No. 6227 of 2 May 1978 and its amendments.

WHEREAS:

1º-All agricultural aviation activities as well as fumigation activities must be conducted in conformity with Article 50 of the Political Constitution, in order to guarantee the citizens' right to a healthy and ecologically balanced environment without affecting the quality of life of agricultural workers and their families, with respect to their health, life, the right to work, and the environmental quality of their surroundings.

2 º -That at promulgation of Executive Decree No. 15846-MAG-MOPT dated 6 November 1984, its Article 75 took into account the empirical aviation technology of the post-war itself because the applications were being conducted via the "flagging" (*"banderilleo*") method, so named because a worker would hold a flag as a visual guide for pilots who were fumigating, thereby generating great criticism for affecting the health of workers, causing material to be wasted, being imprecise, as well as increased production costs.

3 º-Subsequently, using a more humane approach to agricultural activity, the development of information technology and satellites used by the agricultural sector throughout much of the country, the use of information systems which would sensibly reduce drift in aerial fumigation

was possible. Such systems avoid negatively affecting workers' health, as well as the health of the area's inhabitants, and allow for a more economical use of the activity. At this time, the paper entitled "**Aerial Applications and Drift in Banana Cultivation in Costa Rica**," written by J.R. Washington, F. Gauhl, R. Valenciano, and A. Fournier was used as a basis to determine that aerial fumigations could be conducted using new techniques and scientific developments without affecting the health or lives of people as long as buffer zones of between 20 and 30 meters were observed. The authors provided the following conclusion in said paper:

[…]
[PAGE 4]

HEREBY DECREE
Amend Article 70 of Executive Decree
No. 31520-MS-MAG-MOPT-MGSP,
Regulations for the Agricultural Aviation activities,
of 16 October 2003

Article 1º--Article 70 of Executive Decree No. 31520-MS-MAG-MOPT-MGPSP, "Regulations for Agricultural Aviation activities," of 16 October 2003 is amended, adding the following to the first paragraph:

[PAGE 5]

b) **Height of flight:** Must be equal to or less than 5 meters above the crop's canopy, in order to reduce the concentration of particles that may be dragged by the wind, so as to minimize drift and evaporation of the sprayed product.

c) **Drop size of the mixture:** An average droplet size between 200 and 300 microns (μm) must be used in order to minimize drift due to drops with a slower terminal velocity and greater potential for evaporation.

[…[

g) **Meteorological conditions for application:** 1) Speed and direction of wind: the wind speed must not exceed 15 kilometers per hour when village crop areas are fumigated up to the buffer zones and wind direction must be against the buffer zones or sensitive zones, 2) Temperature: applications in village areas up to buffer zones cannot be conducted if temperature exceeds 29 ºC, and, 3) Relative humidity: must exceed 70%.

Nº 34202-MAG-S-MINAE- MOPT-G- MSP

EL PRESIDENTE DE LA REPÚBLICA

EL MINISTRO DE AGRICULTURA Y GANADERÍA

LA MINISTRA DE SALUD

EL MINISTRO DEL AMBIENTE Y ENERGÍA

LA MINISTRA DE OBRAS PÚBLICAS Y TRANSPORTES

Y EL MINISTRO DE GOBERNACIÓN Y POLICÍA

Y SEGURIDAD PÚBLICA

En ejercicio de las facultades conferidas por los artículos 140, incisos 3) y 18); y 146 de la Constitución Política y con fundamento en lo establecido en el numeral 50 de la Constitución Política, así como en los artículos 2, 4, 239, 240, 244, 278, 298 y 299 de la Ley General de Salud, Nº 5395 del 30 de octubre de 1973 y sus reformas; los artículos 2 y 6 de la Ley Orgánica del Ministerio de Salud, Nº 5412 del 8 de noviembre de 1973 y sus reformas; artículos 1, 2, 3, 4 5 de la Ley Orgánica del Ambiente Nº 7554 del 4 de octubre de 1995, los artículos 5 inciso o), 8 incisos b), e) y j), 23, 25, 30, 32, 35, 39 y 72 de la Ley de Protección Fitosanitaria Nº 7664 del 8 de abril de 1997; la Ley de Creación del Ministerio de Obras Públicas y Transportes, Nº 4786 del 5 de julio de 1971 y sus reformas; la Ley General de Aviación Civil, Nº 5150 del 14 de mayo de 1973 y sus reformas y la Ley General de la Administración Pública, Nº 6227 del 2 de mayo de 1978 y sus reformas.

Considerando:

1º—Que todas las actividades de aviación agrícola, y las actividades de aspersión, deben ejercerse en armonía con el artículo 50 de la Constitución Política, para garantizarle a los ciudadanos el derecho a un ambiente sano y ecológicamente equilibrado, sin afectar la calidad de vida de los trabajadores agropecuarios y sus familias, en cuanto a su salud, su vida, el derecho al trabajo, y la calidad ambiental de su entorno.

2º—Que al promulgarse el Decreto Ejecutivo Nº 15846-MOPT-MAG del 6 de noviembre de 1984, su artículo 75 tomó en cuenta la tecnología aérea empírica propia de la posguerra porque las aplicaciones se llevaban a cabo mediante el método de "banderilleo", llamado así porque un trabajador sostenía una bandera como guía óptica a los pilotos que asperjaban, generando grandes criticas por afectar la salud de los trabajadores, desperdicio de material, por ser imprecisa, e incrementaba los costos de producción.

3º—Que posteriormente con un sentido más humano de la actividad agraria, el desarrollo de las tecnologías y satélites de la información, en uso del sector agrícola de buena parte del país, fue posible utilizar sistemas informáticos que reducen sensiblemente la deriva en la aspersión aérea,

necesidad de actualizar la legislación acorde con los avances tecnológicos, los cuales han venido a proporcionar un sistema de guía de precisión y un mejor manejo de la deriva, en donde interactúan varios factores como las técnicas adecuadas de aplicación, uso adecuado del equipo, condiciones meteorológicas idóneas durante la aplicación, tipo de formulación de producto y el establecimiento de zonas de amortiguamiento. Por lo anterior, prácticamente se garantizan las medidas necesarias para minimizar el riesgo por error humano.

10.—Que el Poder Ejecutivo, con fundamento en los avances de la ciencia y de la técnica, debidamente acreditados en estudios e investigaciones, ha decidido reglamentar la actividad de aspersión aérea, adicionando el artículo 70 del Decreto Ejecutivo Nº 31520-MS-MAG-MOPT-MGPSP, "Reglamento para las actividades de Aviación Agrícola", del 16 de octubre del 2003, en los términos señalados por la Sala Constitucional para cumplir con el principio del derecho al ambiente sano y ecológicamente equilibrado, por medio de la exigencia del uso de técnicas adecuadas de aplicación, de manera que se evite la caída de partículas fuera del perímetro de la plantación, para reducir el peligro potencial de la deriva se encuentran: altura de vuelo, velocidad del vuelo, tamaño de gotas, tipo de boquillas, calibración del equipo, equipos de señalamiento satelital, longitud de barra de aspersión, manejo de condiciones meteorológicas, tipo de productos y zonas de amortiguamiento, para garantizar la actividad productiva agraria en armonía con el medio ambiente y los derechos constitucionales de las personas, para garantizarles su salud, su vida, y su entorno. **Por tanto,**

DECRETAN:

Reforma al artículo 70 del Decreto Ejecutivo Nº 31520-

MS-MAG-MOPT-MGSP, Reglamento para las

actividades de Aviación Agrícola, del 16 de

octubre del 2003

Artículo 1º—Se reforma el artículo 70 del Decreto Ejecutivo Nº 31520-MS-MAG-MOPT-MGPSP, "Reglamento para las actividades de Aviación Agrícola", del 16 de octubre del 2003, para adicionar al primer párrafo el siguiente:

"La distancia podrá reducirse de 100 hasta 30 metros si se dispone de una zona de amortiguamiento y se cumplen las siguientes condiciones:

a) **Zonas de amortiguamiento.** Estas zonas deberán ser áreas reforestadas con árboles de especies preferiblemente nativas con una altura mayor al cultivo y un ancho mínimo de 30 metros, para servir como barreras para reducir la deriva de las aplicaciones aéreas, si la aplicación se lleva a cabo en dirección paralela a la zona de amortiguamiento. Si la aplicación se realizara con avión y en forma perpendicular a la línea de cultivo, adicionalmente se deberá dejar una franja de 40 metros dentro del cultivo, en la que no se deberá asperjar para reducir el efecto del arrastre. La autoridad administrativa competente podrá aumentar esta distancia mediante resolución razonada cuando en el área por asperjar existan situaciones particulares y objetivas que requieran una mayor distancia a pesar de la existencia de la zona de amortiguamiento. La

franja de no aplicación de productos podrá omitirse en caso de vías o caminos internos de uso exclusivo para el cultivo y mientras no existan viviendas.

b) **Altura de vuelo.** Debe ser igual o inferior a 5 metros sobre dosel de la plantación, para que la concentración de partículas que pueden ser arrastradas por la influencia del viento, se reduzcan para minimizar la deriva y evaporación del producto asperjado.

c) **Tamaño de las gotas de la mezcla.** Se debe trabajar con un tamaño de gota promedio entre 200 y 300 micras (µm) para minimizar la deriva con una aplicación más lenta en su velocidad de caída libre y de más fácil evaporación.

d) **Calibración sistemática de equipo de aplicación.** Para garantizar una aplicación efectiva y la dosis adecuada de los productos, un técnico capacitado en la materia deberá verificar el tamaño de las gotas y el flujo de los aspersores con la siguiente frecuencia: 1) Flujo boquillas: semestral, 2) Número de gotas: semestral, 3) Dosificación: diaria. Antes y después de las aplicaciones aéreas un técnico deberá realizar una revisión que asegure el buen estado del sistema de mangueras, aspersores, válvulas, el sistema de señalamiento satelital y del Medidor Automático de Flujo.

e) **Sistemas de señalamiento satelital.** Todas las aeronaves deben contar con un sistema de señalamiento satelital para ofrecer la posibilidad de asegurar una adecuada aplicación de los productos en las áreas de cultivo, así como de disponer de una evidencia gráfica de esta. Los gráficos generados por el sistema de señalamiento satelital deben ser mantenidos por la empresa aspersora, por un mínimo de dos años. En todas las aeronaves que asperjen en fincas que poseen zonas de amortiguamiento deben instalar en el plazo de un año, un sistema automático de cierre de aspersores.

f) **Longitud de la barra de aspersión (boom).** La longitud efectiva de la barra no debe exceder el 80% de la longitud de cada ala del avión.

g) **Condiciones meteorológicas de aplicación:** 1) Velocidad y dirección del viento: la velocidad del viento no puede ser mayor a 15 kilómetros por hora cuando se asperjen las zonas de cultivo aledañas a las áreas de amortiguamiento y la dirección del viento debe ser contraria a la zona de amortiguamiento o zonas sensibles, 2) Temperatura: las aplicaciones en zonas aledañas a las áreas de amortiguamiento no podrán realizarse si la temperatura es superior a los 29 ºC, y, 3) Humedad relativa: debe ser superior al 70%.

h) **Tipos de productos.** En las fincas que poseen zonas de amortiguamiento sólo se podrán aplicar vía aérea los productos inscritos y autorizados de conformidad con el artículo 69 de este reglamento. Dichos productos deben ser de moderada toxicidad."

Artículo 2.—Rige a partir de su publicación.

Dado en la Presidencia de la República.—San José, a los veintiún días del mes de mayo del dos mil siete.

ÓSCAR ARIAS SÁNCHEZ.—El Ministro de Agricultura y Ganadería, Marco Vargas Díaz; la Ministra de Salud, María Luisa Ávila Agüero; el Ministro del Ambiente y Energía, Roberto Dobles Mora; la Ministra de Obras Públicas y Transportes, Karla González Carvajal; y el Ministro de Gobernación, Policía y Seguridad Pública, Fernando Berrocal Soto.—1 vez.—(D34202-34).

Annex 19

Nova Scotia Environment and Labour,
Media Backgrounder: Herbicide Management (July 2007)

NOVA SCOTIA

Environment and Labour

Media Backgrounder
Herbicide Management
July 2007

Health Canada's Pest Management Regulatory Agency (PMRA), is the federal agency responsible for the regulation of pest control products in Canada. As the federal authority under the Pest Control Products Act (PCPA), the PMRA also:

- Develops pest management policies and guidelines;
- Promotes sustainable pest management;
- Looks to improve the regulatory process to increase efficiency;
- Enforces compliance with the PCPA; and,
- Distributes pest management information to the general public and key stakeholders.

Glyphosate is registered with the PMRA for use as a forestry herbicide and other purposes, such as in the production of food crops and residential home and garden use. The agency regularly reviews scientific literature on registered pesticides. **The PMRA can be reached at 613-736-3500 if you have questions about glyphosate or their role.**

Provincial and territorial agencies, such as Nova Scotia Environment and Labour, are responsible for ensuring that registered products are used as specified by the PMRA, with proper care for human health and the environment. Municipalities may also assume some responsibility.

In Nova Scotia, the forestry application of herbicides falls under the jurisdiction of Nova Scotia Environment and Labour. The department requires compliance with the PMRA-registered label and also imposes conditions of its own. The department's requirements for the forestry use of glyphosate include:

- Formal application for permission
- Application of the herbicide to a specified spray zone
- Buffer zones around watercourses and wells
- Proper weather conditions for drift control
- In recognition of the right to know, there must be notification of residents and businesses within 500 metres of the spray area at least 30 days before spraying. This is a notification zone only – not a danger zone.
- Signs advising of the spraying must be posted on access roads to the area 30 days in advance
- The company applying the product must be certified by NSEL

- The person applying the product must pass an examination and be certified by NSEL
- NSEL must be notified when spraying is about to take place

In addition, NSEL can require special conditions where circumstances warrant.

Glyphosate has been determined by the PMRA to be safe when used as directed on the product label and presents a low risk. These conditions imposed on its use are effective management of that risk.

Spraying
The application of glyphosate for forestry, whether from the air or ground, is tightly controlled.

Aerial spray applicators use low-flying helicopters equipped with Global Positioning Systems (GPS) and Geographical Information Systems to ensure the spray lands within the boundaries specified on their permit. The process generates a computer record of where the spray is applied.

Ground-spray applicators are required to flag the spray boundaries and ensure the spray lands within them.

Applicators must meet the same kinds of requirements whether spraying by ground or air, although aerial buffer zones may be larger.

Compliance
Both ground and aerial applicators are required to notify NSEL before they start work on an approved area.

NSEL inspectors can and do arrive at approved sites at any time to monitor the spraying and applicators are aware of that.

NSEL can request the computer records from aerial applications.

Misapplication is obvious from the effect on vegetation.

Citizens are quick to file complaints with NSEL when they believe there is a problem.

Penalties can include loss of certification and fines of up to $1 million.

Contact:

Bill Turpin
Communications Director
902-424-2575
Cell: 902-478-0542

Annex 20

Republic of Estonia, *Plant Protection Products Act*, entered into force 1 May 2004, amended 1 July 2008

Plant Protection Act[1]

Passed 21 April 2004
(RT[2] I 2004, 32, 226),
entered into force 1 May 2004,
amended by the following Act:
21.05.2008 entered into force 01.07.2008 - RT I 2008, 23, 150
01.06.2006 entered into force 01.07.2006 - RT I 2006, 28, 211
08.12.2005 entered into force 01.01.2006 - RT I 2005, 68, 530.

Chapter 1
General Provisions

§ 1. Scope of application of Act

(1) This Act prescribes the requirements for plant health and plant protection products to guarantee the safety of plant protection products to the health of human beings and animals and to the environment, as well as the requirements for plant protection equipment, and the bases and extent of state supervision.
(2) The provisions of the Administrative Procedure Act (RT I 2001, 58, 354; 2002, 53, 336; 61, 375; 2003, 20, 117; 78, 527) apply to administrative proceedings prescribed in this Act, taking into account the specifications provided for in this Act.
(3) The provisions of this Act apply to plant protection products containing genetically modified organisms, taking into account the specifications provided for in the Deliberate Release of Genetically Modified Organisms into the Environment Act (RT I 2004, 30, 209).

§ 2. Notification

The Plant Production Inspectorate shall notify in writing the European Commission and the competent authorities of other states of the harmful organisms and plant protection products admitted to the market, as well as decisions and supervision operations on which notice must be given pursuant to legislation of the European Union.
(08.12.2005 entered into force 01.01.2006 - RT I 2005, 68, 530)

Chapter 2
Plant Health

Division 1
Plant, Plant Product and Harmful Organism

§ 3. Plant and plant product

(1) For the purposes of this Chapter, ‘plants’ are living plants and living parts thereof, including seeds.
(2) For the purposes of this Act, ‘seeds’ are seeds in the botanical sense which are intended for sowing.

3) to minors.

(2) Plant protection products which have not been marketed before the expiry of the term provided in the authorisation may be marketed until stocks run out but not beyond one year from the expiry of such term.

(3) The marketing of plant protection products which conform to the requirements and whose durability period has expired may be continued for up to one year from the expiry of the durability period. A corresponding comment shall be made on the packaging of plant protection products.

(4) Highly toxic plant protection products must not be marketed by retail sale.

(21.05.2008 entered into force 01.07.2008 - RT I 2008, 23, 150)

(5) Information concerning persons who wish to engage in the marketing of plant protection products and the conveyance of highly toxic plant protection products to Estonia shall be entered in the register of plant protection products.

(6) (Repealed - 21.05.2008 entered into force 01.07.2008 - RT I 2008, 23, 150)

§ 77. Storage and marketing facilities for plant protection products

(1) Premises where plant protection products are stored and marketed shall conform to the requirements provided for in the Chemicals Act and this Act. The plant protection products to be marketed shall be stored and marketed separately from foodstuffs, medicinal products and animal feed in order to avoid the contamination of the substances listed above with plant protection products.

(08.12.2005 entered into force 01.01.2006 - RT I 2005, 68, 530)

(01.06.2006 entered into force 01.07.2006 - RT I 2006, 28, 211)

(2) There shall not be any open packages of plant protection products in the storage and marketing facilities of plant protection products. It is prohibited to re-package plant protection products at the facilities where the products are stored or marketed. Plant protection products with broken packaging shall be promptly removed from distribution and rendered harmless pursuant to the procedure provided in the Chemicals Act.

(3) Before the marketing of plant protection products is commenced, the distributor of the plant protection products shall apply to the Plant Production Inspectorate for entry of the marketing premises in the register of plant protection products.

(4) Records shall be kept at the marketing premises concerning plant protection products marketed on the basis of plant protection certificates. The procedure for keeping records concerning plant protection products marketed on the basis of plant protection certificates shall be established by the Minister of Agriculture.

§ 78. Use of plant protection products

(1) Plant protection products may be used only under the conditions, for the purposes, in the manner and at the application rate specified on the labelling, and observing the number of applications and waiting periods before and after using the products. It is recommended that the principles of good plant protection practice and integrated pest control be observed in the use of plant protection products.

(2) Integrated control is the rational application of a combination of biological, biotechnological, chemical,

cultural or plant-breeding measures whereby the use of chemical plant protection products is limited to the strict minimum necessary to maintain the pest population at levels below those causing economically unacceptable damage or loss.

(3) Users of plant protection products shall maintain records of the used plant protection products in field records.

(4) Pest control from aircraft is prohibited.

(5) The requirements for the use of plant protection products shall be established by the Minister of Agriculture.

(6) (Repealed - 21.05.2008 entered into force 01.07.2008 - RT I 2008, 23, 150)

(7) (Repealed - 21.05.2008 entered into force 01.07.2008 - RT I 2008, 23, 150)

§ 79. Training in plant protection; plant protection certificates

(1) Distributors of plant protection products and in the cases prescribed by a decision on authorisation of a plant protection product, the persons who purchase or use the plant protection product shall undergo training in plant protection and hold a plant protection certificate.

(2) A plant protection certificate is a document which certifies that a person may market, buy and use all plant protection products except those classified as highly toxic.

(3) The training programmes of plant protection, the requirements for obtaining plant protection certificates and the procedure for the issuing of certificates shall be established by the Government of the Republic.

§ 79[1]. Requirements for persons using highly toxic plant protection products

(1) Data concerning a person who wishes to use highly toxic plant protection products shall be entered in the register of plant protection products.

(2) The person specified in subsection (1) of this section or an employee thereof may use only such highly toxic plant protection products for the safe and proper use of which the person has adequate qualification within the meaning of the Chemicals Act.

(3) A person using a highly toxic plant protection product shall observe the requirements provided in the user manual of the plant protection product and ensure the safety thereof to the neighbouring populations and the environment.

(4) A person using a highly toxic plant protection product shall prepare a plan for the use of the plant protection product compliance with which is mandatory. The plan shall be prepared by taking into account the special characteristics and temperature of the treated object and be approved by the possessor of the site before the use of the highly toxic plant protection product.

(5) A person using a highly toxic plant protection product shall keep record of the use. For that purpose, the

Annex 20

Annex 21

Austrian Federated State of Vorarlberg, Ordinance on Plant Protection Products, LGB1.Nr. 18/2008 (2008)

State Government Regulation
on the Use of Plant Protection Agents
(Plant Protection Regulation)
State Law Gazette No. 18/2008[1)]

On the basis of section 10 subsection 5, and section 11 subsections 6 and 8 of the Austrian Plant Protection Act, State Law Gazette No. 58/2007, the following is enacted:

Section 1
Prohibitions

(1) It shall be prohibited

a) to disperse plant protection agents from aerial vehicles,
b) to use plant protection agents
   1. in wetlands, straw meadows and rough pastures or dry grasslands as well as in adjoining three meter wide strips of land
   2. in three meter wide strips of land bordering forests or the shore edge of surface waters,
   3. in other areas, especially in residential or agricultural areas, if an impact on the neighbor's health, the health of other persons staying there, or on the plants or plant products growing on adjacent properties can be expected.

(2) The use of plant protection agents showing no hazardous properties within the meaning of section 3 subsection 1 of the Chemicals Act of 1996 shall be exempted from the prohibition of subsection 1 letter b numbers 1 and 2.

(3) Subsection 1 shall not affect other provisions on the impermissibility of the use of plant protection agents.

[1)] The purpose of this Regulation is to implement Directive 2005/36/EC.

Annex 21

Verordnung der Landesregierung über das Verwenden von Pflanzenschutzmitteln (Pflanzenschutzmittelverordnung)

LGBl.Nr. 18/2008[1)]

Auf Grund der §§ 10 Abs. 5 und 11 Abs. 6 und 8 des Pflanzenschutzgesetzes, LGBl.Nr. 58/2007, wird verordnet:

§ 1
Verbote

(1) Verboten ist

a) das Ausbringen von Pflanzenschutzmitteln aus Luftfahrzeugen,
b) die Verwendung von Pflanzenschutzmitteln
   1. in Feuchtgebieten, Streue- und Magerwiesen oder Trockenstandorten sowie in daran angrenzenden drei Meter breiten Geländestreifen,
   2. in an Wald oder die Uferoberkante von Oberflächengewässern angrenzenden drei Meter breiten Geländestreifen,
   3. in sonstigen Gebieten, insbesondere in Wohn- oder Landwirtschaftsgebieten, wenn eine Beeinträchtigung der Gesundheit des Nachbarn, der sonstigen sich dort aufhaltenden Personen oder der auf benachbarten Grundstücken wachsenden Pflanzen oder Pflanzenerzeugnisse zu erwarten ist.

(2) Vom Verbot des Abs. 1 lit. b Z. 1 und 2 ausgenommen ist die Verwendung von Pflanzenschutzmitteln, welche keine gefährlichen Eigenschaften im Sinne des § 3 Abs. 1 des Chemikaliengesetzes 1996 aufweisen.

(3) Abs. 1 lässt andere Vorschriften über die Unzulässigkeit der Verwendung von Pflanzenschutzmitteln unberührt.

§ 2
Bewilligungspflicht

(1) Pflanzenschutzmittel, die den Wirkstoff Streptomycin enthalten und deren Inverkehrbringen nach dem Pflanzenschutzmittelgesetz 1997 aufgrund von Gefahr im Verzug zulässig ist, dürfen nur mit Bewilligung der Bezirkshauptmannschaft verwendet werden.

[1)] Diese Verordnung dient der Umsetzung der Richtlinie 2005/36/EG.

Annex 21

Annex 22

Australian Pesticides and Veterinary Medicines Authority (APVMA), A*VPM Operating Principles in Relation to Spray Drift Risk* (15 July 2008)

APVMA OPERATING PRINCIPLES IN RELATION TO SPRAY DRIFT RISK

15 JULY 2008

Annex 22

APVMA operating principles in relation to spray drift risk

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For more information on the APVMA go to <http://www.apvma.gov.au>

Important information

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has prepared this document to describe its approach to spray drift risk assessment and risk management.

This document has been published previously in four earlier draft versions (1 July 2003, 5 August 2005, 24 July 2006 and 20 February 2008) each of which was followed by a period of public consultation. All comments from previous submissions to the APVMA have been considered in the preparation of this document.

This document is now in final form as an overview of APVMA spray drift risk regulation. The methods and principles described herein will apply uniformly to both new applications and reconsiderations.

The APVMA will continue to improve its risk assessment methods to strengthen their reliability. The APVMA will publish minor changes on its website as they occur and will announce a consultation period for stakeholders to comment on any major changes that may be contemplated.

2 APVMA's responsibility in relation to spray drift

The legislation under which the APVMA derives its powers (*Agricultural and Veterinary Chemicals Code Act 1994*) sets out the factors that the APVMA must consider in registering an agricultural or veterinary chemical product for use. When the APVMA considers registering an agricultural chemical product, it must satisfy itself, according to scientific principles, that the product can be used to achieve its intended purpose and at the same time not be likely to harm human health, the environment or Australia's international trade. To achieve this end, the APVMA determines instructions for use and limitations on use for each product and places them on the product's label. User compliance with these instructions and limitations falls under the enforcement powers of the states and territories.

Ideally, a product would only be applied to the intended target. However, the APVMA recognises that measurable off-target spray drift can occur at times even when the product is applied with care. The APVMA therefore has an obligation to consider the potentially harmful consequences of that associated spray drift and determine whether it would be likely to harm human health, the environment or unduly prejudice Australia's international trade.

If the APVMA finds that spray drift associated with a chemical application would be likely to cause harm, the APVMA cannot allow that product to be used unless a way can be found to prevent that harm from occurring.

6 General application concerns

6.1 Ground application

In relation to spray drift risk, ground application has some distinct advantages such as being able to keep spray release height low, operating at slower speeds that do not shatter droplets and being able to use wind-shielding hoods or shrouds around nozzles in some circumstances.

However, ground applications, both broadacre and orchard, can also result in unacceptable amounts of spray drift in some circumstances. For example, the slower speed of ground machines (compared to aerial application) can lead to spraying through changing wind conditions and to all night spraying during surface temperature inversion conditions that can result in significant spray drift. The temptation to increase machine ground speed to finish the job more quickly can also lead to greater bouncing of the spray boom over rough ground that also increases spray drift.

Orchard applications with radial airblast machines can cause significant spray drift when the machine is not properly set up to avoid driving spray above tree tops or when outer nozzles are not shut down on row turns or outside rows. Modern tower and tunnel airblast machine designs perform better but are not yet the most common types in use.

6.2 Aerial application

Aerial application has great advantages in speed of coverage, in being able to access crops when fields are too wet for ground machines and in avoiding soil compaction and crop damage from ground machinery. However, aircraft have some inherent properties that can add to spray drift risk. One of the most significant is that aircraft need to release spray droplets high enough for safe operation, and higher release heights add to spray drift risk. Moreover, the high speed air moving past aircraft-mounted nozzles can shatter droplets delivered by the nozzles into smaller droplets that are more drift prone. Wake disturbances to the air from large and necessarily fast moving aircraft also contribute to spray drift by lofting droplets higher.

Some of these inherent features of aircraft can be compensated for by proper set up of accessory equipment such as ensuring that a nozzle design is chosen that will deliver a coarse enough spray to compensate for droplet shatter. Booms can also be positioned optimally and shortened in relation to wingspan to avoid much of the droplet lofting effect from wingtip vortices. However, the higher release height remains a disadvantage in comparison to ground application that has not been overcome.

8 Operational risk factors and mitigation measures that the APVMA considers

As stated earlier, the APVMA must link its consideration of chemical risk to the need to protect human health, the environment and Australia's international trade. The specific issues discussed in the following paragraphs should be viewed from that perspective.

Many factors affect how much off-target spray drift might occur. Among them are droplet size, weather conditions, the type of equipment and methods used, local landforms where the application is made and the expertise of the applicator. In reducing risk, the APVMA uses a range of integrated strategies to mitigate the potentially harmful effects of spray drift and at times may need to impose restrictions or qualifications on one or more of the risk factors. Normally the APVMA would prefer to rely on industry best practices and the competence of applicators whenever it can be satisfied that such would be adequate.

Some examples of how instructions relating to these factors are incorporated into label statements are presented at the end of this document in Section 10. More information on these risk factors can be found in a publication sponsored by the Primary Industries Standing Committee and titled, *Spray Drift Management—Principles, Strategies and Supporting Information*, published by CSIRO Publishing, 2002, ISBN 0 643 06835 X. (This book is also available for download from the internet at <http://www.publish.csiro.au/pid/3452.htm>)

8.1 Factors affecting spray drift that are not related to the specific chemical

Droplet size

Spray droplet size (which is directly proportional to droplet mass) is the most important single factor in spray drift risk. Smaller, lower mass droplets have greater potential for drifting off target. In most circumstances, the APVMA imposes a limitation on the range of droplet sizes that can be used for applications. An acceptable droplet size range is influenced by the need for adequate coverage to achieve efficacy of the chemical product. As long as risk standards are not exceeded, the APVMA balances the need for efficacy with the need to limit spray drift. For dust formulations, the dust particle size is fixed during manufacture, and except where information shows dust particles are further fragmented by handling, the APVMA uses the nominal particle size range (backed by measurement data) in assessing risk.

Medium and Course ranges for the bulk of the downwind distance only dropping to the vicinity of the Medium profiles beyond 600 metres.

A droplet size range can be set by using specific types of nozzles, nozzle angles, rotary atomizer speeds and system pressures. In the case of aerial application, high airspeeds can cause excessive fragmentation of droplets delivered by the nozzle system when the droplets are impacted by fast moving air flowing relative to the wing boom. Aerial operators must choose a nozzle that will provide a sufficiently coarse droplet spectrum to partially compensate for droplet shatter. With the highest speed aircraft, that can be difficult and the number of suitable nozzles is limited. The aerial agriculture industry in Australia with chemical company support has sponsored wind tunnel tests to determine which nozzles can be relied upon for situations requiring the ASAE Coarse spray category (see below) such as is required for all 2,4-D products.

Many industry organisations support the use of the droplet size standard, ASAE S572, adopted by the American Society of Agricultural Engineers. This standard defines a set of droplet spectra that can be used to describe the output of specific nozzle types under defined conditions. Manufacturers categorise most commonly available nozzles in terms of this standard. The APVMA has adopted ASAE S572 as a uniform way of describing droplet spectra on its labels for both aerial and ground application. (See Section 8.3 for discussion of the new ISO droplet spectrum standard currently under development.)

When specifying a droplet size range on a product label, the APVMA prescribes a particular droplet size classification as defined in the ASAE standard. That prescribed size classification along with the needed application rate then specifies the nozzle options that can be selected by the user.

It is important to emphasise that a chemical user must not rely on tank mix products advertised as ‘drift retardants’ to achieve the correct droplet spectrum. The APVMA has no consistent data supporting the efficacy of these products. For the present, chemical users should always rely on proper nozzle choice and system pressures to achieve optimal droplet size rather than using unproven tank-mix additives.

Although correct nozzle choice is always critical, there is a different kind of tank-mix strategy that does have merit and can further improve the benefits of correct nozzle choice. It is the use of non-volatile tank-mix additives that have the effect of reducing drift deposits from fine droplets at the greater downwind distances by imposing a minimum mass limit on each evaporating droplet. This strategy is discussed in greater detail in the next section under ‘Humidity and temperature’.

Droplet size classification categories for nozzles in manufacturers’ catalogues are largely based on tests done with water. The APVMA recognises that product formulations and final tank mix ratios can have a significant influence on the droplet spectra actually delivered by nozzles. By specifying a standard droplet size classification on labels, the APVMA provides a standard that must be met, and chemical users will need to use the best available information in meeting that standard. At the present time, that would be catalogue specifications in most cases. In the future, further work by scientific testing laboratories and wind tunnel facilities will provide updated and

reliable information for product formulations and tank mixes relative to nozzle choice. As new information becomes widely available, chemical users can more accurately achieve the label standard. In the meantime, choosing appropriate nozzles based on current best information will be a great improvement on choices often made in the past.

Weather conditions

Wind speed and direction

Weather conditions are critical factors influencing spray drift risk. Wind speed and wind direction must be taken into account. In an important sense, wind direction is the most critical factor of all because spray droplets move only downwind. As was pointed out in Figure 2, the droplet size range is the single most important factor affecting spray drift in the downwind direction, but wind speed is perhaps the second most important factor that must be considered.

The APVMA may require that the label provide advisory information or mandatory limitations in relation to wind direction and speed. For example, the label may specify a maximum and minimum wind speed during spray operations and may state where the wind speed must be measured as, for example, outside an orchard at a specified distance upwind from the trees (or if not possible, 2 metres above the tree tops). Wind direction will always be taken into account in the description of any mandatory no-spray zone or declared spray drift risk area (see Section 8.2 for more detail). Both restricted areas will only exist in the downwind direction from the application site at the time of application.

The APVMA does not specifically require use of an anemometer to make accurate wind speed measurements. However, state and territory laws and the courts require a demonstration of duty of care so that an applicator should be capable of proving, if necessary in court, that a reliable method was used to measure wind speed and direction on site at the time of application. When other factors are favourable, applications can be made safely at wind speeds of between 3 and 20 km/hr, but in higher risk situations, the maximum speed allowable may be reduced. In assessing risk, the APVMA first uses 20 km/hr as the wind speed in modelling and then assesses at reduced wind speeds if the higher figure points to unacceptable risk.

A minimum speed of 3 km/hr is required because times of no wind (essentially below 3 km/hr) often precede or accompany periods of highly stable air and surface temperature inversion conditions both of which can greatly increase spray drift risk. Moreover, when wind resumes after periods of calm, its direction is not predictable. Spraying only when there is at least some wind ensures that wind direction is known (so that drift onto sensitive areas can be avoided) and greatly reduces the likelihood of surface temperature inversions forming during or shortly after application.

When the APVMA sets a declared spray drift risk area or a mandatory no-spray zone on a label (see Section 8.2), it will specify three wind speed ranges for aerial applications, usually 3–8, 9–14 and 15–20 km/hr. Each wind speed range will be associated with either a mandatory no-spray zone or a declared spray drift risk area specifically calculated for that wind speed and the

appropriate risk conditions for that product. Providing three wind speed options will allow chemical users greater flexibility in matching label requirements to actual wind conditions at the time of application. The distances associated with each wind speed will also give chemical users a better appreciation of how to manage risk.

At this time, the APVMA cannot model different wind speeds for ground applications because validated and flexible modelling programs for ground applications have not yet been developed. Since ground application no-spray zones and risk areas are substantially smaller than those for aerial application, the differences obtained for different wind speeds would be less significant. The APVMA expects to have access to modelling capability for ground applications in the future (see Section 8.3). When such modelling is available, the APVMA can introduce this option for ground applications in situations where it is needed.

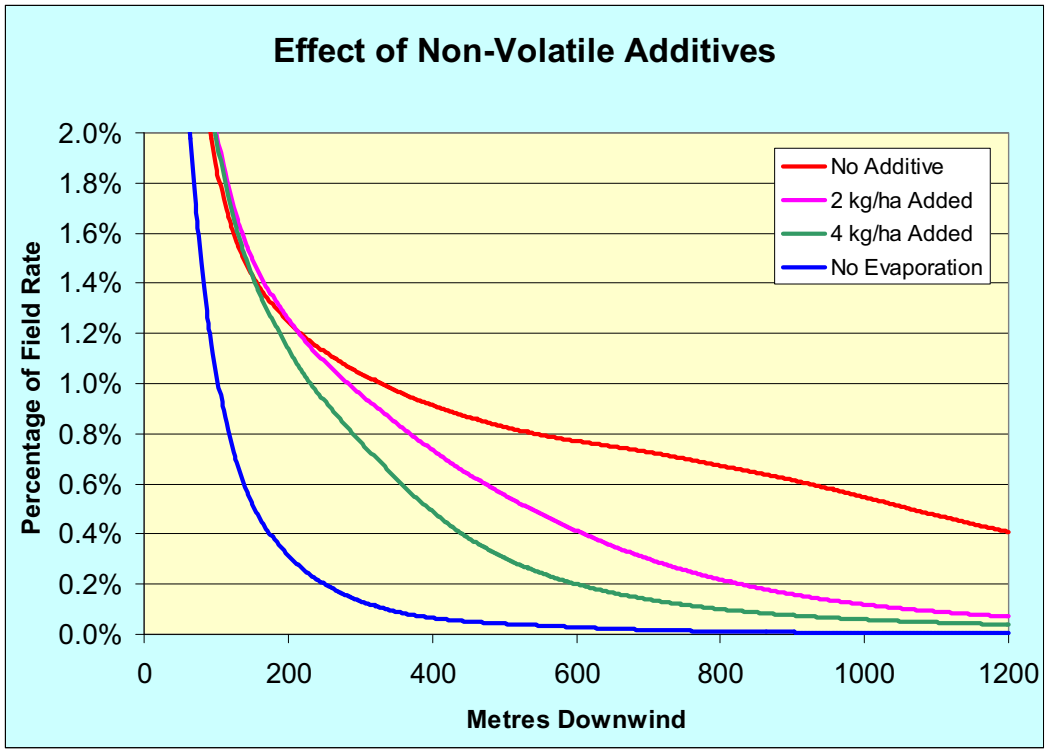
Humidity and temperature

For water based tank mixes, humidity and temperature affect droplet evaporation rates and can make a surprisingly large difference in drift deposits at longer downwind distances due to shrinkage in droplet size (and therefore mass). Spray operations cannot be suspended during summer months when temperatures are high and humidity is low, and one way of compensating is to increase both the droplet size spectrum (so that larger droplets on average leave the nozzle) and the carrier water volume applied per hectare to provide adequate droplet numbers for coverage. In cases where the APVMA specifies a minimum carrier volume on the label, it is expressly stated as a ‘minimum’ volume to allow the user to increase the volume if desired.

Increasing the carrier water volume is sometimes not practicable, particularly for aerial operators. A different management approach is to make the spray droplets less vulnerable to the effects of evaporation. A simple method is to add dispersible non-volatile material to the tank mix. The added non-volatile material in each droplet imposes a minimum mass value on the droplet, and as the droplet shrinks due to evaporation, acts as a humectant (depending on the properties of the added material) further slowing evaporation. The added material might be a non-volatile crop oil adjuvant, ammonium sulphate, urea, molasses or other substances that have been found to be safe to apply and compatible with the particular tank mix and application equipment.

Figure 3 illustrates how significant a difference can be achieved using this approach [modelled with AgDRIFT version 2.0.07, Tier III Aerial (Agricultural)].

Figure 3 Effect of adding non-volatile material to the tank mix



In the graph above, the deposit profiles are modelled for an aerial application all using a Medium droplet spectrum and a wind speed of 20 km/hr. Ambient conditions were set at 30º Centigrade and 50% relative humidity for the three upper curves. The top red curve is the profile where only the product formulation and carrier water are in the tank. The pink curve is a case where an additional 2 kg/ha of non-volatile material has been added to the tank mix, and the green curve is where an extra 4 kg/ha has been added. The lowest curve (blue) is an example where evaporation has been suppressed by setting the model conditions to 1º C and 99% relative humidity. (Note that the curve for 'no additive' does not look the same as the comparable curve in Figure 1 because the scale is different, a different aircraft was used and different model input parameters were used.)

In Figure 3, comparison of the blue curve (negligible evaporation) and the red curve (significant evaporation), both with no added non-volatile material, shows how significant the effect of evaporation on the drift profile can be. In this example, adding 2 or 4 kg/ha of non-volatile material to the tank mix has a surprisingly large beneficial effect in reducing off-target drift deposits. The effect does not become important until the deposits have dropped below about 1% of the field rate, but the differences are very significant at greater downwind ranges for chemicals that have a very sensitive impact threshold such as 2,4-D or typical trade risk scenarios. For example in Figure 3, if the acceptable deposition threshold was 0.2% of field rate, the unaltered tank mix would fail by a large margin even at 1200 metres downwind and the unacceptable risk distances for the 2 and 4 kg/ha additions would extend to 830 and 602 metres respectively, a substantially lesser distance.

The APVMA will assist registrants and the application industry in implementing this approach through permits, where necessary, when scientific data or acceptable argument has been provided to show that a proposed non-volatile tank supplement meets all safety and efficacy criteria.

Surface temperature inversion conditions

The potential for or presence of a surface temperature inversion condition is a very important factor in spray drift risk management. The ability to recognise a surface inversion condition or the atmospheric conditions likely to lead to one requires training beyond what can be included in label instructions.

Pilots are well trained in weather related issues and an aircraft's speed of coverage can be a great advantage in fitting applications between adverse weather conditions such as surface inversions. The slower rate of coverage of ground application makes it important that ground applicators should also be well-trained in recognising weather conditions signalling an impending surface inversion. Where the properties of the product and use situation present an exceptional risk from surface inversion conditions, the APVMA may find it necessary to invoke a Restricted Chemical Product status for the product to limit chemical access to those who are properly trained.

Height of spray release

Spray release height is another of the major factors affecting spray drift risk: the higher the release height, the greater the potential for off-target drift. In practice, release height is usually controlled within relatively narrow limits (see below). Because the release height will be accounted for in APVMA risk assessments and because operators have little motivation to depart from good practice norms, the APVMA will not specify release heights on labels in most cases. In unusual cases where it might be desirable to limit release heights on labels, the APVMA will be able to consult with its Application Technical Reference Group which includes people with expertise in application technology from both industry and academia.

Aerial applicators in broadacre situations seek a compromise between optimal spray placement and safety and generally maintain a release height of approximately 3 metres. In its risk assessments using computer modelling, the APVMA uses an aerial release height of 3 metres as a standard.

Aerial applications to forests have different requirements due to the fact that tree tops are uneven and forests are often located in hilly areas. For pilot safety, a release height of 15 metres above the general forest canopy is typical, and the APVMA uses this value in its risk assessments. In relation to risk, the higher release height in forestry applications is largely compensated for by the efficient droplet trapping properties of forest canopies. Localised turbulence eddies caused by wind interacting with uneven tree tops help move droplets down into the canopy volume more quickly for capture.

Exceptional aerial application situations and methods such as those relating to plague locust control authorities and regional mosquito control programs will be assessed on their own merits and appropriate instructions placed on labels when needed. Representatives from the authority in

question and the APVMA Application Technical Reference Group may be consulted in such circumstances.

Applicators using ground boom equipment are constrained in most cases by nozzle design and placement that fix release height to a narrow range in order to achieve uniform spray deposition. The most common release height is 50 cm for 110º nozzles with 50 cm spacing on the boom. Different boom heights apply to setups with different nozzle spray angles (such as 80º) and different nozzle spacing. The release height is not always set from ground level (as for bare ground applications) but often from the general surface of a maturing crop canopy or over high weed infestations. In addition, rough ground and higher machine ground speeds can cause boom bounce that disturbs a uniform release height.

The overseas data sets that the APVMA uses for ground application assessment used typical application heights for the various studies undertaken. In using these data sets, the APVMA applies a conservative safety factor by using the 90th percentile of the data.

Release height is not easily related to orchard applications because spraying usually takes place under the trees and is directed sideways and upward into the tree canopy rather than being applied from above the canopy. Radial airblast machines that are improperly set up and that drive droplets above the tree canopy or do not turn off outside nozzles at turns or outer rows present a significant added risk. For orchard ground applications, the APVMA may impose limitations on how airblast and other spray applications are done.

With vineyards, the spray needs to be directed sideways into the vines or with tunnel-type equipment, sideways and down into the vines. The key feature for applications in orchards and vineyards is that spray must be directed into the foliage and not above it or below it (i.e. to the trunk area) where there is no foliage to intercept the spray.

Time of application

The time of day of application is important only in the way it relates to atmospheric conditions. Evening hours are frequently associated with stable air conditions. Night-time hours are often associated with surface temperature inversion conditions. Both are conditions of high spray drift risk. In particular, spray operations should not be conducted during inversion conditions. The APVMA encourages better training for all applicators to recognise and avoid spraying in these conditions and may at times require such training (see Section 8.2).

In rare circumstances, the APVMA may also find it necessary to limit application of a product to a particular period of the year in order to control spray drift risk. This type of restriction is sometimes needed because of a crop's stage of development or to constrain the risk period to a defined calendar interval so that an industry under risk can limit the time during which commodities must be monitored for that chemical. The current calendar restrictions on endosulfan applications to cotton are an example of such a limitation.

Annex 23

American Society of Agricultural and Biological Engineers, Spray Nozzle Classification by Droplet Spectra, ANSI/ASAE S572.1 (Mar. 2009)

ASAE S-572 Spray Tip Classification by Droplet Size

Developed by the Pest Control and Fertilizer Application Committee; approved by the Power and Machinery Division Standards Committee; adopted by ASAE PM41.

This standard defines droplet spectrum categories for the classification of spray tips, relative to specified reference fan tips discharging spray into static air or so that no stream of air enhances atomization. **The purpose of classification is to provide the tip user with droplet size information, primarily to indicate off-site spray drift potential, and secondarily, for application efficiency.**

This standard defines a means for relative tip comparisons only based on droplet size. Other spray drift and application efficiency factors, such as droplet discharge trajectory, height and velocity, air bubble inclusion, droplet evaporation and impaction on target are examples of factors not addressed by the current standard.

Classification categories, symbols and corresponding color codes are as follows:

Classification Category	Symbol	Color Code	Approximate VMD
Very Fine	VF	Red	<100
Fine	F	Orange	100-175
Medium	M	Yellow	175-250
Coarse	C	Blue	250-375
Very Coarse	VC	Green	375-450
Extremely Coarse	XC	White	>450

Degree of Atomization	Droplet Size (Microns)	Relative Size	Relative Size Related to Common Objects
Fog	Up to 20		Point of Needle (25 Microns)
Fine Mist	20-100		Human Hair (100 Microns)
Fine Drizzle	100-250		Sewing Thread (150 Microns)
Light Rain	250-1000		Staple (420 Microns)
Thunderstorm Rain	1000-4000		#2 Pencil Lead (2000 Microns)

Droplet sizes are usually expressed in microns (micrometers). One micron equals one thousandth of a millimeter. Other than the effects of the specific material being sprayed, the four major factors effecting droplet size are: tip style, capacity, spraying pressure and spray pattern type. Lower spraying pressures provide larger droplet sizes, while higher spraying pressures yield smaller droplet sizes. The smallest droplet sizes are achieved by air atomizing tips. Generally speaking, the largest spray droplets are produced by wide-angle, flat hydraulic spray tips. In the hydraulic spray tip series, the smallest droplet sizes are produced by hollow-cone spray tips.

Color Code	Classifications	Thresholds		
		Dv0.1	Dv0.5	Dv0.9
VF	Very Fine	41.5	99.9	170.8
F	Fine	65.7	163.6	350.1
M	Medium	88	249.4	495.2
C	Coarse	95.6	365.1	683.5
VC	Very Coarse	109.2	408.3	842.6
XC	Extremely Coarse	>109.2	>408.3	>842.6

Droplet size classification are based on BCPC specification and in accordance with ASAE S-572 as of 5/01. Classifications are subject to change. Measures made by MALVERN particle sizer 2600 and Oxford Visizer.

Pressure Conversions

1 Bar . . . . . 15 psi	6 Bar . . . . . 87 psi
1.5 Bar . . . . 22 psi	7 Bar . . . . . 102 psi
2 Bar . . . . . 29 psi	8 Bar . . . . . 116 psi
2.76 Bar . . . 40 psi	10 Bar . . . . . 145 psi
3 Bar . . . . . 44 psi	11 Bar . . . . . 160 psi
3.5 Bar . . . . 51 psi	12 Bar . . . . . 174 psi
4 Bar . . . . . 58 psi	20 Bar . . . . . 290 psi
4.5 Bar . . . . 65 psi	30 Bar . . . . . 435 psi
5 Bar . . . . . 73 psi	

ULD 120° - Ultra Lo-Drift - Dual Air Eduction

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	115 PSI
ULD120-015	VC	C	C	C	C	M	M	M	M	F	F
ULD120-02	VC	VC	C	C	C	C	M	M	M	M	F
ULD120-025	VC	VC	C	C	C	C	M	M	M	M	M
ULD120-03	VC	VC	VC	C	C	C	C	M	M	M	M
ULD120-04	VC	VC	VC	C	C	C	C	M	M	M	M
ULD120-05	XC	XC	VC	VC	VC	C	C	C	C	M	M
ULD120-06	XC	XC	XC	VC	VC	VC	C	C	C	C	M
ULD120-08	XC	XC	XC	VC	VC	VC	C	C	C	C	M

AVI 110° - Air-Inducing Venturi Flat Fan Ceramic Tip

	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI
AVI-11001	VC	VC	VC	VC	C	C	C	C
AVI-110015	VC	VC	VC	VC	VC	VC	C	C
AVI-11002	VC	VC	VC	VC	VC	VC	VC	C
AVI-110025	XC	VC	VC	VC	VC	VC	VC	VC
AVI-11003	XC	XC	XC	VC	VC	VC	VC	VC
AVI-11004	XC	XC	XC	VC	VC	VC	VC	VC
AVI-11005	XC	XC	XC	XC	VC	VC	VC	VC
AVI-11006	XC	XC	XC	XC	VC	VC	VC	VC
AVI-11008	XC	XC	XC	XC	XC	XC	XC	XC
AVI-11010	XC	XC	XC	XC	XC	XC	XC	XC

LD 80° - Lo-Drift Flat Fan Tip

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
LD015F80	C	C	M	M	M	M	M
LD02F80	C	C	C	M	M	M	M
LD03F80	C	C	C	C	M	M	M
LD04F80	C	C	C	C	M	M	M
LD05F80	VC	C	C	C	C	M	M
LD06F80	VC	VC	VC	C	C	C	C
LD08F80	XC	VC	VC	VC	C	C	C

LD 110° - Lo-Drift Flat Fan Tip

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
LD015F110	M	M	M	M	M	M	F
LD02F110	C	C	M	M	M	M	M
LD025F110	C	C	M	M	M	M	M
LD03F110	C	C	C	M	M	M	M
LD04F110	C	C	C	M	M	M	M
LD05F110	VC	C	C	C	C	M	M
LD06F110	VC	C	C	C	C	C	C
LD08F110	VC	VC	C	C	C	C	C

ASAE S-572 Chart

Continued

ADI 110° - Anti-Drift Flat Fan Ceramic Tip

	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
ADI-11001	M	M	F	F	F
ADI-110015	M	M	M	M	M
ADI-11002	M	M	M	M	M
ADI-11003	C	M	M	M	M
ADI-11004	VC	C	C	C	M

VP 80° - Variable Pressure Range Flat Fan Tip

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
VP80-015	M	M	F	F	F	F	F
VP80-02	M	M	F	F	F	F	F
VP80-03	M	M	M	F	F	F	F
VP80-04	C	M	M	M	M	F	F
VP80-05	C	C	M	M	M	M	F
VP80-06	C	C	C	C	M	M	M

VP 110° - Variable Pressure Range Flat Fan Tip

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
VP110-015	M	F	F	F	F	F	F
VP110-02	M	M	F	F	F	F	F
VP110-025	M	M	F	F	F	F	F
VP110-03	M	M	M	F	F	F	F
VP110-04	C	M	M	M	M	F	F
VP110-05	C	C	M	M	M	M	F
VP110-06	C	C	C	M	M	M	M
VP110-08	VC	C	C	M	M	M	M
VP110-10	VC	C	C	M	M	M	M
VP110-15	VC	VC	VC	C	C	M	M

AXI 80° - Wide Pressure Range Flat Fan Ceramic

	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
AXI-80015	F	F	F	F	F	VF
AXI-8002	M	F	F	F	F	F
AXI-8003	M	M	M	F	F	F
AXI-8004	M	M	M	M	M	F
AXI-8005	M	M	M	M	M	M
AXI-8006	M	M	M	M	M	M

AXI 110° - Wide Pressure Range Flat Fan Ceramic

	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
AXI-110015	F	F	F	F	F	VF
AXI-11002	F	F	F	F	F	F
AXI-11003	M	M	M	F	F	F
AXI-11004	M	M	M	M	F	F
AXI-11005	M	M	M	M	M	M
AXI-11006	M	M	M	M	M	M

TR 80° - Total Range - Stainless Steel Insert

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
TR80-01	M	F	F	VF	VF	VF	VF
TR80-015	M	F	F	F	F	VF	VF
TR80-02	M	M	F	F	F	F	VF
TR80-03	C	M	M	F	F	F	F
TR80-04	C	C	M	M	M	F	F
TR80-05	C	C	C	M	M	M	F
TR80-06	C	C	C	M	M	M	M
TR80-08	VC	C	C	C	C	M	M
TR80-10	VC	VC	VC	C	C	C	M
TR80-15	XC	VC	VC	C	C	C	C

TR 110° - Total Range - Stainless Steel Insert

	15 PSI	20 PSI	30 PSI	**40 PSI**	50 PSI	60 PSI	70 PSI
TR110-01	F	F	F	VF	VF	VF	VF
TR110-015	M	F	F	F	F	F	VF
TR110-02	M	M	F	F	F	F	F
TR110-03	M	M	M	F	F	F	F
TR110-04	C	M	M	F	F	F	F
TR110-05	C	C	M	F	F	F	F
TR110-06	C	C	C	M	M	M	F
TR110-08	C	C	C	M	M	M	M
TR110-10	VC	VC	C	M	M	M	M
TR110-15	VC	VC	VC	C	C	M	M

Fan Tip 80° - Standard Flat Fan Spray Tip

	30 PSI	**40 PSI**	50 PSI	60 PSI
30-0067F80	VF	VF	VF	VF
30-01F80OR	F	F	F	F
30-015F80RG	M	F	F	F
30-02F80YE	M	F	F	F
30-03F80UB	C	M	M	F
30-04F80RE	C	M	M	M
30-05F80LB	C	M	M	M
30-06F80GY	C	C	M	M
30-08F80WH	C	C	C	C
30-10F80CB	VC	C	C	C
30-15F80LG	VC	VC	C	C
30-20F80BL	VC	VC	VC	VC

Fan Tip 110° - Standard Flat Fan Spray Tip

	30 PSI	**40 PSI**	50 PSI	60 PSI
30-02F110YE	F	F	F	F
30-03F110UB	M	F	F	F
30-04F110RE	M	M	M	F
30-05F110LB	M	M	M	M
30-06F110GY	M	M	M	M
30-08F110WH	C	C	C	C
30-10F110CB	C	C	C	C
30-15F110LG	C	C	C	C

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DT - DeflecTip Wide-Angle Flat Flood Tip

	10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI
30DT0.5	C	M	M	F	F	F	F
30DT0.75	C	C	M	M	F	F	F
30DT1.0	C	C	M	M	M	M	F
30DT1.5	C	M	M	M	M	M	M
30DT2.0	C	C	C	M	M	M	M
30DT2.5	C	C	C	M	M	M	M
30DT3.0	C	C	C	M	M	M	M
30DT4.0	C	C	C	M	M	M	M
30DT5.0	C	C	C	C	M	M	M
30DT7.5	C	C	C	C	C	C	C
30DT10	VC	VC	VC	C	C	C	C
30DT15	XC	VC	VC	VC	C	C	C
30DT20	XC	XC	VC	VC	VC	C	C

DTC - Cam Couple DeflecTip Wide-Angle Flat Flood Tip

	10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI
30DT10C	VC	VC	VC	C	C	C	C
30DT15C	XC	VC	VC	VC	C	C	C
30DT20C	XC	XC	VC	VC	C	C	C
30DT30C	XC	XC	XC	VC	VC	VC	C
30DT40C	XC	XC	XC	XC	VC	VC	VC
30DT50C	XC	XC	XC	XC	XC	XC	VC
30DT60C	XC	XC	XC	XC	XC	XC	XC
30DT80C	XC	XC	XC	XC	XC	XC	XC
30DT100C	XC	XC	XC	XC	XC	XC	XC
30DT120C	XC	XC	XC	XC	XC	XC	XC
30DT150C	XC	XC	XC	XC	XC	XC	XC
30DT180C	XC	XC	XC	XC	XC	XC	XC

APM - Wide-Angle Flat Flood Tip

	10 PSI	15 PSI	20 PSI	30 PSI	40 PSI	50 PSI	60 PSI
APM-Yellow	M	M	M	M	M	M	M
APM-Orange	M	M	M	M	M	M	M
APM-Red	C	C	C	M	M	M	M
APM-Green	C	C	C	M	M	M	M
APM-Blue	C	C	C	C	M	M	M
APM-Gray	VC	C	C	C	C	C	C
APM-Black	VC	VC	C	C	C	C	C

AVI-OC 80° - Air-Inducing Venturi Ceramic Off-Center

	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI
AVI-OC-8002	XC	VC	VC	VC	VC	VC	VC
AVI-OC-80025	XC	XC	VC	VC	VC	VC	VC
AVI-OC-8003	XC	XC	XC	VC	VC	VC	VC
AVI-OC-8004	XC	XC	XC	XC	VC	VC	VC

OC 80• - Brass Off-Center

	30 PSI	40 PSI	50 PSI	60 PSI
28OC2	M	M	M	F
28OC3	M	M	M	F
28OC4	C	M	M	M
28OC6	C	C	M	M
28OC8	C	C	C	M
28OC12	C	C	C	C
28OC16	VC	C	C	C

OCI 80° - Ceramic Off-Center

	30 PSI	40 PSI	50 PSI	60 PSI
OCI-8002	M	M	M	F
OCI-8003	M	M	M	M
OCI-8004	M	M	M	M

E - Even Flat Fan

	30 PSI	40 PSI	50 PSI	60 PSI
30-01E80OR	F	F	F	F
30-015E80RG	M	F	F	F
30-02E80YE	M	M	M	F
30-03E80UB	C	M	M	M
30-04E80RE	C	C	M	M
30-05E80LB	C	C	C	C
30-06E80GY	C	C	C	C
30-08E80WH	VC	C	C	C

ASAE S-572 Chart

Continued

TVI 80° - Hollow Cone

	70 PSI	150 PSI	200 PSI
TVI-80015	XC	C	C
TVI-8002	XC	XC	C
TVI-80025	XC	XC	C

HCX 80° - Hollow Cone

	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	125 PSI	150 PSI
30HCX2	VF	VF	VF	VF	VF	VF	VF	VF	VF
30HCX3	VF	VF	VF	VF	VF	VF	VF	VF	VF
30HCX4	F	F	VF	VF	VF	VF	VF	VF	VF
30HCX6	F	F	VF	VF	VF	VF	VF	VF	VF
30HCX8	F	F	F	VF	VF	VF	VF	VF	VF
30HCX9	F	F	F	F	F	VF	VF	VF	VF
30HCX10	F	F	F	F	F	F	VF	VF	VF
30HCX12	F	F	F	F	F	F	F	VF	VF
30HCX18	F	F	F	F	F	F	F	F	VF

HCA / ATR 80° - Hollow Cone

	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	125 PSI	150 PSI	350 PSI
ATR-White	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
HCA-01	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
ATR-Lilac	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
HCA-015	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
ATR-Brown	VF	VF	VF	VF	VF	VF	VF	VF	VF	VF
HCA-02	F	F	VF	VF	VF	VF	VF	VF	VF	VF
ATR-Yellow	F	F	VF	VF	VF	VF	VF	VF	VF	VF
HCA-025	F	F	F	VF	VF	VF	VF	VF	VF	VF
ATR-Orange	F	F	F	F	VF	VF	VF	VF	VF	VF
HCA-03	F	F	F	F	F	VF	VF	VF	VF	VF
ATR-Red	F	F	F	F	F	F	VF	VF	VF	VF
HCA-045	M	F	F	F	F	F	F	VF	VF	VF
ATR-Green	M	M	F	F	F	F	F	F	VF	VF
ATR-Blue	M	M	M	M	F	F	F	F	F	F

DC-CR Disc/Core

	40 PSI	50 PSI	60 PSI	70 PSI	80 PSI	90 PSI	100 PSI	125 PSI	150 PSI
30-DC-01/30-CR-23	F	F	VF	VF	VF	VF	VF	VF	VF
30-DC-015/30-CR-23	F	F	VF	VF	VF	VF	VF	VF	VF
30-DC-02/30-CR-23	F	F	F	VF	VF	VF	VF	VF	VF
30-DC-03/30-CR-23	F	F	F	F	VF	VF	VF	VF	VF
30-DC-04/30-CR-23	F	F	F	F	F	F	VF	VF	VF
30-DC-05/30-CR-23	F	F	F	F	F	F	F	VF	VF
30-DC-06/30-CR-23	M	F	F	F	F	F	F	F	VF
30-DC-01/30-CR-25	F	F	F	VF	VF	VF	VF	VF	VF
30-DC-1.5/30-CR-25	F	F	F	F	VF	VF	VF	VF	VF
30-DC-02/30-CR-25	F	F	F	F	VF	VF	VF	VF	VF
30-DC-03/30-CR-25	F	F	F	F	F	VF	VF	VF	VF
30-DC-04/30-CR-25	M	F	F	F	F	F	VF	VF	VF
30-DC-05/30-CR-25	M	M	M	F	F	F	F	VF	VF
30-DC-06/30-CR-25	M	M	M	M	M	M	F	F	F
30-DC-07/30-CR-25	M	M	M	M	M	M	M	F	F
30-DC-08/30-CR-25	C	C	C	C	M	M	M	M	M
30-DC-10/30-CR-25	C	C	C	C	C	M	M	M	M
30-DC-01/30-CR-45	F	F	F	VF	VF	VF	VF	VF	VF
30-DC-1.5/30-CR-45	M	F	F	F	VF	VF	VF	VF	VF
30-DC-02/30-CR-45	M	M	F	F	F	VF	VF	VF	VF
30-DC-03/30-CR-45	M	M	M	F	F	F	VF	VF	VF
30-DC-04/30-CR-45	M	M	M	M	F	F	F	VF	VF
30-DC-05/30-CR-45	M	M	M	M	M	F	F	F	VF
30-DC-06/30-CR-45	C	M	M	M	M	M	M	F	F
30-DC-07/30-CR-45	C	C	M	M	M	M	M	M	F
30-DC-08/30-CR-45	C	C	C	M	M	M	M	M	M

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French Republic, Rural and Maritime Fishery Code, Art. L253-1(V) (2010)

Detail of a code article http://www.legifrance.gouv.fr/affichCodeArticle.do;jsessionid=

Rural and marine fisheries code

► Legislative part

► Book II: Food, veterinary public health and protection of plant life

► Title V: The protection of plant life

► Chapter III: Marketing of plant health products

► Section 1: General provisions.

Article L253-3

Modified by LAW n° 2010-788 of July 12, 2010 - art. 102

Modified by LAW n° 2010-788 of July 12, 2010 - art. 103

Modified by LAW n° 2010-788 of July 12, 2010 - art. 95

In the interest of public health or the environment, the administrative authority may take any particular measure of prohibition, restriction or prescription concerning the placement on the market, delivery, use and holding of the products mentioned in article L. 253-1, after notice by the national agency responsible for health, food safety, the environment and labor, and assessment of the socioeconomic and environmental effects of such a measure, except when the measure is taken in application of a decision of the European Union. In particular, it can prohibit or restrict the use of these products in particular zones frequented by the general public or groups of vulnerable people, notably in parks, public gardens, sports grounds, school grounds and playgrounds, as well as in proximity to public health institutions.

Aerial distribution of the products mentioned in article L. 253-1 is forbidden, except under conditions strictly defined by the administrative authority for a limited duration when a danger threatening plants, animals or public health cannot be controlled by any other means or if this type of spreading presents manifest advantages for health and the environment in relation to a terrestrial application, in conformity with national provisions established following the opinion of the consultative committee for the protection of plant life, and following information from the competent departmental commission in matters of environment, health and technological risks.

Citation:

Rural code - art. L253-1 (V)

Cited by:

Rural and marine fisheries code - art. R253-1 (V)

Annex 24

Code rural et de la pêche maritime

- Partie législative
  - Livre II : Alimentation, santé publique vétérinaire et protection des végétaux
    - Titre V : La protection des végétaux
      - Chapitre III : Mise sur le marché des produits phytosanitaires
        - Section 1 : Dispositions générales.

Article L253-3

Modifié par LOI n° 2010-788 du 12 juillet 2010 - art. 102
Modifié par LOI n° 2010-788 du 12 juillet 2010 - art. 103
Modifié par LOI n° 2010-788 du 12 juillet 2010 - art. 95

Dans l'intérêt de la santé publique ou de l'environnement, l'autorité administrative peut prendre toute mesure d'interdiction, de restriction ou de prescription particulière concernant la mise sur le marché, la délivrance, l'utilisation et la détention des produits mentionnés à l'article L. 253-1, après avis de l'Agence nationale chargée de la sécurité sanitaire de l'alimentation, de l'environnement et du travail, et évaluation des effets socio-économiques et environnementaux d'une telle mesure, sauf lorsque celle-ci est prise en application d'une décision de l'Union européenne. En particulier, elle peut interdire ou encadrer l'utilisation de ces produits dans des zones particulières fréquentées par le grand public ou des groupes de personnes vulnérables, notamment les parcs, les jardins publics, les terrains de sport, les enceintes scolaires et les terrains de jeux, ainsi qu'à proximité d'infrastructures de santé publique.

L'épandage aérien des produits mentionnés à l'article L. 253-1 est interdit, sauf dans des conditions strictement définies par l'autorité administrative pour une durée limitée lorsqu'un danger menaçant les végétaux, les animaux ou la santé publique ne peut être maîtrisé par d'autres moyens ou si ce type d'épandage présente des avantages manifestes pour la santé et l'environnement par rapport à une application terrestre, conformément aux dispositions nationales fixées après avis du comité consultatif de la protection des végétaux, et après information de la commission départementale compétente en matière d'environnement, de risques sanitaires et technologiques.

Cite:
Code rural - art. L253-1 (V)

Cité par:
Code rural et de la pêche maritime - art. R253-1 (V)

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Annex 25

Government of Saskatchewan, Ministry of Agriculture, *2010 Guide to Crop Protection* (2010)

2010 GUIDE TO CROP PROTECTION

weeds, plant diseases, insects

AGRICULTURE

CROPS

This publication is only a guide.
Always refer to the product label for application details and precautions.

Saskatchewan Ministry of Agriculture

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Saskatchewan Ministry of Agriculture

Spring Update: An update to this publication is produced for May 1 each year that provides corrections and new uses that have been registered since printing. The Spring Update to the Guide to Crop Protection is available through the Saskatchewan Agriculture Regional Offices , the Agriculture Knowledge Centre or on the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca, Your local dealer may also have copies available.

Saskatchewan Agriculture Regional Offices
Saskatchewan Agriculture Regional Offices are a place to go to get publications and personal service on a range of topics. Specialists in Crops, Forage,Livestock and Farm Business Management are available to assist you at the following Regional Offices:

Kindersley **(306) 463-5513**	**Prince Albert** **(306) 953-2363**	**Weyburn** **(306) 848-2857**
Moose Jaw **1-866-457-2377**	**Swift Current** **(306) 778-8218**	**Yorkton** **(306) 786-1531**
North Battleford **(306) 446-7964**	**Tisdale** **(306) 878-8842**	
Outlook **(306) 867-5575**	**Watrous** **(306) 946-3220**	

Agriculture Knowledge Centre **1-866-457-2377**
The Agriculture Knowledge Centre is your place to start for the latest answers on topics ranging from crops and livestock to nutrient management and the economic implications of management decisions. The toll-free line puts you in touch with resource agents and specialists who draw on expertise from around the province and beyond. The friendly staff will help you find the solutions you need for your operation.

Crop Protection Laboratory **(306) 787-8130**
(plant disease diagnosis, weed and insect identification, herbicide resistance screening)

The **Crop Protection Laboratory** offers a range of diagnostic services to assist in the identification of problems associated with all agricultural crops and forage. The major areas of expertise include weed, insect and plant disease identification and herbicide resistance screening.

Better background information on a diagnostic sample results in more accurate diagnosis. Therefore, a Crop Protection Laboratory submission form should be completed fully and included with the sample. A printable version of the Crop Protection Laboratory submission form and instructions on sample submission can be found at www.agriculture.gov.sk.ca on the main page, select “Programs and Services” from the menu on the right and select “Crop Protection Laboratory Services” from the list of links. Otherwise, contact the Crop Protection Lab directly at the number below or the Agriculture Knowledge Centre at 1-866-457-2377.

Fees:

Insect or weed identification	$10
Visual plant disease identification	$20
Cultured plant disease identification	$40
Herbicide resistance screening	$35 - $100

Phone: (306) 787-8130
E-mail: croplab@gov.sk.ca

Agriculture and Agri-Food Canada

Saskatoon Research Centre	(306) 956-7200
Scott Research Farm	(306) 247-2011
Melfort Research Farm	(306) 752-2776

Shelterbelts
PFRA Shelterbelt Centre
Indian Head (306) 695-2284

Pesticide Analysis
(herbicide, fungicide or insecticide)
ALS Labs 1-800-668-9878
www.alsenviro.com

Additional Information
For more information on herbicides, pesticides, pesticide safety and weed, insect or plant disease control, consult the publications available from the Agriculture Knowledge Centre or visit the Saskatchewan Agriculture website at www.agriculture.gov.sk.ca.

Major Poison Control Centres

Saskatchewan Health
1-866-454-1212

Saskatoon	**Regina**
Royal University Hospital	Regina General Hospital
(306) 655-1010	**(306) 766-4545**
1-800-363-7474	**1-800-667-4545**

Toxicology Centre

University of Saskatchewan
(306) 966-7441
tox.centre@usask.ca

Spill Report

Saskatchewan Environment
1-800-667-7525

This publication was prepared by the Saskatchewan Ministry of Agriculture in co-operation with Manitoba Agriculture, Food and Rural Initiatives, and with the assistance of the Saskatchewan Weed Committee.

Cover photos From left: Cleavers seedling, Sclerotinia bodies (sclerotia) forming inside canola stems, Aphids on field pea pods.

Protecting Your Eyes, Face and Lungs

Wear the following equipment to protect your facial area from exposure:

EQUIPMENT	PROTECTION	HOW TO WEAR IT
Goggles	Chemical-resistant goggles keep your eyes safe from both splashing and, if using dry formulations, dusts or granules. Don't use goggles with cloth or elastic headbands as these will absorb pesticides.	Wear goggles snugly on your face so that the sides of your head are protected from splashes. If you wear glasses, make sure you purchase goggles that fit snugly over them. Never wear contact lenses when working around pesticides.
Respirators	Only NIOSH-approved respirators should be used. Do not exchange parts of different respirators. (For example, do not use a cartridge produced by Company "A" with a respirator produced by Company "B" as the combination may not provide adequate protection to the user). Dust masks are ineffective in protecting against herbicide vapours. Similarly, the filters on tractor cabs are intended to remove dust and are not designed to protect against herbicide vapours or mists. Chemical cartridge respirators are recommended for outdoor use when mixing and applying herbicides.	When carrying out operations, change filters each day. The cartridge should be replaced when chemical odour becomes apparent or when breathing becomes difficult. New cartridges should always be installed at the beginning of the spray season. Prior to commencing work, check the face seal while the respirator is on the wearer's face. Regardless of design, respirators cannot be worn securely by people wearing beards, moustaches or sideburns.
Face Shields	Goggles offer some protection, but frequently full-face protection is advised or required according to the pesticide label. It is especially important to protect your eyes and face when pouring or mixing liquid concentrates. Effective face shields are made of clear plastic.	Since the shield attaches to the hard hat, you can raise or lower it as needed.

Avoiding Spray Drift

To minimize the risk of drift, follow these guidelines:

1. Do not spray in winds above 15 km/h (9 mph).
2. Do not spray under dead calm conditions in early morning, night, or late evening. These are often associated with temperature inversions and the combination of these factors can result in long-distance spray drift (2 km or more). Fog or dust that seems to hang in the air is a good indicator of an inversion.
3. Avoid nozzle pressures above 45 psi (310 kPa) for conventional flat fan tips.
4. Use a minimum of 45 L/acre water for all pesticides unless otherwise specified for the product.
5. Take note of buffer zones identified in the "Restrictions" section of this guide. Do not spray when the wind is blowing towards a nearby sensitive crop, shelterbelt, garden, or water body.
6. Use amine formulations of 2,4-D or MCPA where possible. Use special care when applying volatile herbicides (most herbicides in Group 3 and Group 4, particularly ester formulations). Avoid spraying these products on or immediately before hot days.
7. Ensure that air flow from air assisted sprayers is properly set to minimize airblast rebound and drift for different crop canopies.
8. Operate nozzles at their minimum recommended height. For 80° tips, this is 18" (45 cm), and for 110° tips, this is 12" (35 cm). Orienting nozzles forward allows further height reductions.
9. Special nozzles are now available that create coarse, low-drift sprays. Pre-orifice, Turbo-TeeJet, or venturi-type nozzles are available from a number of manufacturers, and these reduce drift by 50 to 95 percent. (Refer to the section entitled **Herbicide Efficacy with Low-Drift Nozzles**)
10. Consider equipping your sprayer with protective shrouds. A number of different designs are available that can reduce drift between 35 and 75 percent.

For more information on reducing drift refer the Factsheet entitled "Spray Drift – Causes and Solutions" available at the Saskatchewan Ministry of Agriculture Website: www.agriculture.gov.sk.ca

Annex 25

Annex 26

Federal Republic of Germany, Federal Institute of Risk Assessment, *Health Assessment Report POE-tallowamines* (6 Sep. 2010)

BfR

6-6112-5736141

06 September 2010

Federal Institute of Risk Assessment

Health Assessment Report POE-tallowamines[2]

1. Subject of the assessment

- Evaluation of the toxicological properties und the residue behaviour of POE-tallowamines
- Consumer risk assessment with respect to POE-tallowamines on the basis of registered plant protection products containing glyphosat and POE-tallowamines

2. Conclusions

2.1 Based on the available data and information a systemic AOEL, an ADI and an ARfD in the same magnitude of 0.1 mg/kg bw(/day) are proposed for the POE-tallowamine with the CAS no. 61791-26-2 that is contained as a surfactant in many glyphosate-based (and some other) PPP. Furthermore, an inhalative AOEL of 0.0166 mg/kg bw/day was established. For its dermal absorption rate, a reduced default value of 10% is proposed.
The substance should be classified and labelled for acute oral toxicity (Xn, R22, corresponding to "Acute tox. 4, H302" according to GHS), for skin and severe eye irritation (Xi, R38-41; corresponding C&L according to the GHS would be "Skin irrit. 2, H315" and "Eye dam. 1, H318") and skin sensitisation (Xi, R43, corresponding to "Skin sens. 1, H302"). Most likely, classification for inhalative toxicity will be also needed.

2.2 With regard to nearly all toxicological endpoints under investigation, the POE-tallowamine was clearly more toxic than glyphosate. Its primary mode of action was a local effect, *i.e.*, strong mucosal irritation. However, occurrence of systemic effects after ingestion or inhalation is also likely. There is some evidence to assume a higher vulnerability of pups.
Eye or mucosal irritation may be produced by both glyphosate and the surfactant and some additivity seems theoretically possible but, with regard to the very different toxic properties of these substances and the apparent differences in the effect doses and severity of findings, higher toxicity of certain PPP as compared to the active ingredient can be allocated to the surfactant alone. The same holds true for poisoning inci-

[2] POE-tallowamines refers to the subgroup of polyethoxylated alkylamines (POEA), which originate from naturally occurring tallow (unbranched with typical chain lengths).

dents in humans, Therefore, separate reference values of these products are not needed but risk assessment should include a comparison of the expected exposures with the reference values for both glyphosate and POE-tallowamine surfactant.

2.3 For the consumer risk assessment the dietary intake was calculated with the German VELS model[3] based on consumption values for German children aged two to under five years with a mean body weight of 16.15 kg and additionally with the EFSA-PRIMo[4] which includes a comprehensive set of European and WHO diets. For a better understanding of possible management options the dietary burden was calculated based on three different scenarios:

- Scenario 1: all possible feed items considered
- Scenario 2: feeding of forage/grass excluded
- Scenario 3: feeding of forage/grass and cereal straw excluded.

Only those uses were taken into account which involved glyphosate formulations registered (or pending) in Germany. Additional sources of POE-tallowamines (e.g. adjuvants used in tank mixes) were not considered within this document.
The German VELS model as well as the EFSA PRIMo model indicated an exceedance of the ADI and/or the ARfD value due to residues in animal commodities when forage/grass and/or cereal straw were taken into account as potential feed items.
Under the assumption of establishing restrictions for feeding forage/grass and straw, the German VELS model resulted in a chronic intake of 0.0246 mg/kg bw and a maximum (acute) intake of 0.033 mg/kg bw (based on oat bran), representing 24.6 % of the ADI or 33.0 % of the ARfD.
On European level the EFSA PRIMo model, which contains dietary information from various Member States and the WHO GEMS-Food Cluster diet model, identified Danish children as consumer group being most exposed to POE-tallowamine residues (0.0559 mg/kg bw) as far as the chronic intake is concerned. The highest acute intake of 0.0601 mg/kg bw was calculated for adults from the Netherlands which provided the most critical consumption pattern among EU consumer groups.
When restricting the feeding of forage/grass and cereal straw, the chronic as well as the acute dietary intake are below the respective toxicological reference values (ADI and ARfD for POE-tallowamines: 0.1 mg/kg bw). POE-tallowamine residues would be unlikely to present a public health concern.

3. Justification / Risk assessment

3.1 Toxicological evaluation of POE-tallowamines

[3] Banasiak, U., Heseker, H., Sieke, C., Sommerfeld, C. und Vohmann, C. (2005) Abschätzung der Aufnahme von Pflanzenschutzmittel-Rückständen in der Nahrung mit neuen Verzehrsmengen für Kinder. Bundesgesundheitsbl – Gesundheitsforsch – Gesundheitsschutz 48:84–98.

[4] Reasoned opinion on the potential chronic and acute risk to consumers health arising from proposed temporary EU MRLs. Calculation model "Acute and chronic consumer exposure REV1". Europäische Behörde für Lebensmittelsicherheit (EFSA), 15. März 2007
http://www.efsa.europa.eu/EFSA/efsa_locale-1178620753812_1178620776373.htm

Objective of this evaluation:

Many plant protection products (PPP), in particular a number of (but not all) widely used formulations of the herbicidal active ingredient glyphosate, contain a substance with the CAS no. 61791-26-2 as a surfactant. This substance (sum formula, according to U.S.EPA, $C_{48}H_{97}NO_{15}$) is also known as "POE-tallowamine" and belongs to the heterogeneous chemical group of polyethoxylated alkylamines (POEA). A huge amount of information from different sources (poisoning incidents in humans; *in vitro* data obtained in different test systems; studies on short-term, reproductive and developmental toxicity of Roundup® formulations or preparations), even though of different quality and reliability, in the whole suggests a higher toxicity of such PPP as compared to the active compound. Glyphosate itself is generally considered to be of low toxicological concern (WHO/IPCS, 1994; Williams *et al.*, 2000; EU, 2002; JMPR, 2004). However, in the DAR on glyphosate (BgVV, 1998) that was prepared to support first Annex I listing of the active ingredient, it was already mentioned that surfactants could significantly contribute to the toxicity of glyphosate products.

To facilitate a comprehensive risk assessment of products that contain both glyphosate and the POE-tallowamine and to ensure sufficient protection of operators, bystanders, workers, residents and consumers, it was necessary to establish reference values (ADI, AOEL, ARfD) for the surfactant with CAS no. 61791-26-2 and to estimate its dermal absorption rate. These values may be applied in future for risk assessment purposes in addition to those of glyphosate.
Another goal of this evaluation was to check if there was enough evidence to conclude that higher toxicity of certain PPP was in fact due to the surfactant of if there were indications of a synergistic mode of action with glyphosate.

The evaluation of and proposed reference values for the POE-tallowamine surfactant with the CAS no. 61791-26-2 are mainly based on toxicological studies with the surfactant formulations MON 0818 and G-3780 that were submitted by the company Monsanto on request of the BfR after they had been identified in a recent evaluation of the U.S. Environmental Protection Agency (EPA). Both formulations contain this tallowamine at an amount of about 70% and are or were part of various glyphosate-based PPP. The data package consists of subchronic oral studies in rats and dogs and of reproductive and developmental toxicity studies in rats. Furthermore, former evaluations by the EU, the EPA and a number of publications (see reference list) were taken into consideration. With regard to the EPA evaluation (EPA, 2009), it must be emphasised that it was more comprehensive because the whole group of polyethoxylated alkyl amines was addressed with special regard to the need of setting tolerances in crops. The EPA conclusions were drawn under the assumption, that the alkyl amine content in herbicidal formulations will not exceed 25% and will not be higher than 10% in fungicides and insecticides.

In the following, an overview on the toxicological profile of the POE-tallowamine surfactant with CAS no. 61791-26-2 is given. (For direct comparison to glyphosate, see Table 2.) Subsequently, reference values are proposed, its dermal absorption rate is estimated and its possible impact on the toxicity of Roundup® formulations as an example for glyphosate-based herbicides is discussed.

Toxicokinetics and metabolism

No information is available. However, a metabolic pathway suggested by the registrant based on Krogh et al. 2003 (ASB2010-8153), HERA 2009 (ASB2010-8124) and Ginkel et al. 1993 (ASB2010-8107, -8108) seems to some extent reasonable from a biochemical point of view, even though no data on mammalian metabolism of POEA were presented. Additionally, in a memorandum US EPA suggests that for metabolism and kinetics of POEA, even though no data are available, certain parameters might be bridged from alcohol alkoxylates (EPA 2009, ASB2009-9023). This position has to be seen critical, since the central nitrogen atom of POEA is missing in alcohol alkoxylates and metabolism might consequently be different.

Other literature presented by the notifier refers to metabolism of POEA in bacteria, biodegradation of POEA, kinetics of other classes of substances but not to toxicokinetics or mammalian metabolism of POEA and is therefore presented in detail elsewhere.

Acute toxicity

The acute oral LD_{50} of the surfactant in rats was 864 mg/kg bw when the value of *ca* 1200 mg/kg bw for MON 0818 (EPA, 2009) was corrected for the presumed POE-tallowamine content of 72%.This result warrants classification and labelling for acute oral toxicity as "harmful if swallowed" (Xn), *i.e.,* the risk phrase R22, or H302 (Acute toxicity cat. 4, "Warning") according to GHS would be appropriate.

The acute dermal toxicity was tested in rabbits. The LD_{50} was above the highest dose of 907 mg/kg bw (EPA, 2009; corrected for tallowamine content). Although the amount applied was below the required limit dose of 2000 mg/kg bw, classification and labelling is not considered necessary because no mortality occurred and no clinical signs were reported up to this dose. Furthermore, a dermal absorption of not more than 10% can be assumed.

Unfortunately, acute inhalation data for the POE-tallowamine under consideration or a surfactant formulation such as MON 0818 is not available. This must be in fact regarded as a data gap because there is evidence coming from an acute inhalation study with a Roundup formulation (Velasquez, 1982) that inhalative toxicity was higher than with glyphosate alone for which an LC_{50} > 5 mg/L air was determined (BgVV,. 1998). In this acute study, an LC_{50} of 3.18 mg/L air for Roundup was obtained resulting in the classification and labelling of the product with Xn, R20 (H332 according to GHS). It is quite likely that this apparent difference was due to the surfactant. MON 0818 was contained in this product at an amount of approximately 18% w/v, *i.e.*, the POE-tallowamine content was *ca* 14% w/v. When the strong irritating properties of the POE-tallowamine surfactant (see below) are taken into consideration, one would expect similar effects in the respiratory tract. A higher inhalative toxicity than for glyphosate was also substantiated by a subacute inhalation study (Velasquez, 1983) with Roundup and by observations in humans after occupational exposure without protective measures ranging from weak symptoms such as a headache to well-documented systemic poisoning with persistent morphological findings (Jauhiainen *et al.*, 1991; BfR, 2008).
A high acute inhalative toxicity was experimentally confirmed for other polyethoxylated alkyl amine substances. *Armoblen 557* (CAS no. 68219-26-3) had an LC_{50} of 0.66 mg/L that was

established in a study with 4-hour exposure. For Ethomeen C/12 (CAS No. 61791-31-9), an LC_{50} of 0.98 mg/L was calculated on the basis of a one-hour trial (EPA, 2009).
However, acute inhalation data for different products that were submitted to support registration in Germany were partly contradictory although they contain similar amounts of glyphosate (at least 360 g/L) and of the surfactant. Apparently, there is no clear correlation of inhalative toxicity with the surfactant content. In fact, there are PPP with the same surfactant at nearly the same concentration for which classification and labelling for acute inhalation toxicity is not needed. In sum, the available information is not sufficient to conclude on the appropriate classification and labelling of the POE-tallowamine surfactant itself for acute inhalation toxicity although some classification will be probably needed.
If experimental data for a particular formulation containing this surfactant is not available, according to Directive 1999/45/EEC or the CLP regulation, classification and labelling of the PPP for precautionary reasons might be a reasonable option.

The POE-tallowamine surfactant was found irritating to the skin (Xi, R38) and strongly irritating to the eyes. The U.S. EPA (EPA, 2009) labelled the substance for eye effects even as "corrosive" (C) but, according to the EU scheme, R41 seems to be more appropriate. Correct classification according to GHS rules difficult because the studies themselves were not submitted and the assessment is based on the EPA evaluation (EPA, 2009). However, if Annex VII of the CLP regulation (Translation table from classification under Directive 67/548/EEC to classification and assignment of hazard statements under this regulation) is applied, cat. 2/H315 (for skin irritation) and cat. 1/H318 (for eye irritation) would be most appropriate.
Eye irritation is often considered to provide evidence also of mucosal irritation. Mizuyama (1987) studied the irritating effect of the glyphosate isopropylammonium salt, MON 0818 and a Roundup formulation (containing 41% w/v of the IPA salt and 15% of MON 0818) on stomach and small intestine mucosa in dogs. Irritation was more severe with the Roundup formulation than with either the IPA salt or the surfactant alone. The intestine appeared to be more affected than the stomach. The severity of the damage was equivalent to that caused be 0.25 N hydrochloric acid.

Concerning skin sensitisation, the available data is scarce. However, in its 2009 evaluation, U.S. EPA concluded that the POE-tallowamine was sensitising because of a positive Buehler test using three applications (Blasczak and Auletta, 1987). Therefore, Xi, R43 or, according to GHS, Skin sensitisation, cat. 1/H317 is proposed.

For setting of reference values, the acute toxicity data is not appropriate. However, acute oral toxicity supports a need to establish an ARfD and the evidence of inhalative toxicity suggests that an inhalative AOEL should be established.

Short-term toxicity (subacute and subchronic studies)

Rat, oral
A 90-day feeding study was performed on SD rats (Stout, 1990). Because current standards are basically met, the study may be considered as valid and reliable. Test substance was the surfactant formulation MON 0818. As stated in the study report, this test item contained 71.9% of "polyoxyethylen (15) tallow amine" (POEA). Groups of 10 male and 10 female rats were fed MON 0818 at nominal concentrations of 0, 500, 1500, or 4500 ppm. In most groups,

however, these nominal concentrations were not achieved. The actual concentrations were in the range from 80 to 90% of the nominal values.

The highest dose level was clearly toxic. This became apparent mainly by a reduced body weight gain in both sexes that achieved statistical significance and resulted in a lower mean body weight over the whole course of the study. Food consumption was diminished and clinical signs (piloerection, soft faeces) occurred. Furthermore, blood glucose and urea levels were decreased.
Some deviations in organ weights are most probably related to the lower body weight at termination and there were no gross pathological findings at necropsy that could be attributed to treatment. In contrast, histological lesions of the intestinal mucosa were certainly treatment-related. These findings comprised hyperplasia and cell vacuolation in the *Lamina propria* and all animals receiving the high dose were affected.

At the mid dose level of 1500 ppm 4 out of ten male rats and 5/10 females exhibited the same histopathological changes as described above. In males, there was in addition a statistically significant decrease in food consumption and body weight gain over the first 9 days of treatment.

Feeding of MON 0818 at the low dose level of 500 ppm did not cause any remarkable differences from the control groups and, thus, this dose can be regarded as the NOAEL.
For the nominal dietary concentration of 500 ppm, a mean daily intake of 33.0 mg/kg bw/day was calculated for the male rats and of 39.9 mg/kg bw/day for the females. However, to establish the true NOAEL for the POE-tallowamine, these values must be corrected for the actually achieved concentration of 84% of nominal in both the male and female groups and then for the 71.9% content of the surfactant in MON 0818. These corrections result in intake calculations of 19.9 mg/kg bw/day for males and 24.1 mg/kg bw/day for females. It seems reasonable to round them to 20 mg/kg bw/day that is considered the NOAEL for the surfactant in this study. For the LOAEL that was established at a three times higher dietary level, hence, an achieved intake of 60 mg/kg bw/day is assumed.

The outcome of this study 90-day was at least partly in line with an additional one-month feeding study with "POEA surfactant" on Sprague-Dawley rats of which the original report was not made available to the BfR. In this experiment, the NOAEL was claimed to be 800 ppm (*ca* 40 mg/kg bw/day). At the next higher dose level of 2000 ppm, body weight gain in male rats was reduced. At the high dose level of 5000 ppm, lower body weight gain and irritation and inflammation of the colon mucosa were observed in both sexes (Ogrowsky, 1989, cited by Williams *et al.*, 2000).

The toxicological findings in these feeding studies in rats point to local irritation in the intestines as the primary mode of action. Because of the known irritating properties of the POE-tallowamine, it was first assumed that this local effect was behind the higher toxicity of PPP containing glyphosate and this surfactant as compared to the active ingredient. However, the subchronic study in dogs, the reproduction and developmental studies in rats, comparative mechanistic data and human experience suggest that systemic effects will be most likely due to a second mechanism of POE-tallowamine toxicity.

Dog, oral
Groups of four male and four female Beagle dogs received three times a day a capsule containing the formulation G-3780 for a total of 14 weeks (Fillmore, 1973). According to a claim made by Monsanto, G-3780 was very similar to the formulation MON 0818. However, in the study report itself, no information on the composition of the test substance and the content of the POE-tallowamine with the CAS no. 61791-26-2 is given. Therefore, it is assumed that the POE-content, as in MON 0818, was about 72% suggesting a need for correction of the NOAEL/LOAEL.
The total daily doses of G-3780 were 0, 30 (*i.e.*, 3 x 10), 60 (3 x 20), or 90 (3 x 30) mg/kg bw. However, because of a rather tricky dosing scheme, these dose levels were achieved not before the third or fourth week of treatment. This is one of the reasons for a compromised reliability of this study. Transiently, high dose animals even received 120 (3 x 40) mg/kg bw/day but because of enhanced emesis, diarrhoea and subsequent cachexia the dose was lowered again after 10 days. It seems that the MTD was exceeded when more than 90 mg/kg bw/day was administered.
At the two upper dose levels, dogs did not gain and, sometimes, even lost weight. At termination, mean body weight were by more than 10% lower than in the control groups. In addition, vomiting and diarrhoea were more frequently observed than in the controls. Clinical chemistry revealed lower blood calcium and total protein concentrations.
There were no remarkable findings at necropsy and histopathological examination. In particular, local effects on intestinal mucosa, as in the rat study, were not reported. The clinical signs might suggest gastrointestinal irritation but, on the other hand, are common unspecific signs of general toxicity in dogs.
The lowest dose level of 30 mg/kg bw/day was considered the NOAEL. After correction for presumed POE-tallowamine content, a numeric value of 21 mg/kg bw/day would result that is in the same magnitude as the NOAEL in the subchronic rat study. Accordingly, the LOAEL was 42 mg/kg bw/day.

Despite a wide range of parameters that were investigated, the study design, examination methods and the quality of reporting do not comply with modern standards. Therefore, and because of the uncertainties with regard to the actually applied doses, the study can be considered at best supplementary. However, it can be accepted that the requirement of testing for short-term toxicity in a second species has been fulfilled. The conclusion can be drawn that the sensitivity of rats and dogs in terms of the NOAELs/LOAELs is not that different. In contrast to the studies in rats, however, the findings in dogs suggest rather a systemic effect than local irritation.

Rat, inhalative
In a four-week study on SD rats, 15 male and 15 female animals per group were exposed (whole-body) for 6 hours per day over 5 days per week (total number of treatments 22) to nominal concentrations of 0 (control), 0.37, 0.75, or 2.17 mg/L air of the Roundup formulation MON 2139 (Velasquez, 1983). However, the analytically determined air concentrations were 0.05 mg/L (low dose), 0.16 mg/L (mid dose), and 0.36 mg/L (high dose). There were no unscheduled deaths in this study. Clinical signs did not occur, and there were no gross pathological changes at necropsy. Body weight and organ weights were not altered but, surprisingly, the lungs had not been weighed.
The only findings that may be attributed to treatment were significantly higher total protein, albumin and globulin serum concentrations in females at the two upper dose levels.

Furthermore, the incidence of certain histopathological findings in the lungs (perivascular lymphoid infiltrates or aggregates, interstitial infiltration or pneumonia), in the trachea (mononuclear infiltration and chronic inflammation) and the nasal turbinates (inflammation) was increased in high dose females. Unfortunately, histopathology was performed on control and high dose animals only.
Even though the study author did not mention these findings as adverse or treatment-related, they might be a reaction to Roundup application. Accordingly, the lowest concentration of 0.05 mg/L air is considered the NOAEC. This is far below the NOAEC of 3.8 mg/L, *i.e.*, the highest concentration tested, in a 14-day inhalation study with glyphosate in rats (BgVV, 1998).
Under the assumption that the effects were in fact entirely due to the POE-tallowamine, an inhalative NOAEL (expressed in mg/kg bw) for this surfactant may be calculated. Since 180 g/L MON 0818 were contained in the test item, a NOAEC of 0.09 mg/L air for this surfactant formulation and of 0.062 mg/L for the POE-tallowamine can be assumed. Taking into consideration the tallowamine content in MON 0818, a respiratory rate of 45 L air/kg bw per hour for the rat and an exposure time of 6 hours per day, the calculation results in a NOAEL of *ca* 1.66 mg/kg bw/day.

Mutagenicity

Possible mutagenicity of POE-tallowamine(s) was addressed in the past by different regulatory bodies as well as in a review article (BgVV, 2000; Williams *et al.*, 2000; EPA, 2009). The overall conclusion was that these substance were not mutagenic but might have caused positive findings in a number of test systems due to cytotoxicity when PPP such as various Roundup formulations were tested. Unfortunately, there are relatively few experiments with formulations in standard test systems available because usually only the active compounds are subject to rigorous testing in a battery of regulatory studies. At least, the Roundup formulation MON 2139 containing the POE-tallowamine with the CAS no. 61791-26-*2* as part of the surfactant formulation MON 0818 proved negative in an Ames test in concentrations of up to 500 µg/plate without and of up to 1500 µg/plate in the presence of metabolic activation by S9 mix (Kier *et al.*, 1992a). In a mouse bone marrow micronucleus assay (Kier *et al.*, 1992b) no evidence of a clastogenic potential was found up to the highest tested dose of 555 mg/kg bw/day that was already clearly toxic to mice after single intraperitoneal administration. Roundup proved cytotoxic in the bone marrow.
MON 0818 itself was tested in the Ames test by Stegemann and Li (1990) and proved negative. However, due to severe cytotoxicity, it could be tested only at rather low concentrations (up to 300 µg/plate) in the various *Salmonella typhimurium* strains. It proved also negative in a micronucleus assay in mouse bone marrow (Stegemann and Kier, 1998) at the dose level of 100 mg/kg bw that was administered by intraperitoneal injection but this latter study was considered supplementary only because no evidence of systemic or bone marrow toxicity was obtained.

There is evidence coming from several studies using the Comet assay or other less validated systems, that products which contain cytotoxic tallowamine (or other) surfactants might produce, mostly in very high concentrations, DNA damage either by direct contact or by enhanced formation of DNA reactive oxygen species (*e.g.*, Clements *et al.*, 1997; Peluso *et al.*, 1998; Cavalcante *et al.*, 2008). A part of these investigations was made in non-mammalian systems that are more relevant to ecotoxicology. Positive findings are nearly

always linked to toxicity as recently confirmed by Heydens *et al.* (2008). Unfortunately, no UDS assay in, *e.g.*, rat hepatocytes is available that would be most suitable to investigate a potential for DNA damage also at concentrations below overt toxicity. However, for the time being, weight of evidence suggests that the relevance of possible effects on the DNA to humans under practical exposure conditions is very low.

Chronic toxicity and carcinogenicity

No such data is available. Currently, for co-formulants like surfactants, long-term studies are not required and, accordingly, usually not performed. However, based on the toxicological profile of POE-tallowamine, it is not expected that chronic toxicity would be much different from the effects that were noted in the subchronic studies. With regard to carcinogenicity, it should be taken into consideration that, in spite of long-lasting experience and extensive use, there is no convincinig epidemiological evidence in people who had been in frequent occupational contact with glyphosate-based plant protection products (BgVV, 1998; JMPR; 2004; DeRoos *et al.*, 2005). The EPA concluded that the whole group of polyethoxylated alkyl amines was not of concern for carcinogenicity (EPA, 2009).

Reproduction toxicity

Two GLP-compliant studies were performed in rats to investigate possible effects of the surfactant formulation MON 0818 on reproduction (Knapp, 2007, 2008). Furthermore, a rather new published study on reproductive toxicity of a commercial Roundup® formulation (Dallegrave *et al.*, 2007) is available. Unfortunately, the design of all three studies was not in line with usual OECD Guideline requirements. The reproductive/developmental screening studies according OCED testing guidelines 421/422 are less sensitive than the full scale study designs according to testing guidelines 414/416.

MON 0818

In a two-generation study (according to OECD 421), Sprague-Dawley rats (20 per sex and dose group) received the test formulation in the F0 generation at dose levels of 0, 100, 300, or 1000 ppm via their diet (Knapp, 2007). A broad range of endpoints was examined including hormone measurements, sperm parameters and extensive histopathology. There was no evidence of parental toxicity but the highest dose tested was lower than the LOAEL in the 90-day rat study. In contrast, administration of the high dose resulted in a reduced implantation rate (with 5 of 15 pregnant dams being affected), lower litter size and also an increase in perinatal mortality. Total loss of two litters immediately after birth or at the beginning of the lactation period was noted. However, further development of the surviving pups was not altered.

To produce the F2 generation, three male and female pups from each litter were selected and reared. Between days 21 and 70 after birth, they received the test item at a dietary concentration that was adjusted to the respective actual body weight. The mean daily doses during this period were 0, 7, 21 or 61 mg/kg bw in male rats and 0, 6, 28 or 72 mg/kg bw in females. Two male and female pups per litter were selected for further breeding but only from the control and high dose groups. From the beginning of this third mating period, the selected high dose F1 animals received again 1000 ppm of MON 0818 in their diet. In the F2 generation, no parental toxicity and no impact of this high dose on reproduction were observed.

Histopathological examination of different parts of the intestinal tract (jeunum, ileum, caecum, colon and rectum) did not reveal indications for mucosal irritation in F0 and F1 animals.

Based on the findings in the F1 generation (*i.e.*, lower implantation rate, litter size and pup survival) 300 ppm was considered the NOAEL for reproduction and offspring effects. For the F0 adults, a mean daily intake of 16.6 (males) or 19.5 mg/kg bw/day of MON 0818 was calculated at this dose level that must be corrected for the tallowamine surfactant content. A NOAEL of 12 (males) to 14 (females) mg/kg bw/day for the surfactant would result (EPA, 2009). For parental toxicity, the highest dose of 1000 ppm was the NOAEL. The corrected mean daily surfactant intake was about 38 mg/kg bw (lowest value as calculated for F1 males).

In a second study (Knapp, 2008; according to OECD 422), groups of 12 male and female rats of the same strain [Crl:CD(SD)] were fed 1000 ppm of MON 0818 for a total period of 69 – 72 days. This dose was equivalent to a mean daily intake of 66 mg/kg bw by the male animals and 95 mg/kg bw/day by females over the whole course of the study. During the individual study periods (pre-mating, pregnancy, lactation), the intake in females varied between 74 and 126 mg/kg bw/day. A control groups of equal size received untreated diet. From administration day 14 onwards, the animals were mated.
There were two unscheduled deaths among the treated dams. One female rat died showing clinical signs of dystocia. Another dam was did not give birth and was killed 30 days after mating in poor clinical state. At necropsy, uterine rupture was established and two implantation sites were recorded of which one was a dead fetus and the other an early resorption. In contrast to the assessment by the study author, it cannot be excluded that these deaths were treatment-related. However, there were no adverse effects in the remaining 10 dams or in any of the 12 males in the treatment group. Furthermore, reproduction was not affected in the remaining dams. A higher incidence of chronic-progressive nephropathy in treated males as compared to the control group (6/12 vs. 3/12) was not allocated to substance administration because it was only unilateral. Thus, a NOAEL for parental and reproduction toxicity was not established. Offspring effects could not be fully evaluated because all pups were killed on day 4 *post partum* already. However, if effects on litter size or perinatal mortality as in the first study would have occurred, they might have been noted.

<u>Roundup® herbicide</u>
In a one-generation study, pregnant Wistar rats (15 per group) were administered a Roundup® herbicide that is commercially available in Brazil (containing 36% glyphosate and 18% of the POE-tallowamine surfactant) at dose levels of 50, 150, or 450 mg/kg bw/day by oral gavage from day 1 of presumed gestation through the end of lactation (postnatal day 21). The calculated daily intake of the surfactant was 9, 27, or 81 mg/kg bw. A control group received only the vehicle, *i.e.*, distilled water (Dallegrave *et al.*, 2007).
Evaluation of toxicity in the parental generation was based on observations for mortality and clinical signs, body weight measurements and determination of selected organ weights at termination. Reproductive toxicity was assessed by determining litter size, number of living and dead pups, viability and sex ratio. Possible effects on offspring development, in particular with regard to sexual maturation, were studied in one male pup and one female pup per litter which were killed at an age of 65 days and in one more pup per sex and litter

which were sacrificed on postnatal day 140. Organ weights were also determined in these animals.
Up to the highest dose level, there was no evidence of maternal toxicity. Likewise, litter size, mean number of live and dead pups and sex ratio among the pups were not affected at any dose level. Thus, the NOAEL for parental and reproductive toxicity was 450 mg Roundup/kg bw/day, corresponding to a dose of 81 mg/kg bw/day for the surfactant.
However, sexual development in offspring was affected. In female pups, delayed vaginal opening suggested a slower sexual development in all treated groups. Since this finding was associated with a markedly lower body weight in the low dose group, a possible treatment-related effect was assumed only for the two upper dose levels. In male pups, functional disturbances were confined to the highest dose level of 450 mg Roundup/kg bw/day and were partly contradictory. On one hand, preputial separation was noted to occur a bit earlier than in the control group. On the other hand, at an age of 65 days, testosterone serum concentration was significantly lower (but not at 140 days) and, when measured at 140 days, daily sperm production and total number of sperm in the epididymis tail were diminished suggesting rather a delay in sexual development. Interpretation of this data is difficult since a similar decrease in both parameters was observed at the low dose level, too, whereas the mean values in the mid dose group were similar to the controls. At all three dose levels, histopathological examination revealed degenerative changes in the testes with the absence of tubular lumen being the most outstanding finding. However, all these observations were flawed by a low number of animals on which the findings are based, *e.g.*, histopathology of the testes was confined to only five male pups per dose level.
Thus, a NOAEL for offspring effects cannot be established.

A direct comparison of the results by Dallagrave *et al.* (2007) with the studies of Knapp (2007, 2008) is not possible because the test material was different and the same holds true for the study design and the range of parameters under investigation. Unfortunately, it is also not feasible to compare these studies and their results with the Guideline-compliant reproduction studies with glyphosate. Thus, no definite conclusion can be drawn if the effects of treatment with Roundup can be allocated to the surfactant. Nonetheless, the published findings might confirm that offspring development was in fact a particularly sensitive target of Roundup and the POE-tallowamine. A certain potential for endocrine disrupture cannot be excluded, because of the findings in young male rats that might indicate impairment of spermatogenesis.

Developmental toxicity

The surfactant formulation MON 0818 and a Roundup® herbicide that is commercially available in Brazil were tested for developmental toxicity and teratogenicity in rats. A study in a second species was not submitted. However, it is unclear whether the data requirements for pesticides or drugs can be applied to co-formulants. Furthermore, the rabbit as the usual second species is known to be very sensitive to gut irritation. Thus, severe maternal toxicity at low doses due to the well known irritation potential of the tallowamine surfactant must be expected in a rabbit study that might prevent meaningful evaluation of fetal effects at sufficiently high dose levels.

MON 0818

A preliminary (range-finding) and a main study were performed under GLP conditions in which MON 0818 was administered to pregnant rats (Charles River Crl:CD Br). Although the studies themselves can be considered acceptable, it is not clear how much POE-tallowamine was contained because its amount even in different batches of MON 0818 can vary. However, based on the information given in the study report of Stout (1990) and in line with the EPA evaluation (EPA, 2009), it is assumed that the amount of this surfactant in the tested formulation accounted for 71.9%, too. The NOAELs/LOAELs will be corrected accordingly.

Preliminary study

MON 0818 was administered by oral gavage to groups of 8 pregnant rats from day 6 through day 15 post mating at dose levels of 0, 25, 50, 100, 200, or 400 mg/kg bw/day. On pregnancy day 20, the dams were killed and fetuses developed by caesarian section. The uteri were dissected and examined. Fetuses were counted and inspected for external anomalies.

Mortality, clinical signs and body weight losses were clear indications of severe maternal toxicity at a dose of 100 mg/kg bw/day and above. The NOAEL for maternal toxicity was 50 mg MON 0818/kg bw/day, corresponding to 36 mg/kg bw/day for the POE-tallowamine. Obvious developmental toxicity, in contrast, was confined to the highest dose level of 400 mg/kg bw/day at which post implantation losses were increased. However, due to mortality among the dams, only 3 litters were available at this dose for evaluation preventing meaningful evaluation of teratogenicity (Holson, 1989). Based on these results, the dose selection for the subsequent main study appears acceptable.

Main study

25 pregnant rats per groups received MON 0818 from days 6 through 15 post mating by oral gavage at dose levels of 0, 15, 100 and 300 mg/kg bw/day. Following sacrifice of the dams and caesarean section, uteri were inspected and fetuses examined for external, visceral and skeletal anomalies by appropriate methods (Holson, 1990).

Severe maternal toxicity became apparent at the top dose level by the death of 6 dams between treatment days 8 and 13, clinical signs, initial body weight losses and a diminished body weight gain thereafter. Furthermore, food consumption was decreased. After cessation of treatment, body weight gain and food consumption showed a trend towards normalisation from study day 16 onwards. Soft and mucous faeces might suggest mucosal damage. A lower mean liver weight was probably a reflection of the lower body weight.

At the mid dose level of 100 mg/kg bw/day, mean food consumption was significantly reduced during the first three days of treatment and five out of 25 dams lost weight although the mean body weight and body weight gain were not different from the control group. Clinical signs were only rarely seen. Based on these minor findings, and in accordance to the study author, this dose is considered the LOAEL. For this assessment, it was also taken into account that clear maternal toxicity occurred at the same dose level in the range-finding study. After adjustment for a tallowamine content of 71.9 %, the LOAEL for the surfactant was calculated to be 72 mg/kg bw/day. The low dose of 15 mg MON 0818/kg bw/day was the NOAEL in this study corresponding to 10.8 mg tallowamine/kg bw/day.

(In the 2009 EPA evaluation, the findings at 100 mg MON 0818/kg bw/day were disregarded and 72 mg/kg bw/day considered the NOAEL for the tallowamine. This dose is also used as starting point to derive the ARfD.)

In the study report (Holson, 1990) as well as in the EPA evaluation (EPA, 2009), it is stated than no developmental toxicity was observed up to the highest dose level of 300 mg/kg bw/day. However, the total number of visceral and skeletal anomalies at this dose was increased. Due to maternal mortality, only 15 litters were available for evaluation but the incidence of exencephalia and stenosis of the right carotid were already above the historical control range. It may be expected that, with a higher number of litters, the frequency of these anomalies would be even higher. Furthermore, malformations such as *Situs inversus* and absent bladder were noted only in this high dose group for which no historical control data was provided. Therefore, the NOAEL for developmental toxicity of MON 0818 was the mid dose level of 100 mg/kg bw/day corresponding to 72 mg/kg bw/day for the tallowamine. The highest dose of 300 mg/kg bw/day (216 mg/kg bw/day) was considered the LOAEL for this endpoint.

Roundup® herbicide

Pregnant Wistar rats (14 - 16 per group) were administered a Roundup® formulation that is commercially distributed in Brazil and was reported to contain 36% glyphosate and 18% of the POE-tallowamine surfactant (Dallegrave *et al.*, 2003). The test material was applied in distilled water once a day by oral gavage from day 6 through 15 of gestation at dose levels of 500, 750, or 1000 mg/kg bw whereas the control group received only the vehicle. The respective doses of the tallowamine accounted for approximately 91, 135, and 180 mg/kg bw/day. On gestation day 21, dams were anaesthetised and the uteri with contents were removed by caesarean section and weighed. Afterwards, the dams were sacrificed, necropsied and organ weights of heart, lung, liver, kidneys, and spleen determined. Uteri were inspected for live and dead fetuses and number of implantation sites. The fetuses were weighed, sexed and examined for external and skeletal but not for visceral anomalies.

Maternal toxicity was severe with 50% of the dams (7 out of 14 in that group) dying between gestation days 7 and 14 but was confined to the highest dose level of 1000 mg Roundup/kg bw/day. In the surviving dams, no remarkable findings were reported and relative organ weights did not show statistically significant differences although relative liver weight at the top dose level tended to be increased.
Developmental toxicity was observed in all dose groups and was characterised by a developmental delay of the skeleton and an increase in certain skeletal anomalies. Whereas only 15.4% of the fetuses in the control group exhibited skeletal findings of any kind, the total frequency was higher in a dose-related manner in the treated groups (33.1%, 42.0%, and 57.3%). Incomplete ossification of the skull was noted in all three dose groups and was dose-related as well as a reduced number of caudal vertebrae at the two upper dose levels. In contrast, for other findings, a clear relation to dose was absent. Thus, the incidence of the malformation "fused zygomatic bone" was higher only at the lowest dose level and, accordingly, cannot be attributed to treatment.
The NOAEL for maternal toxicity of the POE-tallowamine in a Roundup formulation in this study was 135 mg/kg bw/day. In contrast, a NOAEL for fetotoxicity/teratogenicity could not be established.

Similar maternal or developmental effects in rats were not reported for the active ingredient glyphosate (BgVV, 1998; JMPR, 2004). It may be concluded that the higher maternal and developmental toxicity of Roundup® was due to co-formulants in the herbicidal formulation. It

is quite likely that they result from the rather high amount of the POE-tallowamine surfactant in the product but a definitive proof is lacking. It must be emphasised that the selected dose levels in the more recent Brazilian study were clearly above the LOAELs in the 90-day study (Stout, 1990) and the developmental studies (Holson, 1989 and 1990) with the surfactant in the formulation MON 0818. However, these previous studies were apparently not known to the authors because the reports were unpublished. When the different studies are compared, it is surprising that maternal toxicity in the study by Dallegrave *et al.* (2003) occurred only at the highest dose level. It may be doubted if the investigations in the dams were sufficiently extensive to reveal adverse findings at the lower dose levels. In contrast, developmental (skeletal) effects were obviously more pronounced as in the more comprehensive study by Holson (1990).

Neurotoxicity

No data available. Based on chemical structure, a specific neurotoxic potential is not expected. The available studies do not suggest neurotoxicity of the tallowamine surfactant.

Mechanistic studies

A systemic effect of a tallowamine surfactant was demonstrated by Tai *et al.* (1990) who studied the haemodynamic effects of continuous i.v. application of either glyphosate IPA salt, the formulation Roundup or the surfactant in dogs. The impact on cardiovascular functions was studied in groups of five anesthetised and artificially ventilated female Beagle dogs. Duration of i.v. exposure was 60 minutes. A total of 8.2 g glyphosate (IPA salt administration) or 2.8 g glyphosate (Roundup) was injected. These amounts would correspond to doses of about 550 - 820 mg/kg bw or 180 - 280 mg/kg bw, respectively, since the body weight of the dogs was 10 to 15 kg.
The surfactant alone and Roundup significantly reduced the blood pressure, cardiac output and left ventricular stroke work index suggesting a marked effect on circulation. It could be shown that the cardiac depression observed with Roundup was likely due to the surfactant since, in contrast, arterial blood pressure was even increased when glyphosate isopropylamine salt had been injected. Similarly, the IPA salt did not cause changes in heart rate or cardiac output. A decrease in blood pH observed in this group could be either due to a direct effect of administration or to metabolic acidosis. In any case, it was not strong enough to affect the circulatory system.

Martinez et al. (1990) reported a high toxicity of a tallowamine following intratracheal application to dogs, due to severe lung irritation. A similar effect after oral administration was assumed to result from aspiration because vomiting occurred.

Human data (poisoning incidents)

Despite the low acute toxicity of glyphosate technical, a number of poisoning incidents in humans sometimes even resulting in death were reported in particular from Asian countries (BgVV, 1998; Lee, 2000). Severe intoxication was mainly characterized by a decrease in blood pressure and further cardiovascular symptoms followed by pulmonary dysfunction and renal failure and by signs of irritation in the gastointestinal tract. Pathophysiology of poisoning by the oral route is assumed to include irritation or corrosion of the intestinal

mucosa as a first step resulting in electrolyte imbalances, shock and disturbances in the cardiovascular system. The respiratory signs, as well as renal symptoms, are considered secondary to this mechanism being caused either by pulmonary edema related to disturbed circulation or by aspiration pneumonia following emesis. It is generally assumed that all these effects were mainly due to the (tallowamine) surfactants (BgVV, 1998; Bradberry et al., 2004; Stella and Ryan, 2004), as well as disturbances of lung function and circulation and histopathological lung lesions after acute inhalation (BfR, 2008). Sawada and Nagai (1987, cited in WHO, 1994 and BgVV, 2000) reported two cases of human poisonings with surfactants causing clinical signs resembling very much those observed after ingestion of large amounts of Roundup.

Reference doses

Table 1 provides an overview on the toxicological studies with the surfactant formulations MON 0818 or G-3780 that might be used for setting reference values for the POE-tallowamine with the CAS no. 61791-26-2. For correction of the NOAELs/LOAELs, a tallowamine content of 72% is assumed. Although acute studies might point to, e.g., a need for setting an ARfD, they are usually not considered an appropriate basis to derive any of the reference doses. Likewise, mechanistic studies are often performed under very artificial conditions and unrealistic high doses are employed. Long-term studies that are mostly used to derive the ADI are not available. Therefore, only short-term toxicity, reproduction and developmental toxicity studies can be taken into consideration for this purpose.

Table 1: NOAELs and effect doses for the POE-tallowamine with CAS no. 61791-26-2 in relevant toxicological studies

Study type / Formulation	NOAEL	LOAEL	Effects at LOAEL	Reference
90-days (feeding), rat / MON 0818	20 mg/kg bw/d	60 mg/kg bw/d	Histopathological lesions of intestinal mucosa, bw gain and food consumption ↓	Stout, 1990
14-weeks (capsules), dog / G-3780	21 mg/kg bw/d	42 mg/kg bw/d	Clinical signs (vomiting, diarrhea); bw (gain) ↓	Fillmore, 1973
4-weeks (inhalation), rat / MON 2139 (Roundup)	1.6 mg/kg bw/d (calculated from NOAEC)	5 mg/kg bw/d (calculated from LOAEC)	Clinical chemistry findings, histopathological lesions (lung, trachea, nasal turbinates) at higher concentration	Velasquez, 1983

Study type / Formulation	NOAEL	LOAEL	Effects at LOAEL	Reference
2-generation (feeding), rat / MON 0818	12 mg/kg bw/d	38 mg/kg bw/d	Implantation rate, litter size, pup survival ↓	Knapp, 2007
One-generation (feeding), rat / MON 0818	Not established	74 mg/kg bw/d	Equivocal evidence of maternal toxicity	Knapp, 2008
One-generation (feeding), rat / Roundup	81 mg/kg bw/d (reproductive and parental toxicity), not established for offspring effects	> 81 mg/kg bw/d (reproduction and parental toxicity); 9 mg/kg bw/d (offspring effects)	Sexual development mainly of male pups affected	Dallegrave et al., 2007
Developmental toxicity (gavage), rat (range-finding study) / MON 0818	36 mg/kg bw/d	72 mg/kg bw/d	Clinical signs and bw losses in pregnant dams	Holson, 1989
Developmental toxicity (gavage), rat (main study) / MON 0818	10.8 mg/kg bw/d (maternal toxicity); 72 mg/kg bw/d (developmental effects)	72 mg/kg bw/d (maternal toxicity); 216 mg/kg bw/d (developmental effects)	Food consumption ↓ and bw losses in dams; visceral and skeletal anomalies in fetuses ↑	Holson, 1990
Developmental toxicity (gavage), rat / Roundup	135 mg/kg bw/d (maternal toxicity); not established for developmental effects	180 mg/kg bw/d (maternal toxicity); 91 mg/kg bw/d (developmental effects)	Mortality in pregnant dams; skeletal anomalies in fetuses ↑, delay in ossification	Dallegrave et al., 2003

Studies with MON 0818 are of greater value for deriving the reference values because it cannot be excluded that the active ingredient or co-formulants other than the POE-tallowamine to a certain degree may have contributed to the toxicity of Roundup. In the studies with oral administration of MON 0818, the lowest NOAELs were obtained in the Two-generation study by Knapp (2007) and, with regard to maternal toxicity, in the developmental toxicity study by Holson (1990). Numerically, both NOAELs were in the same magnitude of 10 – 12 mg/kg bw/day. The LOAEL of 9 mg/kg bw/day as calculated from the reproduction study with Roundup is in the same range. It is proposed to derive both the ADI and the AOEL on this basis. Since postnatal effects on pup survival in the reproduction study could be an acute effect and because a lower food consumption and body weight losses in pregnant dams in the developmental study at the LOAEL were observed during the first days of treatment, a NOAEL of 10 – 12 mg/kg bw/day is also considered suitable for deriving the ARfD.

The toxic effects of the POE-tallowamine can be partly attributed to its irritating potential. However, systemic effects were also noted and, therefore, reduction of the usual safety factor is not feasible. When a safety factor of 100 is applied, a numeric value of 0.1 mg/kg bw(/day) for all three reference values (ADI, systemic AOEL, ARfD) will result.

In its recent evaluation, U.S. EPA has set a "chronic RfD" (ADI) and a reference value for "incidental oral (short-term and intermediate-term) exposure" (corresponding to the AOEL) of 0.15 mg/kg bw/day each (EPA, 2009). However, these values are intended to be applied for the whole group of ethoxylated alkyl amines and is based on the NOAEL of 15 mg/kg bw/day as obtained in a 90-day rat study with ATMER®163 (Zoetis, 1991). In this study, mortality occurred at the next higher dose level of 30 mg/kg bw/day. ATMER®163 is an alkylamine formulation (CAS no. 70955-14-5) that is not contained as a co-formulant in plant protection products which are authorised in Germany. Therefore, this study is of no relevance for this evaluation.

The POE-tallowamine with CAS no. 61791-26-2 proved more toxic by the inhalation route than by oral intake. Therefore, setting of an inhalative AOEL as an additional reference value is needed. In the absence of an appropriate inhalative study with the surfactant itself, a calculation must be performed on the basis of a 4-week study with Roundup (Velasquez, 1983) under the (conservative) assumption that the effects were entirely due to the tallowamine. Based on the calculated NOAEL of 1.66 mg/kg bw/day for the POE-tallowamine in this study (see section on short-term toxicity), an inhalative AOEL for this surfactant of 0.0166 mg/kg bw/day can be set when the safety factor of 100 is applied.

Dermal absorption

The POE-tallowamine with CAS no. 61791-26-2 is a surfactant that is used to enhance the uptake of the herbicidal compound glyphosate (or other herbicides) into the leaves or other part of the weeds which are intended to be controlled. Accordingly, it is a surface-active substance and a certain ability to penetrate through biological membranes can be assumed. However, estimation of dermal absorption for substances with strong irritating properties is difficult because dermal penetration can be either inhibited or facilitated.
Experimental data on dermal absorption is not available.

If physico-chemical properties are taken into consideration, a high molecular weight of 928.31 D (EPA, 2009) suggests poor dermal penetration. However, according to the EU guidance document on dermal absorption, the $\log P_{OW}$ of 3.15 (EPA, 2009) does not allow reduction of the 100% default value to 10%. On the other hand, the guidance document (EU, 2004) opens the possibility for expert judgement.

The EPA has proposed 5 %, based on models used in cosmetic and detergents industries that would reveal predictions for dermal absorption of alkylamine polyalkoxylates ranging from "negligible" to a maximum of 1.1% (EPA, 2009). A "read-across" approach, in principle, can be taken but should rely usually on experimental data an not on model calculations. Since this is apparently not the case for this group of substances, the EPA proposal cannot be followed. However, together with the high molecular weight and a rather high $\log P_{OW}$, it can be used to support a default value of 10%. The applicants should consider to submit the models and calculations on which the EPA assessment was based.

Impact of POE-tallowamine on the toxicity of Roundup formulations

With regard to nearly all endpoints investigated, the POE-tallowamine (CAS no. 61791-26-2) was clearly more toxic than glyphosate. A direct comparison is shown in Table 2. Data for the active substance have been taken from a recent evaluation (EU, 2002).

Table 2: Comparison of toxicity data for glyphosate and the POE-tallowamine surfactant with CAS no. 61791-26-2

Endpoint	Glyphosate		POE-tallowamine surfactant	
Acute oral (rat)	LD50 >5000 mg/kg bw		LD50: 864 mg/kg bw	
Acute dermal (rabbit)	LD50 >2000 mg/kg bw		LD50 >907 mg/kg bw	
Skin irritation	Not irritant		Irritant	
Eye irritation	Moderately to severely irritant		Severely irritant	
Skin sensitization	Negative		Sensitising	
Mutagenicity (gene mutations)	Negative		Negative	
Mutagenicity (chromosome aberrations)	Negative		Negative	
DNA damage	Negative		Equivocal (some evidence at high and clearly toxic doses)	
	NOAEL (mg/kg bw/day)	**LOAEL (mg/kg bw/day)**	**NOAEL (mg/kg bw/day)**	**LOAEL (mg/kg bw/day)**
Short-term toxicity (rat, oral, 90 d)	150	300	20	60
Short-term toxicity (dog, oral, ca 3 mo)	300	1000	21	42
Reproduction toxicity (rat)	700 (parental) 2000 (repro) 700 (offspring)	2000 (parental) >2000 (repro) 2000 (offspring)	38 (parental) 12 (repro) 12 (offspring)	74 (parental) 38 (repro) 38 (offspring)
Developmental studies (rat), maternal toxicity	300	1000	10.8	72
Developmental studies (rat), fetal effects	300	1000	72	216

The higher toxicity of the surfactant might explain that also Roundup formulations when tested for different endpoints were more toxic than glyphosate (Velasquez, 1982 and 1983; Dellagrave *et al.*, 2003 and 2007). This is also the most likely explanation for poisoning incidents in humans by the oral or the inhalation route. A possible potentiation of toxicity of glyphosate IPA salt and the tallowamine in animals was suspected by Martinez and Brown (1991) who tested the acute oral toxicity of Roundup formulations in rats. However, taking into consideration the toxicological profile of glyphosate, synergism is not very likely. Most effects of both substances are different by nature. Even if the surfactant would enhance the oral absorption of glyhosate (usually about 30% only), adverse effects are not expected because they occur only at exaggerated doses (BgVV, 1998). The only effect for which dose additivity could be theoretically assumed is eye (and perhaps mucosal) irritation. However, the low acute oral toxicity and the high NOAELs of glyphosate in short-term oral studies (see Table 2) suggest that the irritating potential of this active ingredient is not relevant after oral intake. Therefore, it is not very likely that glyphosate itself contributed that much to the toxicity of Roundup products in poisoning incidents in humans.
In sum, the available data is sufficient to support the assumption that critical effects of glyhosate-based PPP that were not seen with the active ingredient were due to toxicity of the POE-tallowamine surfactant alone.

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Annex 27

United States Roundup Ultra Label

Monsanto

Roundup ULTRA®

TRANSORB™

Complete Directions for Use

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS (EXCEPT AS SPECIFIED FOR INDIVIDUAL ROUNDUP READY® CROPS), DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT.

Roundup Ultra and Roundup Ready are registered trademarks, TransSorb, Monsanto and the Vine symbol are trademarks of Monsanto Company.

ACTIVE INGREDIENT:

*Glyphosate, N-(phosphonomethyl)glycine, in the form of its isopropylamine salt	41.0%
OTHER INGREDIENTS:	59.0%
	100.0%

*Contains 480 grams per litre or 4 pounds per U.S. gallon of the active ingredient glyphosate, in the form of its isopropylamine salt. Equivalent to 356 grams per litre or 3 pounds per U.S. gallon of the acid, glyphosate.

This product is protected by U.S. Patent No. 4,405,531 and by U.S. patent No. 5,703,015. Other patents pending. No license granted under any non-U.S. patent(s).

EPA Reg. No. 524-475

2000-1 21137X6-2/53

Read the entire label before using this product.

Use only according to label instructions.

It is a violation of Federal law to use this product in any manner inconsistent with its labeling.

Read the "LIMIT OF WARRANTY AND LIABILITY" statement at the end of the label before buying or using. If terms are not acceptable, return at once unopened.

THIS IS AN END-USE PRODUCT. MONSANTO DOES NOT INTEND AND HAS NOT REGISTERED IT FOR REFORMULATION. SEE INDIVIDUAL CONTAINER LABEL FOR REPACKAGING LIMITATIONS.

IMPORTANT PHONE NUMBERS

1. FOR PRODUCT INFORMATION OR ASSISTANCE IN USING THIS PRODUCT, CALL TOLL-FREE, 1-800-332-3111
2. IN CASE OF AN EMERGENCY INVOLVING THIS PRODUCT, OR FOR MEDICAL ASSISTANCE, CALL COLLECT, DAY OR NIGHT, (314)-694-4000

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

KEEP OUT OF REACH OF CHILDREN
CAUTION!

CAUSES EYE IRRITATION.

Avoid contact with eyes or clothing.

FIRST AID: IF IN EYES, flush with plenty of water. Get medical attention if irritation persists.

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear: long-sleeved shirt and long pants, shoes plus socks. Follow manufacturer's instructions for cleaning/maintaining PPE (Personal Protective Equipment). If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240 (d) (4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations:

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Physical or Chemical Hazards

Spray solutions of this product should be mixed, stored and applied using only stainless steel, aluminum, fiberglass, plastic or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS OF THIS PRODUCT IN GALVANIZED STEEL OR UNLINED STEEL (EXCEPT STAINLESS STEEL) CONTAINERS OR SPRAY TANKS. This product or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode, causing serious personal injury, if ignited by open flame, spark, welder's torch, lighted cigarette or other ignition source.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in any manner inconsistent with its labeling. Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulations.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE) and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 4 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is: coveralls, waterproof gloves, shoes plus socks.

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries or greenhouses.

Keep people and pets off treated areas until spray solution has dried to prevent transfer of this product onto desirable vegetation.

STORAGE AND DISPOSAL

Do not contaminate water, foodstuffs, feed or seed by storage or disposal.

See container label for STORAGE AND DISPOSAL instructions.

GENERAL INFORMATION (How this product works)

Product Description: This product is a postemergent, systemic herbicide with no soil residual activity. It is generally non-selective and gives broad spectrum control of many annual weeds, perennial weeds, woody brush and trees. It is formulated as a water-soluble liquid. It may be applied through most standard industrial or field-type sprayers after dilution and thorough mixing with water or other carriers according to label instructions.

Do not add surfactants, additives containing surfactants, buffering agents or pH adjusting agents to the spray solution when Roundup Ultra herbicide is the only pesticide used. Ammonium sulfate, drift control additives, or dyes and colorants may be used. See the "MIXING" section of this label for instructions.

Time to Symptoms: This product moves through the plant from the point of foliage contact to and into the root system. Visible effects on most annual weeds occur within 2 to 4 days, but on most perennial weeds may not occur for 7 days or more. Extremely cool or cloudy weather following treatment may slow activity of this product and delay development of visual symptoms. Visible effects are a gradual wilting and yellowing of the plant which advances to complete browning of above-ground growth and deterioration of underground plant parts.

Stage of Weeds: Annual weeds are easiest to control when they are small. Best control of most perennial weeds is obtained when treatment is made at late growth stages approaching maturity. Refer to the annual, perennial, woody brush and trees rate tables for recommendations for specific weeds.

Always use the higher rate of this product per acre within the recommended range when weed growth is heavy or dense or weeds are growing in an undisturbed (noncultivated) area.

Do not treat weeds under poor growing conditions such as drought stress, disease or insect damage, as reduced weed control may result. Reduced results may also occur when treating weeds heavily covered with dust.

Cultural Considerations: Reduced control may result when applications are made to annual or perennial weeds that have been mowed, grazed, or cut, and have not been allowed to regrow to the recommended stage for treatment.

Rainfastness: Heavy rainfall soon after application may wash this product off of the foliage and a repeat application may be required for adequate control.

Spray Coverage: For best results, spray coverage should be uniform and complete. Do not spray weed foliage to the point of runoff.

Mode of Action: The active ingredient in this product inhibits an enzyme found only in plants and microorganisms that is essential to formation of specific amino acids.

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No Soil Activity: Weeds must be emerged at the time of application to be controlled by this product. Weeds germinating from seed after application will not be controlled. Unemerged plants arising from unattached underground rhizomes or root stocks of perennials will not be affected by the herbicide and will continue to grow.

When this product comes in contact with soil, it is bound to soil particles. Under recommended use situations, once this product is bound to soil particles, it is not available for plant uptake and will not harm off-site vegetation where roots grow into the treated area or if the soil is transported off-site. The strong affinity of this product to soil particles prevents this product from leaching out of the soil profile and entering ground water.

Biological Degradation: Degradation of this product is primarily a biological process carried out by soil microbes.

Volatility: Roundup Ultra herbicide is non-volatile. Therefore, it cannot move as a vapor after application to affect nearby vegetation.

Toxicology Testing: Exposure to workers and other applicators generally is expected to pose minimal risks based on results of short-term toxicity studies. Glyphosate has been thoroughly tested and determined not to cause cancer or other adverse long-term health effects.

Tank Mixing: This product does not provide residual weed control. For subsequent residual weed control, follow a label-approved herbicide program. Read and carefully observe the cautionary statements and all other information appearing on the labels of all herbicides used. Use according to the most restrictive label directions for each product in the mixture.

Buyer and all users are responsible for all loss or damage in connection with the use or handling of mixtures of this product with herbicides or other materials that are not expressly recommended in this labeling. Mixing this product with herbicides or other materials not recommended on this label may result in reduced performance.

Annual Maximum Use Rate: Except as otherwise specified in a crop section of this label, the combined total of all treatments must not exceed 8 quarts of this product per acre per year.

For noncrop uses, the combined total of all treatments must not exceed 10.6 quarts of this product per acre per year.

ATTENTION

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED NON-WOODY ROOTS OR FRUIT OF CROPS (EXCEPT AS SPECIFIED FOR INDIVIDUAL ROUNDUP READY CROPS), DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT.

AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS.

Do not allow the herbicide solution to mist, drip, drift or splash onto desirable vegetation since minute quantities of this product can cause severe damage or destruction to the crop, plants or other areas on which treatment was not intended. The likelihood of injury occurring from the use of this product increases when winds are gusty, as wind velocity increases, when wind direction is constantly changing or when there are other meteorological conditions that favor spray drift. When spraying, avoid combinations of pressure and nozzle type that will result in splatter or fine particles (mist) which are likely to drift. AVOID APPLYING AT EXCESSIVE SPEED OR PRESSURE.

NOTE: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences. Keep container closed to prevent spills and contamination.

MIXING

Clean sprayer parts immediately after using this product by thoroughly flushing with water.

NOTE: REDUCED RESULTS MAY OCCUR IF WATER CONTAINING SOIL IS USED, SUCH AS VISIBLY MUDDY WATER OR WATER FROM PONDS AND DITCHES THAT IS NOT CLEAR.

Mixing with Water

This product mixes readily with water. Mix spray solutions of this product as follows: Fill the mixing or spray tank with the required amount of water. Add the recommended amount of this product near the end of the filling process and mix well. Use caution to avoid siphoning back into the carrier source. Use approved anti-back-siphoning devices where required by state or local regulations. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foam or defoaming agent.

Tank Mixing Procedure

Mix labeled tank mixtures of this product with water as follows:

1. Place a 20 to 35 mesh screen or wetting basket over filling port.
2. Through the screen, fill the spray tank one-half full with water and start agitation.
3. If a wettable powder is used, make a slurry with the water carrier, and add it SLOWLY through the screen into the tank. Continue agitation.
4. If a flowable formulation is used, premix one part flowable with one part water. Add diluted mixture SLOWLY through the screen into the tank. Continue agitation.
5. If an emulsifiable concentrate formulation is used, premix one part emulsifiable concentrate with two parts water. Add diluted mixture slowly through the screen into the tank. Continue agitation.
6. Continue filling the spray tank with water and add the required amount of this product near the end of the filling process.
7. Add individual formulations to the spray tank as follows: wettable powder, flowable, emulsifiable concentrate, drift control additive and water soluble liquid.

Maintain good agitation at all times until the contents of the tank are sprayed. If the spray mixture is allowed to settle, thorough agitation is required to resuspend the mixture before spraying is resumed.

Keep by-pass line on or near the bottom of the tank to minimize foaming. Screen size in nozzle or line strainers should be no finer than 50 mesh.

Always predetermine the compatibility of labeled tank mixtures of this product with water carrier by mixing small proportional quantities in advance.

Refer to the "TANK MIXING" section of "GENERAL INFORMATION" for additional precautions.

Mixing for Hand-Held Sprayers

Prepare the desired volume of spray solution by mixing the amount of this product in water as shown in the following table:

Spray Solution

Desired Volume	Amount of Roundup Ultra ½%	1%	1½%	2%	5%	10%
1 Gal	⅔ oz	1⅓ oz	2 oz	2⅔ oz	6½ oz	13 oz
25 Gal	1 pt	1 qt	1½ qt	2 qt	5 qt	10 qt
100 Gal	2 qt	1 gal	1½ gal	2 gal	5 gal	10 gal

2 tablespoons = 1 fluid ounce

For use in knapsack sprayers, it is suggested that the recommended amount of this product be mixed with water in a larger container. Fill sprayer with the mixed solution.

Ammonium Sulfate

The addition of 1 to 2 percent dry ammonium sulfate by weight or 8.5 to 17 pounds per 100 gallons of water may increase the performance of this product, particularly when tank mixed with certain residual herbicides on annual and perennial weeds. The equivalent rate of ammonium sulfate in a liquid formulation may also be used. Ensure that ammonium sulfate is completely dissolved in the spray tank before adding herbicides. Thoroughly rinse the spray system with clean water after use to reduce corrosion.

NOTE: When using ammonium sulfate, apply this product at rates recommended in this label. Lower rates will result in reduced performance.

Colorants or Dyes

Agriculturally-approved colorants or marking dyes may be added to this product. Colorants or dyes used in spray solutions of this product may reduce performance, especially at lower rates or dilutions. Use colorants or dyes according to the manufacturer's recommendations.

Drift Control Additives

Drift control additives may be used with all equipment types, except wiper applicators, sponge bars and CDA equipment. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label.

APPLICATION EQUIPMENT AND TECHNIQUES

Do not apply this product through any type of irrigation system.

This product may be applied with the following application equipment:

Aerial—Fixed Wing and Helicopter

Ground Broadcast Spray—Boom or boomless systems, pull-type sprayer, floaters, pick-up sprayers, spray coupes and other ground broadcast equipment.

Hand-Held and High-Volume Spray Equipment—Knapsack and backpack sprayers, pump-up pressure sprayers, hand-guns, handwands, mistblowers*, lances and other hand-held and motorized spray equipment used to direct the spray onto weed foliage.

*This product is not registered in California or Arizona for use in mistblowers.

Selective Equipment—Recirculating sprayers, shielded and hooded sprayers, wiper applicators and sponge bars.

Injection Systems—Aerial or ground injection sprayers.

Controlled Droplet Applicator (CDA)—Hand-held or boom-mounted applicators which produce a spray consisting of a narrow range of droplet sizes.

APPLY THESE SPRAY SOLUTIONS IN PROPERLY MAINTAINED AND CALIBRATED EQUIPMENT CAPABLE OF DELIVERING DESIRED VOLUMES.

Aerial Equipment

DO NOT APPLY THIS PRODUCT USING AERIAL SPRAY EQUIPMENT EXCEPT UNDER CONDITIONS AS SPECIFIED WITHIN THIS LABEL.

Use the recommended rates of this herbicide in 3 to 15 gallons of water per acre unless otherwise specified on this label. Unless otherwise specified, do not exceed 1 quart per acre. Aerial applications of this product may be made in annual cropping conventional tillage systems, fallow and reduced tillage systems and preharvest applications. Refer to the individual use area sections of this label for recommended volumes, application rates and further instructions.

FOR AERIAL APPLICATION IN CALIFORNIA OR ARKANSAS, REFER TO THE FEDERAL SUPPLEMENTAL LABEL FOR AERIAL APPLICATIONS IN THAT STATE FOR SPECIFIC INSTRUCTIONS, RESTRICTIONS AND REQUIREMENTS. FOR AERIAL APPLICATIONS, CONSULT WITH STATE OR

LOCAL AUTHORITIES REGARDING ANY ADDITIONAL REQUIREMENTS FOR AERIAL TREATMENTS. Banvel tank mixtures may not be applied by air in California.

Avoid direct application to any body of water.

AVOID DRIFT—DO NOT APPLY DURING LOW-LEVEL INVERSION CONDITIONS, WHEN WINDS ARE GUSTY OR UNDER ANY OTHER CONDITION WHICH FAVORS DRIFT. DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES MUST BE MAINTAINED.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzle configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure.

Ensure uniform application—To avoid streaked, uneven or overlapped application, use appropriate marking devices.

Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or from spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (paint), which meets aerospace specification MIL-C-38413, may prevent corrosion.

Ground Broadcast Equipment

Use the recommended rates of this product in 3 to 40 gallons of water per acre as a broadcast spray unless otherwise specified. As density of weeds increases, spray volume should be increased within the recommended range to ensure complete coverage. Carefully select proper nozzles to avoid spraying a fine mist. For best results with ground application equipment, use flat fan nozzles. Check for even distribution of spray droplets.

Hand-Held and High-Volume Equipment

Apply to foliage of vegetation to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff. Use coarse sprays only.

For control of weeds listed in the annual weeds rate tables, apply a 0.5 percent solution of this product to weeds less than 6 inches in height or runner length. Apply prior to seed-head formation in grass or bud formation in broadleaf weeds. For annual weeds over 6 inches tall, or unless otherwise specified, use a 1 percent solution.

For best results, use a 2 percent solution on harder-to-control perennials, such as bermudagrass, dock, field bindweed, hemp dogbane, milkweed and Canada thistle.

When using application methods which result in less than complete coverage, use a 5 percent solution for annual and perennial weeds and a 5 to 10 percent solution for woody brush and trees.

Selective Equipment

This product may be applied through recirculating spray systems, shielded applicators, hooded sprayers, wiper applicators or sponge bars after dilution and thorough mixing with water to listed weeds growing in any noncrop site specified on this label and only when specifically recommended in cropping systems.

A recirculating spray system directs the spray solution onto weeds growing above desirable vegetation, while spray solution not intercepted by weeds is collected and returned to the spray tank for reuse.

A shielded or hooded applicator directs the herbicide solution onto weeds, while shielding desirable vegetation from the herbicide.

A wiper or sponge applicator applies the herbicide solution onto weeds by rubbing the weed with an absorbent material containing the herbicide solution.

AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

Contact of the herbicide solution with desirable vegetation may result in damage or destruction. Applicators used above desirable vegetation should be adjusted so that the lowest spray stream or wiper contact point is at least 2 inches above the desirable vegetation. Droplets, mist, foam, or splatter of the herbicide solution settling on desirable vegetation may result in discoloration, stunting or destruction.

Applications made above the crops should be made when the weeds are a minimum of 6 inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations or when the height of the weeds varies so that not all weeds are contacted. In these instances, repeat treatment may be necessary.

Shielded and hooded applicators

Use nozzles that provide uniform coverage within the treated area. Keep shields on these sprayers adjusted to protect desirable vegetation. EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE WITH DESIRABLE VEGETATION.

A hooded sprayer is a type of shielded applicator. The spray pattern is completely enclosed on the top and all 4 sides by a hood, thereby shielding the crop from the spray solution. This equipment must be set up and operated in a manner that avoids bouncing or raising the hoods off the ground in any way. If the hoods are raised, spray particles may escape and come into contact with the crop, causing damage or destruction of the crop. The spray hoods must be operated on the ground or skimming across the ground. Tractor speed must be adjusted to avoid bouncing of the spray hoods. Avoid operation on rough or sloping ground where the spray hoods might be raised off the ground.

Wiper applicators and sponge bars

Wiper applicators are devices that physically wipe appropriate amounts of this product directly onto the weed.

Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting desirable vegetation. Operate this equipment at ground speeds no greater than 5 mph. Performance may be improved by reducing speed in areas of heavy weed infestations to ensure adequate wiper saturation. Better results may be obtained if 2 applications are made in opposite directions.

Avoid leakage or dripping onto desirable vegetation. Adjust height of applicator to ensure adequate contact with weeds. Keep wiping surfaces clean. Be aware that, on sloping ground, the herbicide solution may migrate, causing dripping on the lower end and drying of the wicks on the upper end of a wiper applicator.

Do not use wiper equipment when weeds are wet.

Mix only the amount of solution to be used during a 1-day period, as reduced activity may result from use of leftover solutions. Clean wiper parts immediately after using this product by thoroughly flushing with water.

Do not add surfactant to the herbicide solution.

For Rope or Sponge Wick Applicators—Mix 1 gallon of this product in 2 gallons of water to prepare a 33 percent solution. Apply this solution to weeds listed in this section.

For Porous-Plastic Applicators—Solutions ranging from 33 to 100 percent of this product in water may be used in porous-plastic wiper applicators.

When applied as recommended, this product CONTROLS the following weeds:

Corn, volunteer	Shattercane	Starbur, bristly
Panicum, Texas	Sicklepod	
Rye, common	Spanishneedles	

When applied as recommended, this product SUPPRESSES the following weeds:

Beggarweed, Florida	Milkweed	Sunflower
Bermudagrass	Nightshade, silverleaf	Thistle, Canada
Dogbane, hemp	Pigweed, redroot	Thistle, musk
Dogfennel	Ragweed, common	Vaseygrass
Guineagrass	Ragweed, giant	Velvetleaf
Johnsongrass	Smutgrass	

Injection Systems

This product may be used in aerial or ground injection spray systems. It may be used as a liquid concentrate or diluted prior to injecting into the spray stream. Do not mix this product with the concentrate of other products when using injection systems.

CDA Equipment

The rate of this product applied per acre by vehicle-mounted CDA equipment must not be less than the amount recommended in this label when applied by conventional broadcast equipment. For vehicle-mounted CDA equipment, apply 3 to 15 gallons of water per acre.

For the control of annual weeds with hand-held CDA units, apply a 20 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 1.5 mph (1 quart per acre). For the control of perennial weeds, apply a 20 to 40 percent solution of this product at a flow rate of 2 fluid ounces per minute and a walking speed of 0.75 mph (2 to 4 quarts per acre).

Controlled droplet application equipment produces a spray pattern which is not easily visible. Extreme care must be exercised to avoid spray or drift contacting the foliage or any other green tissue of desirable vegetation, as damage or destruction may result.

CROPS (Alphabetical)

This section is organized alphabetically by crop category. There may be several labeled crops listed in a crop category.

Unless otherwise specified, applications may be made to control any weeds listed in the annual, perennial and woody brush tables. Also refer to the "SELECTIVE EQUIPMENT" section.

For any crop not listed in this "CROPS" section, applications must be made at least 30 days prior to planting.

For broadcast postemergent treatments, do not harvest or feed treated vegetation for 8 weeks following application, unless otherwise specified.

PRECAUTIONS, RESTRICTIONS: When applying this product prior to transplanting crops into plastic mulch, care must be taken to remove residues of this product, which could cause crop injury, from the plastic prior to transplanting. Residues can be removed by a single 0.5 inch application of water, either by natural rainfall or via a sprinkler system. Applications made at emergence will result in injury or death to emerged seedlings.

Alfalfa, Clover, and Other Forage Legumes

LABELED CROPS: Alfalfa, clover, kudzu, lespedeza, lupin, sainfoin, trefoil, velvet bean, vetch, crown vetch, milk vetch

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, spot treatment (alfalfa and clover only), wiper applicators (alfalfa and clover only), renovation, preharvest.

Preplant, Preemergence and At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting crops listed in this section. Applications must be made prior to emergence of the crop.

PRECAUTIONS, RESTRICTIONS: Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

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Preharvest (Alfalfa only)

USE INSTRUCTIONS: This product may be used in declining alfalfa stands or any stand of alfalfa where crop destruction is acceptable. This application will severely injure or destroy the stand of alfalfa. This product will control annual and perennial weeds, including quackgrass, when applied prior to the harvest of alfalfa. The treated crop and weeds can be harvested and fed to livestock after 36 hours. Allow a minimum of 36 hours between application and harvest. Applications may be made at any time of the year. Make only one application to an existing stand of alfalfa per year. For control of quackgrass, apply in the spring, late summer or fall when quackgrass is actively growing. Treatments for quackgrass must be followed by deep tillage for complete control.

PRECAUTIONS, RESTRICTIONS: Do not apply more than 1 quart of this product per acre as a preharvest treatment. Do not use for alfalfa grown for seed, as a reduction in germination or vigor may occur.

Spot treatment or Wiper applications (Alfalfa and Clover only)

USE INSTRUCTIONS: This product may be applied as a spot treatment in alfalfa or clover. This product may be applied with wiper applicators to control or suppress the weeds listed under "WIPER APPLICATORS" in the "SELECTIVE EQUIPMENT" section of this label. Applications may be made in the same area at 30-day intervals.

PRECAUTIONS, RESTRICTIONS: For spot treatment and wiper applications, apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre should be treated at one time. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

Renovation

USE INSTRUCTIONS: This product may be applied as a broadcast spray to existing stands of alfalfa, clover, and other labeled forage legumes. Labeled crops may be planted into the treated area.

PRECAUTIONS, RESTRICTIONS: Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Asparagus

TYPES OF APPLICATIONS: Preplant, preemergence, spot treatment, postharvest

Preplant, Preemergence

USE INSTRUCTIONS: This product may be applied prior to emergence of asparagus.

PRECAUTIONS, RESTRICTIONS: Do not apply within a week before the first spears emerge.

Spot treatment

USE INSTRUCTIONS: This product may be applied immediately after cutting, but prior to the emergence of new spears.

PRECAUTIONS, RESTRICTIONS: Do not treat more than 10 percent of the total field area to be harvested. Do not harvest within 5 days of treatment.

Postharvest

USE INSTRUCTIONS: This product may be applied after the last harvest and all spears have been removed. If spears are allowed to regrow, delay application until ferns have developed. Delayed treatments should be applied as a directed or shielded spray in order to avoid contact of the spray with ferns, stems or spears.

PRECAUTIONS, RESTRICTIONS: Direct contact of the spray with the asparagus may result in serious crop injury. Select and use recommended types of spray equipment for postemergence postharvest applications. A directed spray is any application where the spray pattern is aligned in such a way as to avoid direct contact of the spray with the crop. A shielded spray is any application where a physical barrier is positioned and maintained between the spray and the crop to prevent contact of spray with the crop.

Cereal Crops

LABELED CROPS: Barley, Buckwheat, Millet (Pearl, Proso), Oats, Rice, Rye, Teosinte, Triticale, Wheat (All), Wild rice

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, spot treatment (except rice), post-harvest, preharvest (wheat only), wiper applicators (wheat only)

Do not treat rice fields or levees when the field contains flood water.

Preplant, Preemergence and At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting of cereal crops. Applications must be made prior to emergence of the crop.

Spot treatment (except rice)

USE INSTRUCTIONS: This product may be applied as a spot treatment in cereal crops. Apply this product before heading in small grains.

PRECAUTIONS, RESTRICTIONS: Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in the treated area will be killed. Take care to avoid drift or spray outside target area for the same reason.

Postharvest

USE INSTRUCTIONS: This product may be applied after harvest of cereal crops. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.

PRECAUTIONS, RESTRICTIONS: For any crop not listed on this label, applications must be made at least 30 days prior to planting the next crop. Do not harvest or feed treated vegetation for 8 weeks following application.

Preharvest (wheat only)

USE INSTRUCTIONS: This product provides weed control when applied prior to harvest of wheat. Apply after the hard-dough stage of grain (30% or less grain moisture) and at least 7 days prior to harvest. Wheat stubble may be grazed immediately after harvest.

This product may be applied using either aerial or ground spray equipment. For ground applications, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.

PRECAUTIONS, RESTRICTIONS: Do not apply more than 1 quart of this product per acre. Do not apply to wheat grown for seed, as a reduction in germination or vigor may occur.

Wiper applications (wheat only)

USE INSTRUCTIONS: Wiper applications may be used in wheat. To control common rye or cereal rye, apply after the weeds have headed and achieved maximum growth, when the rye is at least 6 inches above the wheat crop.

PRECAUTIONS, RESTRICTIONS: Allow at least 35 days between application and harvest. Do not use roller applicators.

Red Rice control prior to planting rice

USE INSTRUCTIONS: Apply 1.5 quarts of this product in 5 to 10 gallons of water per acre. Flush fields prior to application to obtain uniform germination and stand of red rice. Make application when the majority of the red rice plants are in the 2-leaf stage and no more than 4 inches tall. Red rice plants with less than 2 true leaves may be only partially controlled.

PRECAUTIONS, RESTRICTIONS: Avoid spraying during low humidity conditions, as reduced control may result. Do not treat rice fields or levees when the fields contain water. Do not re-flood treated fields for 8 days following application.

Christmas Trees

TYPES OF APPLICATIONS: Post-directed, spot treatment, site preparation

Post-directed, Spot treatment

USE INSTRUCTIONS: This product may be used as a post-directed spray and spot treatment around established Christmas trees.

PRECAUTIONS, RESTRICTIONS: Desirable plants may be protected from the spray solution by using shields or coverings made of cardboard or other impermeable material. THIS PRODUCT IS NOT RECOMMENDED FOR USE AS AN OVER-THE-TOP BROADCAST SPRAY IN CHRISTMAS TREES. Care must be exercised to avoid contact of spray, drift or mist with foliage or green bark of established Christmas trees.

Site preparation

USE INSTRUCTIONS: This product may be used prior to planting Christmas trees.

PRECAUTIONS, RESTRICTIONS: Precautions should be taken to protect non-target plants during site preparation applications.

Citrus Crops

LABELED CROPS: Calamondin, Chironja, Citron, Citrus Hybrids, Grapefruit, Kumquat, Lemon, Lime, Mandarin (tangerine), Orange (All), Pummelo, Tangelo, Tangor

TYPES OF APPLICATIONS: General weed control, middles (between rows of trees), strips (in row of trees), selective equipment

NOTE: FOR GENERAL USE DIRECTIONS, SEE THE "TREE, NUT AND VINE (GENERAL)" SECTION. THE FOLLOWING DIRECTIONS ARE SPECIFIC TO CITRUS CROPS.

Florida and Texas only: For burndown or control of the weeds listed below, apply the recommended rates of this product in 3 to 30 gallons of water per acre. Where weed foliage is dense, use 10 to 30 gallons of water per acre.

For goatweed, apply 2 to 3 quarts of this product per acre. Apply in 20 to 30 gallons of water per acre when plants are actively growing. Use 2 quarts per acre when plants are less than 8 inches tall and 3 quarts per acre when plants are greater than 8 inches tall. If goatweed is greater than 8 inches tall, the addition of Krovar™ II or Karmex™ may improve control. Refer to the individual product labels for specific crops, rates, geographic restrictions and precautionary statements.

Perennial weeds:

S=Suppression

PC=Partial Control

B=Burndown

C=Control

Weed Species	Roundup Ultra Rate Per Acre 1 QT	2 QT	3 QT	5 QT
Bermudagrass	B	—	PC	C
Guineagrass				
Texas and Florida Ridge	B	C	C	C
Florida Flatwoods	—	B	C	C
Paragrass	B	C	C	C
Torpedograss	S	—	PC	C

PRECAUTIONS, RESTRICTIONS: Allow a minimum of 1 day between last application and harvest.

Conservation Reserve Program (CRP)

TYPES OF APPLICATIONS: Renovation (rotating out of CRP), site preparation, postemergence, wiper

Rotating out of CRP, Site preparation

USE INSTRUCTIONS: This product may be used to prepare CRP land for crop production.

Postemergence, Wiper

USE INSTRUCTIONS: This product may be used to suppress competitive growth and seed production of undesirable vegetation in CRP acres. Such applications may be made with wiper application equipment or as a broadcast or spot treatment to dormant CRP grasses. For selective applications with broadcast spray equipment, apply 12 to 16 fluid ounces of this product per acre in early spring before desirable CRP grasses, such as crested and tall wheatgrass, break dormancy and initiate green growth. Late fall applications can be made after desirable perennial grasses have reached dormancy.

PRECAUTIONS, RESTRICTIONS: Some stunting of CRP perennial grasses will occur if broadcast applications are made when plants are not dormant.

Corn

TYPES OF CORN: Field corn, seed corn, sweet corn and popcorn

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, hooded sprayers, spot treatment, preharvest, postharvest

Preplant, Preemergence and At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting corn. Applications must be made prior to emergence of the crop.

The following tank mixtures may be applied before, during or after planting in conventional tillage systems, into a cover crop, established sod or in previous crop residue.

Apply these tank mixtures in 10 to 20 gallons of water or 10 to 60 gallons of nitrogen solution per acre. For Southern states, do not apply in nitrogen solutions to tough-to-control grasses such as barnyardgrass, fall panicum, broadleaf signalgrass, annual ryegrass and any perennial weeds. See the map in the Annual Weeds section of this label for areas included in this recommendation.

ATRAZINE	EXTRAZINE™	LOROX™
BANVEL	FRONTIER™	MARKSMAN™
BICEP™	GUARDSMAN™	MICRO-TECH®
BICEP II	HARNESS®	PARTNER®
BLADEX/CYANAZINE	HARNESS XTRA	PROWL™
BROADSTRIKE™	HARNESS XTRA 5.6L	SIMAZINE
BULLET®	LARIAT®	SURPASS™
DUAL™	LASSO®/ALACHLOR	SURPASS 100
DUAL II	LINEX™	TOPNOTCH™

For improved burndown, this product may be tank mixed with 2,4-D or dicamba.

Annual weeds—For difficult-to-control weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled annual weeds, apply 1 to 1.5 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall.

PRECAUTIONS, RESTRICTIONS: Applications of 2,4-D or dicamba must be made at least 7 days prior to planting corn.

The tank mix recommendations in this section are not registered in California.

Hooded Sprayers

USE INSTRUCTIONS: This product may be used through hooded sprayers for weed control between the rows of corn. Only hooded sprayers that completely enclose the spray pattern may be used.

When applying to corn that is grown on raised beds, ensure that the hood is designed to completely enclose the spray solution. If necessary, extend the front and rear flaps of the hoods to reach the ground in deep furrows.

Follow these requirements:

- The spray hoods must be operated on the ground or skimming across the ground.
- Do not apply more than 1 quart of this product per acre per application.
- Corn must be at least 12 inches tall, measured without extending leaves.
- Leave at least an 8-inch untreated strip over the drill row. For example, if the crop row width is 38 inches, the maximum width of the spray hood should be 30 inches.
- Maximum tractor speed: 5 mph.
- Maximum wind speed: 10 mph.
- Use low-drift nozzles.

Crop injury may occur when the foliage of treated weeds comes into direct contact with leaves of the crop. Do not apply this product when the leaves of the crop are growing in direct contact with weeds to be treated. Droplets, mist, foam or splatter of the herbicide solution may contact the crop and cause discoloration, stunting or destruction.

PRECAUTIONS, RESTRICTIONS: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator. Do not graze or feed corn forage or fodder following applications of this product through hooded sprayers. Do not apply more than 3 quarts of this product per acre per year for hooded sprayer applications.

Spot treatment

USE INSTRUCTIONS: For spot treatments, apply this product prior to silking of corn.

PRECAUTIONS, RESTRICTIONS: Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in the treated area will be killed. Take care to avoid drift or spray outside target area for the same reason.

Preharvest

USE INSTRUCTIONS: Make applications at 35 percent grain moisture or less. Ensure that maximum kernel fill is complete and the corn is physiologically mature (black layer formed). For ground applications, apply up to 3 quarts of this product per acre. For aerial applications, apply up to 1 quart of this product per acre.

PRECAUTIONS, RESTRICTIONS: Allow a minimum of 7 days between application and harvest. It is not recommended that corn grown for seed be treated because a reduction in germination or vigor may result.

Post-harvest

USE INSTRUCTIONS: This product may be applied after harvest of corn. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.

PRECAUTIONS, RESTRICTIONS: Do not harvest or feed treated vegetation for 8 weeks following application.

Cotton

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, hooded sprayer, selective equipment, spot treatment, preharvest

Preplant, Preemergence, and At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting cotton. Applications must be made prior to emergence of the crop.

Hooded sprayer, Selective equipment

USE INSTRUCTIONS: This product may be applied through hooded sprayers, recirculating sprayers, shielded applicators or wiper applicators in cotton. Allow at least 7 days between application and harvest.

PRECAUTIONS, RESTRICTIONS: See the "SELECTIVE EQUIPMENT" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment.

Spot treatment

USE INSTRUCTIONS: For spot treatments, apply this product prior to boll opening of cotton.

PRECAUTIONS, RESTRICTIONS: Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Take care to avoid drift or spray outside target area for the same reason.

Preharvest

USE INSTRUCTIONS: This product provides weed control and cotton regrowth inhibition when applied prior to harvest of cotton. For weed control, apply at rates given in the annual, perennial and woody brush tables. Apply 1 pint to 2 quarts of this product per acre for cotton regrowth inhibition. Allow a minimum of 7 days between application and harvest of cotton.

This product may be applied using either aerial or ground spray equipment. For ground applications, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.

Apply after sufficient bolls have developed to produce the desired yield of cotton. Applications made prior to this time could affect maximum yield potential.

This product may be tank mixed with DEF™ 6, Folex™, or Prep™ to provide additional enhancement of cotton leaf drop.

PRECAUTIONS, RESTRICTIONS: Do not feed or graze treated cotton forage or hay following preharvest applications. DO NOT APPLY MORE THAN 1 QUART OF THIS PRODUCT PER ACRE BY AIR. Do not apply more than 2 quarts of this product per acre by ground. Do not apply to cotton grown for seed, as a reduction in germination or vigor may occur.

Fallow Systems

TYPES OF APPLICATIONS: Chemical fallow, preplant fallow beds, aid-to-tillage

Chemical fallow

USE INSTRUCTIONS: This product may be applied during the fallow period prior to planting or emergence of any crop listed on this label. For any crop not listed on this label, applications must be made at least 30 days prior to planting. This product may be used as a substitute for tillage to control annual weeds in fallow fields. Also, broadcast or spot treatments will control or suppress many perennial weeds in fallow fields. Ground or aerial application equipment may be used. Tank mixtures with 2,4-D and dicamba may be used.

Annex 27

PRECAUTIONS, RESTRICTIONS: DO NOT APPLY BANVEL TANK MIXTURES BY AIR IN CALIFORNIA.

Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures. Some crop injury may occur if Banvel is applied within 45 days of planting.

Preplant fallow beds

USE INSTRUCTIONS: This product may be applied to fallow beds prior to planting or emergence of any crop listed on this label. For any crop not listed on this label, applications must be made at least 30 days prior to planting. This product will control weeds listed in the annual, perennial and woody brush tables.

In addition, 12 fluid ounces of this product plus 2 to 3 oz of Goal™ 2XL per acre will control the following weeds with the maximum height or length indicated: 3″—common cheeseweed, chickweed, groundsel; 6″—London rocket, shepherd's-purse.

16 fluid ounces of this product plus 2 to 3 oz of Goal 2XL per acre will control the following weeds with the maximum height or length indicated: 6″—common cheeseweed, groundsel, marestail *(Conyza canadensis)*, 12″—chickweed, London rocket, shepherd's-purse.

Aid-to-tillage

USE INSTRUCTIONS: This product may be used in conjunction with tillage practices in fallow systems or preplant to labeled crops to control downy brome, cheat, volunteer wheat, tansy mustard and foxtail. Apply 8 fluid ounces of this product in 3 to 10 gallons of water per acre. Make applications before weeds are 6 inches in height. Application must be followed by conventional tillage practices no later than 15 days after treatment and before regrowth occurs. Allow at least 1 day after application before tillage.

PRECAUTIONS, RESTRICTIONS: Tank mixtures with residual herbicides may result in reduced performance.

Grain Sorghum (Milo)

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, spot treatment, wiper applicators, hooded sprayers, pre-harvest, post-harvest

Preplant, Preemergence, At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting grain sorghum. Applications must be made prior to emergence of the crop.

Spot treatment and Wiper applications

USE INSTRUCTIONS: This product may be applied as a spot treatment in grain sorghum. Make spot treatments before heading of milo. This product may be applied with wiper applicators to control or suppress the weeds listed under "WIPER APPLICATORS" in the "SELECTIVE EQUIPMENT" section of this label.

PRECAUTIONS, RESTRICTIONS: For spot treatment, do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Take care to avoid drift or spray outside target area for the same reason.

For wiper applicators, allow at least 40 days between application and harvest. Do not use roller applicators. Do not feed or graze treated milo fodder. Do not ensile treated vegetation.

Hooded Sprayers

USE INSTRUCTIONS: This product may be used through hooded sprayers for weed control between the rows of milo. Only hooded sprayers that completely enclose the spray pattern may be used.

When applying to milo that is grown on raised beds, ensure that the hood is designed to completely enclose the spray solution. If necessary, extend the front and rear flaps of the hoods to reach the ground in deep furrows.

Follow these requirements:

- The spray hoods must be operated on the ground or skimming across the ground.
- Do not apply more than 1 quart of this product per acre per application.
- Milo must be at least 12 inches tall, measured without extending leaves. Treat before milo sends tillers between the drill rows. If such tillers are contacted with the spray solution, the main plant may be killed.
- Leave at least an 8-inch untreated strip over the drill row. For example, if the crop row width is 38 inches, the maximum width of the spray hood should be 30 inches.
- Maximum tractor speed: 5 mph.
- Maximum wind speed: 10 mph.
- Use low-drift nozzles.

Crop injury may occur when the foliage of treated weeds comes into direct contact with leaves of the crop. Do not apply this product when the leaves of the crop are growing in direct contact with weeds to be treated. Droplets, mist, foam or splatter of the herbicide solution may contact the crop and cause discoloration, stunting or destruction.

PRECAUTIONS, RESTRICTIONS: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator. Do not graze or feed milo forage or fodder following applications of this product through hooded sprayers. Do not apply more than 3 quarts of this product per acre per year for hooded sprayer applications.

Preharvest

USE INSTRUCTIONS: Make applications at 30% grain moisture or less.

PRECAUTIONS, RESTRICTIONS: Do not apply more than 2 quarts of this product per acre. Allow a minimum of 7 days between application and harvest of sorghum. It is not recommended that sorghum grown for seed be treated, as a reduction in germination or vigor may occur. The use of this product for preharvest grain sorghum (Milo) is not registered in California.

Post-harvest

USE INSTRUCTIONS: This product may be applied after harvest of grain sorghum. Higher rates may be required for control of large weeds which were growing in the crop at the time of harvest. Tank mixtures with 2,4-D or dicamba may be used.

This product may be applied to grain sorghum (milo) stubble following harvest to suppress or control regrowth. Apply 1 quart of this product per acre for control, or 1.5 pints of this product per acre for suppression.

PRECAUTIONS, RESTRICTIONS: Do not harvest or feed treated vegetation for 8 weeks following application.

Grass Seed Production

TYPES OF APPLICATIONS: Preplant, preemergence, renovation, site preparation, shielded sprayers, wiper applicators, spot treatments, creating rows in annual ryegrass.

USE INSTRUCTIONS: This product may be applied before, during or after planting or renovation of turf or forage grass areas grown for seed production. Applications MUST be made prior to the emergence of the crop to avoid crop injury. For maximum control of existing vegetation, delay planting to determine if any regrowth from escaped underground plant parts occurs. Where repeat treatments are necessary, sufficient regrowth must be attained prior to application. For warm-season grasses, such as bermudagrass, summer or fall applications provide best control.

PRECAUTIONS, RESTRICTIONS: Do not disturb soil or underground plant parts before treatment. Tillage or renovation techniques such as vertical mowing, coring or slicing should be delayed for 7 days after application to allow proper translocation into underground plant parts.

Do not feed or graze treated areas for 8 weeks following application.

Shielded sprayers

USE INSTRUCTIONS: Apply 1-3 quarts of this product as a broadcast spray in 10 to 20 gallons of water per acre to control weeds in the rows. Uniform planting in straight rows aid in shielded sprayer applications. Best results are obtained when the grass seed crop is small enough to easily pass by or through the protective shields.

PRECAUTIONS, RESTRICTIONS: Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator.

Wiper Applications

PRECAUTIONS, RESTRICTIONS: Contact of the herbicide solution with desirable vegetation may result in damage or destruction. Applicators should be adjusted so that the wiper contact point is at least two (2) inches above the desirable vegetation. Weeds should be a minimum of six (6) inches above the desirable vegetation. Better results may be obtained when more of the weed is exposed to the herbicide solution. Weeds not contacted by the herbicide solution will not be affected. This may occur in dense clumps, severe infestations, or when height of weeds varies so that not all weeds are contacted. In these instances, repeat treatments may be necessary. Better results may be obtained if 2 applications are made in opposite directions.

Spot Treatments

USE INSTRUCTIONS: Use a 1-1.5 percent solution.

PRECAUTIONS, RESTRICTIONS: Apply this product prior to heading of grasses. Do not treat more than 10 percent of the total field to be harvested. The crop receiving the spray in the treated area will be killed. Take care to avoid drift or spray outside the target area for the same reason.

Creating Rows in Annual Ryegrass

USE INSTRUCTIONS: Use 16-32 fluid ounces of this product per acre mixed with water. Use the higher rate when the ryegrass is greater than 6 inches tall. Best results are obtained when applications are made before the ryegrass reaches 6 inches in height.

PRECAUTIONS, RESTRICTIONS: Set nozzle heights to allow the establishment of the desired row spacing while preventing spray droplets, spray fines, or drift to contact the ryegrass plants not treated. Use of low pressure nozzles, or drop nozzles designed to target the application over a narrow band are recommended.

Grower assumes all responsibility for crop losses from misapplication.

Herbs

TYPES OF HERBS: Peppermint, spearmint

USE INSTRUCTIONS: This product may be used as a spot treatment in spearmint and peppermint. Apply spray-to-wet with hand-held equipment, such as backpack and knapsack sprayers, pump-up pressure sprayers, hand-guns, hand-wands or any other hand-held or motorized spray equipment used to direct the spray solution on to a limited area.

PRECAUTIONS, RESTRICTIONS: Allow at least 7 days between application and harvest. Further applications may be made in the same area at 30-day intervals. No more than one-tenth of any acre should be treated at one time. The crop receiving spray in the treated area will be killed. Take care to avoid drift or spray outside the target area for this reason.

Pastures

TYPES OF PASTURES: Bahiagrass, bermudagrass, bluegrass, brome, fescue, orchardgrass, ryegrass, timothy, wheatgrass, alfalfa and clover

TYPES OF APPLICATIONS: Spot treatment, wiper application, preplant, pre-emergence, pasture renovation

Spot treatment and Wiper application

USE INSTRUCTIONS: This product may be applied as a spot treatment or with wiper applicators in pastures. Applications may be made in the same area at 30-day intervals.

PRECAUTIONS, RESTRICTIONS: For spot treatment and wiper applications, apply in areas where the movement of domestic livestock can be controlled. No more than one-tenth of any acre should be treated at one time. Remove domestic livestock before application and wait 14 days after application before grazing livestock or harvesting.

Preplant, Preemergence and Pasture renovation

USE INSTRUCTIONS: This product may be applied prior to planting or emergence of forage grasses and legumes. In addition, this product may be used to control perennial pasture species listed on this label prior to re-planting.

PRECAUTIONS, RESTRICTIONS: Remove domestic livestock before application and wait 8 weeks after application before grazing or harvesting.

Peanuts

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting peanuts. Applications must be made prior to the emergence of the crop.

Small Fruits and Berries

LABELED CROPS: Blackberry, Blueberry, Boysenberry, Cranberry, Currant, Dewberry, Elderberry, Gooseberry, Huckleberry, Loganberry, Olallieberry, Raspberry (Black, Red), Youngberry

TYPES OF APPLICATIONS: Preplant, preemergence, directed spray (except cranberry), wiper application

USE INSTRUCTIONS: This product may be applied as a pre-plant or preemergence broadcast application or as a wiper application for crops listed in this section. Directed sprays may be applied to any crop except cranberries. For wick or wiper applicators, mix 1 gallon of this product in 4 gallons of water to prepare a 20 percent solution. In severe infestations, reduce equipment ground speed to ensure that adequate amounts of this product are wiped on the weeds. A second treatment in the opposite direction may be beneficial.

PRECAUTIONS, RESTRICTIONS: Do not permit herbicide solution to contact desirable vegetation, including green shoots, canes or foliage. Allow a minimum of 30 days between last application and harvest of cranberries. For other small fruits and berries, allow a minimum of 14 days between last application and harvest.

Soybeans

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, spot treatment, preharvest, selective equipment

Preplant, Preemergence and At-planting

USE INSTRUCTIONS: This product may be applied before, during or after planting soybeans. Applications must be made prior to emergence of the crop.

The following tank mixtures may be applied before, during or after planting in conventional tillage systems, into a cover crop, established sod or in previous crop residue.

CANOPY™	LASSO/ALACHLOR	PROWL
COMMAND™	LINEX	PURSUIT™
DUAL	LOROX/LINURON	PURSUIT PLUS
DUAL II	LOROX PLUS	SCEPTER™
FRONTIER	MICRO-TECH	SENCOR™/LEXONE™
FUSION™	PARTNER	SQUADRON™
GEMINI™	PREVIEW™	TURBO™

For improved burndown, this product may be tank-mixed with 2,4-D or 2,4-DB. See the 2,4-D label for intervals between application and planting.

Annual weeds: For difficult-to-control weeds such as fall panicum, barnyardgrass, crabgrass, shattercane and broadleaf signalgrass up to 2 inches tall, and Pennsylvania smartweed up to 6 inches tall, apply this product at 2 pints per acre in these tank mixtures. For other labeled annual weeds, apply 1 to 1.5 pints of this product per acre when weeds are less than 6 inches tall, and 2 to 3 pints when weeds are over 6 inches tall.

PRECAUTIONS, RESTRICTIONS: The tank mix recommendations in this section are not registered in California.

Spot treatment

USE INSTRUCTIONS: For spot treatments, apply this product prior to initial pod set in soybeans.

PRECAUTIONS, RESTRICTIONS: Do not treat more than 10 percent of the total field area to be harvested. The crop receiving spray in treated area will be killed. Take care to avoid drift or spray outside target area for the same reason.

Preharvest

USE INSTRUCTIONS: This product provides weed control when applied prior to harvest of soybeans.

Apply at rates given in the annual, perennial and woody brush tables. This product may be applied using either aerial or ground spray equipment. For ground applications, apply this product in 10 to 20 gallons of water per acre. For aerial applications, apply this product in 3 to 10 gallons of water per acre.

Apply after pods have set and lost all green color. Allow a minimum of 7 days between application and harvest of soybeans. Care should be taken to avoid excessive seed shatter loss due to ground application equipment.

PRECAUTIONS, RESTRICTIONS: Do not graze or harvest treated crop for livestock feed within 25 days of last preharvest application. DO NOT APPLY MORE THAN 6 QUARTS PER ACRE OF THIS PRODUCT FOR PREHARVEST APPLICATIONS. DO NOT APPLY MORE THAN 1 QUART PER ACRE OF THIS PRODUCT BY AIR. Do not apply to soybeans grown for seed as a reduction in germination or vigor may occur.

Selective equipment

USE INSTRUCTIONS: This product may be applied through recirculating sprayers, shielded applicators, hooded sprayers, wiper applicators or sponge bars in soybeans. Allow at least 7 days between application and harvest.

PRECAUTIONS, RESTRICTIONS: See the "SELECTIVE EQUIPMENT" part of the "APPLICATION EQUIPMENT AND TECHNIQUES" section of this label for information on proper use and calibration of this equipment.

Sugarcane

TYPES OF APPLICATIONS: Preplant, preemergence, spot treatment, fallow treatments, hooded sprayers

Preplant, Preemergence

USE INSTRUCTIONS: This product may be applied in or around sugarcane fields or in fields prior to the emergence of plant cane.

PRECAUTIONS, RESTRICTIONS: Do not apply to vegetation in or around ditches, canals or ponds containing water to be used for irrigation.

Spot treatment

USE INSTRUCTIONS: This product may be applied as a spot treatment in sugarcane. For control of volunteer or diseased sugarcane, make a 1 percent solution of this product in water and spray to wet the foliage of vegetation to be controlled. Volunteer or diseased sugarcane should have at least 7 new leaves.

PRECAUTIONS, RESTRICTIONS: Avoid spray contact with healthy cane plants since severe damage or destruction may result. Do not feed or graze treated sugarcane foliage following application.

Fallow treatments

USE INSTRUCTIONS: This product may be used as a replacement for tillage in fields that are lying fallow between sugarcane crops. This product may also be used to remove the last stubble of ratoon cane. For removal of last stubble of ratoon cane, apply 4 to 5 quarts of this product in 10 to 40 gallons of water per acre to new growth having at least 7 new leaves. Allow 7 or more days after application before tillage.

Hooded sprayers

USE INSTRUCTIONS: This product may be used through hooded sprayers for weed control between the rows of sugarcane. A hooded sprayer is a type of shielded applicator. The spray pattern is completely enclosed on the top and all 4 sides by a hood, thereby shielding the crop from the spray solution.

Minimize the potential for spray particles to escape from under the hood by operating the sprayer at appropriate ground speeds, nozzle pressures and wind speeds. Operation on rough or sloping ground may result in spray particles escaping from the hood.

When applying to sugarcane that is grown on raised beds, ensure that the hood is designed to completely enclose the spray. If necessary, extend the front and rear flaps of the hoods to reach the ground in furrows between the rows.

Equipment must be designed, maintained and operated to prevent the herbicide solution from contacting the crop. Contact of this product in any manner to any vegetation to which treatment is not intended may cause damage. Such damage shall be the sole responsibility of the applicator.

PRECAUTIONS, RESTRICTIONS: Do not allow treated weeds to come into contact with the crop. Droplets, mist, foam or splatter of the herbicide solution settling on the crop may result in discoloration, stunting or destruction.

Sunflowers

TYPES OF APPLICATIONS: Preplant, preemergence

USE INSTRUCTIONS: This product may be applied before, during or after planting sunflowers. Applications must be made prior to emergence of the crop.

A tank mixture with Prowl may be applied before, during or after planting in conventional tillage systems, into a cover crop, established sod or in previous crop residue.

PRECAUTIONS, RESTRICTIONS: Do not apply more than 1 quart of this product per acre for sunflowers. Make only one preplant or preemergent application per year. Do not feed or graze sunflower forage following application of this product.

Tree and Vine Crops (General)

TYPES OF APPLICATIONS: General weed control, middles (between rows of trees), strips (in row of trees), perennial grass suppression, selective equipment (except kiwi)

Annex 27

NOTE: THIS SECTION GIVES GENERAL DIRECTIONS THAT APPLY TO ALL CITRUS CROPS, TREE FRUITS, TREE NUTS AND VINE CROPS. SEE THE INDIVIDUAL CROP SECTIONS FOR INSTRUCTIONS, PREHARVEST INTERVALS, PRECAUTIONS AND RESTRICTIONS FOR SPECIFIC CROPS.

This product may be applied in middles, strips and for general weed control in established citrus groves, tree fruit and tree nut orchards, and vineyards. Apply at 1 pint to 5 quarts per acre. Repeat applications may be made up to a maximum of 10.6 quarts per acre per year. This product may also be used for site preparation prior to transplanting these crops. Allow a minimum of 3 days between application and transplanting. Applications may be made with boom equipment, CDA, shielded sprayers, hand-held and high-volume wands, lances, orchard guns or with wiper applicator equipment, except as directed.

Middles (between rows)

USE INSTRUCTIONS: This product will control or suppress annual and perennial weeds and ground covers growing between the rows of labeled tree and vine crops. If weeds are under drought stress, irrigate prior to application. Reduced control may result if weeds have been mowed prior to application.

A tank mixture of this product plus Goal 2XL may be used for annual weeds in middles between rows of citrus crops, tree fruits, tree nuts and vine crops. This mixture is recommended when weeds are stressed or growing in dense populations. 16 to 32 oz/A of this product plus 3 to 12 oz/A of Goal 2XL will control annual weeds with a maximum height or diameter of 6 inches, including crabgrass, hairy fleabane *(Conyza bonariensis)*, common groundsel, junglerice, common lambsquarters, redroot pigweed, London rocket, common ryegrass, shepherd's-purse, annual sowthistle, common cheeseweed (malva), filaree (suppression), horseweed/marestail *(Conyza canadensis)*, stinging nettle and common purslane (suppression). 12 to 32 oz/A of this product plus 3 to 12 oz/A of Goal 2XL will control common cheeseweed (malva) with a maximum height or diameter of 3 inches.

Strips (in rows)

USE INSTRUCTIONS: This product may be applied in rows of tree or vine crops and may also be tank mixed with the following products:

DEVRINOL™ 50 DF	KROVAR II	SIMAZINE 80W
DIREX™ 4L	PROWL	SIM-TROL™ 4L
GOAL 2XL	PRINCEP	SOLICAM™ DF
KARMEX DF	CALIBER™ 90	SURFLAN™ AS
KROVAR I	SIMAZINE 4L	SURFLAN 75W

Do not apply these tank mixtures in Puerto Rico.

Refer to the individual product labels for specific crops, rates, geographic restrictions and precautionary statements.

Apply 1 pint to 5 quarts of this product per acre in these tank mixtures. Use rates at the higher end of the recommended rate range when weeds are stressed, growing in dense populations or are greater than 12 inches tall.

Perennial grass suppression

This product will suppress perennial grasses such as bahiagrass, bermudagrass, tall fescue, orchardgrass, Kentucky bluegrass, and quackgrass that are grown as ground covers in tree and vine crops.

For suppression of tall fescue, fine fescue, orchardgrass and quackgrass, apply 8 fluid ounces of this product in 10 to 20 gallons of water per acre.

For suppression of Kentucky bluegrass covers, apply 6 fluid ounces of this product per acre. Do not add ammonium sulfate.

For best results, mow cool season grass covers in the spring to even their height and apply this product 3 to 4 days after mowing.

For suppression of vegetative growth and seedhead inhibition of bahiagrass for approximately 45 days, apply 6 fluid ounces of this product in 10 to 25 gallons of water per acre. Apply 1 to 2 weeks after full green-up or after mowing to a uniform height of 3 to 4 inches. This application must be made prior to seedhead emergence.

For suppression up to 120 days, apply 4 fluid ounces of this product per acre, followed by an application of 2 to 4 fluid ounces per acre about 45 days later. Make no more than 2 applications per year.

For burndown of bermudagrass, apply 1 to 2 quarts of this product in 3 to 20 gallons of water per acre. Use this treatment only if reduction of the bermudagrass stand can be tolerated. When burndown is required prior to harvest, allow at least 21 days to ensure sufficient time for burndown to occur.

For suppression of bermudagrass, apply 6 to 16 fluid ounces of this product per acre east of the Rocky Mountains and 16 fluid ounces of this product per acre west of the Rocky Mountains. Apply in a total spray volume of 3 to 20 gallons per acre, no sooner than 1 to 2 weeks after full green-up. If the bermudagrass is mowed prior to application, maintain a minimum of 3 inches in height. Sequential applications may be made when regrowth occurs and bermudagrass injury and stand reduction can be tolerated. East of the Rocky Mountains, rates of 6 to 10 fluid ounces per acre should be used in shaded conditions or where a lesser degree of suppression is desired.

Selective equipment (except kiwi)

Shielded and wiper applicators may be used in tree crops and grapes. Refer to the individual crop sections for time interval between application and harvest.

GENERAL PRECAUTIONS/RESTRICTIONS: For citron and olives, apply as a post-directed spray only.

EXTREME CARE MUST BE EXERCISED TO AVOID CONTACT OF HERBICIDE SOLUTION, SPRAY, DRIFT OR MIST WITH FOLIAGE OR GREEN BARK OF TRUNK, BRANCHES, SUCKERS, FRUIT OR OTHER PARTS OF TREES AND VINES. CONTACT OF THIS PRODUCT WITH OTHER THAN MATURED BROWN BARK CAN RESULT IN SERIOUS CROP DAMAGE.

AVOID PAINTING CUT STUMPS WITH THIS PRODUCT AS INJURY RESULTING FROM ROOT GRAFTING MAY OCCUR IN ADJACENT TREES.

Tree Fruits

LABELED CROPS: Apple, Apricot, Cherry (Sweet, Sour), Crabapple, Loquat, Mayhaw, Nectarine, Olive, Peach, Pear, Plum/Prune (All), Quince

TYPES OF APPLICATIONS: General weed control, middles (between rows of trees), strips (in row of trees), selective equipment

NOTE: FOR GENERAL USE DIRECTIONS, SEE THE "TREE, NUT AND VINE (GENERAL)" SECTION. THE FOLLOWING DIRECTIONS ARE SPECIFIC TO TREE FRUITS.

Restrictions on application equipment

For cherries, any application equipment listed in this section may be used in all states.

Any application equipment listed in this section may be used in apricots, nectarines, peaches and plums/prunes growing in Arizona, California, Colorado, Idaho, Kansas, Kentucky, New Jersey, North Dakota, Oklahoma, Oregon, Texas, Utah and Washington, except for peaches grown in the states specified in the following paragraph. In all other states use wiper equipment only.

For PEACHES grown in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee only, apply with a shielded boom sprayer or shielded wiper applicator, which prevents any contact of this product with the foliage or bark of trees. Apply no later than 90 days after first bloom. Applications made after this time may result in severe damage. Remove suckers and low-hanging limbs at least 10 days prior to application. Avoid applications near trees with recent pruning wounds or other mechanical injury. Apply only near trees which have been planted in the orchard for 2 or more years. EXTREME CARE MUST BE TAKEN TO ENSURE NO PART OF THE PEACH TREE IS CONTACTED.

PRECAUTIONS, RESTRICTIONS: Allow a minimum of 1 day between last application and harvest for apple, crabapple, loquat, mayhaw, pear, quince.

Allow a minimum of 17 days between last application and harvest for apricot, cherry, nectarine, olive, peach, plum/prune.

Tree Nuts

LABELED CROPS: Almond, Beechnut, Brazil nut, Butternut, Cashew, Chestnut, Chinquapin, Filbert (Hazelnut), Hickory nut, Macadamia, Pecan, Pistachio, Walnut (Black, English)

TYPES OF APPLICATIONS: General weed control, middles (between rows of trees), strips (in row of trees), selective equipment

NOTE: FOR GENERAL USE DIRECTIONS, SEE THE "TREE, NUT AND VINE (GENERAL)" SECTION. THE FOLLOWING DIRECTIONS ARE SPECIFIC TO TREE NUTS.

PRECAUTIONS, RESTRICTIONS: Allow a minimum of 3 days between last application and harvest of tree nuts.

Tropical Crops

LABELED CROPS: Atemoya, Avocado, Banana, Barbados Cherry (acerola), Breadfruit, Canistel, Carambola, Cherimoya, Cocoa beans, Coconuts, Coffee, Dates, Durian, Figs, Guava, Jaboticaba, Jackfruit, Longan, Lychee, Mango, Mangosteen, Marmaladebox (genip), Papaya, Passion fruit, Persimmon, Pineapple, Plantain, Pomegranate, Rambutan, Sapodilla, Sapote (black, mamey, white), Soursop, Sugar apple, Tamarind, Tea.

USE INSTRUCTIONS: This product may be applied for general weed control or for site preparation prior to transplanting crops listed in this section. In coffee and banana, delay applications 3 months after transplanting to allow the new coffee or banana plant to become established.

PRECAUTIONS/RESTRICTIONS: Allow a minimum of 14 days between last application and harvest of acerola, atemoya, avocado, breadfruit, canistel, carambola, cherimoya, cocoa beans, coconuts, dates, figs, genip, jaboticaba, jackfruit, longan, lychee, mango, mayhaw, passion fruit, persimmon, pomegranate, sapodilla, sapote, soursop, sugar apple, tamarind, and tea.

Allow a minimum of 28 days between last application and harvest of coffee.

Allow a minimum of 1 day between last application and harvest of banana, guava, papaya and plantain.

Do not feed or graze treated pineapple forage following application.

Vegetable Crops

LABELED CROPS: Amaranth, Arrugula, Artichoke (Jerusalem), Beans (All), Beet greens, Garden Beets, Broccoli (All), Brussels sprouts, Cabbage (All), Cabbage (Chinese), Cantaloupe, Cardoon, Cavalo Broccolo, Carrot, Cauliflower, Casaba melon, Celery, Celery (Chinese), Celeriac, Celtuce, Chard (Swiss), Chayote, Chervil, Chick peas, Chicory, Chrysanthemum, Collards, Corn salad, Crenshaw melon, Cress, Cucumber, Dandelion, Dock (sorrel), Eggplant, Endive, Fennel (florence), Garlic, Gherkin, Ginseng, Gourds, Ground cherry, Guar, Honeydew melon, Honey ball melon, Horseradish, Kale, Kohlrabi, Leek, Lentils, Lettuce, Mango melon, Melons (All), Mizuna, Muskmelon, Mustard greens, Okra, Onion, Oriental radish, Parsley, Parsnips, Peas (All), Pepinos, Pepper (All), Persian melon, Potato (Irish), Pumpkin, Purslane, Radish, Rape greens, Rhubarb, Rutabaga, Salsify, Shallot, Spinach (All), Mustard Spinach, Squash (Summer, Winter), Sugar beets, Sweet potato, Tomatillo, Tomato, Turnip, Watercress, Watermelon, Yams.

USE INSTRUCTIONS: This product may be applied prior to the emergence of direct seeded vegetables or prior to transplanting vegetables.

PRECAUTIONS, RESTRICTIONS: When applying this product prior to transplanting crops into plastic mulch, care must be taken to remove residues of this product, which could cause crop injury, from the plastic prior to transplanting. Residues can be removed by a single 0.5 inch application of water, either by natural rainfall or via a sprinkler system. Applications made at emergence will result in injury or death to emerged seedlings.

For the following crops, apply only prior to planting. Allow at least 3 days between application and planting of cantaloupe, casaba melon, crenshaw melon, cucumber, eggplant, gherkin, gourds, ground cherry, honeydew melon, honey ball melon, mango melon, melons (all), muskmelon, pepper (all), persian melon, pumpkin, squash (summer, winter), tomatillo, watercress, and watermelon.

Wiper applicators may be used in rutabagas. Allow at least 14 days between application and harvest.

Vine Crops

LABELED CROPS: Grapes (raisin, table, wine), Kiwi fruit

TYPES OF APPLICATIONS: General weed control, middles (between rows), strips (in row), selective equipment

NOTE: FOR GENERAL USE DIRECTIONS, SEE THE "TREE, NUT AND VINE (GENERAL)" SECTION. THE FOLLOWING DIRECTIONS ARE SPECIFIC TO VINE CROPS.

Applications should not be made when green shoots, canes or foliage are in the spray zone.

In the northeast and Great Lakes regions, applications must be made prior to the end of bloom stage of grapes to avoid injury, or make applications with shielded sprayers or wiper equipment.

PRECAUTIONS, RESTRICTIONS: Allow a minimum of 14 days between last application and harvest.

Roundup Ready® Crops

The following instructions include all applications which can be made onto Roundup Ready® crops during the complete cropping season. Do NOT combine these instructions with other recommendations made for crop varieties which do not contain the Roundup Ready gene, in the "CROPS (ALPHABETICAL)" Section 8 of this label.

MONSANTO COMPANY RECOMMENDS USE OF THIS PRODUCT FOR POSTEMERGENCE APPLICATION ONLY ON CROP VARIETIES DESIGNATED AS CONTAINING THE ROUNDUP READY GENE.

Applying this product to crop varieties which are not designated as Roundup Ready will result in severe crop injury and yield loss. Avoid contact with foliage, green stems, or fruit of crops, or any desirable plants which do not contain the Roundup Ready gene, since severe injury or destruction will result.

The Roundup Ready designation indicates that the crop variety contains a patented gene which provides tolerance to Monsanto's Roundup brand herbicides. Information on Roundup Ready crop varieties may be obtained from your seed supplier or Monsanto representative.

ATTENTION: AVOID DRIFT. EXTREME CARE MUST BE USED WHEN APPLYING THIS PRODUCT TO PREVENT INJURY TO DESIRABLE PLANTS AND CROPS WHICH DO NOT CONTAIN THE ROUNDUP READY GENE.

See the "MIXING" and "APPLICATION EQUIPMENT AND TECHNIQUES" sections of this label for additional directions and restrictions on the application of this product.

THOROUGHLY CLEAN THE SPRAY TANK AND ALL LINES AND FILTERS TO ELIMINATE POTENTIAL CONTAMINATION FROM OTHER HERBICIDES PRIOR TO MIXING AND APPLYING THIS PRODUCT.

NOTE: The following recommendations are based on a clean start at planting by using a burn down application or tillage to control existing weeds before crop emergence. In no-till and stale seedbed systems, a preplant burn-down treatment of 16-64 fluid ounces per acre of this product is recommended to control existing weeds prior to crop emergence.

There are no rotational crop restrictions following the application of this product.

Soybeans with the Roundup Ready Gene

TYPES OF APPLICATIONS: Preplant, preemergence, at-planting, postemergence, preharvest, postharvest.

Application Instructions

Maximum Allowable Application Rates

1. Combined total per year for all applications	8 quarts per acre
2. Preplant, Preemergence applications	5 quarts per acre
3. Total in-crop applications from cracking throughout flowering	3 quarts per acre
4. Maximum preharvest application rate	1 quart per acre

When applied as directed, this product will control labeled annual grasses and broadleaf weeds in Roundup Ready soybeans. Many perennial grasses and broadleaf weeds will be controlled or suppressed with one or more applications of this product.

PRECAUTIONS/RESTRICTIONS: The combined total application from crop emergence through harvest must not exceed 3 quarts per acre. The maximum rate for any single in crop application is 2 quarts per acre. The maximum combined total of this product which can be applied during flowering is 2 quarts per acre. Allow a minimum of 14 days between final application and harvest of soybeans.

For proper stewardship of aerial applications over-the-top of Roundup Ready soybeans, Monsanto recommends that growers and applicators read and follow all precautions and procedures contained in the use guide "A Guide to On-Target Aerial Application" available by calling 1-800-332-3111 or on the internet at www.monsanto.com.

NOTE: The use of this product for in-crop applications over Roundup Ready soybean is not registered in California.

ANNUAL WEED RATE TABLES

The following rate recommendations will provide control of labeled grasses and broadleaf weeds in conventional and no-till Roundup Ready soybean production systems. Refer to the "ANNUAL WEED RATE TABLES" in this label for rate recommendations for specific annual weeds.

Monsanto will not warrant crop safety or weed control when Roundup Ready soybeans are treated with herbicides not specified on this supplemental label. Because of the potential for, 1) crop injury, 2) poor weed control from antagonism, and/or 3) rotational crop restrictions, herbicides not specified on this supplemental label should not be used, whether applied preemergence or applied postemergence as a tank mixture with Roundup Ultra herbicide.

This product may be used up to 2 quarts per acre in any single in-crop application for control of annual weeds, where heavy weed densities exist.

MIDWEST/MID-ATLANTIC RECOMMENDATIONS

Narrow row or drilled soybeans: A single in-crop application of this product will provide effective control of labeled weeds. For best results, an initial application of 1 quart per acre, on 4-8" weeds is recommended. Weeds will generally be 4-8" tall 3 to 5 weeks after planting. If the initial application is delayed and weeds are 8-18" tall, use 48 oz/A for best results.

Under adverse growing conditions such as drought, hail, wind damage or a poor soybean stand that slows or delays canopy closure, a sequential application of this product at 24 to 32 fluid ounces per acre may be necessary to control late flushes of weeds.

Wide row soybeans: An in-crop application of this product will provide effective control of the initial stand of labeled weeds. For best results, an initial application of 1 quart per acre, on 4-8" weeds is recommended. Weeds will generally be 4-8" tall 3 to 5 weeks after planting. If new flushes of weeds occur, they can be controlled by sequential applications of this product.

Initial and Sequential (if needed) Applications

Weed Height (inches)	Rate (fl oz/A)
1-3	24
4-8	32
8-18	48

Giant ragweed: Apply 1 quart per acre when the weed is 8-12" tall to avoid the need for sequential application.

Black nightshade, Pennsylvania smartweed, velvetleaf and waterhemp. Apply 1 quart per acre to weeds 3-6" tall and 48 fl oz/A when weeds are up to 12 inches tall. For Morningglory species apply 32 fl oz/A when weeds are up to 4 inches tall, and 48 fl oz/A when weeds are up to 6 inches tall.

Some weeds, such as black nightshade, woolly cupgrass, shattercane, wild proso millet, burcumber, and giant ragweed, with multiple germination times may require a sequential application of this product. Suppressed or stunted weeds may also require sequential applications. Sequential applications should be made after some regrowth has occurred. Use a minimum of 24 fluid ounces of this product per acre for sequential applications.

SOUTHEAST RECOMMENDATIONS

Narrow row, drilled, or wide-row soybeans: An in-crop application of this product will provide effective control of the initial stand of labeled weeds. For best results, an initial application of 1 quart per acre, on 3-6" weeds is recommended. Weeds will generally be 3-6" tall 2 to 3 weeks after planting.

Initial Treatment

Weed Height (inches)	Rate (fl oz/A)
3-6	32
6-12	48

Under adverse growing conditions such as drought, hail, wind damage or a poor soybean stand that slows or delays canopy closure, a sequential application of this product at 16 to 32 fluid ounces per acre may be necessary to control late flushes of weeds.

Sequential Application (if needed)

Weed Height (inches)	Rate (fl oz/A)
2-3	16
3-6	24
6-12	32

Annex 27

Florida pusley, hemp sesbania and spurred anoda: Apply 1 quart per acre to weeds 2-4″ for the initial application. Apply 1 quart per acre when these weeds are 3-6″ tall if a sequential application is necessary.

Morningglory, black nightshade, groundcherry, and Pennsylvania smartweed: Apply 24 fl oz/A on 1-3″ weeds, 32 fl oz per acre on 3-6″ weeds, or 48 fl oz/A on 6-12″ weeds for the initial application.

Some weeds, such as black nightshade, broadleaf signalgrass, Texas panicum, burcumber, and sicklepod, with multiple germination times may require a sequential application of this product. Suppressed or stunted weeds may also require sequential applications. Sequential applications should be made after some regrowth has occurred. Use a minimum of 16 fluid ounces of this product per acre for sequential applications.

DELTA/MID-SOUTH RECOMMENDATIONS

Narrow row, drilled, or wide row soybeans: An in-crop application of this product will provide effective control of the initial stand of labeled weeds. A sequential application will be required to control new flushes of weeds. For best results, an initial application of 32 fl oz per acre, on 2-4″ weeds is recommended. Weeds will generally be 2-4″ tall 2 to 3 weeks after planting.

Initial Treatment

Weed Height (inches)	Rate (fl oz/A)
2-4	32
5-12	48

Sequential Application

Weed Height (inches)	Rate (fl oz/A)
2-3	16
3-6	24
6-12	32

Hemp sesbania and spurred anoda: Apply a sequential treatment of 32 fl oz/A on 3-6″ weeds if necessary.

Some weeds, such as black nightshade, broadleaf signalgrass, Texas panicum, burcumber, and sicklepod with multiple germination times may require a sequential application of this product. Suppressed or stunted weeds may also require sequential applications. Sequential applications should be made after some regrowth has occurred. Use a minimum of 16 fluid ounces of this product per acre for sequential applications.

PERENNIAL WEEDS RATE RECOMMENDATIONS

A 1- to 2-quart per acre rate (single or multiple applications) of this product will control or suppress perennial weeds such as: bermudagrass, Canada thistle, common milkweed, field bindweed, hemp dogbane, horsenettle, marestail (horseweed), nutsedge, quackgrass, rhizome johnsongrass, redvine, trumpetcreeper, swamp smartweed, and wirestem muhly.

For best results, allow perennial weed species to achieve at least 6″ of growth before spraying with Roundup Ultra herbicide.

FARMSTEADS

TYPES OF APPLICATIONS: General nonselective weed control, trim-and-edge, chemical mowing, cut stumps, habitat management.

General nonselective weed control, Trim-and-edge

USE INSTRUCTIONS: This product may be used to control annual weeds, perennial weeds and woody brush which are found in any part of the farmstead, including building foundations, along and in fences, in dry ditches and canals, along ditchbanks, farm roads, shelterbelts, prior to landscape plantings and equipment storage areas.

This product may be tank mixed with the following products. Refer to these product labels for approved farmstead sites and application rates. For annual weeds, use 1 quart per acre of this product when weeds are less than 6 inches tall and 1.5 quarts per acre when weeds are greater than 6 inches tall. For perennial weeds, apply 2 to 5 quarts per acre in these tank mixes. For tank mixtures with these products through backpack sprayers, handguns or other high-volume spray-to-wet applications, see the "HAND-HELD AND HIGH VOLUME EQUIPMENT" section of this label for recommended rates.

Arsenal	Krovar I DF	Ronstar 50 WP
Banvel	Oust	Sahara
Barricade 65WG	Pendulum 3.3EC	Simazine
Diuron	Pendulum WDG	Surflan
Endurance	Plateau	Telar
Escort	Princep DF	Vanquish
Karmex DF	Princep Liquid	2,4-D

Banvel tank mixtures may not be applied by air in California.

Chemical mowing

USE INSTRUCTIONS: This product will suppress perennial grasses listed in this section to serve as a substitute for mowing. Apply this product at a rate of 6 to 8 fluid ounces per acre. Use 8 fluid ounces of this product per acre when treating tall fescue, fine fescue, orchardgrass or quackgrass covers. Use 6 fluid ounces of this product per acre when treating Kentucky bluegrass. Apply treatments in 10 to 20 gallons of spray solution per acre. Chemical mowing applications may be made along farm ditches and other parts of farmsteads.

PRECAUTIONS, RESTRICTIONS: Use only in areas where some temporary injury or discoloration of perennial grasses can be tolerated.

Cut Stumps

TYPES OF APPLICATION: Treating cut stumps in any non-crop site listed on this label

USE INSTRUCTIONS: This product will control regrowth of cut stumps and resprouts of many types of woody brush and tree species, some of which are listed below. Apply this product using suitable equipment to ensure coverage of the entire cambium. Cut trees or resprouts close to the soil surface. Apply a 50 to 100 percent solution of this product to the freshly-cut surface immediately after cutting. Delays in application may result in reduced performance. For best results, applications should be made during periods of active growth and full leaf expansion.

Alder	Oak	Sweetgum
Eucalyptus	Reed, giant	Tan oak
Madrone	Salt-cedar	Willow

PRECAUTIONS, RESTRICTIONS: DO NOT MAKE CUT STUMP APPLICATIONS WHEN THE ROOTS OF DESIRABLE WOODY BRUSH OR TREES MAY BE GRAFTED TO THE ROOTS OF THE CUT STUMP. INJURY RESULTING FROM ROOT GRAFTING MAY OCCUR IN ADJACENT WOODY BRUSH OR TREES.

Habitat Management

TYPES OF USES: Habitat restoration and maintenance, wildlife food plots

Habitat restoration and maintenance

USE INSTRUCTIONS: This product may be used to control exotic and other undesirable vegetation in habitat management areas. Applications can be made to allow recovery of native plant species, prior to planting desirable native species, and for similar broadspectrum vegetation control requirements in habitat management areas. Spot treatments can be made to selectively remove unwanted plants for habitat maintenance and enhancement. The tank mixtures listed in this section of the label may be used for habitat restoration and maintenance.

Wildlife food plots

USE INSTRUCTIONS: This product may be used as a site preparation treatment to control annual and perennial weeds prior to planting wildlife food plots. Any wildlife food species may be planted after applying this product, or native species may be allowed to repopulate the area. If tillage is needed to prepare a seedbed, wait 7 days after application before tillage.

ANNUAL WEEDS RATE TABLES

Alphabetically by Species

Water carrier volumes of 3 to 10 gallons per acre for ground applications and 3 to 5 gallons per acre for aerial applications are recommended.

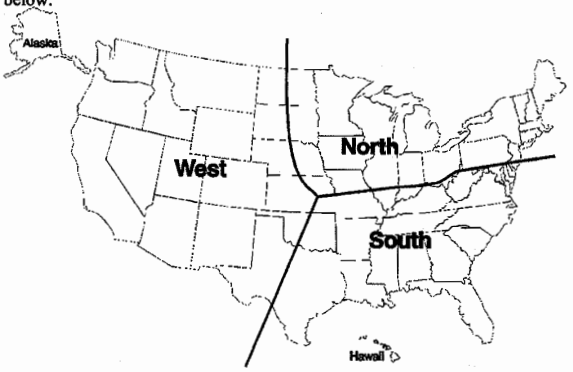
Apply to actively growing annual weeds.

Do not tank mix with soil residual herbicides when using these rates unless otherwise specified.

For weeds that have been mowed, grazed or cut, allow regrowth to occur prior to treatment.

For those rates less than 48 fluid ounces per acre, this product may be used up to 48 fluid ounces per acre where heavy weed densities exist.

Refer to this map for location of the regions listed in the annual weed tables below.



ANNUAL WEEDS RATE TABLE, NORTH AND SOUTH REGIONS

Weed Species	Region	Rate (Fluid Ounces Per Acre) Maximum Height/Length 12	16	24	32	40	48
Annoda, spurred		—	1″	2″	3″	5″	8″
Barley		—	18″	18″+	—	—	—
Barnyardgrass	South	—	3″	5″	7″	9″	12″
	North	—	—	6″	12″	—	—
Bassia, fivehook		—	—	—	6″	—	—
Bittercress		—	12″	20″	—	—	—

Weed Species	Region	Rate (Fluid Ounces Per Acre) 12	16	24	32	40	48
			Maximum Height/Length				
Bluegrass, annual		—	10″	—	—	—	—
Brome, downy		6″	—	—	—	—	—
Brome, Japanese		—	6″	—	24″	—	—
Browntop panicum		—	6″	8″	12″	—	24″
Burcucumber		—	—	6″	12″	—	—
Buttercup		—	12″	20″	—	—	—
Carolina foxtail		—	20″	—	—	—	—
Carolina geranium		—	—	—	4″	—	9″
Carpetweed		—	—	6″	12″	—	—
Cheat		—	6″	20″	—	—	—
Chervil		—	20″	—	—	—	—
Chickweed		—	12″	18″	—	—	—
Cocklebur		—	12″	18″	24″	—	—
Copperleaf, hophornbeam		—	1″	2″	3″	4″	6″
Copperleaf, Virginia		—	1″	2″	3″	4″	6″
Corn		—	12″	20″	—	—	—
Corn speedwell		—	12″	—	—	—	—
Crabgrass		—	12″	18″	—	—	—
Cutleaf evening primrose		—	—	—	3″	—	6″
Dwarfdandelion		—	20″	—	—	—	—
Eastern mannagrass		—	8″	12″	—	—	—
Eclipta		—	4″	8″	12″	—	—
Fall panicum	South	—	4″	6″	8″	12″	24″
	North	—	6″	12″	18″	—	—
Falsedandelion		—	20″	—	—	—	—
Falseflax, smallseed		—	12″	—	—	—	—
Fiddleneck		—	—	—	6″	—	12″
Field pennycress		—	6″	12″	—	—	—
Filaree		—	—	—	—	—	12″
Fleabane, annual		—	6″	20″	—	—	—
Fleabane, hairy *(Conyza bonariensis)*		—	6″	—	—	—	—
Fleabane, rough		—	3″	6″	12″	—	—
Florida pusley		—	—	—	12″	—	—
Foxtail	South	—	8″	12″	20″	—	—
	North	18″	18″+	—	—	—	—
Goatgrass, jointed		—	6″	—	—	—	—
Goosegrass		—	3″	5″	8″	—	18″
Grain sorghum (milo)		—	6″	12″	20″	—	—
Groundsel, common		—	6″	—	—	—	—
Hemp sesbania		—	—	2″	4″	6″	8″
Henbit		—	—	—	6″	—	20″
Horseweed/Marestail	South	—	—	12″	30″	—	—
(Conyza canadensis)	North	—	6″	12″	18″	—	—
Itchgrass		—	6″	12″	18″	—	—
Jimsonweed		—	—	—	6″	—	12″
Johnsongrass, seedling	South	—	—	18″	—	—	—
	North	—	12″	18″	—	—	—
Junglerice		—	3″	5″	7″	9″	12″
Knotweed		—	3″	8″	12″	—	20″
Kochia[1]		—	3 to 6″	12″	—	—	—
Lambsquarters		—	6″	8″	12″	—	20″
Little barley		—	20″	—	—	—	—
London rocket		—	6″	—	—	—	—
Mayweed		—	—	2″	6″	12″	18″
Morningglory *(Ipomoea spp.)*		—	—	2″	4″	—	6″
Mustard, blue		6″	—	—	—	—	—
Mustard, tansy		6″	12″	20″	—	—	—
Mustard, tumble		6″	—	—	—	—	—
Mustard, wild		6″	12″	18″	—	—	—
Nightshade, black		—	6″	12″	—	—	—
Nightshade, hairy		—	6″	12″	—	—	—
Oats		—	—	6″	20″	—	—
Pigweed		—	12″	18″	24″	—	—
Prickly lettuce		—	6″	12″	20″	—	—
Purslane		—	—	—	6″	—	12″
Ragweed, common	South	—	4″	6″	8″	—	11″
	North	—	6″	12″	18″	—	—
Ragweed, giant		—	—	4″	6″	—	11″
Red rice		—	—	—	4″	—	—
Russian thistle		—	—	—	6″	—	—
Rye	South	—	6″	20″	60″	—	—
	North	—	18″	18″+	—	—	—
Ryegrass		—	—	—	6″	—	7″+
Sandbur, field		12″	—	—	—	—	—
Shattercane		—	12″	18″	—	—	—
Shepherd's-purse		—	6″	12″	—	—	—
Sicklepod		—	—	2″	4″	—	8″
Signalgrass, broadleaf		—	3″	5″	7″	9″	12″
Smartweed, ladysthumb		—	4″	6″	8″	—	12″
Smartweed, Pennsylvania		—	4″	6″	8″	—	12″
Sowthistle, annual		—	—	—	6″	—	12″
Spanishneedles		—	—	—	8″	—	18″
Speedwell, purslane		—	12″	—	—	—	—
Sprangletop		—	6″	12″	20″	—	—
Spurge, prostrate		—	6″	12″	20″	—	—
Spurge, spotted		—	6″	12″	20″	—	—
Spurry, umbrella		6″	—	—	—	—	—
Stinkgrass		12″	—	—	—	—	—
Sunflower		—	12″	18″	—	—	—
Teaweed/Prickly sida		—	1″	2″	3″	4″	6″
Texas panicum		—	6″	8″	12″	—	24″
Velvetleaf	South	—	2″	3″	4″	5″	8″
	North	—	3″	6″	12″	—	—
Virginia pepperweed		—	18″	—	—	—	—
Waterhemp		—	—	6″	12″	—	—
Wheat	South	—	6″	30″	—	—	—
	North	—	18″	18″+	—	—	—
Wheat (overwintered)		—	6″	18″	—	—	—
Wild oats		—	12″	—	—	—	—
Wild Proso Millet		—	—	6″	12″	12″	18″
Witchgrass		—	12″	—	—	—	—
Woolly cupgrass		—	6″	12″	—	—	—
Yellow rocket		—	—	12″	20″	—	—

[1]Do not treat kochia in the button stage.

ANNUAL WEEDS RATE TABLE, WEST REGION

Weed Species	Rate (Fluid Ounces Per Acre) 12	16	24	32	48
		Maximum Height/Length			
Barley	12″	—	—	—	—
Barnyardgrass	6″	—	—	—	—
Bluegrass, annual	6″	—	—	—	—
Bluegrass, bulbous	—	6″	—	—	—
Brome, downy[1]	6″	—	—	—	—
Buttercup	—	12″	—	—	—
Cheat	—	6″	—	—	—
Chickweed	—	6″	—	—	—
Cocklebur	—	12″	—	—	—
Corn	—	6″	—	—	—
Crabgrass	—	12″	—	—	—
Dwarfdandelion	—	12″	—	—	—
Fall panicum	—	12″	—	—	—
Falseflax, smallseed	—	12″	—	—	—
Field pennycress	—	6″	—	—	—
Filaree	—	—	—	—	12″
Fleabane, hairy *(Conyza bonariensis)*	—	6″	—	—	—
Florida pusley	—	—	—	12″	—
Foxtail		(8 fl. oz. for up to 12″)			
Goatgrass, jointed	—	6″	—	—	—
Groundsel, common	—	6″	—	—	—
Henbit	—	6″	—	—	—
Horseweed/Marestail *(Conyza canadensis)*	—	6″	—	—	—
Johnsongrass, seedling	—	12″	—	—	—
Lambsquarters	—	6″	—	—	—
London rocket	—	6″	—	—	—
Morningglory *(Ipomoea spp.)*	—	2″	—	—	—
Mustard, blue	6″	—	—	—	—
Mustard, tansy	6″	—	—	—	—
Mustard, tumble	6″	—	—	—	—
Mustard, wild	6″	—	—	—	—
Pigweed	—	12″	—	—	—
Rye	12″	—	—	—	—
Ryegrass, Italian	—	6″	—	—	—
Sandbur, field	12″	—	—	—	—
Shattercane	12″	—	—	—	—
Shepherd's-purse	—	6″	—	—	—
Sowthistle, annual	—	6″	—	—	—
Spurge, annual	—	6″	—	—	—
Stinkgrass	12″	—	—	—	—
Texas panicum	—	12″	—	—	—
Wheat	18″	—	—	—	—
Wild oats	—	12″	—	—	—
Witchgrass	—	12″	—	—	—

[1]For control of Downy brome in no-till systems, use 16 fluid ounces per acre.

Annual Weeds—Water Carrier Volumes of 10 to 40 Gallons Per Acre

Apply 1 to 1.5 quarts of this product per acre. Use 1 quart per acre if weeds are less than 6 inches tall and 1.5 quarts per acre if weeds are over 6 inches tall.

These rates will provide control of weeds listed in the annual weed control tables when water carrier volumes are 10 to 40 gallons per acre for ground applications.

Annual Weeds—Tank Mixtures with 2,4-D or Banvel

12 to 16 fluid ounces of this product plus 0.25 pound a.i. of Banvel or 0.5 pound a.i. of 2,4-D per acre will control the following weeds with the maximum

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height or length indicated: 6″—prickly lettuce, marestail/horseweed *(Conyza canadensis)*, morningglory *(Ipomoea spp.)*, kochia (Banvel only); 12″—cocklebur, lambsquarters, pigweed, Russian thistle.

16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D per acre will control the following weeds when they are a maximum height or length of 6 inches: common ragweed, giant ragweed, Pennsylvania smartweed, and velvetleaf.

12 fluid ounces of this product plus 0.25 pound a.i. of Banvel or 0.5 pound a.i. of 2,4-D per acre will control foxtail up to 18″.

Refer to the specific product labels for crop rotation restrictions and cautionary statements of all products used in tank mixtures. Some crop injury may occur if Banvel is applied within 45 days of planting.

DO NOT APPLY BANVEL TANK MIXTURES BY AIR IN CALIFORNIA.

PERENNIAL WEEDS RATE TABLE

Alphabetically by Species

Apply to actively growing perennial weeds.

NOTE: If weeds have been mowed or tilled, do not treat until plants have resumed active growth and have reached the recommended stages.

Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. Repeat treatments must be made prior to crop emergence.

Unless otherwise stated, allow 7 or more days after application before tillage.

Best results are obtained when soil moisture is adequate for active weed growth.

Weed Species	Rate (QT/A)	Water Volume (GPA)	Hand-Held % Solution
Alfalfa	1-2	3-10	2%

Make applications after the last hay cutting in the fall. Allow alfalfa to regrow to a height of 6 to 8 inches or more prior to treatment. Applications should be followed with deep tillage at least 7 days after treatment, but before soil freeze-up.

Alligatorweed	4	3-20	1.5%

Partial control. Apply when most of the plants are in bloom. Repeat applications will be required to maintain control.

Anise (fennel)	—	—	1-2%

Apply as a spray-to-wet treatment. Optimum results are obtained when plants are treated at the bud to full-bloom stage of growth.

Bahiagrass	3-5	3-20	2%

Apply when most plants have reached the early head stage.

Bentgrass	1.5	10-20	2%

For suppression in grass seed production areas. For ground applications only. Ensure entire crown area has resumed growth prior to a fall application. Bentgrass should have at least 3 inches of growth. Tillage prior to treatment should be avoided. Tillage 7 to 10 days after application is recommended for best results.

Bermudagrass	3-5	3-20	2%

For control, apply 5 quarts of this product per acre. For partial control, apply 3 quarts per acre. Treat when bermudagrass is actively growing and seedheads are present. Retreatment may be necessary to maintain control.

Bermudagrass, water (knotgrass)	1-1.5	5-10	2%

Apply 1.5 quarts of this product in 5 to 10 gallons of water per acre. Apply when water bermudagrass is 12 to 18 inches in length. Allow 7 or more days before tilling, flushing or flooding the field.

Fall applications only: Apply 1 quart of this product in 5 to 10 gallons of water per acre. Fallow fields should be tilled prior to application. Apply prior to frost on water bermudagrass that is 12 to 18 inches in length.

This product is not registered in California for use on water bermudagrass.

Bindweed, field	0.5-5	3-20	2%

Do not treat when weeds are under drought stress as good soil moisture is necessary for active growth.

For control, apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts east of the Mississippi River. Apply when the weeds are at or beyond full bloom. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost.

Also for control, apply 2 quarts of this product plus 0.5 pound a.i. of Banvel in 10 to 20 gallons of water per acre. Do not apply by air.

For suppression on irrigated agricultural land, apply 1 to 2 quarts of this product plus 1 pound a.i. of 2,4-D in 10 to 20 gallons of water per acre with ground equipment only. Applications should be made following harvest or in fall fallow ground when the bindweed is actively growing and the majority of runners are 12 inches or more in length. The use of at least one irrigation will promote active bindweed growth.

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Apply by air in fallow and reduced tillage systems only. Applications should be delayed until maximum emergence has occurred and when vines are between 6 to 18 inches in length.

In California only, apply 1 to 5 quarts of this product per acre. Actual rate needed for suppression or control will vary within this range depending on local conditions. For suppression on irrigated land where annual tillage is performed, apply 1 quart of this product in 3 to 10 gallons of water per acre. Apply to bindweed that has reached a length of 12 inches or greater. Allow maximum weed emergence and runner growth. Allow 3 or more days after application before tillage.

Bluegrass, Kentucky	1-2	3-40	2%

Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height.

Blueweed, Texas	3-5	3-40	2%

Apply 4 to 5 quarts of this product per acre west of the Mississippi River and 3 to 4 quarts per acre east of the Mississippi River. Apply when plants are at or beyond full bloom. New leaf development indicates active growth. For best results, apply in late summer or fall. Fall treatments must be applied before a killing frost.

Brackenfern	3-4	3-40	1-1.5%

Apply to fully expanded fronds which are at least 18 inches long.

Bromegrass, smooth	1-2	3-40	2%

Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height.

Bursage, woolly-leaf	—	3-20	2%

For control, apply 2 quarts of this product plus 1 pint of Banvel per acre. For partial control, apply 1 quart of this product plus 1 pint of Banvel per acre. Apply when plants are producing new active growth which has been initiated by moisture for at least 2 weeks and when plants are at or beyond flowering.

Canarygrass, reed	2-3	3-40	2%

For best results, apply when most plants have reached the boot-to-head stage of growth.

Cattail	3-5	3-40	2%

Apply when most plants have reached the early head stage.

Clover; red, white	3-5	3-20	2%

Apply when most plants have reached the early bud stage.

Cogongrass	3-5	10-40	2%

Apply when cogongrass is at least 18 inches tall in late summer or fall. Due to uneven stages of growth and the dense nature of vegetation preventing good spray coverage, repeat treatments may be necessary to maintain control.

Dallisgrass	3-5	3-20	2%

Apply when most plants have reached the early head stage.

Dandelion	3-5	3-40	2%

Apply when most plants have reached the early bud stage of growth.

Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre.

Dock, curly	3-5	3-40	2%

Apply when most plants have reached the early bud stage of growth.

Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre.

Dogbane, hemp	4	3-40	2%

Apply when most plants have reached the late bud to flower stage of growth. Following crop harvest or mowing, allow weeds to regrow to a mature stage prior to treatment. For best results, apply in late summer or fall.

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D in 3 to 10 gallons of water per acre for ground applications and 3 to 5 gallons of water per acre for aerial applications. Delay applications until maximum emergence of dogbane has occurred.

Fescue (except tall)	3-5	3-20	2%

Apply when most plants have reached the early head stage.

Fescue, tall	1-3	3-40	2%

Apply 3 quarts of this product per acre when most plants have reached boot-to-early seedhead stage of development.

Fall applications only: Apply 1 quart of this product in 3 to 10 gallons of water per acre. Apply to fescue in the fall when plants have 6 to 12 inches of new growth. A sequential application of 1 pint per acre of this product will improve long-term control and control seedlings germinating after fall treatments or the following spring.

Guineagrass	3	3-40	1%

Apply when most plants have reached at least the 7-leaf stage of growth. Ensure thorough coverage when using hand-held equipment.

Horsenettle	3-5	3-20	2%

Apply when most plants have reached the early bud stage.

Horseradish	4	3-40	2%

Apply when most plants have reached the late bud to flower stage of growth. For best results, apply in late summer or fall.

Iceplant	—	—	1.5-2%

Iceplant should be at or beyond the early bud stage of growth. Thorough coverage is necessary for best control.

Jerusalem artichoke	3-5	3-20	2%

Apply when most plants are in the early bud stage.

Johnsongrass	0.5-3	3-40	1%

In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop, or areas where annual tillage (no-till) is not practiced, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre.

For best results, apply when most plants have reached the boot-to-head stage of growth or in the fall prior to frost. Allow 7 or more days after application before tillage. Do not tank-mix with residual herbicides when using the 1 quart per acre rate.

For burndown of Johnsongrass, apply 1 pint of this product in 3 to 10 gallons of water per acre before the plants reach a height of 12 inches. For this use, allow at least 3 days after treatment before tillage.

Spot treatment (partial control or suppression)—Apply a 1 percent solution of this product when Johnsongrass is 12 to 18 inches in height. Coverage should be uniform and complete.

Kikuyugrass	2-3	3-40	2%

Spray when most kikuyugrass is at least 8 inches in height (3- or 4-leaf stage of growth). Allow 3 or more days after application before tillage.

Knapweed	4	3-40	2%

Apply when most plants have reached the late bud to flower stage of growth. For best results, apply in late summer or fall.

Lantana	—	—	1-1.25%

Apply at or beyond the bloom stage of growth. Use the higher application rate for plants that have reached the woody stage of growth.

Lespedeza	3-5	3-20	2%

Apply when most plants have reached the early bud stage.

Milkweed, common	3	3-40	2%

Apply when most plants have reached the late bud to flower stage of growth.

Muhly, wirestem	1-2	3-40	2%

Use 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre or in pasture, sod, or noncrop areas. Spray when the wirestem muhly is 8 inches or more in height. Do not till between harvest and fall applications or in the fall or spring prior to spring applications. Allow 3 or more days after application before tillage.

Mullein, common	3-5	3-20	2%

Apply when most plants are in the early bud stage.

Napiergrass	3-5	3-20	2%

Apply when most plants are in the early head stage.

Nightshade, silverleaf	2	3-10	2%

Applications should be made when at least 60 percent of the plants have berries. Fall treatments must be applied before a killing frost.

Nutsedge; purple, yellow	0.5-3	3-40	1-2%

Apply 3 quarts of this product per acre or apply a 1 to 2 percent solution for control of nutsedge plants and immature nutlets attached to treated plants. Treat when plants are in flower or when new nutlets can be found at rhizome tips. Nutlets which have not germinated will not be controlled and may germinate following treatment. Repeat treatments will be required for long-term control of ungerminated tubers.

Sequential applications: 1 to 2 quarts of this product in 3 to 10 gallons of water per acre will also provide control. Make applications when a majority of the plants are in the 3- to 5-leaf stage (less than 6 inches tall). Repeat this application, as necessary, when newly emerging plants reach the 3- to 5-leaf stage. Subsequent applications will be necessary for long-term control.

For partial control of existing plants, apply 1 pint to 2 quarts of this product in 3 to 40 gallons of water per acre. Treat when plants have 3 to 5 leaves and most are less than 6 inches tall. Repeat treatments will be required to control subsequent emerging plants or regrowth of existing plants.

Orchardgrass	1-2	3-40	2%

Apply 2 quarts of this product in 10 to 40 gallons of water per acre when most plants have reached boot-to-early seedhead stage of development. For partial control in pasture or hay crop renovation, apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to actively growing plants when most have reached 4 to 12 inches in height.

Orchardgrass sods going to no-till corn: Apply 1 to 1.5 quarts of this product in 3 to 10 gallons of water per acre. Apply to orchardgrass that is a minimum of 12 inches tall for spring applications and 6 inches tall for fall applications. Allow at least 3 days following application before planting. A sequential application of atrazine will be necessary for optimum results.

Pampasgrass	—	—	1.5-2%

Pampasgrass should be at or beyond the boot stage of growth. Thorough coverage is necessary for best control.

Paragrass	3-5	3-20	2%

Apply when most plants are in the early head stage.

Phragmites	3-5	10-40	1-2%

For partial control. For best results, treat during late summer or fall months or when plants are actively growing and in full bloom. Treatment before or after this stage may lead to reduced control. Due to the dense nature of the vegetation, which may prevent good spray coverage or uneven stages of growth, repeat treatments may be necessary to maintain control. Visual control symptoms will be slow to develop.

Poison hemlock	—	—	1-2%

Apply as a spray-to-wet treatment. Optimum results are obtained when plants are treated at the bud to full-bloom stage of growth.

Pokeweed, common	1	3-40	2%

Apply to actively growing plants up to 24 inches tall.

Quackgrass	1-3	3-40	2%

In annual cropping systems, or in pastures and sods followed by deep tillage: Apply 1 quart of this product in 3 to 10 gallons of water per acre. For 10 to 40 gallons of water per acre, apply 2 quarts of this product. Do not tank mix with residual herbicides when using the 1 quart rate. Spray when quackgrass is 6 to 8 inches in height. Do not till between harvest and fall applications or in fall or spring prior to spring application. Allow 3 or more days after application before tillage. In pastures or sods, use a moldboard plow for best results.

In pastures, sods or noncrop areas where deep tillage does not follow application: Apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre when the quackgrass is greater than 8 inches tall.

Redvine	0.75-2	5-10	2%

For suppression, apply 24 fluid ounces of this product per acre at each of two applications 7 to 14 days apart or a single application of 2 quarts per acre. Apply recommended rates in 5 to 10 gallons of water per acre. Apply in late September or early October to plants which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least 1 week before a killing frost.

Reed, giant	—	—	2%

Best results are obtained when applications are made in late summer to fall.

Ryegrass, perennial	1-3	3-40	1%

In annual cropping systems apply 1 to 2 quarts of this product per acre. Apply 1 quart of this product in 3 to 10 gallons of water per acre. Use 2 quarts of this product when applying 10 to 40 gallons of water per acre. In noncrop, or areas where annual tillage (no-till) is not practiced, apply 2 to 3 quarts of this product in 10 to 40 gallons of water per acre.

For best results, apply when most plants have reached the boot-to-head stage of growth or in the fall prior to frost. Do not tank-mix with residual herbicides when using the 1 quart per acre rate.

Smartweed, swamp	3-5	3-40	2%

Apply when most plants have reached the early bud stage of growth.

Also for control, apply 16 fluid ounces of this product plus 0.5 pound a.i. of 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall.

Sowthistle, perennial	2-3	3-40	2%

Apply when most plants are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage.

Spurge, leafy	—	3-10	2%

For suppression, apply 16 fluid ounces of this product plus 0.5 pound a.i. 2,4-D in 3 to 10 gallons of water per acre in the late summer or fall. If mowing has occurred prior to treatment, apply when most of the plants are 12 inches tall.

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Starthistle, yellow	2	10-40	2%

Best results are obtained when applications are made during the rosette, bolting and early flower stages.

Sweet potato, wild	—	—	2%

Partial control. Apply to plants that are at or beyond the bloom stage of growth. Repeat applications may be required.

Thistle, artichoke	—	—	2%

Partial control. Apply to plants that are at or beyond the bloom stage of growth. Repeat applications may be required.

Thistle, Canada	2-3	3-40	2%

Apply when most plants are at or beyond the bud stage of growth. After harvest, mowing or tillage in the late summer or fall, allow at least 4 weeks for initiation of active growth and rosette development prior to the application of this product. Fall treatments must be applied before a killing frost. Allow 3 or more days after application before tillage.

For suppression, apply 1 quart of this product, or 1 pint of this product plus 0.5 pound a.i. 2,4-D, in 3 to 10 gallons of water per acre in the late summer or fall after harvest, mowing or tillage. Allow rosette regrowth to a minimum of 6 inches in diameter before treating. Applications can be made as long as leaves are still green and plants are actively growing at the time of application. Allow 3 or more days after application before tillage.

Timothy	2-3	3-40	2%

For best results, apply when most plants have reached the boot-to-head stage of growth.

Torpedograss	4-5	3-40	2%

For partial control. Apply when most plants are at or beyond the seedhead stage of growth. Repeat applications will be required to maintain control. Fall treatments must be applied before frost.

Trumpetcreeper	2	5-10	2%

Partial control. Apply in late September or October, to plants which are at least 18 inches tall and have been growing 45 to 60 days since the last tillage operation. Make applications at least 1 week before a killing frost.

Vaseygrass	3-5	3-20	2%

Apply when most plants are in the early head stage.

Velvetgrass	3-5	3-20	2%

Apply when most plants are in the early head stage.

Wheatgrass, western	2-3	3-40	2%

For best results, apply when most plants have reached the boot-to-head stage of growth.

WOODY BRUSH AND TREES RATE TABLE

Alphabetically by Species

Apply this product after full leaf expansion, unless otherwise directed. Use the higher rate for larger plants and/or dense areas of growth. On vines, use the higher rate for plants that have reached the woody stage of growth. Best results are obtained when application is made in late summer or fall after fruit formation.

In arid areas, best results are obtained when applications are made in the spring to early summer when brush species are at high moisture content and are flowering.

Ensure thorough coverage when using hand-held equipment. Symptoms may not appear prior to frost or senescence with fall treatments.

Allow 7 or more days after application before tillage, mowing or removal. Repeat treatments may be necessary to control plants regenerating from underground parts or seed. Some autumn colors on undesirable deciduous species are acceptable provided no major leaf drop has occurred. Reduced performance may result if fall treatments are made following a frost.

Weed Species	Rate (QT/A)	Water Volume (GPA)	Hand-Held % Solution
Alder	3-4	3-40	1-1.5%

For control

Ash	2-5	3-40	1-2%

Partial control

Aspen, quaking	2-3	3-40	1-1.5%

For control

Bearmat (Bearclover)	2-5	3-40	1-2%

Partial control

Beech	2-5	3-40	1-2%

Partial control

Birch	2	3-40	1%

For control

Blackberry	3-4	10-40	1-1.5%

For control. Make applications after plants have reached full leaf maturity. Best results are obtained when applications are made in late summer or fall. Applications may also be made after leaf drop and until a killing frost or as long as stems are green. After berries have set or dropped in late fall, blackberry can be controlled by applying a ¾ percent solution of this product. For control of blackberries after leaf drop and until killing frost or as long as stems are green, apply 3 to 4 quarts of this product in 10 to 40 gallons of water per acre.

Blackgum	2-5	3-40	1-2%

For control

Bracken	2-5	3-40	1-2%

For control

Broom; French, Scotch	—	—	1.5-2%

For control

Buckwheat, California	—	—	1-2%

For partial control. Thorough coverage of foliage is necessary for best results.

Cascara	2-5	3-40	1-2%

Partial control

Catsclaw	—	—	1-1.5%

Partial control

Ceanothus	2-5	3-40	1-2%

Partial control

Chamise	—	—	1%

For control. Thorough coverage of foliage is necessary for best results.

Cherry; bitter, black, pin	2-3	3-40	1-1.5%

For control

Coyote brush	—	—	1.5-2%

For control. Apply when at least 50 percent of the new leaves are fully developed.

Dogwood	2-5	3-40	1-2%

Partial control

Elderberry	2	3-40	1%

For control

Elm	2-5	3-40	1-2%

Partial control

Eucalyptus	—	—	2%

For control of eucalyptus resprouts, apply when resprouts are 6 to 12 feet tall. Ensure complete coverage. Avoid application to drought-stressed plants.

Florida holly (Brazilian Peppertree)	2-5	3-40	1-2%

Partial control

Gorse	2-5	3-40	1-2%

Partial control

Hasardia	—	—	1-2%

Partial control. Thorough coverage of foliage is necessary for best results.

Hawthorn	2-3	3-40	1-1.5%

For control

Hazel	2	3-40	1%

For control

Hickory	2-5	3-40	1-2%

Partial control

Honeysuckle	3-4	3-40	1-1.5%

For control

Hornbeam, American	2-5	3-40	1-2%

Partial control

Kudzu	4	3-40	2%

For control. Repeat applications may be required to maintain control.

Locust, black	2-4	3-40	1-2%

Partial control

Madrone resprouts	—	—	2%

Partial control. Apply to resprouts that are 3 to 6 feet tall. Best results are obtained with spring/early summer treatments.

Manzanita	2-5	3-40	1-2%
Partial control			
Maple, red	2-4	3-40	1-1.5%
For control, apply a 1 to 1.5 percent solution when at least 50 percent of the new leaves are fully developed. For partial control, apply 2 to 4 quarts of this product per acre.			
Maple, sugar	—	—	1-1.5%
For control. Apply when at least 50 percent of the new leaves are fully developed.			
Monkey flower	—	—	1-2%
Partial control. Thorough coverage of foliage is necessary for best results.			
Oak; black, white	2-4	3-40	1-2%
Partial control			
Sage brush, Oak, post	3-4	3-40	1-1.5%
For control			
Oak; northern, pin	—	—	1-1.5%
For control. Apply when at least 50 percent of the new leaves are fully developed.			
Oak; southern red	2-3	3-40	1-1.5%
For control			
Persimmon	2-5	3-40	1-2%
Partial control			
Pine	2-5	3-40	1-2%
For control			
Poison ivy/ Poison oak	4-5	3-40	2%
For control. Repeat applications may be required to maintain control. Fall treatments must be applied before leaves lose green color.			
Poplar, yellow	2-5	3-40	1-2%
Partial control			
Redbud, eastern	2-5	3-40	1-2%
For control			
Rose, multiflora	2	3-40	1%
For control. Treatments should be made prior to leaf deterioration by leaf-eating insects.			
Russian olive	2-5	3-40	1-2%
Partial control			
Sage, black	—	—	1%
For control. Thorough coverage of foliage is necessary for best results.			
Sage, white	2-5	3-40	1-2%
Partial control			
California	—	—	1%
For control. Thorough coverage of foliage is necessary for best results.			
Salmonberry	2	3-40	1%
For control			
Salt-cedar	2-5	3-40	1-2%
For control			
Sassafras	2-5	3-40	1-2%
Partial control			
Sourwood	2-5	3-40	1-2%
Partial control			
Sumac; poison, smooth, winged	2-4	3-40	1-2%
Partial control			
Sweetgum	2-3	3-40	1-1.5%
For control			
Swordfern	2-5	3-40	1-2%
Partial control			
Tallowtree, Chinese	—	—	1%
For control. Thorough coverage of foliage is necessary for best results.			
Tan oak resprouts	—	—	2%
For partial control. Apply to resprouts that are less than 3 to 6 feet tall. Best results are obtained with fall applications.			
Thimbleberry	2	3-40	1%
For control			
Tobacco, tree	—	—	1-2%
Partial control			
Trumpetcreeper	2-3	3-40	1-1.5%
For control			
Vine maple	2-5	3-40	1-2%
Partial control			
Virginia creeper	2-5	3-40	1-2%
For control			
Waxmyrtle, southern	2-5	3-40	1-2%
Partial control			
Willow	3	3-40	1%
For control			

LIMIT OF WARRANTY AND LIABILITY

This Company warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes set forth in the Complete Directions for Use label booklet ("Directions") when used in accordance with those Directions under the conditions described therein. NO OTHER EXPRESS WARRANTY OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE. This warranty is also subject to the conditions and limitations stated herein.

Buyer and all users shall promptly notify this Company of any claims whether based in contract, negligence, strict liability, other tort or otherwise.

Buyer and all users are responsible for all loss or damage from use or handling which results from conditions beyond the control of this Company, including, but not limited to, incompatibility with products other than those set forth in the Directions, application to or contact with desirable vegetation, unusual weather, weather conditions which are outside the range considered normal at the application site and for the time period when the product is applied, as well as weather conditions which are outside the application ranges set forth in the Directions, application in any manner not explicitly set forth in the Directions, moisture conditions outside the moisture range specified in the Directions, or the presence of products other than those set forth in the Directions in or on the soil, crop or treated vegetation.

This Company does not warrant any product reformulated or repackaged from this product except in accordance with this Company's stewardship requirements and with express written permission from this Company.

For over-the-top uses on Roundup Ready crop varieties, crop safety and weed control performance are not warranted by Monsanto when this product is used in conjunction with "brown bag" or "bin run" seed saved from previous year's production and replanted.

THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE LIMIT OF THE LIABILITY OF THIS COMPANY OR ANY OTHER SELLER FOR ANY AND ALL LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED IN CONTRACT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL BE THE PURCHASE PRICE PAID BY THE USER OR BUYER FOR THE QUANTITY OF THIS PRODUCT INVOLVED, OR, AT THE ELECTION OF THIS COMPANY OR ANY OTHER SELLER, THE REPLACEMENT OF SUCH QUANTITY, OR, IF NOT ACQUIRED BY PURCHASE, REPLACEMENT OF SUCH QUANTITY. IN NO EVENT SHALL THIS COMPANY OR ANY OTHER SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES.

Buyer and all users are deemed to have accepted the terms of this LIMIT OF WARRANTY AND LIABILITY which may not be varied by any verbal or written agreement.

Bullet, Harness, Lariat, Lasso, Micro-Tech, Partner, Roundup Ultra and Roundup Ready are registered trademarks and TransSorb is a trademark of Monsanto Company.

Bladex, Canopy, Extrazine, Gemini, Karmex, Krovar, Lexone, Lorox, and Preview are trademarks of E.I. duPont de Nemours and Company.

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Broadstrike and Surflan are trademarks of DowElanco Company.

Banvel, Frontier, Guardsman and Marksman are trademarks of BASF Ltd.

Folex and Prep are trademarks of Rhone-Poulenc, Inc.

Goal is a trademark of Rohm and Haas Company.

Sencor and Turbo are trademarks of Bayer AG.

Prowl, Pursuit, Scepter, and Squadron are trademarks of American Cyanamid Company.

Command is a trademark of FMC Corporation.

DEF is a trademark of Mobay Chemical Company.

Devrinol, Fusion, Surpass, and Topnotch are trademarks of Zeneca Group Company.

Direx and Linex are trademarks of Griffen Company.

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Sim-Trol is a trademark of Oxon Italia Company.

This product is protected by U.S. Patent No. 4,405,531 and by U.S. Patent No. 5,703,015. Other patents pending. No license granted under any non-U.S. patent(s).

EPA Reg. No. 524-475

In case of an emergency involving this product, Call Collect, day or night, (314) 694-4000.

21137X6-2/53

This sample label is current as of January 13, 1999. The product descriptions and recommendations provided in this sample label are for background information only. Always refer to the label on the product before using Monsanto or any other agrichemical product.

Annex 28

Colombia GYL-41 SL Label and Safety Data Sheet

SECTION 1

READ THE LABEL BEFORE USING THIS PRODUCT
KEEP OUT OF CHILDRENS REACH

CAUTION AND USE WARNINGS
Spray solutions of this product should be mixed, stored, and applied using only stainless steel, alumina, fiberglass or plastic-lined steel containers.

DO NOT MIX, STORE OR APPLY THIS PRODUCT OR SPRAY SOLUTIONS IN GALVANIZED STEEL OR UNLINED (EXCEPT STAINLESS STEEL) STEEL CONTAINERS OR SPRAY TANKS. This products or spray solutions of this product react with such containers and tanks to produce hydrogen gas which may form a highly combustible gas mixture. This gas mixture could flash or explode causing serious personal, if ignited by open flame, spark or a welder's torch, a lighted cigarette or other ignition source.

AVOID CONTACT OF HERBICIDE WITH FOLIAGE, GREEN STEMS, EXPOSED ROOTS OR FRUIT OF CROPS, DESIRABLE PLANTS AND TREES, BECAUSE SEVERE INJURY OR DESTRUCTION MAY RESULT

CAUTION: THIS PRODUCT CAUSES EYE IRRITATION. Avoid contact with eyes and clothes.

FIRST AID

Call a medical center or doctor for treatment advice
IF IN EYES: - Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. - Remove contact lenses if present after the first 5 minutes then continue rinsing eye.
TOXICOLOGICAL EMERGENCIES PHONE NUMBER
Have the product container or label with you when calling a poison control center or

DOMESTIC ANIMALS: This product is considered to be relatively nontoxic to dogs and other domestic animals; however, ingestion of this product or large amounts of freshly sprayed vegetation may result in temporary gastrointestinal irritation (vomiting, diarrhea, colic, etc.). If such symptoms are observed, provide the animal with plenty of fluids to prevent dehydration. Call a veterinarian if symptoms persist for more than 24 hours

STORAGE AND DISPOSALWASTE

When storing or disposing the product, do not contaminate water, foodstuffs, animal foodstuff or seeds. Do not store at home. DO not transport or store in vehicles or places where seeds or foodstuffs for human consumption are transported or stored. Keep container closed to prevent spills and contamination. DESTROY THIS CONTAINER AFTER USING THIS

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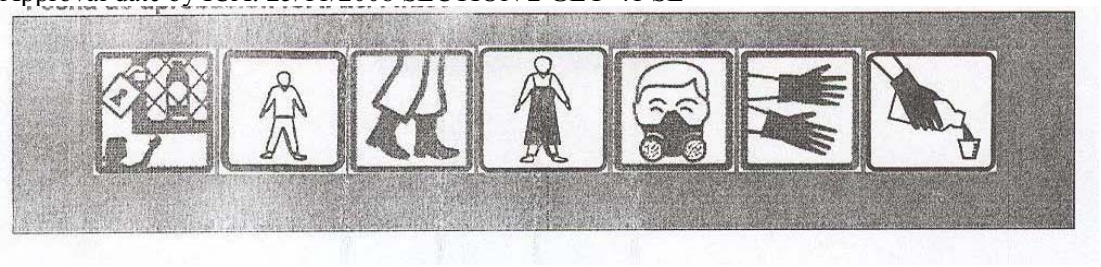
PRODUCT. No container that has contained herbicides should be used to store water or food for human or animal consumption.

Approval date by ICA: 25/11/2008 SECTION 2 GLY-41 SL



GLY-41 SL

Herbicide for land and aerial applications to remove unwanted vegetation in nonagricultural sites

ICA SALES REGISTERED No. 4294

GUARANTEED COMPOSITION

ACTIVE INGREDIENT:
*Glyphosate, N-(phosphonomethyl) glycine, in the form of its isopropylamine salt ……..……...……..41.0%

INERT INGREDIENTES……..... 59.0%

_____
100.0%

*Contains 480 grams per litre of active ingredient glyphosate, in the form of isopropylamine salt. Equivalent to 356 grams per litre of the acid, Glyphosate.

DISTRIBUTED BY:
CAC. Ltda, y Cía. S.C.A.
A.A. 50915,
Tel:(57-1) 288-6012 -- 01 8000916012
Bogota, Colombia

NET CONTENT:
Formulation date:
Expiration date:
Lot number:

TOXICOLOGICAL CATEGORY IV
SLIGHTLY TOXIC
CAUTION

SECTION 3

GENERAL INFORMATION

Product description: This product is a post-emergence, systemic herbicide with no soil

residual activity. It gives broad-spectrum control of many annual weeds, perennial weeds, woody bush and trees. It may be applied using most equipments commonly used on farms, after diluting and mixing it well in water or other solvents, according to the label recommendations.

MIXTURE:

Clean thoroughly all parts of application equipment after using this product, rinsing with abundant water.

NOTICE: RESULTS WILL NOT BE OPTIMAL IF DIRTY WATER, OR WATER FROM PONDS AND DRAINS THAT IS NOT CLEAR IS USED.

Mixing with water: This product mixes readily with water. Mix spray solutions of this product as follows: Begin filling the mixing tank or spray tank with the required amount of clean water. Add the recommended amount of this product near the end of the filling process and mix well. Use caution to avoid siphoning back into the carrier source. Use approved anti-back siphoning devices. During mixing and application, foaming of the spray solution may occur. To prevent or minimize foam, avoid the use of mechanical agitators, terminate by-pass and return lines at the bottom of the tank and, if needed, use an approved anti-foaming agent.

Surfactants.

Non-ionic surfactants may be used to improve wetting on foliage. Do not reduce rates of this product when adding surfactant. Read and carefully observe all caution statements and other information on the surfactant label.

WEED CONTROL

Annual weeds

Apply from 2 to 3 litres of GL Y-41 SL per hectare to control the following species: *Amaranthus spp* (pigweed), *Bidens pilosa* (Spanish needle), *Boerhaavia erecta* (erect spiderling), *Borreris laevis* (purple-leaved button weed), *Cenchrus brownii* (Brown's burgrass), *Commoiina diffusa* (climbing dayflower), *Cyperus diffuses (*Dwarf Umbrella Grass*), Digitaria sanguinalis (hairy crabgrass), Echinochloa coIonum* (Jungle rice), *Eleusine indica* (wire grass), *Euphorbia hirta (*asthma weed), *Fimbrisilys annua* (annual fimbry), *Galinsoga ciliata (*hairy galingosa*), Ipomoea spp (*morning glory*), Ischaemum rugosum (*ribbed muriana grass*)*, *Jussiaea linifolia, Kallstroemia maxima (*big caltrop*), Oryza sativa* (*Asian rice*), Portulaca oleracea (*common purslane*), Physalis angulata (*cutleaf groundcherry*), Rottboellia exaltata (*itch grass*), Tradescantia cumanensis* (*spiderwort*).*

Perennial weeds*:* Apply from 4 to 6 litres of GL Y-41 SL per hectare to control the following species:
Andropogon bicomis (West Indian foxtail), *Axonopus micay* (pasto micael), *Brachiaria mutica* (para grass), *Cynodon dactylon (*bermudagrass*), Cyperus spp (*papyrus*), Cyperus rotundus* (nutgrass), *Imperata cilindrica* (cogongrass), *Panicum maximum* (Embu guinea grass), *Paspalum*

*conjugatum (*hilograss*), Paspalum fasciculatum* (Mexican crown grass), *Paspalum virgatum* (talquezal)*, Paspalum paniculatum* (arrocillo) Pennisetum purpureum (elephant grass), *Pennisetum clandestinum,* (Kikuyograss), *Sorghumhalepense* (Johnsongrass),

Herbaceous semi-woody weeds such as Croton leptostachyus (empidonax), globules of Croton (myrtle), edible Randia (cruceto), Myrcia acuminata (smooth myrtle), canescent Cordia (sharpened foliage), Acacia farnesiana (pela, corona de Cristo, aromo), among other difficult to control. Knowing that the ligneous brushes and trees do not grow in the form of ordered plants occupying constant areas, we recommend a solution of 6 % (12 liters of GLY-41 SL per hectare, applying 27 cc of herbicide solution per plant for the control of plants woody shrubs and trees of waxy cuticle. For shrubby weeds plants with leaf area less waxed, the recommendation is a solution of the herbicide from 4% to 5% (8-10 litres of GLY-41 SL) per hectare, applying 22.5 cc per plant.

TECHNIQUES AND EQUIPMENT FOR IMPLEMENTATION:

Sites for implementation: You can use this product, as recommended for:

- Control of annual herbaceous weeds and undesirable perennial and perennial weeds in non cultivated lands,
- Control of semi-ligneous shrubs and small trees
- • For burning help, to develop and maintain burning limit, fire perimeters and "black" lines,
- • Along the roads and easements of power lines
- • Around industrial and parking lots, buildings, fences, etc

Implementation techniques: Always use this product to the higher dose per hectare, within the range recommended, when the growth of weeds is large or dense, or if the weeds are growing up in an area without disturbing

The control can be reduced when addressing the weeds in terms of stress and little growth as in drought, damage caused by disease or insects. They can also detract the results of control when treated weeds are covered by a layer of dust. When they have been lopped or cut, the weeds must be expected to grow back prior to treat them. For best results, the implementation should be uniform and complete. It is not necessary to spray the foliage of weeds until the solution drains. It may be necessary to repeat the treatments to control weed that regrow from the roots or runners or when new weeds germinate by seed below the surface of the soil. You can repeat the treatments up to an annual maximum download of 27.7 litres of this product per hectare. You can use the product of 10 to 12 L/has for best results t control perennial weeds, semiligneous shrubs and trees of difficult control, when the plants grow in poor conditions, or when the infestation is dense. Do not apply this product through an irrigation system. THE HERBICIDE SOLUTION WITH WELL MAINTAINED AND CALIBRATED EQUIPMENTS, CAPABLE OF SPRAYING THE DOSES IN DESIRED VOLUMES

This product can be applied using the following equipments:

Implementation with land equipments: Systems with or without boom and other

equipment for the implementation on the ground.

To control annual weeds or perennial with equipment for the implementation on the ground, use the recommended doses per hectare for this product in volumes of 30 to 350 litres of solution. As it increases the population density of the weeds, the volume of implementation must be increased within the range recommended to obtain full coverage with the recommended dose per hectare. Select carefully the nozzle to prevent that the application is too thin and causes drift. For better results in terrestrial application use flat spray nozzle.

Hand-held or high-volume spray equipment. Knapsack and backpack sprayers, pump –up pressure sprayers, handguns, handwands, mistblowers, lances or other hand-held or motorized spray equipment used to direct the spray onto weed foliage.

Apply the spray solution onto vegetation foliage to be controlled. For applications made on a spray-to-wet basis, spray coverage should be uniform and complete. Do not spray to the point of runoff. Use coarse sprays only. Prepare the desired volume of the spray solution by mixing the amount of this product with the volume water, as shown in the following table:

Desired	Quantity of GLY-41 herbicide					
volume	½ %	1%	1½ %	2%	5%	10%
4 L	20 cc	40 cc	60 cc	80 cc	200 cc	400 cc
20 L	100 cc	200 cc	300 cc	400 cc	1 L	2 L
200 L	1 L	2 L	3 L	4 L	10 L	20 L

When using backpack sprayers, it is suggested to mix the recommended quantity of this product with the water volume in a big container separately. Then pour the spray solution into the tank of the spray pump

Equipment for aerial – fixed wing and helicopter

Use the recommended dose of herbicide in 20 to 140 litres of water volume per hectare, unless otherwise specified on the label. Refer to the recommended volumes, application dose, and additional instructions in the individual sections of use area in the label according to the type of mixture.

Avoid direct application to any body of water. AVOID DRIFT – DO NOT APPLY DURING INVERSION CONDITIONS, WHEN WINDS ARE GUSTY, OR UNDER ANY OTHER CONDITION WHICH FAVORS DRIFT. DRIFT MAY CAUSE DAMAGE TO ANY VEGETATION CONTACTED TO WHICH TREATMENT IS NOT INTENDED. TO PREVENT INJURY TO ADJACENT DESIRABLE VEGETATION, APPROPRIATE BUFFER ZONES SHOULD BE MAINTAINED.

Coarse sprays are less likely to drift; therefore, do not use nozzles or nozzles configurations which dispense spray as fine spray droplets. Do not angle nozzles forward into the airstream and do not increase spray volume by increasing nozzle pressure. Drift control additives may be used. When a drift control additive is used, read and carefully observe the cautionary statements and all other information appearing on the additive label. Ensure uniform application. To avoid streaked, uneven or overlapped application use appropriate marking devices. Thoroughly wash aircraft, especially landing gear, after each day of spraying to remove residues of this product accumulated during spraying or flap spills. PROLONGED EXPOSURE OF THIS PRODUCT TO UNCOATED STEEL SURFACES MAY RESULT IN CORROSION AND POSSIBLE FAILURE OF THE PART. LANDING GEAR ARE MOST SUSCEPTIBLE. The maintenance of an organic coating (paint) which meets aerospace specifications ML-C- 38413 may prevent corrosion.

LIMITED WARRANTY AND LIABILITY:

The owner of the Registration ensures that this product meets the label chemical description and that is reasonably designed for specific purposes, when used according to these instructions and under the conditions described for implementing. DO NOT OFFER ANY OTHER EXPRESS OR IMPLIED GUARANTEE AS TO THE SUITABILITY FOR A PARTICULAR PURPOSE OR ITS MERCHANDISING. This warranty is also subject to the conditions and restrictions here stipulated. The buyer and users must notify opportunely this Company any complaint, either based on contract, negligence, strict obligation, injury or otherwise. The buyer and all users are responsible for the loss or damage by use or handling, resulting from conditions outside the control of the Company, including but not limited and incompatibility with products other than the indicated on the label, implementation or contact with desirable vegetation, unusual climate conditions, other than the conditions that are considered normal for the site and during the period of the application, as well as weather conditions other than those specified in the label and other implementation than the explicitly specified in the label. This company does not guarantee any product reformulated or re-packaged from this product, except in accordance with the requirements of this Company and express permission in writing, granted by this Company.

THE WAY OF COMPENSATE THE USER OR THE BUYER DAMAGE AND THE LIABILITY LIMIT OF THIS COMPANY OR ANY OTHER SELLER IN REGARD TO ANY AND ALL THE LOSSES, INJURIES OR DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT (INCLUDING CLAIMS BASED ON CONTRACT, NEGLIGENCE, STRICT OBLIGATION, OTHER DAMAGE, OR OTHERWISE), WILL BE THE PURCHASE PRICE PAID BY THE USER OR THE BUYER FOR THE RESPECTIVE QUANTITY OF THIS PRODUCT OR AS THIS COMPANY OPTION OR ANY OTHER SELLER, THE REPLACEMENT OF THE QUANTITY, IF NOT BOUGHT, THE REPLACEMENT OF THE QUANTITY IN ANY CASE SHALL THIS COMPANY WILL BE RESPONSIBLE OR ANY OTHER SELLER FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL PREJUDICE Once the product IS open and used, it is understood that the buyer and users have accepted the terms of this limited warranty and liability, which may not be altered by any verbal or written agreement. If these terms are unacceptable, immediately return the product without opening it.

SALES REGISTRATION 4294

SAFETY DATA SHEET Glyphosate Herbicide

Section 2: IDENTIFICATION OF CHEMICAL PRODUCT: Commercial name: Glyphosate Herbicide Use: Agricultural herbicide, Soluble Liquid Glyphosate N-(phosphonomethyl) glycine, Isopropylamine salt ……480.0 g/l Formulation agents ……. C.s.p. 1 L C.A.S No. 38-642-94-0
Section 3: RISKS IDENTIFICATION: Glyphosate herbicide is neither flammable nor explosive. It is irritating when in contact with eyes. Keep in a locked place and keep out of children's reach
Section 4: FIRST AID MEAURES: The person must be taken away from the contamination source and check that he/she is breathing. Artificial breathing must be provided if necessary to ensure that this vital function continues. People in charge of providing first aid must avoid direct contact with the very contaminated clothes or vomit of the victim. Impermeable gloves must be used to decontaminate the hair and skin of the victim. LOOK FOR MEDICAL ASSISTANCE AS SOON AS POSSIBLE If ingested If the person is conscious and aware, give her two glasses of milk or water. An unconscious person or with unusual movements must never be fed or induced to vomit. LOOK FOR MEDICAL ASSITANCE In case of skin contact: Wash the skin immediately with water and soap. If possible, remove the shoes and shoes of the patient. Contaminated clothes must be washed separately before wearing it again. In case of inhaling: Take the person to a fresh air area; if he/she is not breathing, provide artificial breathing and oxygen if necessary. LOOK FOR MEDICAL ASSITANCE In case of contact with the eyes: Keep eyelids open and wash with running water for at least 15 minutes. LOOK FOR MEDICAL ASSITANCE NOTE FOR THE PHYSICIAN Treatment must be based on symptoms. This product does not inhibit
cholinesterase. Atropine and oximes must not be used as an antidote. s open given
Section 5: MEASURES TO EXTINGUISH FIRES Glyphosate herbicide is neither flammable nor explosive. In case of fire, combustion of the product may produce toxic vapors such as carbon oxides and nitrogen. Extinguishing: Containers exposed to heat must be kept cool. It is extinguished with carbon dioxide, foam, dry chemical powder or water spray in limited quantities. Water used to extinguish it must not be allow to flow to superficial water nor must it be allowed to flow to sewage systems. Water must be collected and kept as special residues. Autonomous breathing protection equipment must be used.
Section 6: MEASURES IN CASE OF ACCIDENTAL SPILL Spills are contained with sand or earth dikes. It is pick up by suction or vacuuming or by absorption using dry sand or earth and the material collected is packed in a sealed container duly labeled. The contaminated sites must be decontaminated by washing it with industrial detergent and it is handled as special residues in burning devices or approved safety landfills. Recommended personal protection: See section 8

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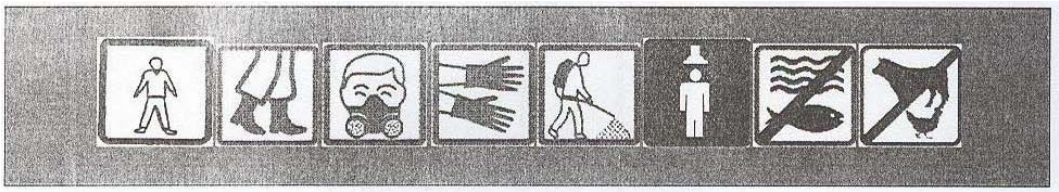

Section 7: HANDLING AND STORAGE: Handling: Eating, drinking or smoking not allowed during handling or application of this product. Was hands after being in contact with this product. Storage: Keep the product in original packaging and containers. No smoking in the place. Keep out of children and animals' reach. Stored in a ventilated place, away from food, drink, hay, or concentrated food for animals. Compatible materials for storage: Stainless steel, aluminum, fiber glass or plastic.
Section 8: EXPANSION CONTROLS AND PERSONAL PROTECTION: Chemical safety gloves and eye protection must be worn while handling. Occupational health and safety general rules must be observed.
Section 9 PHYSICAL-CHEMICAL PROPERTIES: State: Liquid Appearance and color: Amber viscous liquid, practically odorless Density: 1,17 g/mL pH: 4.99 (Solution at 1%)
Section 10: STABILITY AND REACTIVITY: Glyphosate herbicide is stable under normal storage and manipulation conditions. There is no probability of dangerous reaction in the original containers. It reacts with galvanized steel or soft steel without covering layer, producing hydrogen, a very flammable gas that may cause explosion.
Section 11: TOXICOLOGICAL INFORMATION: ACUTE TOXICITY: It is very unlikely that exposure to glyphosate herbicide poses risk of acute toxicity (LD50 Oral (rats): > 5.000 mg/Kg; LD50 Dermal (rats): > 5.000 mg/Kg. It may cause slight irritation on skin and from moderate to severe in the eyes. CHRONICLE TOXICITY: No chronicle effects on humans have been documented, attributable to chronicle exposure. Mutagenicity and carcinogenicity studies have resulted negative.
Section 12: ECOTOXICOLOGICAL INFORMATION: ECOTOXICITY:
It is not dangerous for aquatic organisms, nor is it toxic to birds. It must not be poured into or near channels, drains, nor water courses or reservoirs.
Section 13: CONSIDERATIONS ON PRODUCT DISPOSAL: Residues resulting from the use of this product cannot be chemically re-used and must be disposed of as special residues in adequate burning devices or approved safety landfills.

Section 14: INFORMATION ON TRANSPORT: It cannot be transported nor stored with food for people or concentrated food for animals, beverages, medicine, nor items for human use such as clothes, blankets or mattresses. Glyphosate herbicide is not classified as dangerous.
ISSUING DATE: August 2005

This information is applicable only to the purposes stated for the product. It complements the technical information on the label but does not substitute it in any matter. It is based on the best information available at the time of issuing; it does not imply insurance or warranty and it is provided on good faith basis.

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SECCION 1

LEA LA ETIQUETA ANTES DE USAR EL PRODUCTO
MANTENGA FUERA DEL ALCANCE DE LOS NIÑOS

PRECAUCIONES Y ADVERTENCIAS DE USO:

Las soluciones herbicidas de este producto se deben mezclar, guardar y aplicar usando solo recipientes de acero inoxidable, aluminio, fibra de vidrio o de acero revestido con plástico.

NO MEZCLE, GUARDE O APLIQUE ESTE PRODUCTO, O LAS SOLUCIONES HERBICIDAS DE ESTE PRODUCTO, EN RECIPIENTES O TANQUES DE APLICACIÓN DE ACERO GALVANIZADO O ACERO SIN REVESTIR (EXCEPTO ACERO INOXIDABLE). Este producto o las soluciones de este producto reaccionan con esa clase de recipientes produciendo gas hidrógeno, el cual puede formar una mezcla muy combustible. Esta mezcla de gas puede incendiarse o explotar causando lesiones personales si se inflama debido a una llama abierta, una chispa accidental, una chispa de soldadura, un cigarrillo encendido u otra fuente de ignición.

EVITE EL CONTACTO DEL HERBICIDA CON EL FOLLAJE, LOS TALLOS VERDES, LAS RAICES EXPUESTAS, O LOS FRUTOS DE LAS COSECHAS, LAS PLANTAS Y ÁRBOLES DESEABLES, PUESTO QUE SE PUEDEN DAÑAR CONSIDERABLEMENTE O DESTRUIRSE.

PRECAUCION:
CAUSA IRRITACION EN LOS OJOS. Evite el contacto con los ojos y con la ropa.

PRIMEROS AUXILIOS:

Llame a un centro de atención médica o a un médico para que aconseje el tratamiento		
SI ES EN LOS OJOS: - Mantenga abierto el ojo y lave con agua, despacio y suavemente, durante 15-20 minutos. - Después de los primeros 5 minutos retire los lentes de contacto, si los tiene y continúe lavando el ojo.		
NUMERO DE LA LINEA DE ATENCION DE EMERGENCIAS MEDICAS TOXICOLOGICAS		
Tenga a mano el envase del producto o la etiqueta cuando llame al centro de atención médica de emergencias toxicológicas o al médico, o cuando vaya a recibir el tratamiento.		
TELÉFONOS DE EMERGENCIAS 24 HORAS		
	En Bogotá:	Fuera de Bogotá:
CISPROQUIM:	288-6012	01 8000 916012

ANIMALES DOMESTICOS: Se considera que este producto es relativamente no tóxico para perros y otros animales domésticos; sin embargo, la ingestión de grandes cantidades de este producto, o de vegetación recién aplicada puede causar irritación gastrointestinal temporal (vómito, diarrea, cólico, etc.). Si se observan estos síntomas, administre al animal suficiente líquido para evitar la deshidratación. Llame al veterinario si los síntomas persisten durante más de 24 horas.

ALMACENAMIENTO Y DESECHOS:

Al almacenar o desechar el producto no contamina el agua, los alimentos, los concentrados para animales o las semillas. No lo guarde en la casa. No transporte ni almacene en vehículos o sitios donde guarde o transporte semillas o alimentos para consumo humano. Mantenga el envase tapado para evitar derrames y contaminación. DESTRUYA ESTE ENVASE DESPUES DE USAR ESTE

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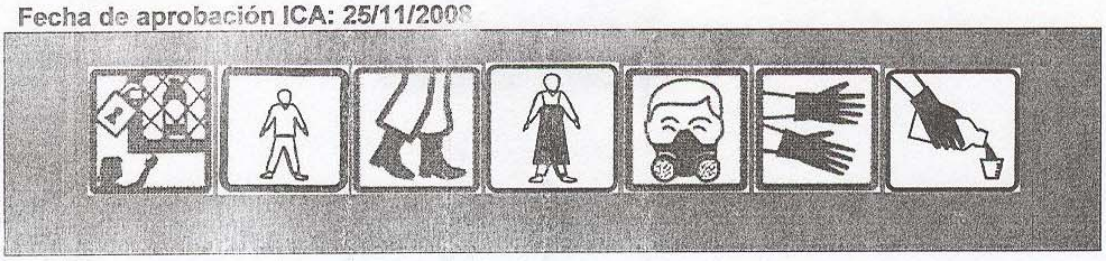
PRODUCTO. No se debe usar ningún envase que haya contenido herbicidas para guardar agua o alimento para el consumo humano o animal.

Fecha de aprobación ICA: 25/11/2008



SECCION 2

GLY-41 SL

Herbicida para aplicaciones terrestres y aéreas para remover vegetación indeseable en sitios no agrícolas

REGISTRO DE VENTA ICA No. 4294

COMPOSICION GARANTIZADA

INGREDIENTE ACTIVO:
* Glifosato, N-(fosfonometil) glicina, en forma de sal isopropilamina al.....41.0%

INGREDIENTES INERTES:.....59.0%
100.0%

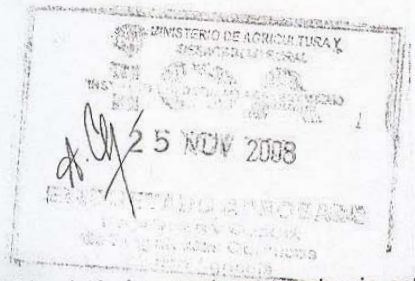
* Contiene 480 gramos por litro del ingrediente activo glifosato, en la forma de su sal isopropilamina. Equivalente a 356 gramos por litro del ácido glifosato.

DISTRIBUIDO POR:
C.A.C. Ltda. y Cía. S.C.A.
A.A. 50915.
Tel:(57-1) 288-6012 - 01 8000 916012
Bogotá, Colombia

CONTENIDO NETO:
Fecha de formulación:
Fecha de vencimiento:
Lote No.:

CATEGORIA TOXICOLOGICA IV
LIGERAMENTE TOXICO
PRECAUCION

Annex 28



SECCION 3

INFORMACION GENERAL:

Descripción del Producto: Este producto es un herbicida sistémico, post-emergente sin actividad residual en el suelo. Generalmente no selectivo, ofrece control de amplio espectro para muchas malezas anuales y perennes, arbustos y árboles. Se puede aplicar usando la mayor parte de los equipos usuales para el campo, después de diluirlo y mezclarlo muy bien con agua o con otros solventes, de acuerdo con las instrucciones de la etiqueta.

MEZCLA:

Limpie bien las piezas del equipo de aplicación después de usar este producto, enjuagando con bastante agua.

NOTA: LOS RESULTADOS NO SERAN LOS OPTIMOS SI SE USA AGUA QUE CONTENGA TIERRA, ESTE VISIBLEMENTE SUCIA O AGUA DE POZOS Y ZANJAS QUE NO SEA CLARA.

Mezcla con agua: Este producto se mezcla fácilmente con agua. Prepare la mezcla de este producto así: Llene el tanque de mezcla o del equipo de aplicación con la cantidad necesaria de agua. Agregue la cantidad recomendada de este producto y los aditivos cuando esté terminando el proceso de llenado y mezcle bien. Tenga cuidado para evitar que se haga sifón hacia la fuente de agua. Use dispositivos aprobados para evitar que se haga sifón. Durante la mezcla y aplicación de la solución puede hacerse espuma. Evite el uso de agitación mecánicos para evitar o minimizar la espuma, coloque las líneas de paso y de retorno en el fondo del tanque, y si es necesario, use un agente antiespumante o des-espumante aprobado.

Surfactantes: Puede usar los surfactantes de tipo no-iónicos para mejorar el humedecimiento del follaje. La adición de surfactantes puede mejorar la homogeneidad del control de malezas pero no se deben reducir las dosis de aplicación de este producto cuando se agregan surfactantes. Lea y observe las dosis del surfactante, las precauciones y toda la información que aparece en la etiqueta del fabricante del surfactante.

MALEZAS QUE CONTROLA:

Malezas anuales: Aplique de 2 a 3 litros de GLY-41 SL por hectárea para controlar las siguientes especies:
Amaranthus spp (bledos), ***Bidens pilosa*** (masiquía), ***Boerhaavia erecta*** (golondrina), ***Borreria laevis*** (botoncillo), ***Cenchrus brownii*** (cadillo), ***Commelina diffusa*** (siempreviva), ***Cyperus diffusus*** (cortadera), ***Digitaria sanguinalis*** (guardarrocío), ***Echinochloa colonum*** (liendre de puerco), ***Eleusine indica*** (pata de gallina), ***Euphorbia hirta*** (tripa de pollo), ***Fimbristylis annua*** (arrocillo), ***Galinsoga ciliata*** (guasca), ***Ipomoea spp*** (batatilla), ***Ischaemum rugosum*** (falsa caminadora), ***Jussiaea linifolia*** (clavito), ***Kallstroemia maxima*** (atarraya), ***Oryza sativa**** (arroz rojo), ***Portulaca oleracea*** (verdolaga), ***Physalis angulata*** (uchuva), ***Rottboellia exaltata*** (caminadora), ***Tradescantia cumanensis**** (siempreviva morada).

Malezas perennes: Aplique de 4 a 6 litros de GLY-41 SL por hectárea para controlar las siguientes especies:
Andropogon bicornis (rabo de zorro), ***Axonopus micay*** (pasto micay), ***Brachiaria mutica*** (pasto pará), ***Cynodon dactylon*** (pasto argentina), ***Cyperus spp*** (cortaderas), ***Cyperus rotundus*** (coquito), ***Imperata cilindrica*** (guayacana), ***Panicum maximum*** (pasto guinea), ***Paspalum conjugatum*** (pasto horqueta), ***Paspalum fasciculatum*** (gramalote), ***Paspalum virgatum*** (pajón o maciega), ***Paspalum***

paniculatum (pajón), ***Pennisetum purpureum*** (pasto elefante), ***Pennisetum clandestinum*** (pasto kikuyo), ***Sorghum halepense*** (pasto Johnson), ***Typha angustifolia*** (enea o junco).

Malezas herbáceas y semileñosas como ***Croton leptostachys*** (mosquero), ***Croton globulus*** (arrayán), ***Randia sculenta*** (cruceto), ***Myrcia acuminata*** (arrayán liso), ***Cordia canescens*** (rasgarropa), ***Acacia farnesiana*** (pelá, corona de Cristo, aromo), entre otras de difícil control. Sabiendo que los arbustos leñosos y los árboles no crecen en forma de plantación ordenada ocupando áreas constantes, se recomienda una solución al 6% (12 litros de GLY-41 SL por hectárea, aplicando 27 cc de solución herbicida por planta para el control de plantas arbustivas leñosas y árboles de cutícula cerosa. Para plantas malezas arbustivas con superficie foliar menos cerosa se recomienda una solución del herbicida del 4% al 5% (8 a 10 litros de GLY-41 SL por hectárea, aplicando 22.5 cc por planta.

EQUIPO Y TECNICAS PARA LA APLICACIÓN:

Sitios de aplicación: Se puede usar este producto, en la forma recomendada, para:

- Control de malezas herbáceas anuales y perennes indeseables y malezas perennes en terrenos no cultivados.
- Control de arbustos semileñosos y árboles pequeños.
- Como ayuda para quemas, para establecer y mantener límites de quema, perímetros de fuego y líneas "negras".
- A lo largo de las carreteras y de las servidumbres de tendidos eléctricos.
- Alrededor de lotes industriales, estacionamientos, edificios, cercas, etc.

Técnicas de aplicación: Use siempre este producto a la dosis más alta por hectárea, dentro de la gama recomendada, cuando el crecimiento de malezas es grande o denso, o si las malezas crecen en un área sin disturbar.

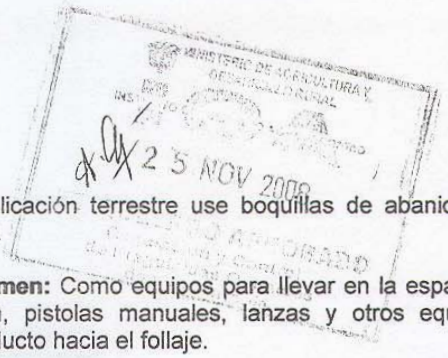
El control se puede ver reducido cuando se tratan las malezas en condiciones de estrés y de poco crecimiento como en sequía, daños causados por enfermedades o insectos. También pueden desmejorar los resultados de control cuando se tratan malezas cubiertas por una capa de polvo. Cuando se han podado o cortado las malezas, se debe esperar que vuelvan a crecer antes de tratarlas. Para obtener los mejores resultados, la aplicación debe ser uniforme y completa. No es necesario rociar el follaje de las malezas hasta que la solución escurra. Puede ser necesario repetir los tratamientos para controlar malezas que rebrotan por las raíces o estolones y nuevas que germinan por semilla debajo de la superficie del suelo. Se pueden repetir los tratamientos hasta por una descarga máxima anual de 27.7 litros de este producto por hectárea. Para controlar malezas perennes y arbustos semileñosos y árboles de difícil control, cuando las plantas crecen en malas condiciones, o cuando la infestación es densa, se puede usar el producto de 10 a 12 L/ha para mejores resultados. No aplique este producto a través de un sistema de irrigación. APLIQUE LA SOLUCION HERBICIDA CON EQUIPOS BIEN MANTENIDOS Y CALIBRADOS, CAPACES DE ROCIAR LAS DOSIS EN LOS VOLUMENES DESEADOS.

Este producto se puede aplicar usando los siguientes equipos:

Aplicación con equipos terrestres: Sistemas con o sin aguilón y otros equipos de aplicación en tierra.

Para controlar malezas anuales o perennes con equipos de aplicación terrestre, use las dosis recomendadas por hectárea para este producto en volúmenes de 30 a 350 litros de solución. A medida que aumenta la densidad de población de las malezas, se debe aumentar el volumen de aplicación dentro de la gama recomendada para obtener total cobertura con la dosis recomendada por hectárea. Seleccione cuidadosamente la boquilla para evitar que la aplicación sea demasiado fina

Annex 28



y cause deriva. Para mejores resultados de aplicación terrestre use boquillas de abanico plano. Verifique la distribución de las gotas de aplicación.

Equipos de aplicación manual o de gran volumen: Como equipos para llevar en la espalda y de cargar en tracción animal, bombas de presión, pistolas manuales, lanzas y otros equipos de aplicación manual o motorizado para dirigir el producto hacia el follaje.

Aplique la solución herbicida al follaje de la vegetación que se quiere controlar. Cuando aplique humedeciendo la planta, el rociado debe ser uniforme y completo. No es necesario rociar hasta que escurra la solución herbicida. Use solo boquillas de gota gruesa. Prepare el volumen deseado de la solución mezclando la cantidad de este producto con el volumen de agua, como se indica en la siguiente tabla:

Solución para aplicación:

Volumen deseado	Cantidad de herbicida GLY-41					
	½%	1%	1½%	2%	5%	10%
4 L	20 cc	40 cc	60 cc	80 cc	200 cc	400 cc
20 L	100 cc	200 cc	300 cc	400 cc	1 L	2 L
200 L	1 L	2 L	3 L	4 L	10 L	20 L

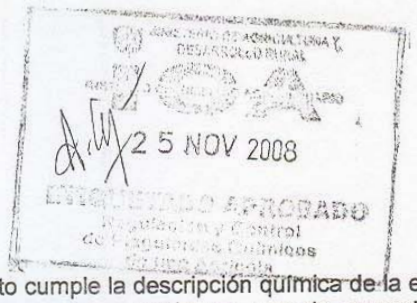
Cuando usen bombas de espalda, se sugiere mezclar la cantidad recomendada de este producto con el volumen de agua en un recipiente grande, aparte. Luego vacíe la solución dentro del tanque de la bomba de aplicación.

Equipos para aplicación aérea – ala fija y helicóptero

Use las dosis recomendadas del herbicida en 20 a 140 litros de volumen de agua por hectárea, excepto si la etiqueta indica otra cosa. Vea los volúmenes recomendados, las dosis de aplicación y las instrucciones adicionales en las secciones individuales de área de uso de la etiqueta según el tipo de maleza.

Evite aplicar directamente sobre cualquier cuerpo de agua. EVITE LA DERIVA. NO APLIQUE EN CONDICIONES DE INVERSION TERMICA, CUANDO HAY RAFAGAS DE VIENTO, O EN CUALQUIER OTRA CONDICION QUE FAVOREZCA LA DERIVA. EL CONTACTO DE LA DERIVA PUEDE DAÑAR CUALQUIER VEGETACION QUE NO SE PRETENDA TRATAR. PARA EVITAR QUE SE DAÑE LA VEGETACION ADYACENTE SE RECOMIENDA DEJAR ZONAS DE AMORTIZACION ADECUADAS.

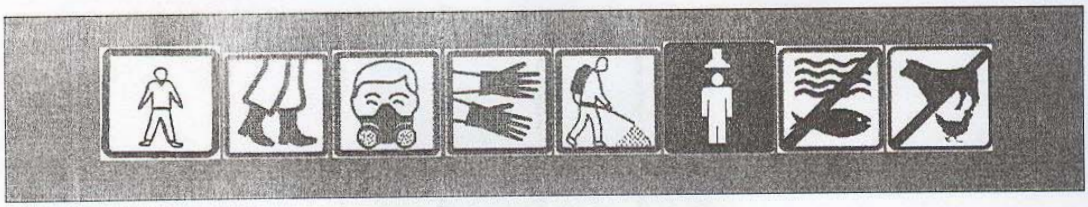
Las boquillas de gota gruesa tienen menos tendencia a derivar, por lo tanto no use boquillas o configuraciones de boquilla que dispersen la solución en forma de gotas muy pequeñas. No coloque el ángulo de las boquillas de frente al flujo de aire y no aumente el volumen de aplicación aumenta la presión de la aplicación. Puede usar aditivos para controlar la deriva. Cuando se use un aditivo de control de deriva, lea y observe cuidadosamente las precauciones y otra información del fabricante en la etiqueta del aditivo. Verifique que la aplicación sea uniforme. Para evitar aplicaciones por franjas, desiguales o sobrepuestas, use los dispositivos adecuados para marcar la zona de aplicación por vía aérea. Lave muy bien la aeronave después de cada aplicación, especialmente el tren de aterrizaje para retirar los residuos del producto acumulados durante la aplicación o por derrames durante el llenado. LAS SUPERFICIES DE ACERO SIN REVESTIMIENTO, EXPUESTAS DURANTE UN TIEMPO PROLONGADO A ESTE PRODUCTO, SE PUEDEN CORROER Y LA PIEZA PUEDE FALLAR. EL TREN DE ATERRIZAJE ES EL MÁS SUSCEPTIBLE. Un recubrimiento (pintura) orgánica, el cual cumpla las especificaciones aeroespaciales ML-C38413, puede evitar la corrosión.



GARANTIA Y RESPONSABILIDAD LIMITADA:

El Titular del Registro garantiza que este producto cumple la descripción química de la etiqueta y que es razonablemente idóneo para los fines específicos, cuando se usa de acuerdo con estas instrucciones y en las condiciones de aplicación descritas. NO SE OFRECE NINGUNA OTRA GARANTIA EXPRESA O IMPLICITA EN CUANTO A LA IDONEIDAD PARA UN FIN EN PARTICULAR O SU COMERCIALIZACION. Esta garantía también está sometida a las condiciones y limitaciones aquí estipuladas. El comprador y los usuarios deberán notificar oportunamente a esta Compañía cualquier reclamación, bien sea basada en contrato, negligencia, obligación estricta, perjuicio o de otra forma. El comprador y todos los usuarios son responsables de la pérdida o perjuicios por uso o manejo, resultante de condiciones fuera del control de la Compañía, incluyendo pero sin limitarse a incompatibilidad con productos distintos de los indicados en la etiqueta, aplicación o contacto con vegetación deseable, condiciones inusuales del clima, distintas de las condiciones que se consideran normales para el sitio y durante el período de la aplicación, así como condiciones del clima distintas de las especificadas en la etiqueta y aplicaciones de manera distinta a las explícitamente especificadas en la etiqueta. Esta Compañía no garantiza ningún producto reformulado o re-empacado a partir de este producto, excepto de acuerdo con los requisitos de esta Compañía y permiso expreso, por escrito, otorgado por esta Compañía.

LA FORMA DE RESARCIR EL DAÑO DEL USUARIO O DEL COMPRADOR Y EL LIMITE DE RESPONSABILIDAD DE ESTA COMPAÑÍA O DE CUALQUIER OTRO VENDEDOR EN CUANTO A CUALESQUIERA Y TODAS LAS PERDIDAS, LESIONES O PERJUICIOS QUE RESULTEN DEL USO O MANEJO DE ESTE PRODUCTO (INCLUYENDO RECLAMACIONES BASADAS EN CONTRATO, NEGLIGENCIA, OBLIGACION ESTRICTA, OTROS PERJUICIOS, O DE OTRA FORMA), SERA EL PRECIO DE COMPRA PAGADO POR EL USUARIO O EL COMPRADOR POR LA RESPECTIVA CANTIDAD DE ESTE PRODUCTO O A OPCION DE ESTA COMPAÑÍA O DE CUALQUIER OTRO VENDEDOR, EL REEMPLAZO DE TAL CANTIDAD, SI NO SE COMPRÓ, EL REEMPLAZO DE TAL CANTIDAD EN NINGUN CASO SERA RESPONSABLE ESTA COMPAÑÍA O CUALQUIER OTRO VENDEDOR POR CUALQUIER PERJUICIO INCIDENTAL, CONSECUENCIAL O ESPECIAL. Una vez abierto y utilizado el producto, se entiende que el comprador y los usuarios han aceptado los términos de esta GARANTIA Y RESPONSABILIDAD LIMITADA, los cuales no se podrán modificar mediante ningún acuerdo verbal o escrito. Si estos términos son inaceptables, devuelva inmediatamente el producto sin abrirlo.



C.A.C. Ltda.
A.A. 56014

GLY 41

REGISTRO DE VENT
4294

HOJA DE SEGURIDAD Herbicida Glifosato

Sección 2: IDENTIFICACIÓN DEL PRODUCTO QUÍMICO:

Nombre Comercial: Herbicida Glifosato

Uso: Herbicida Agrícola, Líquido Soluble

Glifosato N-(fosfonometil) glicina, Sal Isopropilamina..... 480 g/L C.A.S. No.: 38641-94-0
Agentes de Formulación..... c.s.p. 1 L

Sección 3: IDENTIFICACIÓN DE RIESGOS:

Herbicida Glifosato no es inflamable, ni explosivo. Es IRRITANTE al contacto con los ojos. Consérvese bajo llave y manténgase fuera del alcance de los niños.

Sección 4: MEDIDAS DE PRIMEROS AUXILIOS:

Se debe retirar a la persona de la fuente de contaminación y verificar que esté respirando. Se debe administrar respiración artificial si es necesario para asegurar la continuidad de ésta función vital.
Las personas encargadas de prestar auxilio deben evitar el contacto directo con ropas muy contaminadas o vómito de la víctima, se deben emplear guantes impermeables para descontaminar el cabello y la piel. SOLICITE ATENCIÓN MÉDICA LO MÁS PRONTO POSIBLE.

Si se ha tragado:
Si la persona está consciente y alerta, se le suministran dos vasos de agua o leche. Nunca se deben dar alimentos ni hacer vomitar a una persona inconsciente o que presente movimientos anormales. SOLICITE ATENCIÓN MÉDICA.

En caso de contacto con la piel:
Lave inmediatamente la piel con agua y jabón, si es posible, retirar los zapatos y la ropa del paciente. Se debe lavar la ropa contaminada sin mezclarla con otras prendas antes de usarlas de nuevo.

En caso de inhalación:
Se lleva a la persona al aire fresco, si no está respirando, se le da respiración artificial y se administra oxigeno si es necesario. SOLICITE ATENCIÓN MÉDICA.

En caso de contacto con los ojos:
Se mantienen los párpados abiertos y se enjuagan con agua corriente durante no menos de 15 minutos. SOLICITE ATENCIÓN MÉDICA.

NOTA PARA EL MÉDICO:
El tratamiento debe ser sintomático. Este producto no es inhibidor de colinesterasa.
La antropina y las oximas no deben ser utilizadas como antidoto.

Sección 5: MEDIDAS PARA EXTINGUIR INCENDIOS:

Herbicida Glifosato no es inflamable ni explosivo. En caso de incendio, la combustión del producto puede producir vapores tóxicos como óxidos de carbono y nitrógeno.
Extinción: Se deben mantener fríos los contenedores expuestos al calor. Se extingue con dióxido de carbono, espuma, polvo químico seco o aspersión de agua en cantidades limitadas. No se debe permitir que el agua empleada para la extinción corra libremente a cauces superficiales, ni se debe dejar que llegue a los sistemas de alcantarillado. El agua se debe recoger y manejar como un residuo especial. Se debe usar protección con equipo respiratorio autónomo.

Sección 6: MEDIDAS EN CASO DE ESCAPE ACCIDENTAL:

Se contiene el derrame con diques de arena o tierra. Se recoge por succión o aspiración, o por absorción empleando arena seca o tierra y se empaca el material recogido en un recipiente hermético debidamente rotulado.
El sitio contaminado se debe descontaminar lavando con un detergente industrial y se maneja como residuo especial en incineradores o rellenos de seguridad aprobados.
Materiales de los recipientes: ver sección 7.
Protección personal recomendada: ver sección 8.

Sección 7: MANIPULACIÓN Y ALMACENAMIENTO:

Manipulación: No se debe comer, beber ni fumar durante la manipulación o aplicación de este producto. Lavarse las manos después de tener contacto con el producto.
Almacenamiento: Se debe mantener el producto en el empaque y envases originales. No se debe fumar en el sitio. Manténgase fuera del alcance de los niños y animales. Almacénese en sitio ventilado, lejos de alimentos, bebidas, forrajes y concentrados para animales.
Materiales compatibles para almacenamiento: acero inoxidable, aluminio, fibra de vidrio o plástico.

Sección 8: CONTROLES DE EXPOSICIÓN Y PROTECCIÓN PERSONAL:

Se deben emplear guantes de seguridad de uso químico y protección ocular durante la manipulación. Se deben cumplir las normas generales de seguridad y salud ocupacional.

Sección 9: PROPIEDADES FISICO-QUÍMICAS:

Estado: Líquido
Apariencia y Olor: Líquido ámbar viscoso prácticamente sin olor
Densidad: 1.17g/mL pH: 4.99 (Solución al 1 %)

Sección 10: ESTABILIDAD Y REACTIVIDAD:

Herbicida Glifosato es estable bajo condiciones normales de almacenamiento y manipulación. No hay probabilidad de reacciones peligrosas, en los contenedores originales. Reacciona con acero galvanizado o acero blando sin recubrimiento produciendo hidrógeno, un gas muy inflamable que puede causar explosión.

Sección 11: INFORMACIÓN TOXICOLOGICA:

TOXICIDAD AGUDA:
Es poco probable que la exposición a **Herbicida Glifosato** represente peligro de toxicidad aguda (DL_{50} Oral (Ratas): >5.000 mg/Kg; DL_{50} Dérmica (Ratas): >5.000 mg/Kg). Puede causar leve irritación de la piel y moderada a severa de los ojos.

TOXICIDAD CRÓNICA:
No se han documentado efectos crónicos en humanos, atribuibles a la exposición crónica; los estudios de mutagenicidad y carcinogenicidad han resultado negativos.

Sección 12: INFORMACIÓN ECOTOXICOLOGICA:

ECOTOXICIDAD
No es peligroso para organismos acuáticos, ni tóxico para aves. No debe verterse en o cerca de canales, desagües ni corrientes o reservorios de agua.

Sección 13: CONSIDERACIONES SOBRE LA DISPOSICIÓN DEL PRODUCTO:

Los residuos como resultado del uso de este producto no pueden ser químicamente reutilizados y deben ser dispuestos como residuo especial en incineradores adecuados o en rellenos de seguridad aprobados.

Sección 14: INFORMACIÓN SOBRE TRANSPORTE:

No se debe transportar ni almacenar con alimentos para personas o concentrados para animales, bebidas, medicamentos, ni con elementos destinados al uso humano como ropas, frazadas o colchones.
Herbicida Glifosato no es clasificado como peligroso.

FECHA DE EMISIÓN: agosto de 2005

Esta información es aplicable solamente a los propósitos señalados para el producto, complementa la información técnica de la etiqueta pero no la sustituye en forma alguna. Está basada en la mejor información disponible a la fecha de su expedición, no implica seguro o garantía alguna, y se ofrece de buena fe.

Annex 28

Annex 29

Organization of Indigenous Nations of Colombia (ONIC), *Evaluation of the Fumigations in Colombia: Destruction of Rural Areas from Plan Colombia* (Aug. 2002)

Annex 29

ORGANIZATION OF INDIGENOUS NATIONS OF COLOMBIA- ONIC

PROCESS OF AFRO-COLOMBIAN COMMUNITIES - CN

NATIONAL UNION FEDERATION OF AGRICULTURE- FENSUAGO – CUT

EVALUATION OF THE FUMIGATIONS IN COLOMBIA

DESTRUCTION OF RURAL AREAS AS A RESULT OF PLAN COLOMBIA

AUGUST 2002

who do not plant illicit crops, whose crime is being located next to others who do plant them. This situation is described in numerous complaints reviewed.

- Many farmers can abstain from filing a complaint because they believe that it is a waste of time if no one believes them. In fact, both the state and the antinarcotics police have considered complaints for abuses and destruction caused by aerial fumigation to be false or rigged.

- The groups who have resorted to armed confrontation can cause displacement of people or failure to submit their complaints.

- The antinarcotics police's offensive attitude with the Ombudsmen, in asserting their unreliability, because they are relatives of those who plant coca, can induce ombudsmen to refuse to receive complaints.

- Many farmers may abstain from filing complaints due to the inoperability of the system, given that no compensation has been awarded.

The volume of parties harmed could be 100 times greater or more than what is detected in the analyzed sample of complaints, since only a fraction of all complaints located at the Ombudsmen's Office were analyzed, and it was calculated that not more than 10% of the complaints filed with various institutions in the whole country reach this particular office. As has been noted above, many of those affected do not file complaints.

3.3 RESULTS FROM THE REVIEW OF COMPLAINTS

3.3.2 Types of complaints, their origin and destination

A sample of 1,852 complaints was reviewed, presented in the departments of Boyacá, Meta, Guaviare, Caquetá and Putumayo, between 1997 and January 2002, through the regional ombudsmen, police inspectors and Municipal Ombudsmen. We found only one complaint presented at the antinarcotics police, because this institution manages its files independently from the Ombudsman, but it is known that many complaints lie there, which, according to police investigations, are almost never well-founded.

Ninety-five percent of the complaints reviewed correspond to 10 municipalities. These statistics are presented in the following tables, subject to the clarification that only a fraction of the Ombudsman's files were reviewed, which can represent a small percentage of the actual files

on a national level. Some ombudsmen calculate that the complaints that reach the Ombudsman's office represent only 10% of all complaints filed

[PAGE 3-26]

on a national level. And the total complaints presented only cover an estimated 10% of the cases that actually occur.

Quantity of complaints in the sample reviewed, per year

Year	Number of complaints reviewed
1997	64
1998	69
1999	153
2000	238
2001	1,154
2002	174
Total complaints reviewed	1,852

Institutions in which complaints were filed

Institution[1]	Number of complaints filed
Municipal Ombudsmen	944
Municipal police inspectors	904
Regional Ombudsmen	3
Antinarcotics police	1
Total complaints reviewed	1,852

Departments in which these complaints were filed

Department[2]	Number of complaints filed
Putumayo	1,254
Caquetá	503
Guaviare	90
Meta	4
Boyacá	1[3]
Total complaints reviewed	1,852

[1] The Antinarcotics police must be crammed by complaints. Complaints are also filed with the townships, offices of Umata, Ministries of Health, Agriculture and Environment, Colombian Agricultural Institute – ICA, General Comptroller of the Republic and District Attorney, but there is no state office that currently exists that collects or systematizes them.
[2] The Departments of Cauca, Vichada, Norte de Santander, Tolima and others do not appear, because not all the Ombudsman's files were reviewed, but it was confirmed that they exist at this entity.
[3] Collective, filed in 1997 by 111 signatories.

We can see that the greatest portion of complaints come from only 3 departments, therefore demonstrating that the damages are undervalued, since fumigations are being conducted in at least 12 departments and there is no reason to presume that

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the police acts in a different manner in certain departments as opposed to others. Additionally, the complaints are concentrated in only 10 out of the 260 municipalities with illicit crop presence.

Municipalities with the largest number of complaints

Municipality	Department	Complaints presented	Percentage
Valle del Guamuez	Putumayo	909	49
Curillo	Caquetá	358	19
Puerto Asís	Putumayo	149	8
San Miguel	Putumayo	100	5
Albania	Caquetá	75	4
Puerto Guzmán	Putumayo	54	3
Calamar	Guaviare	51	3
El retorno	Guaviare	36	2
Solano	Caquetá	26	1
La Hormiga	Putumayo	20	1
10 Municipalities	3 Departments	1,778	95%

3.3.3 Collective complaint proceedings

Fifteen collective complaints were detected in the analyzed sampling of complaints. Close to half of them corresponded to 1997 and 1999 in the departments of Caquetá and Guaviare, and the other half between 2000 and January 2001 in the department of Putumayo. 36% of these complaints arise from Indigenous Reservations, in which aggressions against people's projects such as Coreguaje, Cofanes and Ingas were recorded.

Some of these collective complaints were supported by hundreds of signatures; one of them was filed by 8 physicians who confirmed the serious impacts and projects affected in the reservation Cofán de Santa Rosa in Putumayo. In addition to the damages to thousands of hectares among food crops, pastures, weeds and virgin forest areas, intoxication symptoms were reported such as diarrhea, vomiting, fever, headache and coughing. In Cumaribo, Vichada, 942 peasants complained and reported the deaths of two drowned persons who were trying to ford the river, because 130 houses, in addition to being fumigated, were gunned down.

The collective complaints are a diffuse technique, but an important one to understanding the magnitude of the damages caused by the fumigations. The fumigation that covers ancestral territories is, by definition, a process close to genocide, given that certain communities have such a limited population that their dispersion is the probable cause of their disappearance as an ethnic group.

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"At the end of the month of July and the start of the month of August of the present year, the Indigenous Reservation Inga de Aponte was the scene of the most intense indiscriminate fumigations, there was no mercy for the sources of water, flora, fauna, food crops, including the fields financed by the Alternative Development Plan PLANTE such as: potato, coffee, among others; additionally, pastures were fumigated as well as other crops that had been planted by natives with their very efforts, where they had invested the entirety of their few possessions in the hopes of obtaining their harvests and acquiring the necessities for subsistence once their products had been sold. All their efforts have become illusory because they have not been able to obtain anything, on the contrary, more hunger and misery is being encouraged, leading to the imminent extinction of the Ingas de Aponte as an ethnic group. Our rights to life, tranquility, and health, are being abruptly attacked by the fumigations, each time that human beings, such as children, who have been most affected, show skin rashes, subsequent fever as a result of said fumigations. And this occurs now that it is the beginning; we do not know whether more cases of disease will surface as a result of the spreading of chemicals."

Libardo Chaso Jansasoy, indigenous governor.[4]

Approximately eight days ago, the corn crops on my farm as well as the grass in general started to yellow without knowing the reasons for it doing so. ASKED: Do you know or have you heard who has caused or who are responsible for what you say? ANSWER: Nothing is known about this, we only hear rumors from villagers about an aircraft that passes at night, but no one knows who it belongs to. I ask that you find out who is causing these damages, so that it does not affect my neighbors, so that the soil is not sterilized and the waters are not polluted, because they are used by everyone.

Guillermo Gines Ilvira[5]

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[4] Letter signed by Libardo Chassoy Jansasoy, indigenous governor and a series of authorities from the Indigenous reservation Inga de Aponte, Nariño, 14 August 2001.
[5] Complaint ·111, 9 November 1999, Municipal Ombudsman of Puerto Caicedo, Putumayo.

> We have been subject to a series of fumigations in the middle of January 1998 and I was fumigated on 7 January 1999. On 11 and 12 March they also passed by and fumigated us, they fumigated two hectares of our plantain and three hectares of our yucca, they fumigated our pipes, from which we collect water for our food, they fumigated our house, and our chickens. These chickens died as a result of the fumigation, some pregnant rabbits also died and we were also affected by the fumigation. The birds fell from the trees; they also sprayed the entire jungle, who allowed the jungle, with its myriad of animals, to be fumigated? ASKED: Do you have anything more to add or amend in the present proceeding? ANSWERED. I ask the government to take a look at what they can do, we are poor, and we started to work on the field so that we need not harm anyone, and they come and take us away from the field by fumigating our food, our grass and even our animals. Or does the government want us to be just another criminal in the city? Because what are we to do with 4 children? We have no education, no money and, to sum up, they fumigate the little that we have. We also have rights, even as poor people, they need to respect us. The government has everything and does not know what it means to be hungry.
>
> ***Magda Liliana Cruz Sarmiento***[6]

3.4 IMPACT ON HEALTH AND ENVIRONMENT

In the complaints reviewed, the damage to food crops such as fruit orchards and others is denounced, the destruction of pastures and natural grasslands, illness and death of both domesticated and wild animals, intoxication in human beings, mainly in children and other contamination problems. Calculating how many thousands of hectares will be affected is not easy, because there are collective complaints and others in which, in addition to food crop areas and pastures, damages to wild areas are reported such as jungles and weed areas. The losses for farmers and for biodiversity caused by the fumigations directly or indirectly can be incalculable.

Symptoms such as fever, vomiting, diarrhea, headaches, skin affectations, dizziness, ocular irritation and others are among the health problems that have been reported, The epidemiological nurse, Diva Ravelo, from the Administrative Health Department of the Putumayo, Dasalud, has monitored and systematized hundreds of complaints and medical consultations and her report, included below, clearly reflects

[…]
[Page 3-42]

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[6] Complaint ·8, at the Office of the Ombudsman, Municipality of Calamar, 16 March 1999.

3.4.7 Posture held by the Ministry of Environment

It is interesting to consider the Ministry of Environment's contradictory stance, which has publicly defended the fumigations as safe for the environment, including Senate debates, at the same time that it rejected the Plan for Environmental Management proposed by the National Narcotics Directorate, for not responding to the "scope and objectives defined in the terms referenced or to the requirements for information that this Ministry has requested in repeated opportunities" (Resolution 0341 dated May 2001). Finally, the Ministry, after a six-year process, imposed the Plan of Environmental Management on the National Narcotics Directorate, pursuant to Resolution 1065 dated 26 November 2001 (where little relevance has been given to the health component), and the same day it issued Resolution 1066, "Through which an investigation is opened, a statement of objections is elevated to a higher authority and other findings are made," as a result of violations of certain provisions requiring immediate actions ordered in Resolution 0341 dated May 2001.

The Comptroller General of the Republic had already registered several of these violations, such as the lack of geo-referentiation in adequate degrees in the fumigated zones; and the non-compliance in performing evaluations of the environmental impact in order to establish the nature and characteristics of the possible environmental impact caused, and having failed to measure the residues of glyphosate in soil and its effects on physical, chemical and biological properties of the soils, using sample parcels.

As a response, the National Narcotics Directorate filed, the following month, in December of 2001, an appeal against Resolution 1065 setting forth a series of arguments, among them the lack of jurisdiction to assume the responsibility of the entirety of the execution of the Plan of Environmental Management. Although a series of other considerations of normative type will be made, what is clear is that the government has made irresponsible declarations regarding the harmlessness of these fumigations, despite the lack of studies regarding the impacts on the environment or the fact that an epidemiological monitoring has not been carried out by the health authorities.

3.4.8 Position held by the Ministry of Health

The response that the Health Ministry sent to the National Organization of Indigenous People in Colombia (ONIC) on August 22, 2001, in response to three interrogatories that were formulated to it as part of a right to petition, is proof that said Ministry has not concerned itself in years over what can occur to the communities as a result of these fumigations. When concretely asked about the preventative measures in public health that had been decided on for the provinces of Cauca, Nariño, and Putumayo, in light of the use of glyphosate or other

chemicals used by eradication. The Ministry, in two extensive paragraphs, referred itself to Decree 1843 of 1991 regarding pesticide use and management with respect to buffer zones and toxicological classification: but the true and relevant response occupied less than two lines and consisted of the following: "there are no experimental studies in the country that deal with the impact of aerial spraying of Glyphosate on human health."

Regarding the second question, about the number of those intoxicated, ill, or affected by the use of chemicals used by eradication, the answer was that the Direcciones Departamentales de Salud de Putumayo ("Departmental Health Directorates of Putumayo") have been asked to carry out the appropriate investigation, and they highlight that the Departmental Health Directorate of Putumayo has not reported any cases of intoxication as a result of glyphosate. With respect to this, the complaints reviewed at the Ombudsman's office and the February 2001 report issued by epidemiologist Diva Revelo, official from the Department of Health of Putumayo (Dasalud), to which we refer to below, show the Ministry of Health's lack of interest for the problem.

"Around 8:00 a.m. on 17 January of the present year, they fumigated the whole village and my farm, in particular. They fumigated around 50 hectares of pasture, two hectares of rubber crops, and two hectares of plantain and yucca. That poison also drenched 80 cows and it is not the first time that this has occurred with respect to cattle and because of that I assume that this poison has caused me a high mortality of born cattle as well as cattle miscarriages. On another note, I sent my child to collect guavas on the pasture and when she was collecting the guavas, the aircraft passed over and fumigated her as well. She immediately started to experience dizziness, and I was forced to leave the farm which is approximately two hours away by canoe, by river transportation. The physician found that she was affected by the beginnings of intoxication, this is confirmed by a written medical diagnosis and is the reason that I come to file a complaint so that this does not continue to happen to the majority of us who inhabit the field, as well as animals, food crops and other species. **ASKED**: **MIREYA TORRES**, please tell us about the fumigation of which you were a victim. **ANSWERED**: My dad sent me to the pasture to collect guavas and bring them home. At that moment, aircraft passed over and fumigated the pasture and fumigated me as well. I immediately felt dizzy, felt a headache and at that moment, I went to pee and my lungs hurt. I started to itch and feel a burning sensation in my bladder. My dad immediately took me to the village, to the health center, and I was examined there. The doctor told me that I showed symptoms of intoxication. **ASKED**: Did the physician prescribe any medication when he diagnosed you with symptoms of intoxication?"

Annex 29

ORGANIZACIÓN DE NACIONES INDÍGENAS DE COLOMBIA- ONIC,
PROCESO DE COMUNIDADES NEGRAS- CN, FEDERACIÓN NACIONAL SINDICAL UNITARIA AGROPECUARIA- FENSUAGRO-CUT

EVALUACIÓN DE LAS FUMIGACIONES EN COLOMBIA

DESTRUCCIÓN DE LAS ZONAS RURALES POR EL PLAN COLOMBIA

AGOSTO DEL 2002

que no siembran cultivos ilícitos, cuyo delito es ser vecino de otros que sí los siembren. Esta situación se encuentra consignada en numerosas quejas revisadas.

- Muchos campesinos pueden abstenerse de poner la queja porque consideran que pierden el tiempo si no se les cree. De hecho el estado y la policía antinarcóticos han considerado falsas o amañadas las denuncias por los abusos y destrucción que resultan de la fumigación aérea.

- Los grupos alzados en armas pueden incidir en que la gente se desplace o no a presentar las quejas.

- La actitud ofensiva de la policía antinarcóticos con los personeros al afirmar que no son confiables, porque son parientes de quienes siembran la coca, puede inducir a los personeros a negarse a recibir quejas.

- Muchos campesinos pueden abstenerse de presentar las quejas por lo inoperante del sistema, ya que en ningún caso ha habido indemnizaciones.

El volumen de personas damnificadas podría ser 100 veces mayor o más que lo detectado en la muestra de quejas analizada, porque sólo se analizó una fracción de todas las quejas que reposan en los archivos de la Defensoría del Pueblo, y se calcula que a esta institución no deben llegar más del 10% de las quejas presentadas en todo el país en diversas instituciones. Ya se aclaró además que muchos afectados no se quejan.

3.3 RESULTADOS DEL ESTUDIO DE QUEJAS

3.3.2 Tipos de quejas, su origen y destino

Pudo revisarse una muestra de 1.852 quejas, presentadas en los departamentos de Boyacá, Meta, Guaviare, Caquetá y Putumayo, entre los años 1997 y enero de 2002, a través de las defensorías a nivel regional, Inspecciones de policía y Personerías Municipales. Sólo se encontró una queja presentada en la policía antinarcóticos, porque esta institución maneja sus archivos independientemente de la Defensoría, pero se conoce que allí reposan muchas quejas y denuncias, que según las investigaciones de la policía casi nunca están fundamentadas.

El 95% de las quejas revisadas corresponde a 10 municipios. En los cuadros siguientes se presentan estas cifras, aclarándose que sólo se revisó una fracción de todos los archivos de la Defensoría, las cuales pueden representar un pequeño porcentaje de las

reales a nivel nacional. Algunos personeros calculan que las quejas que llegan a la Defensoría son tan sólo un 10% de todas las quejas presentadas a nivel nacional. Y el total de quejas presentadas a su vez sólo cubre un estimado del 10 por ciento de los casos que suceden.

Cantidad de quejas en la muestra revisada, por años

Año	N° de quejas revisadas
1997	64
1998	69
1999	153
2000	238
2001	1.154
2002	174
Total quejas revisadas	1.852

Instituciones en las que se interpusieron estas quejas

Institución[10]	N° de quejas presentadas
Personerías Municipales	944
Inspecciones de policía Municipales	904
Defensorías del Pueblo Regionales	3
policía antinarcóticos	1
Total quejas revisadas	1.852

Departamentos en las que fueron presentadas estas quejas

Departamentos[11]	N° de quejas revisadas
Putumayo	1.254
Caquetá	503
Guaviare	90
Meta	4
Boyacá	1[12]
Total quejas revisadas	1.852

Podemos ver que la mayor parte de las quejas vienen de solo 3 departamentos, con lo cual queda demostrado que es una subvaloracion de los daños, dado que las fumigaciones se estan dando en al menos 12 departamentos y no hay razon de suponer que en ciertos

[10] La policía Antinarcóticos debe estar atiborrada de quejas y denuncias. También se presentan quejas ante las alcaldías, oficinas de Umata, Ministerios de Salud, Agricultura y Medio Ambiente, Instituto Colombiano Agropecuario ICA, Contraloría General de la República y Procuraduría, pero no existe una oficina del Estado que las recopile y sistematice.

[11] No aparecen los departamentos de Cauca, Vichada, Norte de Santader, Tolima y otros, porque no se revisaron todos los archivos de la Defensoría del Pueblo, pero se constató que existen en esta entidad.

[12] Colectiva, presentada por 111 firmantes en 1997.

departamentos la policía actua de manera diferente. Ademas las denuncias se concentran en solo 10 municipios de los 260 con presencia de cultivos de uso ilicito.

Municipios con mayor número de quejas

Municipio	Departamento	Nº quejas presentadas	
Valle del Guamuez	Putumayo	909	49
Curillo	Caquetá	358	19
Puerto Asís	Putumayo	149	8
San Miguel	Putumayo	100	5
Albania	Caquetá	75	4
Puerto Guzmán	Putumayo	54	3
Calamar	Guaviare	51	3
El retorno	Guaviare	36	2
Solano	Caquetá	26	1
La Hormiga	Putumayo	20	1
10 Municipios	3 Dptos.	1.778	95%

3.3.3 Procesos de denuncia colectiva

En la muestra de quejas analizada se detectaron unas 15 quejas colectivas, alrededor de la mitad de ellas correspondientes a los años 1997 y 1999 en los departamentos de Caquetá y Guaviare, y la otra mitad de 2000 a enero de 2001 en el departamento del Putumayo. El 36% de estas quejas corresponde a Resguardos Indígenas, en las cuales quedó constancia de las agresiones a proyectos de pueblos como los Coreguaje, Cofanes e Ingas.

Algunas de las quejas colectivas están respaldadas por cientos de firmas; una de ellas está suscrita por 8 médicos que confirmaron los graves impactos y proyectos afectados en el resguardo Cofán de Santa Rosa en el Putumayo. Además de los daños a miles de hectáreas entre cultivos alimenticios, potreros, rastrojo y zonas de bosque primario, se reportaron síntomas de intoxicación como diarrea, vómito, fiebre, dolor de cabeza y tos. En Cumaribo, Vichada, 942 campesinos se quejaron y reportaron la muerte de dos personas ahogadas mientras intentaban cruzar el río, porque 130 casas además de fumigadas fueron ametralladas.

Las quejas colectivas son una forma difusa pero importante de entender la magnitud de los daños causados por las fumigaciones. La fumigación que abarca territorios ancestrales es por definición un proceso cercano al genocidio, dado que algunas comunidades tienen una población tan restringida que su dispersión es la probable causa de su desaparición como etnia.

"A finales del mes de julio e inicios del mes de agosto del presente año, el Resguardo Indígena Inga de Aponte, fue escenario de las más intensas fumigaciones indiscriminadas, no se tuvo compasión por las fuentes de agua, flora, fauna, cultivos de pancoger, incluido las que fueron financiadas por el Plan de Desarrollo Alternativo PLANTE tales como: papa, café, entre otros; además se fumigaron potreros y otros cultivos que han sido plantados por los nativos con sus propios esfuerzos donde han invertido el total de sus pocos teneres con la esperanza de obtener sus cosechas y así adquirir las cosas necesarias para su subsistencia una vez vendan los productos. Todos los esfuerzos, se han constituido en ilusiones porque nada han podido obtener, al contrario, se está fomentando más hambre y más miseria, conduciendo así a una inminente extinción como etnia de los Ingas de Aponte.
Nuestro derecho a la vida, a la tranquilidad, a la salud, se ven abruptamente violentados con las fumigaciones toda vez que los seres humanos tales como los niños han sido los más afectados al presentar brotes de piel, fiebre posterior a dichas fumigaciones, esto, ahora que son los inicios; quedando en duda que se presenten más casos de enfermedades como consecuencia del esparcimiento de los químicos"

Libardo Chasoy Jansasoy, gobernador indígena.[13]

Desde hace aproximadamente ocho días para acá, los cultivo de maíz de mi finca así como la grama en general comenzó a amarillarse sin saber los motivos de eso. ***PREGUNTADO:*** *Sabe usted o le han comentado quién o quiénes son los causantes o responsables de lo que usted cuenta.* ***CONTESTO:*** *De eso no se sabe nada, sólo se escuchan rumores de habitantes de la comunidad acerca de una avioneta que pasa por las noches, pero que no se sabe de quien es. Solicito que se averigüe quién está haciendo estos daños, para que no le pase a los vecinos y que no se esterilice la tierra y se contaminen las aguas, porque son utilizadas por todo el mundo.*

Guillermo Gines Ilvira[14]

[13] Carta abierta firmada por Libardo Chasoy Jansasoy, gobernador indígena y una serie de autoridades del resguardo Indígena Inga de Aponte, Nariño, 14 de agosto de 2001.
14 Queja #111, 9 de noviembre de 1999, Personería Municipal de Puerto Caicedo, Putumayo.

Hemos sido objeto de varias fumigaciones a mediado de enero del 98 y el 7 de enero del 99 me fumigaron y en marzo 11 y 12 también pasaron y nos fumigaron, nos fumigaron dos hectáreas de plátano y tres hectáreas de yuca, nos fumigaron el caño donde se recoge el agua para los alimentos, nos fumigaron la casa, y unas gallinas que teníamos se murieron a causa de la fumigación, unos conejos con cría también se murieron, los niños y nosotros también salimos afectados por causa ad la fumigación, los pájaros se caían de los árboles, también fumigaron toda la selva, quién dijo que la selva se fumiga donde hay tanto animal. ***PREGUNTADO:*** *¿Tiene algo más que agregar o enmendar a la presente diligencia?* ***CONTESTO:*** *Que mire el gobierno que puede hacer, nosotros somos pobres, y nos metemos a trabajar al campo para no hacerle mal a nadie y vienen y nos sacan del campo fumigándonos la comida, el pasto y hasta los animales, o será que el gobierno quiere que seamos unos delincuentes más de la ciudad, porque nosotros con 4 hijos ¿ qué vamos a hacer? No tenemos estudio, no tenemos dinero y para acabar de completar nos fumigan lo poco que tenemos, nosotros también tenemos derechos como pobres, que nos respeten, que el gobierno lo tiene todo y no saben qué es tener un hambre".*

Magda Liliana Cruz Sarmiento.[15]

3.4 IMPACTOS SOBRE AMBIENTE Y SALUD

En las quejas revisadas se denuncia el daño a cultivos alimenticios como frutales y otros, la destrucción de potreros y praderas naturales, las enfermedades y muertes de animales domésticos y silvestres, intoxicaciones en seres humanos principalmente en niños y otros problemas de contaminación. No es fácil calcular cuántos miles de hectáreas serán las afectadas, porque hay denuncias colectivas y otras en las que, ademas de las áreas de cultivos alimenticios y potreros se reportan daños a áreas silvestres como selvas y a zonas de rastrojo. Las pérdidas para los agricultores y para la biodiversidad, causadas directa o indirectamente por las fumigaciones pueden ser incalculables.

Entre los problemas de salud se reportan síntomas de intoxicación como fiebre, vómito, diarrea, dolor de cabeza, afecciones a la piel, mareos, irritaciones oculares y otras. La enfermera epidemióloga Diva Ravelo, del Departamento Administrativo de Salud del Putumayo, Dasalud, ha hecho el seguimiento y sistematizado cientos de quejas y consultas médicas y su informe, el cual se incluye más adelante, refleja claramente esta

[15] Queja #8, ante la Personería, Municipio de Calamar, 16 de marzo de 1999.

3.4.7 Posiciones del Ministerio del Medio Ambiente:

Es interesante considerar las posiciones contradictorias del Ministro del Medio Ambiente, quien ha defendido públicamente las fumigaciones como seguras para el ambiente, incluso en debates en el Senado, al tiempo que rechazaba el Plan de Manejo Ambiental propuesto por la Dirección Nacional de Estupefacientes, por no responder "a los alcances y objetivos definidos en los términos de referencia ni a los requerimientos de información que este Ministerio ha solicitado en repetidas oportunidades" (Resolución 0341 de mayo de 2001). Finalmente el Ministerio, después de un proceso de unos seis años, impuso el Plan de Manejo Ambiental a la Dirección Nacional de Estupefacientes, según Resolución 1065 de noviembre 26 de 2001 (donde se da muy poca relevancia al componente salud), y el mismo día emitió la Resolución 1066, "Por la cual se abre una investigación, se eleva un pliego de cargos y se toman otras determinaciones", por incumplimiento de disposiciones de acción inmediata ordenadas en la Resolución 0341 de mayo/01.

La Contraloría General de la República ya había anotado algunos de estos incumplimientos, como la falta de georreferenciación en escalas adecuadas de las zonas fumigadas; el incumplimiento en evaluaciones de impacto ambiental para establecer la naturaleza y características de los posibles impactos ambientales generados, y el no haber determinado residuos de glifosato en suelos y sus efectos sobre las propiedades físicas, químicas y biológicas de los mismos utilizando parcelas demostrativas.

En respuesta, la Dirección Nacional de Estupefacientes interpuso al mes siguiente, en diciembre de 2001, un recurso de reposición contra la Resolución 1065 con varios argumentos, entre ellos por su falta de competencia para asumir la responsabilidad de la totalidad de la ejecución del Plan de Manejo Ambiental. Aunque más adelante se harán otras consideraciones de tipo normativo, lo que queda claro es que el gobierno ha hecho declaraciones irresponsables sobre la inocuidad de estas fumigaciones, cuando no se cuenta con estudios sobre impactos en el ambiente ni se ha hecho una vigilancia epidemiológica de parte de las autoridades de salud.

3.4.8 Posición del Ministerio de Salud:

La respuesta que el Ministerio de Salud envió a la Organización Nacional Indígena de Colombia (ONIC) el 22 de agosto de 2001, ante tres interrogantes que como derecho de petición les fueron formulados, es prueba de que dicho Ministerio hace años que no se preocupa por lo que pueda suceder a las comunidades con estas fumigaciones. Ante la pregunta concreta sobre qué medidas preventivas en salud pública se habían determinado para los departamentos del Cauca, Nariño y Putumayo ante el uso del glifosato u otros

químicos utilizados en la erradicación, el Ministerio en dos extensos párrafos se refirió al Decreto 1843 de 1991 sobre uso y manejo de plaguicidas en lo referente a franjas de seguridad y clasificación toxicológica; pero la verdadera y tajante respuesta ocupó menos de dos renglones y fue: "No existen estudios experimentales en el país que señalen el impacto del Glifosato por aspersión aérea en la salud humana."

A la segunda pregunta sobre el número de intoxicados, enfermos o afectados por el uso de los químicos utilizados en la erradicación, la respuesta fue que han requerido a las Direcciones Departamentales de Salud para que realicen las investigaciones pertinentes, y destacan que la Dirección Departamental de Salud del Putumayo no ha reportado casos de intoxicación por glifosato. A este respecto, las quejas revisadas en la Defensoría y el informe de febrero de 2001 de la epidemióloga Diva Revelo, funcionaria del Departamento de Salud del Putumayo (Dasalud), al cual se hará referencia más adelante, demuestran la falta de interés del Ministerio de Salud frente a la problemática.

"Como a las 8:00 de la mañana del día 17 de enero del año en curso, fumigaron en toda la vereda y particularmente en mi finca, me fumigaron más o menos 50 hectáreas de potrero, para pastoreo de ganado, dos hectáreas de cultivo de caucho y dos hectáreas entre plátano y yuca, también ese veneno bañó a 80 reses y no es la primera vez que esto ha ocurrido con respecto a la ganadería y por eso presumo que este veneno me ha causado una alta mortalidad de ganado al nacer al igual que abortos en las vacas, de otro lado, yo mandé a la niña a recoger guayabas en el potrero y al momento de estar recogiendo las guayabas, pasaron los aviones y también la fumigaron y al momento empezó con mareos, me tocó trasladarme de la finca que queda aproximadamente dos horas en canoa, transporte fluvial y los resultados que dice el médico, fue que se le encontraron principios de intoxicación, la cual se corrobora con el dictamen médico por escrito y es la razón por la cual vengo a quejarme para que esto no le siga pasando a la mayoría que habitamos el campo, tanto a los animales, como a los cultivos de pan coger y otras especies. ***PREGUNTADO: MIREYA TORRES,*** *cuéntenos al respecto sobre la fumigación de que fue víctima.* ***CONTESTO:*** *Mi papá me mandó a recoger guayabas al potrero para traer a la casa, y en ese momento pasaron los aviones y fumigaron el potrero y me fumigaron a mí, al instante me sentí mareada, con dolor de cabeza y en ese momento me fui a orinar y me dolieron los pulmones y me dio una picada fuerte y me comenzó ardor en la vejiga, inmediatamente mi papá me trasladó para el pueblo, al centro de salud, allí me examinaron y dijo el médico que me encontraba con síntomas de intoxicación.* ***PREGUNTADO:*** *¿El médico al dictaminarle síntomas de intoxicación le suministró algún medicamento?*

Annex 30

Colombian Medical Inquests (Sept. 2002)

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Soledad Last Names: _____

Age: 32 Nationality: Colombian Parish/Village: Nueva Granada

County/Municipality: Puerto Asis Province/Department: Putumayo

Occupation: Farmer Place of work: Farm

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/ dizziness Disorientation temp/esp X Other: Bodily pain	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other:Itchiness, Pruritus on all the body	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fatigue, depression		

What activity do you perform in your farm:

X Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

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Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance
No

When did the events occur? __I was the subject of fumigations on many occasions ___
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People **X** Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
J	22	Exactly the same as him
M	19	Exactly the same as him
M	16	Exactly the same as him
V	42	Exactly the same as him
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

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acción ecológica

Fecha de reporte: 11/Sep/2002

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: SOLEDAD Apellidos: _____

Edad: 32 Nacionalidad: COLOMBIANA Parroquia/Vereda: Nueva Granada (6)

Cantón/Municipio: Pto Asis Provincia/ Departamento: PUTUMAYO.

Ocupación: Campesina Lugar de trabajo: finca

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Dolor del cuerpo.	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: CONGESTION, PRURITO x TODO EL CUERPO	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: fatiga, decaimiento.

Annex 30

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? ____
- [ ] Ganadería — qué tipo de ganados? ____
- [ ] Avicultura — qué tipo de aves? ____
- [ ] Pisicultura — qué tipo de peces? ____
- [ ] Otros — especifique ____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[x] Clifosato	[ ] Roundup	[x] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[x] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[x] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[x] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[x] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[x] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[x] Sunup (Sundat)
[ ] Atila	[x] Rondo	[ ] Batalla (Bayer)	[x] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[x] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[x] Cauca)
		[ ] Socar (Agrevo)	[x] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[x] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ____

¿Ha notado cambios, molestias o efectos en la salud? ____

¿Desde hace cuanto tiempo? ____

¿Cuál cree que es la causa? ____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia
- [ ] No

¿En qué fecha sucedieron los hechos? Recibió varias veces fumigaciones.

¿Cuántas veces al día sobre volaron las avionetas? ____

¿Por cuantos días se realizaron las fumigaciones? ____

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) ____

Otros afectados

Otras personas de la familia afectados.

Nombre	V	Edad 22	Efectos
Nombre	M	Edad 19	Efectos
Nombre	M	Edad 16	Efectos
Nombre	V	Edad 42	Efectos

EXACTAMENTE IGUAL QUE EL

Alguna mujer embarazada?

Nombre Edad Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Jose Last Names: _____
Age: 48 Nationality: _____ Parish/Village: Nueva Granada
County/Municipality: Puerto Asis Province/Department: Putumayo
Occupation: Farmer Place of work: Nueva Granada

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis Like a Rash X Other: Itchiness	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Tiredness. Fatigue. Depression		

What activity do you perform in your farm:

X Agricultural What type of crops? See annex Livestock What type of cattle?
Aviculture What type of birds? Aquaculture What type of fish?
Other Please specify:

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)

Annex 30

Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance
No

When did the events occur? _____30 August and 3 September_____
How many times a day did the aircraft pass over? _____5 aircraft, 2 overpasses____
How many days were the fumigations conducted? _____2 days _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
NAME	**AGE**	**EFFECTS**
M	40	All felt the same
M	23	All felt the same
V	12	All felt the same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They visited and the discomfort remains

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acción ecológica

Fecha de reporte: 11/06/2002
Oganización:
C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Jose [redacted] Apellidos:
Edad: 48a Nacionalidad: Parroquia/Vereda: Nueva Granada (4)
Cantón/Municipio: Rio Asis. Provincia/ Departamento: Putumayo
Ocupación: Campesino Lugar de trabajo: N. 6.

Signos y síntomas

Gastrointestinales	[X] Dolor abdominal [ ] Vómitos [ ] Quemazón [ ] Otros:	[ ] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[X] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: .... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: .... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[X] Cefaleas [ ] Insomnio [ ] Depresión [X] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia / Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros:	[X] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[X] Irritación conjuntival [ ] Midriasis [ ] Otros: C	[ ] Alterac. Visuales [ ] Dolor ocular	[X] Lagrimeo / Miosis
Respiratorios	[ ] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[X] Dermatitis Como Ronchas. [ ] Otros: COMEZON.	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: Desaliento. Fatiga, decaimiento

Relato de los hechos

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¿A qué actividad se dedica en su finca? Ver hoja aparte.

- [x] Agricultura — qué tipo de cultivos?
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR

- [ ] Roundup
- [ ] Glifosato
- [ ] Glifonox
- [ ] Pillaround
- [ ] Glifosato 480 g/l
- [ ] Gliphogan
- [ ] Ranger
- [ ] Rodeo
- [ ] Atila
- [ ] Arbex
- [ ] Clifosato
- [ ] Mon 0139
- [ ] Candela Super
- [ ] Caldeon
- [ ] Glialca
- [ ] Glifosan
- [ ] Banox
- [ ] Super
- [ ] Rondo
- [ ] Rocket

COLOMBIA

- [ ] Roundup
- [ ] Rocket
- [ ] Rocky
- [ ] Faena
- [ ] Patrol
- [ ] Squadron
- [ ] Ranger
- [ ] Fuente
- [ ] Batalla (Bayer)
- [ ] Glifonox (Cristal)
- [ ] Glyfoagri (Disagri)
- [ ] Socar (Agrevo)
- [ ] Crossout (Agroser)
- [ ] Candela (Agroser)
- [ ] Glyfosan (Agroser)
- [ ] Glifosol (Coljap)
- [ ] Stelar (Dow)
- [ ] Panzer (Invequímica)
- [ ] Glyphogan (Magan)
- [ ] Faena (Proficol)
- [ ] Regio (Quimor)
- [ ] Sunup (Sundat)
- [ ] Glifosato Agrogen
- [ ] (Agroquímicos del
- [ ] Cauca)
- [ ] Tunda (Fertizantes
- [ ] cafeteros)

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia
- [ ] No

¿En qué fecha sucedieron los hechos? 30 de Agosto. y 3 de Septiembre.

¿Cuántas veces al día sobre volaron las avionetas? 5 avionetas. 2 pasadas.

¿Por cuantos días se realizaron las fumigaciones? 2 días.

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre	m	Edad 40	Efectos
Nombre	m	Edad 23	Efectos
Nombre	K	Edad 12	Efectos
Nombre		Edad	Efectos

Sintieron lo mismo. todos.

Alguna mujer embarazada?

Nombre Edad Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: [illegible]

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: DAVID Last Names: VILLAMARQUES
Age: 72 Nationality: Colombian Parish/Village: Nueva Granada
County/Municipality: Pro Asis Province/Department: Nueva Granada
Occupation: Farmer Place of work: Nueva Granada

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning X Other: Sore throat	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia X Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion X Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: Great Itchiness	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	I am out of breath; I am fatigued		

What activity do you perform in your farm:

X Agricultural What type of crops? Plantain, pastures, fruit trees, avocado, cane, orange, pineapple
Livestock What type of cattle? Aviculture What type of birds?
Aquaculture What type of fish? Other Please specify:

Annex 30

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance
No

When did the events occur? _____
How many times a day did the aircraft pass over? 4 aircraft and 5 helicopters
How many days were the fumigations conducted? They have been fumigating for one month every day
What could you see was affected by the fumigations? _____

Sources of water X Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		I live alone
Name	**Age**	**Effects**
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: The two cows from the government are about to die.

(20)

acción ecológica

Fecha de reporte: 11/Sep/2002
Oganización:
C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: DAVID Apellidos: VILLAMARQUES
Edad: 72 Nacionalidad: Colombiano Parroquia/Vereda: (NUEVA GRANADA) (3)
Cantón/Municipio: PTO ASIS. Provincia/ Departamento: PUTUMAYO
Ocupación: Campesino. Lugar de trabajo: N. Grande

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros: Dolor de garganta.	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: .... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: .... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☒ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☒ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: COMEZÓN GRANDE	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: No tengo alimento, tengo pobreza.

Relato de los hechos

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¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? Plátano, palmera, frutales / Naranja, aguacate, yuca, caña.
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
Roundup	Clifosato	Roundup	Glyfosan (Agroser)
Glifosato	Mon 0139	Rocket	Glifosol (Coljap)
Glifonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invequímica)
Glifosato 480 g/l	Glialca	Patrol	Glyphogan (Magan)
Gliphogan	Glifosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Fuente	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glifosato Agrogen
Arbex	Rocket	Glifonox (Cristal)	(Agroquímicos del
		Glyfoagri (Disagri)	Cauca)
		Socar (Agrevo)	Tunda (Fertizantes
		Crossout (Agroser)	cafeteros)
		Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia
- [ ] No

¿En qué fecha sucedieron los hechos?

¿Cuántas veces al día sobre volaron las avionetas? 4 avionetas y 5 helicópteros.

¿Por cuantos días se realizaron las fumigaciones? Llevan un mes pasando todos los días.

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [x] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

	Edad	Efectos
Nombre	Edad	Efectos
Nombre	Edad	Efectos
Nombre	Edad	Efectos
Nombre	Edad	Efectos

Alguna mujer embarazada?

Nombre — Edad — Efectos

Vive solo.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Las avionetas del gobierno. A punto de arruinarse.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Pedro _____ Last Names: _____
Age: 45 Nationality: Colombian _____ Parish/Village: Azul _____
County/Municipality: Puerto Asis _____ Province/Department: Putumayo _____
Occupation: Farmer _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia (Stress) X Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion X Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: Generalized pruritus, mainly on arms and face	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fever, General discomfort		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR	**COLOMBIA**

Annex 30

Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance
No

When did the events occur? 5 and 6 September _____
How many times a day did the aircraft pass over? 4 planes went over twice _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water X Crops – fruit trees, grains
X People X Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
H	14	All the same
M	23	All the same
M	4	All the same, very frightened
H	24	All the same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: Things have gotten a little better but they are going to Ecuador as we can no longer stay here.

acción ecológica

Fecha de reporte: 11/Sep/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: PEDRO Apellidos:

Edad: 45 a Nacionalidad: Cholo Parroquia/Vereda: AZUL - (1)

Cantón/Municipio: BASIC Provincia/ Departamento: Putumayo

Ocupación: Campesino Lugar de trabajo: "

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☒ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor de huesos.	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: PRURITO GENERALIZADO + BROTES Y Costras.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Ficha. malestar general.

Annex 30

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? ____
- [ ] Ganadería — qué tipo de ganados? ____
- [ ] Avicultura — qué tipo de aves? ____
- [ ] Pisicultura — qué tipo de peces? ____
- [ ] Otros — especifique ____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR

- [ ] Roundup
- [ ] Glifosato
- [ ] Glifonox
- [ ] Pillaround
- [ ] Glifosato 480 g/l
- [ ] Gliphogan
- [ ] Ranger
- [ ] Rodeo
- [ ] Atila
- [ ] Arbex
- [ ] Clifosato
- [ ] Mon 0139
- [ ] Candela Super
- [ ] Caldeon
- [ ] Glialca
- [ ] Glifosan
- [ ] Banox
- [ ] Super
- [ ] Rondo
- [ ] Rocket

COLOMBIA

- [ ] Roundup
- [ ] Rocket
- [ ] Rocky
- [ ] Faena
- [ ] Patrol
- [ ] Squadron
- [ ] Ranger
- [ ] Fuente
- [ ] Batalla (Bayer)
- [ ] Glifonox (Cristal)
- [ ] Glyfoagri (Disagri)
- [ ] Socar (Agrevo)
- [ ] Crossout (Agroser)
- [ ] Candela (Agroser)
- [ ] Glyfosan (Agroser)
- [ ] Glifosol (Coljap)
- [ ] Stelar (Dow)
- [ ] Panzer (Invequímica)
- [ ] Glyphogan (Magan)
- [ ] Faena (Proficol)
- [ ] Regio (Quimor)
- [ ] Sunup (Sundat)
- [ ] Glifosato Agrogen
- [ ] (Agroquímicos del
- [ ] Cauca)
- [ ] Tunda (Fertizantes
- [ ] cafeteros)

Especifique otros plaguicidas que usted utiliza ____

¿Ha notado cambios, molestias o efectos en la salud? ____

¿Desde hace cuanto tiempo? ____

¿Cuál cree que es la causa? ____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia
- [ ] No

¿En qué fecha sucedieron los hechos? 5 de Septiembre y 6.

¿Cuántas veces al día sobre volaron las avionetas? 4 avionetas. - 2 pasadas.

¿Por cuantos días se realizaron las fumigaciones? →

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos → platanos, yuca, ...
- [x] Personas
- [x] Viviendas

Otros (especifique) ____

Otros afectados

Otras personas de la familia afectados.

Nombre	h	Edad 14	Efectos
Nombre	m	Edad 23	Efectos
Nombre	M	Edad 4	Efectos
Nombre	h	Edad 24	Efectos

Todos igual. / muy asustados / todo igual.

Alguna mujer embarazada?

	Edad	Efectos
Nombre		

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: Se ha normalizado un poco, pero sería ir a Ecuador porque yo no se quiere estar aquí.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Manuel _____ Last Names: _____
Age: 31 _____ Nationality: Colombian _____ Parish/Village: Nueva Granada _____
County/Municipality: Puerto Asis _____ Province/Department: _____
Occupation: Farmer _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Body ache	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fever, Bone ache, Fatigue, Tiredness		

What activity do you perform in your farm:

X Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 30

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above
No

When did the events occur? Tuesday 3rd and Friday 6th of September _____
How many times a day did the aircraft pass over? 6 planes, twice each _____
How many days were the fumigations conducted? 2 times _____
What could you see was affected by the fumigations? _____

X Sources of water X Crops
X People X Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
M	33	The same
V	22	The same
V	17	The same
M	20	The same
V	5	The same
M	3	The same
M	1	The same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They still have the symptoms. They even double over with the affectation,

(22)

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acción ecológica

Fecha de reporte: 11/Sep/2002
Oganización:
C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: ——— MANE C Apellidos: ———
Edad: 31 Nacionalidad: COLOMBIA. Parroquia/Vereda: NUEVA GRANADA -(1)
Cantón/Municipio: PTO ASIS Provincia/ Departamento:
Ocupación: AGRICULTORES. Lugar de trabajo: " "

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: .... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: .... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor al cuerpo.	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	NO ☐ ~~Dermatitis~~ ~~como~~ ~~ronchas~~ ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fiebre., Dolor a los huesos. Fatiga, Cansancio

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¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos?
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
Roundup	Clifosato	Roundup	Glyfosan (Agroser)
Glifosato	Mon 0139	Rocket	Glifosol (Coljap)
Glifonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invequímica)
Glifosato 480 g/l	Glialca	Patrol	Glyphogan (Magan)
Gliphogan	Glifosan	Squadron	Faena (Proficol)
Ranger.	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Fuente	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glifosato Agrogen
Arbex	Rocket	Glifonox (Cristal)	(Agroquímicos del
		Glyfoagri (Disagri)	Cauca)
		Socar (Agrevo)	Tunda (Fertizantes
		Crossout (Agroser)	cafeteros)
		Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia ENCIMA.
- [ ] No

¿En qué fecha sucedieron los hechos? Martes 3 y Viernes 6 de septiembre

¿Cuántas veces al día sobre volaron las avionetas? 6 Avionetas. 2 veces cada una.

¿Por cuantos días se realizaron las fumigaciones? 2 veces //

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas →
- [x] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre M Edad 33 Efectos — Los mismos
Nombre V Edad 22 Efectos
Nombre M Edad 17 Efectos
Nombre M Edad 20 Efectos
Alguna mujer embarazada? V 5
Nombre M Edad 3 Efectos
M 1 — [illegible]

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Siguen con los síntomas:
[illegible]

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Jon _____ Last Names: _____
Age: 22 Nationality: Colombian
County/Municipality: Puerto Asis Province/Department: Putumayo
Occupation: Farmer Place of work: Putumayo

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Skin rashes in the face	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Face lesions that are still present. The lesions are look like a pimple. Before, he had nothing.		

What activity do you perform in your farm:

Agricultural What type of crops? Livestock What type of cattle?
Aviculture What type of birds? Aquaculture What type of fish?
Other Please specify:

Do you use any of the following pesticides on your lands? Please indicate which one

Annex 30

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?
Yes Please specify at what distance
No
When did the events occur? On 2 days. 6 planes, flew twice over_____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____
Sources of water Crops
People Houses
Others: (please specify) _____

Other affected parties		
Other family members affected:		He lives alone.
Name	**Age**	**Effects**
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: The lesions remain to date.

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acción ecológica

Fecha de reporte: 14/Sep/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Jon. Apellidos:

Edad: 22. Nacionalidad: Colombia Parroquia/Vereda: Nueva Granada

Cantón/Municipio: San Lucas Provincia/ Departamento: Pichincha

Ocupación: Campesino. Lugar de trabajo: "

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☐ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: EN RONCHA NIGNTO EN LA CARA.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: LESIONES EN CARA QUE PERDURAN HASTA AHORA. Son lesiones tipo barro. Antes no tenía nada.

Annex 30

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¿A qué actividad se dedica en su finca?

- ☒ Agricultura — ☒ qué tipo de cultivos? _____
- ☒ Ganadería — ☒ qué tipo de ganados? _____
- ☒ Avicultura — ☒ qué tipo de aves? _____
- ☒ Pisicultura — ☒ qué tipo de peces? _____
- ☒ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☒ Roundup	☒ Clifosato	☒ Roundup	☒ Glyfosan (Agroser)
☒ Glifosato	☒ Mon 0139	☒ Rocket	☒ Glifosol (Coljap)
☒ Glifonox	☒ Candela Super	☒ Rocky	☒ Stelar (Dow)
☒ Pillaround	☒ Caldeon	☒ Faena	☒ Panzer (Invequímica)
☒ Glifosato 480 g/l	☒ Glialca	☒ Patrol	☒ Glyphogan (Magan)
☒ Gliphogan	☒ Glifosan	☒ Squadron	☒ Faena (Proficol)
☒ Ranger	☒ Banox	☒ Ranger	☒ Regio (Quimor)
☒ Rodeo	☒ Super	☒ Fuente	☒ Sunup (Sundat)
☒ Atila	☒ Rondo	☒ Batalla (Bayer)	☒ Glifosato Agrogen
☒ Arbex	☒ Rocket	☒ Glifonox (Cristal)	☒ (Agroquímicos del
		☒ Glyfoagri (Disagri)	☒ Cauca)
		☒ Socar (Agrevo)	☒ Tunda (Fertizantes
		☒ Crossout (Agroser)	☒ cafeteros)
		☒ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si Especifíque a qué distancia

☒ No

¿En qué fecha sucedieron los hechos? 2 días. 6 avionetas. 3 pasadas

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☒ Fuentes de agua
- ☒ Cultivos
- ☒ Personas
- ☒ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	Edad	Efectos
Nombre	Edad	Efectos
Nombre	Edad	Efectos
Nombre	Edad	Efectos

Vive solo.

Alguna mujer embarazada?

Nombre	Edad	Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: perdieron los cultivos hasta ahora.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Francisca _____ Last Names: _____
Age: 30 Nationality: Colombian _____ Parish/Village: Nueva Granada _____
County/Municipality: Puerto Asis _____ Province/Department: Putumayo _____
Occupation: Farmer _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia X Hypertension Cyanosis Other:	X Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia Depression X Vertigo/dizziness X Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fever, lack of appetite, bone ache		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)

Annex 30

Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above the houses
No

When did the events occur? It was a Saturday she remembers _____
How many times a day did the aircraft pass over? 5 planes, only 1 time _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		There were 5 other people in the house but they were not affected.
Name	**Age**	**Effects**
	5	Bloody nose and cough
M	20	5 persons in the house but they were not affected
V	15	5 persons in the house but they were not affected
M	38	5 persons in the house but they were not affected
M	8	5 persons in the house but they were not affected
M	4	5 persons in the house but they were not affected
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	Type	Effects	Plant Quantity	Type	Effects

OBSERVATIONS: She has no more discomfort

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acción ecológica

Fecha de reporte: 11 / Sept / 2002 (W)

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: FRANCISCA Apellidos: _____

Edad: 30 a Nacionalidad: Colombiana Parroquia/Vereda: Nuevo Granada ??

Cantón/Municipio: San Lorenzo Provincia/ Departamento: Esmeraldas

Ocupación: Campesina Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☒ Hipertensión ☐ Cianosis ☐ Otros:	☒ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☒ Vértigos/mareos ☒ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia ĺ Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo ĺ Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fiebre, falta de apetito. Dolor huesos,

Annex 30

Relato de los hechos

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¿A qué actividad se dedica en su finca?

- ☐ Agricultura — ☐ qué tipo de cultivos? ______
- ☐ Ganadería — ☐ qué tipo de ganados? ______
- ☐ Avicultura — ☐ qué tipo de aves? ______
- ☐ Pisicultura — ☐ qué tipo de peces? ______
- ☐ Otros — especifique ______

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ______

¿Ha notado cambios, molestias o efectos en la salud? ______

¿Desde hace cuanto tiempo? ______

¿Cuál cree que es la causa? ______

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si — Especifique a qué distancia: ENCIMA CASAS.

☐ No

¿En qué fecha sucedieron los hechos? Setiembre (no recuerda)

¿Cuántas veces al día sobre volaron las avionetas? 5 aviones tal. Por la vez.

¿Por cuantos días se realizaron las fumigaciones? ______

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☐ Cultivos
- ☐ Personas
- ☐ Viviendas

Otros (especifique) ______

Otros afectados

Otras personas de la familia afectados.

Nombre		Edad 56	Efectos — Sangrado de Nariz y tos.
Nombre	M	Edad 20	Efectos
Nombre	V	Edad 15	Efectos
Nombre	M	Edad 38	Efectos → 5 personas + en la casa pero no fueron afectados
Alguna mujer embarazada?			
Nombre	M	Edad 8	Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: Vamos tres soldados.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Luz María _____ Last Names: _____
Age: 37 _____ Nationality: Colombian _____ Parish/Village: Los Cristales (33 families) _____
County/Municipality: _____ Province/Department: _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning X Other: Agony	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Hives	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fever, fatigue, lack of appetite, It smells like weeds are being killed;		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)

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Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above the houses
No

When did the events occur? 17 August
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
V	10	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
M	8	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
M	6	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
V	4	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
V	15	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
M	25	they all have the same as her: Diarrhea, Cough: dry , Hoarseness, Fever
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They are still ill after a month.

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acción ecológica

Fecha de reporte: 14/Sept/2002
Oganización:
C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

33 familias

Nombres: Luz María Apellidos:
Edad: 37a Nacionalidad: Colombiana Parroquia/Vereda: Los Cristales
Cantón/Municipio: Provincia/ Departamento:
Ocupación: Lugar de trabajo:

Signos y síntomas

Gastrointestinales	[x] Dolor abdominal [x] Vómitos [ ] Quemazón [ ] Otros: Anorexia	[x] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[x] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: .... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: .... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[x] Cefaleas [ ] Insomnio [ ] Depresión [x] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia í Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros:	[ ] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[x] Irritación conjuntival [ ] Midriasis [ ] Otros:	[x] Alterac. Visuales [ ] Dolor ocular	[x] Lagrimeo í Miosis
Respiratorios	[x] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[x] Dermatitis [ ] Otros: Urticaria	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: Fiebre. Cansancio, falta apetito.
Huele a mata maleza.
[illegible]

Annex 30

¿A qué actividad se dedica en su finca?

☒ Agricultura	qué tipo de cultivos?
☒ Ganadería	qué tipo de ganados?
☒ Avicultura	qué tipo de aves?
☒ Pisicultura	qué tipo de peces?
☒ Otros	especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☒ Roundup	☒ Clifosato	☒ Roundup	☒ Glyfosan (Agroser)
☒ Glifosato	☒ Mon 0139	☒ Rocket	☒ Glifosol (Coljap)
☒ Glifonox	☒ Candela Super	☒ Rocky	☒ Stelar (Dow)
☒ Pillaround	☒ Caldeon	☒ Faena	☒ Panzer (Invequímica)
☒ Glifosato 480 g/l	☒ Glialca	☒ Patrol	☒ Glyphogan (Magan)
☒ Gliphogan	☒ Glifosan	☒ Squadron	☒ Faena (Proficol)
☒ Ranger	☒ Banox	☒ Ranger	☒ Regio (Quimor)
☒ Rodeo	☒ Super	☒ Fuente	☒ Sunup (Sundat)
☒ Atila	☒ Rondo	☒ Batalla (Bayer)	☒ Glifosato Agrogen
☒ Arbex	☒ Rocket	☒ Glifonox (Cristal)	☒ (Agroquímicos del
		☒ Glyfoagri (Disagri)	☒ Cauca)
		☒ Socar (Agrevo)	☒ Tunda (Fertizantes
		☒ Crossout (Agroser)	☒ cafeteros)
		☒ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si Especifíque a qué distancia
☒ No ENCIMA CASAS.

¿En qué fecha sucedieron los hechos? 17 AGOSTO.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

☒ Fuentes de agua
☒ Cultivos
☒ Personas
☒ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	V	10		Igual q. ella. +
Nombre	M	Edad 8	Efectos	- Diarrea.
Nombre	M	Edad 6	Efectos	- Tos seca.
Nombre	V	Edad 4	Efectos	
Alguna mujer embarazada?	V	15		- Ronquera
Nombre	M	Edad 2,5	Efectos	- Fiebre.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: - Siguen enfermos después de 1 mes.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Janet _____ Last Names: _____
Age: 28 _____ Nationality: Colombian _____ Parish/Village: Los Cristales _____
County/Municipality: _____ Province/Department: _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: Boils all over her body	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR	**COLOMBIA**

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Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above
No

When did the events occur? 17 / 18 August _____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		They all have the same effects as her.
Name	**Age**	**Effects**
M	20	
V	13	
V	9	
V	7	
M	1	
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: (Illegible)

53

acción ecológica

Fecha de reporte: 11/Sep/2002 (27)

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Janet. Apellidos: _____

Edad: 28 Nacionalidad: Col. Parroquia/Vereda: Las Cristales.

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: _____ Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	[X] Dolor abdominal [X] Vómitos [ ] Quemazón [ ] Otros:	[X] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[ ] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: ..... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: ..... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[X] Cefaleas [ ] Insomnio [ ] Depresión [X] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia í Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros: Dolor huesos	[X] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[X] Irritación conjuntival [ ] Midriasis [ ] Otros:	[X] Alterac. Visuales [ ] Dolor ocular	[ ] Lagrimeo í Miosis
Respiratorios	[ ] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[ ] Dermatitis [ ] Otros: GRANOS en todo el cuerpo.	[ ] Ulceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones:

Annex 30

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [x] Ganadería — qué tipo de ganados? _____
- [x] Avicultura — qué tipo de aves? _____
- [x] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[x] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[x] Glifosato	[x] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[x] Glifonox	[x] Candela Super	[x] Rocky	[x] Stelar (Dow)
[x] Pillaround	[x] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[x] Glifosato 480 g/l	[x] Glialca	[x] Patrol	[x] Glyphogan (Magan)
[x] Gliphogan	[x] Glifosan	[x] Squadron	[x] Faena (Proficol)
[x] Ranger	[ ] Banox	[x] Ranger	[x] Regio (Quimor)
[x] Rodeo	[x] Super	[x] Fuente	[x] Sunup (Sundat)
[x] Atila	[x] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[x] Arbex	[x] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

[x] Si — Especifíque a qué distancia Garcia.

[ ] No

¿En qué fecha sucedieron los hechos? 17/18 Agosto.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	V	Edad 13	Efectos	Igual que ellos
Nombre	V	Edad 9	Efectos	
Nombre	V	Edad 7	Efectos	
Nombre	M	Edad 1	Efectos	

Alguna mujer embarazada?

Nombre — Edad — Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: No hubo [illegible] con enfermedad.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Manuel _____ Last Names: _____
Age: 19 _____ Nationality: Colombian _____ Parish/Village: Los Cristales _____
County/Municipality: _____ Province/Department: _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning X Other: Throat ache	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache, Depression	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	X Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Boils	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	The chemical landed on him and he has started to lose his hair. It happened to a neighbor too.		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

Annex 30

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?
X Yes Please specify at what distance Above
No
When did the events occur? _____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____
Sources of water Crops
People Houses
Others: (please specify) _____

Other affected parties		
Other family members affected:		He lives alone.
Name	**Age**	**Effects**
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

55

acción ecológica

Fecha de reporte: 11/Sep/2002 (28)
Oganización:
C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Manuel. Apellidos:
Edad: 19 Nacionalidad: Col. Parroquia/Vereda: Los Costales
Cantón/Municipio: Provincia/ Departamento:
Ocupación: Lugar de trabajo:

Signos y síntomas

Gastrointestinales	[x] Dolor abdominal [x] Vómitos [ ] Quemazón [ ] Otros: Dolor garganta	[x] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[x] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: .... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: .... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[x] Cefaleas [ ] Insomnio [ ] Depresión [x] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia ĺ Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros: Dolor huesos, pérdida ánimo.	[x] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[x] Irritación conjuntival [ ] Midriasis [ ] Otros:	[x] Alterac. Visuales [ ] Dolor ocular	[x] Lagrimeo ĺ Miosis
Respiratorios	[x] Tos : seca / productiva [ ] Edema pulmonar	[x] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[x] Dermatitis [ ] Otros: granos	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: Le cayó encima el químico y se le está cayendo el pelo como a una recién [illegible]

Annex 30

Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — qué tipo de cultivos? _____
- ☐ Ganadería — qué tipo de ganados? _____
- ☐ Avicultura — qué tipo de aves? _____
- ☐ Pisicultura — qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

☒ SI — Especifíque a qué distancia CERCA.

☐ No

¿En qué fecha sucedieron los hechos? _____

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☐ Cultivos
- ☐ Personas
- ☐ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

VIVE SOLO.

Nombre — Edad — Efectos

Nombre — Edad — Efectos

Nombre — Edad — Efectos

Nombre — Edad — Efectos

Alguna mujer embarazada?

Nombre — Edad — Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Julio _____ Last Names: _____
Age: 60 _____ Nationality: _____ Parish/Village: Aguas B. Los Cristales
County/Municipality: _____ Province/Department: _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting X Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Rashes, pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Shortness of breath, fatigue, depressed, fever.		

What activity do you perform in your farm:

Agricultural — What type of crops? — Livestock — What type of cattle?
Aviculture — What type of birds? — Aquaculture — What type of fish?
Other — Please specify:

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

Annex 30

Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above the houses
No

When did the events occur? 1 month ago
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water X Crops
X People X Houses

Other affected parties		
Other family members affected:		Throat pain, skin
Name	**Age**	**Effects**
Man	8	The same
Woman	4	The same
Woman	2	The same
Man	9	The same
Woman	7	The same
Woman	54	The same
Man	18	The same
Man	28	The same
Man	30	The same
Woman	22	The same
Man	12	The same
Any pregnant women?		
Name	**Age**	**Effects**

Others: (please specify)

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

57

acción ecológica

Fecha de reporte: 11/Sep/2002 (29)

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Nilo Apellidos: _____

Edad: 60 Nacionalidad: _____ Parroquia/Vereda: AGUAS B. COS QUISTALES

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: _____ Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☒ Vómitos ☒ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor huesos.	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Ronchas → prurito.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Desalento, fatiga, desanimo., Fiebre.

Annex 30

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — qué tipo de cultivos?
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR

- [ ] Roundup
- [ ] Glifosato
- [ ] Glifonox
- [ ] Pillaround
- [ ] Glifosato 480 g/l
- [ ] Gliphogan
- [ ] Ranger
- [ ] Rodeo
- [ ] Atila
- [ ] Arbex
- [ ] Clifosato
- [ ] Mon 0139
- [ ] Candela Super
- [ ] Caldeon
- [ ] Glialca
- [ ] Glifosan
- [ ] Banox
- [ ] Super
- [ ] Rondo
- [ ] Rocket

COLOMBIA

- [ ] Roundup
- [ ] Rocket
- [ ] Rocky
- [ ] Faena
- [ ] Patrol
- [ ] Squadron
- [ ] Ranger
- [ ] Fuente
- [ ] Batalla (Bayer)
- [ ] Glifonox (Cristal)
- [ ] Glyfoagri (Disagri)
- [ ] Socar (Agrevo)
- [ ] Crossout (Agroser)
- [ ] Candela (Agroser)
- [ ] Glyfosan (Agroser)
- [ ] Glifosol (Coljap)
- [ ] Stelar (Dow)
- [ ] Panzer (Invequímica)
- [ ] Glyphogan (Magan)
- [ ] Faena (Proficol)
- [ ] Regio (Quimor)
- [ ] Sunup (Sundat)
- [ ] Glifosato Agrogen (Agroquímicos del Cauca)
- [ ] Tunda (Fertizantes cafeteros)

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Sí
- [ ] No

Especifique a qué distancia 1 mes.

ENCIMA DE LAS CASAS.

¿En qué fecha sucedieron los hechos?

¿Cuántas veces al día sobre volaron las avionetas?

¿Por cuantos días se realizaron las fumigaciones?

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre ♂ 8a Edad 54 ♀ Efectos — Igual. Dolor garganta, les piel.

Nombre ♀ 4a Edad 18 ♀ Efectos

Nombre ♀ 2a Edad 28 ♂ Efectos

Nombre ♂ 9a Edad 30 ♂ Efectos

22 ♀

Alguna mujer embarazada?

Nombre ♀ 7a Edad 12 ♂ Efectos

Otros efectos

ANIMALES:

\# Tipo Efectos

\# Tipo Efectos

\# Tipo Efectos

\# Tipo Efectos

PLANTAS:

\# Tipo Efectos

\# Tipo Efectos

\# Tipo Efectos

\# Tipo Efectos

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Carla _____ Last Names: _____
Age: 29 _____ Nationality: Colombian _____ Parish/Village: Los Cristales _____
County/Municipality: _____ Province/Department: _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety X Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Body aches	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Rhinorrhea, high fever, fatigue		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 30

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance
No

When did the events occur? 17 / 18 August _____
How many times a day did the aircraft pass over? 6 planes, many flights (5). On Sunday there were more than 5 flights _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
H	32	Same as him. Rhinorrhea
H	5	Colds and fever, Chronic Headache
H	4	Colds and fever, Chronic Headache
M	2	discomfort, fever, rhinorrhea
H	4	Same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They all still ill.

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acción ecológica

Fecha de reporte: 4/Sep/2002

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Carlos. Apellidos: _____

Edad: 29 Nacionalidad: Colo. Parroquia/Vereda: Los Cristales.

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: _____ Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☒ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor cuerpo.	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros: Do	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: PRURITO.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Rinorrea, Fiebre alta., fatiga.

Annex 30

Relato de los hechos

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¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [x] Ganadería — qué tipo de ganados? _____
- [x] Avicultura — qué tipo de aves? _____
- [x] Pisicultura — qué tipo de peces? _____
- [x] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[x] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[x] Glifosato	[x] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[x] Glifonox	[x] Candela Super	[x] Rocky	[x] Stelar (Dow)
[x] Pillaround	[x] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[x] Glifosato 480 g/l	[x] Glialca	[x] Patrol	[x] Glyphogan (Magan)
[x] Gliphogan	[x] Glifosan	[x] Squadron	[x] Faena (Proficol)
[x] Ranger	[x] Banox	[x] Ranger	[x] Regio (Quimor)
[x] Rodeo	[x] Super	[x] Fuente	[x] Sunup (Sundat)
[x] Atila	[x] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[x] Arbex	[x] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia
- [x] No

¿En qué fecha sucedieron los hechos? 17 Agosto. - 18 agosto

¿Cuántas veces al día sobre volaron las avionetas? 6 avionetas. Botaban veces

¿Por cuantos días se realizaron las fumigaciones? 5 (5) domingo 5 veces (+)

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	Edad 32	Efectos	igual que el.
Nombre	Edad 5	Efectos	Rinorrea. gripas y fiebre, Cefalea
Nombre	Edad 4	Efectos	
Nombre	Edad 2	Efectos	vomitos, poco. abdomen,
Alguna mujer embarazada?			fiebre, Rinorrea.
Nombre	Edad 4	Efectos	igual.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Todos igual que los demas.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: _____ Last Names: _____
Age: 38 Nationality: Colombian
Parish/Village: Nueva Floresta
County/Municipality: Puerto Asis
Province/Department: Putumayo
Occupation: Farmer
Place of work: Farm owner

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia (feet and hands) Unconsciousness	Epileptic Convulsion Anxiety X Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: boils on the skin and all over the body, where the rain fell.	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	She still gets dizzy and has paresthesia. She feels burning in her nasal passage as if blood were going to come out.		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 30

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance Above the house
No

When did the events occur? 16 / 17 August_____
How many times a day did the aircraft pass over? 6 planes, twice, then they went and came back the following day
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water - tap water couldn´t be drunk on those days.
Crops People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Man	45	Mouth and skin were also burnt. Not her.
V	7	All the same
H	26	All the same
M	17	All the same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	Type	Effects	Plant Quantity	Type	Effects

OBSERVATIONS: The 45 year old has tremendously burnt skin.

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acción ecológica

Fecha de reporte: 11/Sep/2002

Oganización: ____

C.I.: ____

____ Firma

HOJA CLINICA TOXICOLOGICA

Nombres: [illegible] J. Apellidos: ____

Edad: 38a Nacionalidad: Colomb. Parroquia/Vereda: Nueva Floresta.

Cantón/Municipio: Pto Asís Provincia/ Departamento: Putum.

Ocupación: Campesino Lugar de trabajo: [illegible]

Signos y síntomas

Gastrointestinales	[X] Dolor abdominal [ ] Vómitos [ ] Quemazón [ ] Otros:	[ ] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[X] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: .... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: .... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[X] Cefaleas [ ] Insomnio [ ] Depresión [X] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia í Sudoración [X] Parestesias pies y manos [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [X] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros: Dolor huesos	[ ] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[X] Irritación conjuntival [ ] Midriasis [ ] Otros:	[X] Alterac. Visuales [ ] Dolor ocular	[X] Lagrimeo í Miosis
Respiratorios	[ ] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[ ] Dermatitis [ ] Otros: GRANOS EN PIEL TODO cuerpo/dolor de cabeza [illegible]	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: → Le sigue el mareo y las parestesias siente ardor nasal como si le siguiera fuego a salir.

Annex 30

Relato de los hechos

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¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [ ] Ganadería — qué tipo de ganados? _____
- [ ] Avicultura — qué tipo de aves? _____
- [ ] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR

- [ ] Roundup
- [ ] Glifosato
- [ ] Glifonox
- [ ] Pillaround
- [ ] Glifosato 480 g/l
- [ ] Gliphogan
- [ ] Ranger
- [ ] Rodeo
- [ ] Atila
- [ ] Arbex
- [ ] Clifosato
- [ ] Mon 0139
- [ ] Candela Super
- [ ] Caldeon
- [ ] Glialca
- [ ] Glifosan
- [ ] Banox
- [ ] Super
- [ ] Rondo
- [ ] Rocket

COLOMBIA

- [ ] Roundup
- [ ] Rocket
- [ ] Rocky
- [ ] Faena
- [ ] Patrol
- [ ] Squadron
- [ ] Ranger
- [ ] Fuente
- [ ] Batalla (Bayer)
- [ ] Glifonox (Cristal)
- [ ] Glyfoagri (Disagri)
- [ ] Socar (Agrevo)
- [ ] Crossout (Agroser)
- [ ] Candela (Agroser)
- [ ] Glyfosan (Agroser)
- [ ] Glifosol (Coljap)
- [ ] Stelar (Dow)
- [ ] Panzer (Invequímica)
- [ ] Glyphogan (Magan)
- [ ] Faena (Proficol)
- [ ] Regio (Quimor)
- [ ] Sunup (Sundat)
- [ ] Glifosato Agrogen
- [ ] (Agroquímicos del
- [ ] Cauca)
- [ ] Tunda (Fertizantes
- [ ] cafeteros)

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia CERCA CASA.
- [ ] No

¿En qué fecha sucedieron los hechos? 16/17 Agosto

¿Cuántas veces al día sobre volaron las avionetas? 6 avionetas 2 veces y se fue y volvió al otro día.

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua → agua de grifo. En esos días no se podía tomar.
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre
Nombre
Nombre
Nombre

♂ Edad 45 Efectos → Boca y piel quemada además de la vista
♀ Edad 7 Efectos → Todos igual.
♄ Edad 26 Efectos
♃ Edad 17 Efectos

Alguna mujer embarazada?

Nombre — Edad — Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: Yuca → Del tres de esta quemada.

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Pedro _____ Last Names: _____
Age: 40 _____ Nationality: Colombian _ Parish/Village: Agua Blanca. Los Cristales _
County/Municipality: Puerto Asis _____ Province/Department: Putumayo _____
Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning X Other: Throat pain	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Pruritus all over the body	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Rhinorrhea, Fever, Bone ache, Loss of strength		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 30

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance 500 meters
No

When did the events occur? 3 weeks ago _____
How many times a day did the aircraft pass over? 6 planes flew over twice _____
How many days were the fumigations conducted? 3 weeks in different areas _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		They all got sick just as he did and had boils on their skin.
Name	**Age**	**Effects**
M	25	
H	5	
H	3	
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**
1	Cattle	Gets skinny and dies	1/2 Hectare	Banana	It yellows
			1/2 Hectare	Cassava	The root rots

OBSERVATIONS: The wife is still sick.

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acción ecológica

Fecha de reporte: 4/Sep/2002 (32)

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Pedro [redacted] Apellidos:

Edad: 40 Nacionalidad: Col. Parroquia/Vereda: AGUA BLANCA - Los Cristales

Cantón/Municipio: San Lorenzo Provincia/ Departamento: Putumayo

Ocupación: Lugar de trabajo:

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros: Dolor garganta	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: PICORES. POR TODO CUERPO.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Rinorrea, Fiebre. Dolor huesos. Perdida fuerzas.

Relato de los hechos

64

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — ☐ qué tipo de cultivos?
- ☐ Ganadería — ☐ qué tipo de ganados?
- ☐ Avicultura — ☐ qué tipo de aves?
- ☐ Pisicultura — ☐ qué tipo de peces?
- ☐ Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si — Especifíque a qué distancia 500 m.

☐ No

¿En qué fecha sucedieron los hechos? 3 Semanas hace.

¿Cuántas veces al día sobre volaron las avionetas? 6. avionetas. 2 pasadas

¿Por cuantos días se realizaron las fumigaciones? 8 semanas por distintos sitios

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☐ Cultivos
- ☐ Personas
- ☐ Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre	m	Edad 25a	Efectos: todos se enfermaron, igual que el y con granos en la piel.
Nombre	h	Edad 5a	Efectos
Nombre	h	Edad 3a	Efectos
Nombre		Edad	Efectos

Alguna mujer embarazada?

Nombre — Edad — Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
1	ganado	Enflaquece y muere.
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#/Ha	Banano	Secan y amarillan
#/Ha	yuca	Se seca tallo pudre raíz
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: Escuela Siempre enfermo todavía

Date of report: 11 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Elisenda _____ Last Names: _____
Age: 26 _____ Nationality: Colombian _____ Parish/Village: Teteye _____
County/Municipality: Puerto Asis _____ Province/Department: Putumayo _____
Occupation: Farmer _____ Place of work: Owned farm _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	X Loss of strength	Speech disorder
Ocular	Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Bitter water, shivers, fever		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 30

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance 500 meters
No

When did the events occur? Thursday 6 September _____
How many times a day did the aircraft pass over? 6 planes, 3-4 times _____
How many days were the fumigations conducted? Every day they fumigated and advanced
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
M	2	Vomiting, diarrhea, fever, loss of appetite
V	33	Nothing
M	46	Rashes,itching, red eyes, tearful
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: The doctors told her to boil the water.

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acción ecológica

(33)

Fecha de reporte: 11/Sept/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: ELISENDA Apellidos:

Edad: 26. Nacionalidad: Col. Parroquia/Vereda: TETEYE :-1

Cantón/Municipio: PTO ASIS. Provincia/ Departamento: PUTUMAYO.

Ocupación: Agricultores. Lugar de trabajo: Finca propios.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia ĺ Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor huesos	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☐ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo ĺ Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		
Otros y Observaciones:	AGUA AMARGA, Escalofrios, Fiebre L.		

Relato de los hechos

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¿A qué actividad se dedica en su finca?

- ☐ Agricultura ☐ qué tipo de cultivos?
- ☐ Ganadería ☐ qué tipo de ganados?
- ☐ Avicultura ☐ qué tipo de aves?
- ☐ Pisicultura ☐ qué tipo de peces?
- ☐ Otros especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si Especifíque a qué distancia 500 m.

☐ No

¿En qué fecha sucedieron los hechos? Jueves 6. Sept.

¿Cuántas veces al día sobre volaron las avionetas? 6 avionetas 3-4 pasadas.

¿Por cuantos días se realizaron las fumigaciones? Todos los días van fumigando y avanzando.

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☐ Cultivos
- ☐ Personas
- ☐ Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre	m Edad 20	Efectos	Vómito, diarrea, Fiebre, inapetito.
Nombre	h Edad 33	Efectos	Nada
Nombre	Edad	Efectos	
Nombre	m Edad 46	Efectos	urticaria, comezón. ojos rojos lagrimeo.
Alguna mujer embarazada?			
Nombre	Edad	Efectos	

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Que lleva el agua le dieron los médicos.

Annex 31

Ecuadorian Medical Inquests (Sept.- Nov. 2002)

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Ma. Isabel Last Names: Campoverde

Age: 34 Nationality: Ecuadorian Parish/Village: Chone 2

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: Owned Farm

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning X Other: Sore Throat	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia Hypertension Cyanosis Other:	Tachycardia: Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headaches Insomnia Depression Vertigo/dizziness Disorientation Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Couth: dry/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: generalized itchiness	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural What type of crops? Livestock What type of cattle?
Aviculture What type of birds? Aquaculture What type of fish?
Other Please specify:

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochem. of Cauca
		Glyfoagri (Disagri)	Tunda
		Socar (Agrevo)	Candela (Agroser)
ç		Crossout (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?
X Yes Please specify at what distance : **1,000 meters**
No
When did the events occur? 6 September
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____
Sources of water **X** Crops
X People Houses
Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Juan Camilo	34	Same
José (18) Luz (13)		None became ill
Jimmi (5) Tania (25)		None became ill
Any pregnant women?		
Name	Age	Effects

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

acción ecológica

Fecha de reporte: 12/Sept/2002.

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Dra Isabel Apellidos: Campaverde.

Edad: 34a Nacionalidad: Ecuat. Parroquia/Vereda: CHONE 2

Cantón/Municipio: Provincia/ Departamento:

Ocupación: Comp. Lugar de trabajo: Finca propia.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros: dolor garganta	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☒ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Prurito generalizado.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — qué tipo de cultivos? _____
- ☐ Ganadería — qué tipo de ganados? _____
- ☐ Avicultura — qué tipo de aves? _____
- ☐ Pisicultura — qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- ☒ Si — Especifíque a qué distancia 1.000m.
- ☐ No

¿En qué fecha sucedieron los hechos? 6 Sept.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☒ Cultivos
- ☒ Personas
- ☐ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre Juan Camilo Edad 34 Efectos → Dolor

Nombre José (18) Luz (13) Edad Efectos

Nombre Jimmi (5) Tania (2) Edad Efectos

Nombre Edad Efectos

Ninguno se enfermó.

Alguna mujer embarazada?

Nombre Edad Efectos

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: _____

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Alicia Last Names: Calero

Age: 16 Nationality: Ecuadorian Parish/Village: Chone 2

County/Municipality: Province/Department: _____

Occupation: Farmer Place of work: Owned Farm

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia ……. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone pain	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other: Bone Pain	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

Annex 31

Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **3,000 meters**
No

When did the events occur? 6 September
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Martin	18	All became ill, + leg pain.
Manuel	19	
Edgar	28	
Simon	50	
Margarita	50	
Libio	25	
Any pregnant women?		
Name	Age	Effects

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: Edgar continues to have headaches and pain in his bones

acción ecológica

Fecha de reporte: 12/Sept/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Alicia Apellidos: Calero

Edad: 16 Nacionalidad: Ecuat. Parroquia/Vereda: CHONG-2.

Cantón/Municipio: Provincia/ Departamento:

Ocupación: Campesina Lugar de trabajo: F. propia.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Dolor	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor lumbar.	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — qué tipo de cultivos?
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

[X] Si — Especifíque a qué distancia 3.000 km.

[ ] No

¿En qué fecha sucedieron los hechos? 6 Sept.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- [X] Fuentes de agua
- [X] Cultivos
- [X] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	MARTIN.	Edad 18a.	Efectos TODOS CAYERON ENFERMOS
Nombre	MANUEL	Edad 19a	Efectos + DOLOR pleural.
Nombre	EDGAR	Edad 28a	Efectos
Nombre	SIMON	Edad 50a	Efectos
Nombre	MARGARITA	Edad 60a	Efectos
Alguna mujer embarazada?	LIRIO	25a	
Nombre		Edad	Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#.	Tipo	Efectos

OBSERVACIONES: EDGAR SIGUE CON DOLORES DE CABEZA Y HUESOS. GLA

_____

_____

_____

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: María Last Names: ILBAY

Age: 34 Nationality: Ecuadorian Parish/Village: Chone 2

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: Rented Farm

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning X Other: Sore Throat	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headaches Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others: Bone pain	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis X Other: Bone Pain	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Dry cough/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis Other: generalized itchiness	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural What type of crops? Livestock What type of cattle?
Aviculture What type of birds? Aquaculture What type of fish?
Other Please specify:

Do you use any of the following pesticides on your lands? Please indicate which one

Annex 31

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **1,000 meters**
No

When did the events occur? 6 September
How many times a day did the aircraft pass over? 11
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Jenny Sanchez	8	The same + irritation of eyes
Lorenzo Sanchez	35	The same + irritation of eyes
Junior Sanchez	18	The same + irritation of eyes
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They are still affected.

acción ecológica

Fecha de reporte: 12/ Sept 2002

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: MARÍA Apellidos: ELBAY

Edad: 34a. Nacionalidad: Ecuat Parroquia/Vereda: CHONE-2

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: Campesina Lugar de trabajo: FINCA ARRENDADA.

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros: Dolor garganta.	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☑ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Dolor y huesos.	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — qué tipo de cultivos? _____
- [ ] Ganadería — qué tipo de ganados? _____
- [ ] Avicultura — qué tipo de aves? _____
- [ ] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[x] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 1.000 Metros.
- [ ] No

¿En qué fecha sucedieron los hechos? Sept.

¿Cuántas veces al día sobre volaron las avionetas? 11

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	Jenny Sanchez.	Edad 9a	Efectos
Nombre	Lorenzo "	Edad 3 a	Efectos
Nombre	Javier "	Edad 1 a 8	Efectos
Nombre		Edad	Efectos

Lo mismo, + la fumigación de 2 días

Alguna mujer embarazada?

Nombre		Edad	Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Todavía otros afectados.

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Obdulia Last Names: PINEDA

Age: 57 Nationality: Ecuadorian Parish/Village: Chone 2

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other: Sore Throat	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia X Stress Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis X Other: Bone Pain	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 31

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance 1,000 meters
No

When did the events occur? __6 September_____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Arturo Calevo	57	Pain in the lungs, irritation of eyes, numbness of the arms
Julio Calevo	3	Stomach ache, and appetite
Lorena Calevo	13	Skin rash
Eduardo Calevo	4	
Diana Calevo	11	
Hernan Calevo	23	
Francisco Calevo	22	
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**
			#		

OBSERVATIONS:

(3)

acción ecológica

Fecha de reporte: 12/Sept/2002

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: ORDULIA Apellidos: PINEDA.

Edad: 57a Nacionalidad: Ecuat. Parroquia/Vereda: CHONE-2.

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: Campesina Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [x] Ganadería — qué tipo de ganados? _____
- [x] Avicultura — qué tipo de aves? _____
- [ ] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[x] Rocky	[x] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[x] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[x] Faena (Proficol)
[ ] Ranger	[ ] Banox	[x] Ranger	[x] Regio (Quimor)
[ ] Rodeo	[ ] Super	[x] Fuente	[x] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 1.000 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 6 Sept.

¿Cuántas veces al día sobre volaron las avionetas? /

¿Por cuantos días se realizaron las fumigaciones? /

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre Arturo Calero. Edad 5-7 Efectos → Dolor en el pulmón. irritación de vistas. Adormecimiento de brazos

Nombre _____ Edad _____ Efectos _____

Nombre Julio Lorena Edad 30 Efectos → Dolor barriga. Inapetito.

Nombre _____ Edad 12a → gravidos.

Alguna mujer embarazada?

Nombre _____ Edad _____ Efectos _____

Otros efectos

Edinson (4a), Diana (11a), Hernan (23a), Fico (27a)

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: _____

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Rosa Margarita Last Names: Jimenez

Age: 51 Nationality: Ecuadorian Parish/Village: Chone 2- 30 Families

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: Owned Farm

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning X Other: Sore Throat	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia X Stress Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry / productive Pulmonary edema	X Dysnea X Other: Out of breath	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fatigue, Chills and "it seems like there is a gas in the air"		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR	**COLOMBIA**

Annex 31

Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **500 to 1,000 meters**
No

When did the events occur? __6 September_____
How many times a day did the aircraft pass over? _ 6 aircraft fumigated over 4 hours _
How many days were the fumigations conducted? We heard them all week_____ ___
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People **X** Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Simon Merino	56	All feel the same in the house
Manuel Merino	20	All feel the same in the house
Martin Merino	18	All feel the same in the house s
Libio Merino	23	All feel the same in the house
Edgar Merino	26	All feel the same in the house + bone pain and chills
Any pregnant women?		
Name	**Age**	**Effects**
Verónica Calero (6 months pregnant)	16	

Other effects					
Animal Quantity	**Type**	**Effects**	**Plants Quantity**	**Type**	**Effects**

OBSERVATIONS:

acción ecológica

Fecha de reporte: 12/Sep/2002 V①

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Familias 30

Nombres: Rosa Margarita Apellidos: Jimenez

Edad: 51a Nacionalidad: Ecuat. Parroquia/Vereda: CHONE-2

Cantón/Municipio: Provincia/ Departamento:

Ocupación: Campesina Lugar de trabajo: finca propia

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☒ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☒ Disnea ☐ Otros: Falta el aire.	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		
Otros y Observaciones:	Cansancio, Escalofrios y "Como q se siente un gas"		

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [x] Ganadería — qué tipo de ganados? _____
- [x] Avicultura — qué tipo de aves? _____
- [x] Pisicultura — qué tipo de peces? _____
- [x] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[x] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[x] Glifosato	[x] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[x] Glifonox	[x] Candela Super	[x] Rocky	[x] Stelar (Dow)
[x] Pillaround	[x] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[x] Glifosato 480 g/l	[x] Glialca	[x] Patrol	[x] Glyphogan (Magan)
[x] Gliphogan	[x] Glifosan	[x] Squadron	[x] Faena (Proficol)
[x] Ranger	[x] Banox	[x] Ranger	[x] Regio (Quimor)
[x] Rodeo	[x] Super	[x] Fuente	[x] Sunup (Sundat)
[x] Atila	[x] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[x] Arbex	[x] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 500 - 1000 m.
- [x] No

¿En qué fecha sucedieron los hechos? 6 de Sept.

¿Cuántas veces al día sobre volaron las avionetas? 4 veces fumigaron 6 avionetas.

¿Por cuantos días se realizaron las fumigaciones? Todo la semana excepto el 6.

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	SIMON MERINO	Edad 5-6	Efectos
Nombre	Manuel	Edad 20	Efectos
Nombre	Martha	Edad 18	Efectos
Nombre	Lilibeth	Edad 23	Efectos
		26	

Alguna mujer embarazada?

Nombre	EDGAR → Veronica Calero	Edad 16	Efectos

TODOS IGUAL EN LA CASA.

+ Dolor de huesos, y escalofrios

+ Embarazo de 6 meses.

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: _____

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Ma Last Names: Encarnación

Age: 53 Nationality: Ecuadorian Parish/Village: Chone 2

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: Owned Farm

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other: Sore Throat	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp X Other: Loss of appetite	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bodily pain	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other: Out of breath	Wheeze
Skin	X Dermatitis X Other: generalized itchiness	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **2 kilometers**
No

When did the events occur? _____
How many times a day did the aircraft pass over?_____
How many days were the fumigations conducted?_____
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Hortensio Calero	63	Same
Rosa Calero	15	Generalized Itchiness
Juan Calero	13	COUGH. RINORREA, HEADACHES.
Leonidas Calero	15	Same as above
Hugo Calero	16	Same as above
Jacinto Calero	19	Cough
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

acción ecológica

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: No Apellidos: Encarnación.

Edad: 53 Nacionalidad: Ecuador. Parroquia/Vereda: CHONTA-2

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: _____ Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☑ Cefaleas ☐ Insomnio ☐ Depresión ☑ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Inapetito.	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor cuerpo.	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: PRURITO GRAL.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — ☐ qué tipo de cultivos? _____
- ☐ Ganadería — ☐ qué tipo de ganados? _____
- ☐ Avicultura — ☐ qué tipo de aves? _____
- ☐ Pisicultura — ☐ qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☒ Roundup	☒ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☒ Rocket	☒ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☒ Rocky	☒ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☒ Faena	☒ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☒ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☒ Squadron	☒ Faena (Proficol)
☐ Ranger	☐ Banox	☒ Ranger	☒ Regio (Quimor)
☐ Rodeo	☐ Super	☒ Fuente	☒ Sunup (Sundat)
☐ Atila	☐ Rondo	☒ Batalla (Bayer)	☒ Glifosato Agrogen
☐ Arbex	☐ Rocket	☒ Glifonox (Cristal)	☒ (Agroquímicos del
		☒ Glyfoagri (Disagri)	☒ Cauca)
		☒ Socar (Agrevo)	☒ Tunda (Fertizantes
		☒ Crossout (Agroser)	☒ cafeteros)
		☒ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si — Especifíque a qué distancia 2 Km.

☐ No

¿En qué fecha sucedieron los hechos? _____

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☒ Fuentes de agua
- ☒ Cultivos
- ☒ Personas
- ☒ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre → HORTENSIO CALDERON Edad 63 Efectos IGUAL.
Nombre → ROSA " Edad 150 Efectos PRURITO GRAL. LEVE.
Nombre → JUAN " Edad 13 Efectos TOS. RINORREA, CEFALEAS, ... IGUAL.
Nombre • LEONIDAS " Edad 15 Efectos
Alguna mujer embarazada? • HUGO " 16
Nombre • JACINTO " Edad 19 Efectos → TOS.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: _____

*Blood Sample

Date of report: 13 November 2002
Organization: A.E.
C.I.:
Signature: [*SIGNED*]

CLINICAL TOXICOLOGICAL SHEET

First names: BEATRIZ ESPERANZA Last Names: URBINA
Age: 71 Nationality: Ecuadorian Parish/Village: GENERAL FARFÁN
County/Municipality: LAGO AGRIO Province/Department: SUCUMBIOS
Occupation: FARMER Place of work: STA MARIANITA

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia ……. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration X Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Swelling of Legs up until Knees	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis Other:	X Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	She is diabetic, controlled by diet. The fumigations caused her to suffer an ulcer that does not cease and that she has just recently been able to control.		

What activity do you perform in your farm:

X Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one: **NO**

Annex 31

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance 1 KM
No

When did the events occur? September
How many times a day did the aircraft pass over? 3 times, 3 aircraft
How many days were the fumigations conducted? 8 days
What could you see was affected by the fumigations? _____

X Sources of water X Crops
X People X Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:	**Age**	**Effects**
Cintia Rivera	7	Skin rash and stye
Any pregnant women?		
Name	Age	Effects

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**
50	Chickens	Dead	#		
5	Cats	Dead	#		
2	Pigs	Dead	#		
2	Dogs	Dead	#		

OBSERVATIONS:

* NUESTRA SANGRE

acción ecológica

Fecha de reporte: 13/NOV/2002

Oganización: A.E.

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: BEATRIZ ESPERANZA Apellidos: URBINA

Edad: 71 a Nacionalidad: Cuba Parroquia/Vereda: GRAL FARFAN.

Cantón/Municipio: LAGRIO. Provincia/ Departamento: SUCUMBIOS

Ocupación: CAMPESINA Lugar de trabajo: STA MARGARITA.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☒ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: HINCHAZON DE PIERNAS HASTA RODILLAS.	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☒ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros:	☒ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Es diabética, controlada con dieta. Las quemaduras le provocaron una úlcera que no cedía, y que se le acaba de controlar. Luce pecosa.

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura
- [ ] Ganadería
- [ ] Avicultura
- [ ] Pisicultura
- [ ] Otros

- [ ] qué tipo de cultivos?
- [ ] qué tipo de ganados?
- [ ] qué tipo de aves?
- [ ] qué tipo de peces?

especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos No

ECUADOR		COLOMBIA	
Roundup	Clifosato	Roundup	Glyfosan (Agroser)
Glifosato	Mon 0139	Rocket	Glifosol (Coljap)
Glifonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invequímica)
Glifosato 480 g/l	Glialca	Patrol	Glyphogan (Magan)
Gliphogan	Glifosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Fuente	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glifosato Agrogen
Arbex	Rocket	Glifonox (Cristal)	(Agroquímicos del
		Glyfoagri (Disagri)	Cauca)
		Socar (Agrevo)	Tunda (Fertizantes
		Crossout (Agroser)	cafeteros)
		Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 1 Km.
- [ ] No

¿En qué fecha sucedieron los hechos? Septiembre.

¿Cuántas veces al día sobre volaron las avionetas? 3 veces 3 avionetas.

¿Por cuantos días se realizaron las fumigaciones? 5 días.

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre	Edad	Efectos
Cinthia Rivera.	4	Enf. piel y ovezuelo.

Alguna mujer embarazada?

Nombre — Edad Efectos

Otros efectos

ANIMALES: #	Tipo	Efectos	PLANTAS: #	Tipo	Efectos
50	Gallinas	Muertos			
5	patos	"			
2	Cerdos	"			
2	perros	"			

OBSERVACIONES:

* Blood sample

Date of report: 13 November 2002

Organization: _____

C.I.: _____

Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Italo Ramón Last Names: Bene Cosa

Age: 24 Nationality: Ecuadorian Parish/Village: General Farfán

County/Municipality: Lago Agrio Province/Department: Sucumbios

Occupation: Farmer Place of work: Santa Marianita

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp X Other: Fever	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration X Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Intense Pain	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Working on the farm, his face started itching and he had a headache. He then began to have rashes in his face and body. His face became flushed, hot and swollen. That day they were spraying and he was 600 meters this side of the border. He reports that he had washed his face due to the heat, with water from the river Charapa. He was treated at the Red Cross, where he was injected which calmed the symptoms, but then ...		

What activity do you perform in your farm:

X Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one
They do not use any chemicals

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **600 meters**
No

When did the events occur? Towards the end of September
How many times a day did the aircraft pass over? 6 airplanes and 4 helicopters
How many days were the fumigations conducted? 1 day
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
José Alfonso Bone	53	Skin lesions: Vitoligo that started after the Colombian fumigations
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**
# 2	Calves	Dead			In the folder
# 2	Pigs	Dead			In the folder
# 8	Chickens	Dead			In the folder
# 1	Rooster	Dead			In the folder

OBSERVATIONS:

* MUESTRA DE SANGRE

Fecha de reporte: 13 / NOV / 2002
Oganización: ____________
C.I.: ____________

acción ecológica

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: ITALO RAMÓN Apellidos: BENE COSA
Edad: 24 a. Nacionalidad: Ecuator. Parroquia/Vereda: Gral Farfán
Cantón/Municipio: C. Aguarico Provincia/ Departamento: Sucumbíos
Ocupación: CAMPESINO Lugar de trabajo: STA MARIANITA

Signos y síntomas

Gastrointestinales	[ ] Dolor abdominal [ ] Vómitos [ ] Quemazón [ ] Otros:	[ ] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[ ] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: .... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: .... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[X] Cefaleas [ ] Insomnio [ ] Depresión [ ] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros: Fiebre	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia í Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros:	[X] Perdida de fuerzas	[ ] Trast. del lenguaje
Oculares	[X] Irritación conjuntival [ ] Midriasis [ ] Otros:	[ ] Alterac. Visuales [X] Dolor ocular	[X] Lagrimeo í Miosis
Respiratorios	[X] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros:	[ ] Sibilancias
Piel	[X] Dermatitis [ ] Otros: Dolor intenso	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: Trabajando en la finca, socolando, comenzó con picazón en la cara y dolor de cabeza. Después empezaron a salir granos en la cara y en el cuerpo. La cara se puso roja, caliente e hinchada. Ese día estaban fumigando, y él se encontraba a 600 metros, a este lado de la frontera. Refiere que se había lavado la cara con el agua del río Chararpa. Atendido en la Cruz Roja. Le inyectaron y calmó, pero después [illegible]

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [X] Agricultura — qué tipo de cultivos? _____
- [ ] Ganadería — qué tipo de ganados? _____
- [ ] Avicultura — qué tipo de aves? _____
- [ ] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos NO USAN QUÍMICOS

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [X] Si — Especifique a qué distancia 600 m.
- [ ] No

¿En qué fecha sucedieron los hechos? Septiembre, finales.

¿Cuántas veces al día sobre volaron las avionetas? 6 avionetas + 4 helicópteros.

¿Por cuantos días se realizaron las fumigaciones? 1 día.

¿Qué pudo verse afectado por las fumigaciones?:

- [X] Fuentes de agua
- [X] Cultivos
- [X] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre José Mauricio Bone	Edad 53	Efectos	lesiones de piel: Vitiligo (?)
Nombre	Edad	Efectos	
Nombre	Edad	Efectos	
Nombre	Edad	Efectos	

Alguna mujer embarazada?

Nombre	Edad	Efectos

¿comenzó después de las fumigaciones de Colombia?

Otros efectos

ANIMALES:

# 2	Tipo Terneros	Efectos	Muertos
# 4	Tipo Cerdos	Efectos	"
# 8	Tipo Gallinas	Efectos	"
# 1	Tipo gallo	Efectos	"

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

En la Caspoda.-

OBSERVACIONES: _____

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: [*Signed*]

CLINICAL TOXICOLOGICAL SHEET

First names: Zacarías Last Names: García Chavez

Age: 70 Nationality: Colombian Parish/Village: Puerto Nuevo

County/Municipality: Sucumbios Province/Department: Putumayo

Occupation: Farmer Place of work: temporary worker

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headaches Insomnia Depression Vertigo/dizziness Disorientation temp/esp X Other: General discomfort	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough: dry/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: General Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Itchiness, Fever		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other plaguicides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **700 meters**
No

When did the events occur? 17 August
How many times a day did the aircraft pass over? 5 days (4-5 planes)
How many days were the fumigations conducted? 3-4 times
What could you see was affected by the fumigations? _____

X Sources of water Crops
X People **X** Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Elizabeth Andrade	64	All exactly the same
Elizabeth Garcia	17	All exactly the same
Elisa Garcia	24	All exactly the same
Norberto Garcia	42	All exactly the same
Daniel Garcia	7	All exactly the same
Jairo Garcia	6	All exactly the same
Ever Garcia	2 1/2	All exactly the same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: Itchiness persists

(14)

acción ecológica

Fecha de reporte: 12/Sept/2002.

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Zacarias Eg. Apellidos: Garcia Chavez

Edad: 70a Nacionalidad: Ecuatoriano. Parroquia/Vereda: Pto Nuevo.

Cantón/Municipio: Sucumbíos. Provincia/ Departamento: Sucumbíos

Ocupación: Campesino. Lugar de trabajo: parcelero

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Malestar gral.	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Rubicto generalizado.	☐ Ulceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: "Nausea". Fiebre.

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? ____
- [x] Ganadería — qué tipo de ganados? ____
- [x] Avicultura — qué tipo de aves? ____
- [ ] Pisicultura — qué tipo de peces? ____
- [ ] Otros — especifique ____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[x] Rocky	[x] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[x] Patrol	[x] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[x] Squadron	[x] Faena (Proficol)
[ ] Ranger	[x] Banox	[x] Ranger	[x] Regio (Quimor)
[ ] Rodeo	[ ] Super	[x] Fuente	[x] Sunup (Sundat)
[ ] Atila	[x] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ____

¿Ha notado cambios, molestias o efectos en la salud? ____

¿Desde hace cuanto tiempo? ____

¿Cuál cree que es la causa? ____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] ~~Si~~ Especifíque a qué distancia 700 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 17 Agosto.

¿Cuántas veces al día sobre volaron las avionetas? 5 días (4-5 avionetas).

¿Por cuantos días se realizaron las fumigaciones? 3-4 veces.

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) ____

Otros afectados

Otras personas de la familia afectados.

Nombre	ELIZABETH	ANDRADE	Edad 64	Efectos
Nombre	"	GARCIA.	Edad 17	Efectos
Nombre	ELISA	"	Edad 24	Efectos
Nombre	NORBERTO	"	Edad 42	Efectos
Alguna mujer embarazada?		"	7	
Nombre	DANIEL	"	Edad 6	Efectos
	DIEGO			
	EMER			

TODOS GRADIENTE LEVE.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: La vaquita los pasto.

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Edith Last Names: Garcia

Age: 22 Nationality: Colombian Parish/Village: Puerto Nuevo

County/Municipality: Pacayacu Province/Department: Sucumbios

Occupation: Farmer Place of work: Day laborer

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headaches Insomnia Depression X Vertigo/dizziness Disorientation temp/esp X Other: Bone pain	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: General Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fatigue and despair, as intoxicated Diarrhea having drunk the fumigated water		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance: **Directly above and at 700 meters**.
No

When did the events occur? _____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water Crops
X People **X** Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Salomon Ruiz	82	The same
Mario	47	
R N	4 months	General boils all over the skin. Skin infection. Impetigo on legs, feet and left shoulder
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They were at home when the spraying occurred and the child began having skin problems. Before the spraying occurred, the boy was chubby and had no skin problems.

acción ecológica

Fecha de reporte: 12/Sept/2002 (13)

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: EDITH GARCIA. Apellidos:

Edad: 22 Nacionalidad: Colomb. Parroquia/Vereda: PTO ~~[illegible]~~ NUEVO

Cantón/Municipio: PACAYACU Provincia/ Departamento: SUCUMBIOS

Ocupación: Campesino. Lugar de trabajo: igual.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: .... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: .... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros: Dolor huesos.	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otrós:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: PRURITO GENERALIZADO.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fatiga y desesperación, como a toxicarse. Diarrea al tomar las aguas que fumigaron.

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — [ ] qué tipo de cultivos? ______
- [ ] Ganadería — [ ] qué tipo de ganados? ______
- [ ] Avicultura — [ ] qué tipo de aves? ______
- [ ] Pisicultura — [ ] qué tipo de peces? ______
- [ ] Otros — especifique ______

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ______

¿Ha notado cambios, molestias o efectos en la salud? ______

¿Desde hace cuanto tiempo? ______

¿Cuál cree que es la causa? ______

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia ENCIMA. y A 700 metros!
- [ ] No

¿En qué fecha sucedieron los hechos? ______

¿Cuántas veces al día sobre volaron las avionetas? ______

¿Por cuantos días se realizaron las fumigaciones? ______

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [ ] Cultivos
- [x] Personas
- [x] Viviendas

Otros (especifique) ______

Otros afectados

Otras personas de la familia afectados.

Nombre	SALOMON RUIZ	Edad	82	Efectos	LO MISMOS
Nombre	MARIO	Edad	47	Efectos	
Nombre	R.N.	Edad	4m	Efectos	granería generalizada, sólo. Infección de piel. Impétigo. → en manos, pies y hombros [illegible]
Nombre		Edad		Efectos	

Alguna mujer embarazada?

Nombre		Edad		Efectos	

Otros efectos

ANIMALES:			**PLANTAS:**		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Estaban en la casa cuando fumigaron y al niño le empezó a salir el problema en la piel. Antes de la fumigación el niño estaba gordito y no tenía problemas en la piel.

* Blood sample

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Jose Felix Last Names: Guerga Rodriguez
Age: 27 Nationality: _____ Parish/Village: _____
County/Municipality: Puerto Nuevo Province/Department: _____
Occupation: Farmer Place of work: Puerto Nuevo

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia ……. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Cough dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Intense skin boils	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	He was sprayed directly while he was in the crops. * A blood sample was taken.		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)

Annex 31

Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **Directly above**
No

When did the events occur? 7 September
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could have been affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected: Alone		
Name	**Age**	**Effects**
		Alone
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

(16)

acción ecológica

Fecha de reporte: 12/Sept/2002
Oganización:
C.I.:

TOMA DE SANGRE

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Jose Felix — Apellidos: Gvarga Rodriguez
Edad: 37a — Nacionalidad: Varon — Parroquia/Vereda:
Cantón/Municipio: Pto Nuevo — Provincia/ Departamento:
Ocupación: Campesino. — Lugar de trabajo: Pto Nuevo.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: .... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: .... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Granos en piel, picazón.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fue fumigado directamente mientras estaba en los cultivos.

(*) Se le toma muestra de sangre.

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — qué tipo de cultivos? _____
- ☐ Ganadería — qué tipo de ganados? _____
- ☐ Avicultura — qué tipo de aves? _____
- ☐ Pisicultura — qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

☒ Si — Especifíque a qué distancia GNCIHA.

☐ No

¿En qué fecha sucedieron los hechos? 7 Septiembre.

¿Cuántas veces al día sobre volaron las avionetas? —

¿Por cuantos días se realizaron las fumigaciones? —

¿Qué pudo verse afectado por las fumigaciones?: —

- ☐ Fuentes de agua
- ☐ Cultivos
- ☐ Personas
- ☐ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre ~~LEONIDAS~~. Edad ~~60~~ Efectos → Sob.

Nombre Edad Efectos

Nombre Edad Efectos

Nombre Edad Efectos

Alguna mujer embarazada?

Nombre Edad Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: _____

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: José Hilberto Last Names: Reyes Ramirez

Age: 38 Nationality: Ecuadorian Parish/Village: Puerto Nuevo

County/Municipality: Pacayacu Province/Department: Sucumbios

Occupation: _____ Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: General Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fever, Chills		

What activity do you perform in your farm:

X Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Annex 31

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **400 meters**
No

When did the events occur? 17 August
How many times a day did the aircraft pass over? A lot (3-4) 5 planes
How many days were the fumigations conducted? 5 days
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Carolina	11	All the same
Luz Dori	6	All the same
Nidia Cristina	33	All the same
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: The itching is still present. A coffee-like powder was poured on everything at a distance of 1500 meters. It's not the chemical, it is something else. The last day they poured the "gocterra" and then went away. (It was around the 21st). After 5 days, the rain began.

(15)

acción ecológica

Fecha de reporte: 12/Sep/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: José Wilberto Apellidos: Reyes Ramírez

Edad: 38 Nacionalidad: Ecuador. Parroquia/Vereda: Pto Nuevo

Cantón/Municipio: Pacayacu Provincia/ Departamento: Sucumbíos

Ocupación: Lugar de trabajo:

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Picor y quemazón	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☒ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fiebre, cefalea y

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [X] Agricultura — [ ] qué tipo de cultivos? ____
- [ ] Ganadería — [ ] qué tipo de ganados? ____
- [ ] Avicultura — [ ] qué tipo de aves? ____
- [ ] Pisicultura — [ ] qué tipo de peces? ____
- [ ] Otros — especifique ____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ____

¿Ha notado cambios, molestias o efectos en la salud? ____

¿Desde hace cuanto tiempo? ____

¿Cuál cree que es la causa? ____

¿Se han realizado fumigaciones aéreas en su zona?

[X] Si — Especifíque a qué distancia ~~[illegible]~~ A. 400 m.

[ ] No

¿En qué fecha sucedieron los hechos? 17 Agosto.

¿Cuántas veces al día sobre volaron las avionetas? Bastantes (3-4) 5 avionetas.

¿Por cuantos días se realizaron las fumigaciones? 5 días.

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique) ____

Otros afectados

Otras personas de la familia afectados.

Nombre	Edad	Efectos
Carolina.	11a	Todos igual.
Luz Dori	60	
Nidia Cristina.	33	

Alguna mujer embarazada?

Nombre ____ Edad ____ Efectos ____

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Se mantiene la [illegible]
Echaron un polvo café a 1000-1500 metros. No es el químico, es otra cosa. → El último día echaron "esa bacteria" y después se alejaron. (Hasta el 21) A los [illegible] días de la bacteria [illegible]

P* Blood sample

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Lucelia Last Names: Torres García
Age: 53 Nationality: Colombian Parish/Village: Puerto Nuevo
County/Municipality: _____ Province/Department: _____
Occupation: Farmer Place of work: _____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	X Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	X Dysnea Other:	Wheeze
Skin	Dermatitis X Other: General Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

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Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **200 meters**
No

When did the events occur? 1 month _____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		They all suffered the same effects
Name	**Age**	**Effects**
Alberto	52	Fever, Strong Dysnea
Jovana	7	Fever, Strong Dysnea
Soraida	32	Fever, Strong Dysnea
Marcelo	22	Fever, Strong Dysnea
R N Andrea	10	Fever, Strong Dysnea
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: Received “rain water” from the planes.

(17)

acción ecológica

Fecha de reporte: 12/(SEP)/2002

Oganización:

C.I.:

DOM. DE SANGRE

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Lucrecia Tapuy Garcia Apellidos:

Edad: 53 Nacionalidad: Colombiana Parroquia/Vereda: PTO NUEVO.

Canton/Municipio: Provincia/ Departamento:

Ocupación: Campesina. Lugar de trabajo:

Signos y síntomas

Gastrointestinales	☒ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☒ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotension	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
culares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☒ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: PRURITO GENERALIZADO.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

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Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — ☐ qué tipo de cultivos? _____
- ☐ Ganadería — ☐ qué tipo de ganados? _____
- ☐ Avicultura — ☐ qué tipo de aves? _____
- ☐ Pisicultura — ☐ qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☒ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candèla Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☒ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☒ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☒ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☒ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☒ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☒ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☒ cafeteros)
		☒ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- ☒ Si — Especifíque a qué distancia 200 m.
- ☐ No

¿En qué fecha sucedieron los hechos? 1 mes.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☐ Fuentes de agua
- ☒ Cultivos
- ☒ Personas
- ☐ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre Alberto. Edad 52 Efectos → Todos se recuperaron igual.

Nombre Jovanya. Edad 7a Efectos

Nombre Geraldy. Edad 3a Efectos → Fiebre

Nombre Marcela. Edad 3a Efectos

Alguna mujer embarazada?

Nombre RN Andrea. Edad (10) Efectos → Disca perte

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: Recibes "agua lluvia" de las avionetas.

* Blood sample

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature :_____*[Signed]*_____

CLINICAL TOXICOLOGICAL SHEET

First names: Sabina_____Last Names: Encarnación_____

Age: 37_____ Nationality: Ecuadorian_ _ Parish/Village:Playera Oriental(18 families)

County/Municipality: Cayasu_____Province/Department: Sucumbios_____

Occupation: Farmer_____ Place of work: Owned farm_____

Signs and symptoms			
Gastrointestinal	X Abdominal Pain X Vomiting Burning Other:	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headaches Insomnia Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Dry cough/ productive Pulmonary edema	Dysnea X Other: Burning throat	Wheeze
Skin	X Dermatitis X Other: Rashes all over the body	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	She only has the headaches remaining, and a lack of appetite		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

Annex 31

ECUADOR		COLOMBIA	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **200 meters**
No

When did the events occur? 2-7 September and Friday 6 September
How many times a day did the aircraft pass over? 3 hours of fumigating (5-6 planes)
How many days were the fumigations conducted? 2-7 September and Friday 6 September
What could you see was affected by the fumigations? _____

Sources of water Crops
People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Marcelino Riveda	38	All the same, no variation.
Nelson Riveda	15	All the same, no variation.
Mauricio Riveda	13	All the same, no variation.
Nelly Riveda	9	All the same, no variation.
Glenda Riveda	8	All the same, no variation.
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: They do not use chemicals.

acción ecológica

Fecha de reporte: 12/ Sep/ 2002

Oganización:

C.I.:

Firma

TOMA DE SANGRE

HOJA CLINICA TOXICOLOGICA

Familias 4 (18)

Nombres: Sabina Apellidos: Encarnación Encarnación

Edad: 37a Nacionalidad: Ecuat Parroquia/Vereda: ~~CHONE~~ PLAYERA ORIENTAL

Cantón/Municipio: RA CASAIN Provincia/ Departamento: SUCUMBIOS

Ocupación. Campesina Lugar de trabajo: Finca propia

Signos y síntomas

Gastrointestinales	[X] Dolor abdominal [X] Vómitos [ ] Quemazón [ ] Otros:	[X] Diarrea [ ] Espasmos intestinales [ ] Incontinencia rectal	[ ] Náuseas [ ] Hiperperistaltismo
Cardio - circulatorio	[ ] Bradicardia: ..... ppm [ ] Hipertensión [ ] Cianosis [ ] Otros:	[ ] Taquicardia: ..... ppm [ ] Hipotensión	[ ] Arritmias [ ] Palidez
Neurológicos - psíquicos	[X] Cefaleas [ ] Insomnio [ ] Depresión [ ] Vértigos/mareos [ ] Desorientación tem/esp [ ] Otros:	[ ] Alter. Comportamiento [ ] Somnolencia [ ] Euforia í Sudoración [ ] Parestesias [ ] Inconsciencia	[ ] Convulsiones epileptifor. [ ] Ansiedad [ ] Salivación [ ] Arreflexia [ ] Shock
Neuro - Musculares	[ ] Parálisis [ ] Otros: Dolor muscular	[X] Perdida de fuerzas	[ ] Trast. del lenguaje
`culares	[X] Irritación conjuntival [ ] Midriasis [ ] Otros:	[ ] Alterac. Visuales [ ] Dolor ocular	[X] Lagrimeo í Miosis
Respiratorios	[X] Tos : seca / productiva [ ] Edema pulmonar	[ ] Disnea [ ] Otros: Ardor Garganta	[ ] Sibilancias
Piel	[X] Dermatitis [ ] Otros: ERRADICADA CON TODO EL CUERPO	[ ] Úlceras	[ ] Sudoración con sangre
Renales / Urinarios	[ ] Albuminuria [ ] Incontinencia urinaria	[ ] Anuria [ ] Otros:	[ ] Hematuria
Hematologicos	[ ] Leucocitosis [ ] Hiperglucemia	[ ] Trombocitopenia [ ] Otros:	[ ] Anemia
Hepáticos	[ ] [ ] Otros:		

Otros y Observaciones: Solo le queda el dolor de cabeza i falta de apetito

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — qué tipo de cultivos? 7
- [ ] Ganadería — qué tipo de ganados?
- [ ] Avicultura — qué tipo de aves?
- [ ] Pisicultura — qué tipo de peces?
- [ ] Otros — especifique

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza

¿Ha notado cambios, molestias o efectos en la salud?

¿Desde hace cuanto tiempo?

¿Cuál cree que es la causa?

¿Se han realizado fumigaciones aéreas en su zona?

[X] Si — Especifíque a qué distancia 200 metros

[ ] No

¿En qué fecha sucedieron los hechos? 5-6 avionetas.

¿Cuántas veces al día sobre volaron las avionetas? 3 horas fumigaban.

¿Por cuantos días se realizaron las fumigaciones? 2-7 sept el viernes 6

¿Qué pudo verse afectado por las fumigaciones?:

- [ ] Fuentes de agua
- [ ] Cultivos
- [ ] Personas
- [ ] Viviendas

Otros (especifique)

Otros afectados

Otras personas de la familia afectados.

Nombre	Marcelino Rivera	Edad 38	Efectos	Todos igual, ninguna
Nombre	Salvia Encarnación	Edad -	Efectos	variación.
Nombre	Nelson Rivera	Edad 15	Efectos	
Nombre	Mauricio	Edad 13	Efectos	

Alguna mujer embarazada?

Nombre	Nelly	Edad 9	Efectos
	Graciela	8	

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: No usan químicos. →

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Santa Angelina Last Names: Calero
Age: 40 Nationality: Ecuadorian Parish/Village: La Playera Oriental
County/Municipality: _____ Province/Department: _____
Occupation: Farmer Place of work: Owned farm

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia ……. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone pain	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	X Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Dry cough/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis X Other: General Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fatigue		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)

Annex 31

Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **200 meters**
No

When did the events occur? 6 September
How many times a day did the aircraft pass over? 10 to 2 in the afternoon / 6 planes, 5 helicopters

How many days were the fumigations conducted? 2 days
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Hernan Calero	22	All had the same symptoms
Maria Calero	17	All had the same symptoms
Vicente Encarnación	15	All had the same symptoms
Pedro	10	All had the same symptoms
Juan	5	All had the same symptoms
Rosa Encarnación	21	All had the same symptoms
Roberto Encarnación	6 months	All had the same symptoms. Plus Vomiting.
Jacinto Encarnación	5	All had the same symptoms. Vomiting; rashes, Boils; and later
Segundo Encarnación	27	All had the same symptoms
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effect**

OBSERVATIONS:

(9)

acción ecológica

Fecha de reporte: 12/Sept/2002

Oganización:

C.I.:

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Santa Angelita Apellidos: Calero

Edad: 40 a Nacionalidad: Ecuat. Parroquia/Vereda: La Playera Oriental.

Cantón/Municipio: Provincia/ Departamento:

Ocupación: Campesina. Lugar de trabajo: Finca propia

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: Dolor huesos.	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☒ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros: Eritrito Gravado	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones: Fatiga.

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — [ ] qué tipo de cultivos? ______
- [ ] Ganadería — [ ] qué tipo de ganados? ______
- [ ] Avicultura — [ ] qué tipo de aves? ______
- [ ] Pisicultura — [ ] qué tipo de peces? ______
- [ ] Otros — especifique ______

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ______

¿Ha notado cambios, molestias o efectos en la salud? ______

¿Desde hace cuanto tiempo? ______

¿Cuál cree que es la causa? ______

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 200 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 6 Sept.

¿Cuántas veces al día sobre volaron las avionetas? → 10 – 2 tarde / 6 avionetas 5 helicop[illegible]

¿Por cuantos días se realizaron las fumigaciones? 2 días.

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [ ] Viviendas

Otros (especifique) ______

Otros afectados

Otras personas de la familia afectados.

Nombre	Edad	Efectos
HERNAN CALERO	22	
MARÍA " "	17	
VICENTE ENCARNACIÓN	15	
PEDRO	10	
JUAN	5	

TODOS PADECIERON IGUAL

Alguna mujer embarazada?

Nombre ROSA ENCARNACIÓN — Edad 21 — Efectos

Robert. 6 meses

Jacinto 3 años

Segundo Encarnación 2

→ IGUAL + VOMITOS, sarpullido 1º Ampollas después Carito

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: ______

Date of report: 12 Sept 2002
Organization: _____
C.I.: _____
Signature: *SIGNED*

CLINICAL TOXICOLOGICAL SHEET

First names: Lucía Last Names: Calero

Age: 40 Nationality: Ecuadorian Parish/Village: Playera Oriental

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting X Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia (Hands) Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Fatigue, Burning throat		

What activity do you perform in your farm:

Agricultural What type of crops? Livestock What type of cattle?
Aviculture What type of birds? Aquaculture What type of fish?
Other Please specify:

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

Annex 31

Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?
X Yes Please specify at what distance **2000 m – 3000 m**
No
When did the events occur? 6 September
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____
X Sources of water **X** Crops
X People Houses
Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
María Encarnación	15	Fungus
Angel	50	Healthy, they don't have anything.
Francisco	20	Healthy, they don't have anything.
Victor Antonio	14	Healthy, they don't have anything.
Maria	15	Healthy, they don't have anything.
Silvio	10	Healthy, they don't have anything.
Olger	7 weeks	Healthy, they don't have anything.
Elsa	1	Healthy, they don't have anything.
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: "We are poor people working and we don't feel anything"

acción ecológica

Fecha de reporte: 12/Sept/2007. 10

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Luis Calero Apellidos: _____

Edad: 40 a Nacionalidad: Ecuat. Parroquia/Vereda: Playera Oriental.

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: Campesino Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☒ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias manos. ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☐ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		
Otros y Observaciones:	Fatiga. Quemazon de garganta.		

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [ ] Agricultura — [ ] qué tipo de cultivos? ______
- [ ] Ganadería — [ ] qué tipo de ganados? ______
- [ ] Avicultura — [ ] qué tipo de aves? ______
- [ ] Pisicultura — [ ] qué tipo de peces? ______
- [ ] Otros — especifique ______

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ______

¿Ha notado cambios, molestias o efectos en la salud? ______

¿Desde hace cuanto tiempo? ______

¿Cuál cree que es la causa? ______

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 2-3.000 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 6 Sep

¿Cuántas veces al día sobre volaron las avionetas? ______

¿Por cuantos días se realizaron las fumigaciones? ______

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [ ] Viviendas

Otros (especifique) ______

Otros afectados

Otras personas de la familia afectados.

Nombre María Encarnación Edad 15a Efectos → Hongo

Nombre Angel (50) Edad Efectos

Nombre Francisco (20a), [illegible] María (15) Edad Efectos

Nombre Víctor Antonio (14a) Silvio (10) Edad Efectos

Alguna mujer embarazada?

Nombre Olger ([illegible]) Elsa (1a) Edad Efectos

Sanos. No sintieron nada.

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: "Somos pobres trabajando y no sentimos nada".

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Rosa Elvira _____ Last Names: Mañay _____
Age: 26 _____ Nationality: Ecuadorian _ Parish/Village: Playera Oriental _____
County/Municipality: _____ Province/Department: _____
Occupation: Farmer _____ Place of work: Owned farm _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalisis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache Insomnia Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness X Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	X Cough: dry / productive Pulmonary edema	X Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 31

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **400 meters**
No

When did the events occur? 6 September
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Angel Naigua	37	Chronic Headaches, Dizziness
Micay Edison	3	Fever
Miriam	7	Healthy
Wilmer	5	Healthy
Juan Pasa	6	Healthy
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

acción ecológica

Fecha de reporte: 12/Sept/2002

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Rosa Elvira Apellidos: Mañay

Edad: 26 Nacionalidad: Ecuat. Parroquia/Vereda: PLAYGRA ORIENTAL

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: Campesina Lugar de trabajo: Propio

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☐ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☒ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☒ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☒ Tos : seca / productiva ☐ Edema pulmonar	☒ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: Pruritos	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? ____
- [x] Ganadería — qué tipo de ganados? ____
- [ ] Avicultura — qué tipo de aves? ____
- [ ] Pisicultura — qué tipo de peces? ____
- [ ] Otros — especifique ____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[x] Clifosato	[x] Roundup	[x] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[x] Rocket	[x] Glifosol (Coljap)
[ ] Glifonox	[x] Candela Super	[x] Rocky	[x] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[x] Faena	[x] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[x] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[x] Faena (Proficol)
[ ] Ranger	[ ] Banox	[ ] Ranger	[x] Regio (Quimor)
[ ] Rodeo	[ ] Super	[x] Fuente	[x] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[x] Batalla (Bayer)	[x] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[x] Glifonox (Cristal)	[x] (Agroquímicos del
		[x] Glyfoagri (Disagri)	[x] Cauca)
		[x] Socar (Agrevo)	[x] Tunda (Fertizantes
		[x] Crossout (Agroser)	[x] cafeteros)
		[x] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza ____

¿Ha notado cambios, molestias o efectos en la salud? ____

¿Desde hace cuanto tiempo? ____

¿Cuál cree que es la causa? ____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 400 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 6 Sept

¿Cuántas veces al día sobre volaron las avionetas? ____

¿Por cuantos días se realizaron las fumigaciones? ____

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua —?
- [x] Cultivos
- [x] Personas
- [ ] Viviendas

Otros (especifique) ____

Otros afectados

Otras personas de la familia afectados.

Nombre	ANGEL NAIOOA	Edad 37	Efectos Cefalea - Mareos
Nombre	MICAY EDISON	Edad 3a	Efectos Temperatura
Nombre	MIRIAN	Edad 7a	Efectos
Nombre	WILMER	Edad 5a	Efectos
Alguna mujer embarazada?	JUAN MAJA	69	Sanos.
Nombre		Edad	Efectos

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: ____

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Carmen Last Names: Pineda

Age: 33 Nationality: Ecuadorian Parish/Village: Playera Oriental

County/Municipality: _____ Province/Department: _____

Occupation: Farmer Place of work: _____

Signs and symptoms			
Gastrointestinal	Abdominal Pain Vomiting Burning Other:	Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia …….. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic Headache X Insomnia (stress) Depression Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion X Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis Others:	Loss of strength	Speech disorder
Ocular	Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	Teariness / Myosis
Respiratory	Dry cough/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	Dermatitis Other:	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:			

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)
Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)

Annex 31

Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **1000m to 2000m**
No

When did the events occur? 6 September _____
How many times a day did the aircraft pass over? _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Sergio	16	Healthy
Patricio	14	Dizziness
Angelita	12	Healthy
Jaqueline	10	Healthy
Diana	7	Healthy
Freddy	4	Healthy
Robinson	2	Skin boils
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS:

acción ecológica

Fecha de reporte: 12/Sept/2002 (9)

Oganización: _____

C.I.: _____

Firma

HOJA CLINICA TOXICOLOGICA

Nombres: Carmen Apellidos: Pineda.

Edad: 33 Nacionalidad: Ecuat. Parroquia/Vereda: PLAYERA ORIENTAL.

Cantón/Municipio: _____ Provincia/ Departamento: _____

Ocupación: Campesina Lugar de trabajo: _____

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☐ Vómitos ☐ Quemazón ☐ Otros:	☐ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos Stress.	☒ Cefaleas ☒ Insomnio ☐ Depresión ☐ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☒ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros:	☐ Perdida de fuerzas	☐ Trast. del lenguaje
Oculares	☐ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☐ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☐ Dermatitis ☐ Otros:	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Otros y Observaciones:

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- [x] Agricultura — qué tipo de cultivos? _____
- [ ] Ganadería — qué tipo de ganados? _____
- [ ] Avicultura — qué tipo de aves? _____
- [ ] Pisicultura — qué tipo de peces? _____
- [ ] Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
[ ] Roundup	[ ] Clifosato	[ ] Roundup	[ ] Glyfosan (Agroser)
[ ] Glifosato	[ ] Mon 0139	[ ] Rocket	[ ] Glifosol (Coljap)
[ ] Glifonox	[ ] Candela Super	[ ] Rocky	[ ] Stelar (Dow)
[ ] Pillaround	[ ] Caldeon	[ ] Faena	[ ] Panzer (Invequímica)
[ ] Glifosato 480 g/l	[ ] Glialca	[ ] Patrol	[ ] Glyphogan (Magan)
[ ] Gliphogan	[ ] Glifosan	[ ] Squadron	[ ] Faena (Proficol)
[ ] Ranger	[x] Banox	[ ] Ranger	[ ] Regio (Quimor)
[ ] Rodeo	[ ] Super	[ ] Fuente	[ ] Sunup (Sundat)
[ ] Atila	[ ] Rondo	[ ] Batalla (Bayer)	[ ] Glifosato Agrogen
[ ] Arbex	[ ] Rocket	[ ] Glifonox (Cristal)	[ ] (Agroquímicos del
		[ ] Glyfoagri (Disagri)	[ ] Cauca)
		[ ] Socar (Agrevo)	[ ] Tunda (Fertizantes
		[ ] Crossout (Agroser)	[ ] cafeteros)
		[ ] Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- [x] Si — Especifíque a qué distancia 1000 - 1200 m.
- [ ] No

¿En qué fecha sucedieron los hechos? 6 sept.

¿Cuántas veces al día sobre volaron las avionetas? _____

¿Por cuantos días se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- [x] Fuentes de agua
- [x] Cultivos
- [x] Personas
- [ ] Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre Sergio → Edad 16a Efectos

Nombre Patricio → Edad 14a Efectos → Manos, SANOS.-

Nombre Angelita → Edad 12a Efectos

Nombre Jaqueline → Edad 10a Efectos

Alguna mujer embarazada?

Nombre Diana → 7 a

Nombre Freddy Edad 4a Efectos

Nombre [illegible] → 2a → granos en piel

Otros efectos

ANIMALES:			PLANTAS:		
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos
#	Tipo	Efectos	#	Tipo	Efectos

OBSERVACIONES: _____

* Blood sample

Date of report: 12 September 2002
Organization: _____
C.I.: _____
Signature: *[Signed]*

CLINICAL TOXICOLOGICAL SHEET

First names: Benilde Last Names: Pineda
Age: 40 Nationality: _____ Parish/Village: Palma Seca (18 Families)
County/Municipality: _____ Province/Department: _____
Occupation: Farmer Place of work: Owned farm

Signs and symptoms			
Gastrointestinal	Abdominal Pain X Vomiting X Burning X Other: Sore throat	X Diarrhea Intestinal Spasms Rectal incontinence	Nausea Hyperistalsis
Cardio-circulatory	Bradycardia ……. ppm Hypertension Cyanosis Other:	Tachycardia: …….. ppm Hypotension	Arrhythmias Pallor
Neurological- mental	X Chronic headache X Insomnia (Stress) Depression X Vertigo/dizziness Disorientation temp/esp Other:	Behav. Alteration Drowsiness Euphoria / Sweatiness Paresthesia Unconsciousness	Epileptic Convulsion Anxiety Salivation Arreflexia Shock
Neuro-muscular	Paralysis X Others: Bone ache	X Loss of strength	Speech disorder
Ocular	X Ocular irritation Mydriasis Other:	Visual Alteration Ocular pain	X Teariness / Myosis
Respiratory	Dry cough/ productive Pulmonary edema	Dysnea Other:	Wheeze
Skin	X Dermatitis X Other: Boils with general pruritus	Ulcers	Sweatiness with blood
Renal / Urinary	Albuminuria Urinary incontinence	Anury Other:	Hematuria
Hematological	Leukocytosis Hyperglycemia	Thrombocytopenia Other:	Anemia
Hepatic	Other:		
Other and Observations:	Discomfort when urinating		

What activity do you perform in your farm:

Agricultural	What type of crops?	Livestock	What type of cattle?
Aviculture	What type of birds?	Aquaculture	What type of fish?
Other	Please specify:		

Do you use any of the following pesticides on your lands? Please indicate which one

ECUADOR		**COLOMBIA**	
Roundup	Clyphosate	Roundup	Glyphosan (Agroser)

Annex 31

Glyphosate	Mon 0139	Rocket	Glyphosol (Coljap)
Glyphonox	Candela Super	Rocky	Stelar (Dow)
Pillaround	Caldeon	Faena	Panzer (Invechemical)
Glyphosate 480 g/l	Glyalca	Patrol	Glyphogan (Magan)
Glyphogan	Glyphosan	Squadron	Faena (Proficol)
Ranger	Banox	Ranger	Regio (Quimor)
Rodeo	Super	Source	Sunup (Sundat)
Atila	Rondo	Batalla (Bayer)	Glyphosate Agrogen
Arbex	Rocket	Glifonox (Crystal)	Agrochemicals of Cauca)
		Glyfoagri (Disagri)	Tunda (coffee fertilizers)
		Socar (Agrevo)	
ç		Crossout (Agroser)	
		Candela (Agroser)	

Please specify other pesticides that you use _____
Have you noticed any changes, disorders or effects on your health? _____
When did you start noticing them? _____
What do you think the cause is? _____
Have fumigations been conducted in your area?

X Yes Please specify at what distance **200 meters**
No

When did the events occur? 6 September and all of the prior week _____
How many times a day did the aircraft pass over? 10 in one afternoon.
6 planes and 5 helicopters. _____
How many days were the fumigations conducted? _____
What could you see was affected by the fumigations? _____

X Sources of water **X** Crops
X People **X** Houses

Others: (please specify) _____

Other affected parties		
Other family members affected:		
Name	**Age**	**Effects**
Angel Salazar	50	They all have the same symptoms
Victor Salazar	24	They all have the same symptoms
Olger Salazar	18	They all have the same symptoms
Angel Salazar	15	They all have the same symptoms
Susana Salazar	12	They all have the same symptoms
Veronica	10	They all have the same symptoms
Carlos	8	They all have the same symptoms
Marcelino	5	They all have the same symptoms
Marco	3	They all have the same symptoms
Any pregnant women?		
Name	**Age**	**Effects**

Other effects					
Animal Quantity	**Type**	**Effects**	**Plant Quantity**	**Type**	**Effects**

OBSERVATIONS: Treatment is only water based. There is no money.

acción ecológica

Fecha de reporte: 12/Sept/2002

Oganización:

C.I.:

Firma

TOMA DE SANGRE

HOJA CLINICA TOXICOLOGICA

TAMIUAS 18

Nombres: BENILDE Apellidos: PINEDA

Edad: 40 Nacionalidad: Parroquia/Vereda: PALMA SECA

Cantón/Municipio: Provincia/ Departamento:

Ocupación: CAMPESINA Lugar de trabajo: FINCA PROPIA.

Signos y síntomas

Gastrointestinales	☐ Dolor abdominal ☒ Vómitos ☒ Quemazón ☐ Otros: DOLOR GARGANTA.	☒ Diarrea ☐ Espasmos intestinales ☐ Incontinencia rectal	☐ Náuseas ☐ Hiperperistaltismo
Cardio - circulatorio	☐ Bradicardia: ..... ppm ☐ Hipertensión ☐ Cianosis ☐ Otros:	☐ Taquicardia: ..... ppm ☐ Hipotensión	☐ Arritmias ☐ Palidez
Neurológicos - psíquicos	☒ Cefaleas ☒ Insomnio ☐ Depresión ☒ Vértigos/mareos ☐ Desorientación tem/esp ☐ Otros:	☐ Alter. Comportamiento ☐ Somnolencia ☐ Euforia í Sudoración ☐ Parestesias ☐ Inconsciencia	☐ Convulsiones epileptifor. ☐ Ansiedad ☐ Salivación ☐ Arreflexia ☐ Shock
Neuro - Musculares	☐ Parálisis ☐ Otros: DOLOR HUESOS.	☒ Perdida de fuerzas	☐ Trast. del lenguaje
culares	☒ Irritación conjuntival ☐ Midriasis ☐ Otros:	☐ Alterac. Visuales ☐ Dolor ocular	☒ Lagrimeo í Miosis
Respiratorios	☐ Tos : seca / productiva ☐ Edema pulmonar	☐ Disnea ☐ Otros:	☐ Sibilancias
Piel	☒ Dermatitis ☐ Otros: GRANOS CON PRURITO GENERALIZADO.	☐ Úlceras	☐ Sudoración con sangre
Renales / Urinarios	☐ Albuminuria ☐ Incontinencia urinaria	☐ Anuria ☐ Otros:	☐ Hematuria
Hematologicos	☐ Leucocitosis ☐ Hiperglucemia	☐ Trombocitopenia ☐ Otros:	☐ Anemia
Hepáticos	☐ ☐ Otros:		

Stress.

Otros y Observaciones: Muestras al envio.-

Annex 31

Relato de los hechos

¿A qué actividad se dedica en su finca?

- ☐ Agricultura — ☐ qué tipo de cultivos? _____
- ☐ Ganadería — ☐ qué tipo de ganados? _____
- ☐ Avicultura — ☐ qué tipo de aves? _____
- ☐ Pisicultura — ☐ qué tipo de peces? _____
- ☐ Otros — especifique _____

Usa alguno de los siguientes plaguicidas en sus tierras?. Señale cuál de ellos

ECUADOR		COLOMBIA	
☐ Roundup	☐ Clifosato	☐ Roundup	☐ Glyfosan (Agroser)
☐ Glifosato	☐ Mon 0139	☐ Rocket	☐ Glifosol (Coljap)
☐ Glifonox	☐ Candela Super	☐ Rocky	☐ Stelar (Dow)
☐ Pillaround	☐ Caldeon	☐ Faena	☐ Panzer (Invequímica)
☐ Glifosato 480 g/l	☐ Glialca	☐ Patrol	☐ Glyphogan (Magan)
☐ Gliphogan	☐ Glifosan	☐ Squadron	☐ Faena (Proficol)
☐ Ranger	☐ Banox	☐ Ranger	☐ Regio (Quimor)
☐ Rodeo	☐ Super	☐ Fuente	☐ Sunup (Sundat)
☐ Atila	☐ Rondo	☐ Batalla (Bayer)	☐ Glifosato Agrogen
☐ Arbex	☐ Rocket	☐ Glifonox (Cristal)	☐ (Agroquímicos del
		☐ Glyfoagri (Disagri)	☐ Cauca)
		☐ Socar (Agrevo)	☐ Tunda (Fertizantes
		☐ Crossout (Agroser)	☐ cafeteros)
		☐ Candela (Agroser)	

Especifique otros plaguicidas que usted utiliza _____

¿Ha notado cambios, molestias o efectos en la salud? _____

¿Desde hace cuanto tiempo? _____

¿Cuál cree que es la causa? _____

¿Se han realizado fumigaciones aéreas en su zona?

- ☒ Si — Especifíque a qué distancia 200 metros.
- ☐ No

¿En qué fecha sucedieron los hechos? 6 sept. y toda la semana anterior

¿Cuántas veces al día sobre volaron las avionetas? 10 - 1 tarde. - 6 avionetas y 5 helicópteros.

¿Por cuantos dias se realizaron las fumigaciones? _____

¿Qué pudo verse afectado por las fumigaciones?:

- ☒ Fuentes de agua
- ☒ Cultivos
- ☒ Personas
- ☒ Viviendas

Otros (especifique) _____

Otros afectados

Otras personas de la familia afectados.

Nombre	ANGEL	SALAZAR	Edad 50	Efectos
Nombre	VICTOR	SALAZAR	Edad 24	Efectos
Nombre	OLGER	"	Edad 18	Efectos
Nombre	ANGEL	"	Edad 15	Efectos

Alguna mujer embarazada? Susana "

Nombre			Edad 12	Efectos
	VERONICA		10	
	CARLOS		8	
	MARCELINO		5	
	MARCO		3	

TODOS IGUALES.-

Otros efectos

ANIMALES:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

PLANTAS:

#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos
#	Tipo	Efectos

OBSERVACIONES: Tratamiento solo con agua. → No hay síntomas.

Annex 32

Association of American Jurists, et al., *Report on Verification Mission, "Impacts in Ecuador of Fumigations in Putumayo Department under Plan Colombia"* (Oct. 2002)

Report on Verification Mission, "Impacts in Ecuador of fumigations in Putumayo as part of Plan Colombia,"

October 2002

We thank the Joint Armed Forces Command of Ecuador for enabling us to move about Ecuador's border territory, as well as local authorities of the communities we visited in Colombia for facilitating our access to the places we examined.

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Annex 32

0. EXECUTIVE SUMMARY

The constant concern about the hazards of spraying the herbicide glyphosate and its effects on Ecuador's border territory has brought together various organizations to conduct a verification mission aimed at determining how it has affected the population in Colombia and Ecuador living alongside the San Miguel River, in the sectors of Aguas Blancas, La Pedregosa, Nueva Granada, and Los Cristales, in Colombia, and Chone 2 and Puerto Nuevo, in Ecuador (see map). The results of this verification are as follows:

- The new fumigation period to eliminate illicit crops that started on July 28 in the Department of Putumayo, in Colombia, and on the border zone, in Ecuador, has triggered severe impacts on the population's health and on crops, animals, and ways of living.
- The work done by the multidisciplinary and inter-institutional team in the border zone and the calculation of distances with GPS from the points where there were fumigations up to the San Miguel River have made it possible to corroborate that no attention has been paid to the requests made by Ecuador's Ministry of Foreign Affairs or by the Ecuadorian Ambassador to Colombia, regarding the establishment of a buffer zone for the fumigations, preventing fumigation within a perimeter of 8 to 10 km from the San Miguel River (binational limit) inside Colombian territory.
- Regarding this, it was confirmed that fumigations are affecting Ecuadorian territory. In some cases, spraying extends up to the bank of the San Miguel River, and planes are infringing upon Ecuador's air space. In addition, because of the air currents chemicals drift into Ecuador and severely damage the way of life of Ecuador's border population.
- Medical tests have established a relationship between the symptomatology described by the population and that stemming from the inactivation of cholinesterase, which is the effect coming from organophosphates. The central nervous system is overstimulated, which causes the following: headache, dizziness, nausea, vomiting, stomachache, and weakness. To these symptoms must be added others that are specific to Roundup Ultra, characterized by intense eye and skin irritation.
- Blood samples drawn from inhabitants of the border zone call attention to the risk involved in fumigating a population that has chromosome fragility levels that are 17 times higher than normal. This situation poses questions about the incidence of recent fumigation in increasing chromosome aberrations that have been detected or, if they are due to other factors that have not as yet been determined, about the negative influence on a population that is already at risk. This situation is extremely sensitive, because chromosome vulnerability implies that cancer, mutations, malformations, and abortions may appear more easily.
- Inhabitants of the area reported having seen two different types of fumigations (one involving a whitish liquid and the other brown dust), and this has led us to analyze plant samples to discount the possibility that the biological agent *Fusarium oxysporum* is being used despite prohibitions currently in force. Should this be the case, it would mean that biological agents identified as biological weapons were being used, which would evidently have severe international implications. Although constraints for the technical analysis for detection prevented us from determining the species, the genus *Fusarium* was found in all of the samples that were taken, whether roots, leaves, or soil.
- The damage to both subsistence and cash crops, whether entire crops or a very large share of them, has affected this region's population, bringing it to the brink of a food crisis and forced displacement. These peoples are not receiving any health support or compensations to offset their losses.

1. BACKGROUND

Aerial fumigations, as part of the Plan Colombia, officially started in the Department of Putumayo on December 22, 2000. By January 28, 2001, about 29,000 hectares had been fumigation; during 2001, according to the U.S. Embassy in Colombia, 94,000 hectares were fumigated. The U.S. Administration is planning to expand the fumigation area to 150,000 hectares during 2002 and to 200,000 hectares during 2003, which will heighten socio-environmental and health impacts on the people in the border area.

1.a The chemical formula used

Although it has been impossible to confirm the chemical mix that is being sprayed, according to the technical parameters of the National Narcotic Drugs Council for the aerial fumigation of illicit crops, [1] the following amounts are being applied in the mix:

Plan load	300 – 450 gallons	1137 – 1705 liters
Effective unloading (of Roundup Ultra, with 43.9% of glyphosate)	23.4 liters/hectare (30 tp 50 drops/$cm^{2)}$	10.3 L/ha of glyphosate
Deposit of mix	0.4 – 0.7 mm^3/cm^2	40 – 70 liters/ha

The mix used contains: 44% of Roundup Ultra, whereas the label for use in the United States for Roundup Ultra permits concentrations of between 1.6% and 7.7% for the majority of uses and a maximum concentration of 29%. The U.S. label indicates that, under most conditions, the aerial application should not be over 1 liter (quart) per acre of the formulated product. In Colombia, the rate is equivalent to almost 4.5 times this amount. [2]

If it is estimated that a 300-gallon plane (1,137 liters) drops 40 L/ha of mix, with an effective drop of 23.4 L/ha of Roundup Ultra; this drop is equivalent to 10.3 L/ha of glyphosate in the form of IPA salts. This means that the glyphosate is applied in concentrations of 26%, not at the 1% rate recommended in the United States for land applications, with protection gear and aimed at farm weeds. To this situation must be added the fact that Cosmo Flux 411F multiplies the biological action of glyphosate fourfold.

1.b Impacts of fumigations in Colombia in 2001

The fumigations in Colombia have sparked a major debate, in view of the many reports of damage to licit crops and especially to the health of the population living in the areas adjacent to the areas of fumigation.

In the Municipality of Valle del Guamuez, which lies on the Ecuadorian border, a consolidated report on the impacts stemming from fumigations was issued: 1,551 persons had their health affected, 3,174 hectares of licit crops were destroyed, and 55,045 animals were affected or died, distributed across 44 precincts.

This report, prepared by the Police Station, [3] focuses on damage to crops and animals, broken down as follows:

Damage to crops and animals in the Valle del Guamuez (Colombia)- 2001					
Crops	**Has**	**%**	Animals	**N°**	**%**
Grasses	1,308	41.0%	Fish	34,150	62.0%
Banana	229	7.2%	Hens	8,632	15.7%
Corn	188	5.9%	Cows	1,038	1.9%
Yucca	163	5.1%	Guinea pigs	980	1.8%
Fruits	138	4.3%	Ducks	365	0.6%
Others	1,148	36.0%	Horses	155	0.3%
			Others	9,725	17.7%
Total	**3,174**	**100%**		**55,045**	

1.c Impacts on Ecuador of the fumigations in Colombia in 2001

In October 2000, the press reported the first impacts on health in Mataje (Esmeraldas) associated to the fumigations in the Department of Nariño, with 44 persons falling sick after the first fumigation (*El Comercio,* Quito, October 22, 2000).

In January, *El Comercio* reported on the impacts in the province of Sucumbíos stemming from fumigations in December (*El Comercio,* Quito, January 12, 2001).

Months later, 188 campesinos from different communities filed a report with the Office of the Human Rights Ombudsman in Lago Agrio, which was transferred to the Ombudsman in Quito, where its processing came to a standstill. The report set forth the claims of the campesinos of the parishes of General Farfán, Nueva Loja, Pacayacu, Dureno, and Tarapoa. The claim noted the following losses:

Damage to crops and animals in Sucumbíos (Ecuador)– 2001					
Crops	No. of hectares damaged	**Percentage**	**Animals**	**No. of dead animals**	**Percentage**
Coffee	1,215	47.4%	Fish	6,355	53.7%
Grasses	785	30.6%	Hens	4,681	39.6%
Bananas	182	7.1%	Pigs	315	2.7%
Rice	103	4.0%	Cows	188	1.6%
Corn	87	3.4%	Guinea pigs	117	1.0%
Cacao	79	3.1%	Ducks	73	0.6%
Fruit	53	2.0%	Dogs	49	0.4%
Yucca	51	2.0%	Horses	43	0.4%
Total	**2,560**		**Total**	**11,828**	

Despite huge loses for subsistence and household farming, no government official has traveled to the areas to check, in the field, the damage reported in this claim.

1.d Impacts of fumigations in Colombia in 2002

The second phase of fumigations started on July 28, 2002. Despite the short time that has elapsed, reports are piling up in the following institutions:

- The Municipality of Puerto Asís [4] reported that, since August 11, 2002, it has been fumigated, and this has "affected more than 2,254 families (from 58 precincts), some of whom are beneficiaries of the Manual Eradication Program."

- A report from Agroamazonía [5] dated September 23, 2002 describes how palm heart plantations have been affected in the Valle del Guamuez, Puerto Asís, and Orito. Out of 32 palm heart growers covering 54.8 hectares of sown crops, damage has been reported in 43.8 hectares, which accounts for 80% of farmed area.

- The Office of the Human Rights Ombudsman for the Colombian People [6] asserted the following on October 9: "3.9.5 In addition to the previous reports, in the department there have been complaints about harm to the health of the inhabitants, presumably caused by fumigations. The report of the Deputy Department of Public Health of the Department of Putumayo on the impacts of fumigations in various municipalities of this territorial institution informed that "(…) 4,883 (85%) of the 5,929 persons referred to in the complaint forms and interrogated by the officials of the Technical Assistance Unit of Orito and coming from 46.4% of the 282 precincts comprising the three municipalities, spoke about symptoms that can be attributed to the fumigation. The symptoms were associated to respiratory problems 29% (964), gastrointestinal problems 26.4% (876), skin problems 15.8% (524), psychological problems 1.9% (64), fever 15.5% (516), general indisposition 5.4% (179), dizziness 4.1% (32) and others 0.9% (29)". This report adds that, in the Hospital de la Hormiga, there was "a statistically significant rise in episodes of fever, diarrhea, abdominal pain, acute respiratory infections, and skin infections." The report concludes: "An epidemiological surveillance system for acute intoxication caused by pesticides and a nutritional surveillance system are required." [7]

1.e Impacts on Ecuador of fumigations in Colombia 2002

The "Santa Marianita" Association of Campesinos [8] of the Parish of General Farfán, comprised of 27 members, reported that after the recent fumigations in Colombia they have suffered from "skin and eye diseases, respiratory infections, fevers like those resulting from malaria, but tests turn out to be negative. Females animals have problems when giving birth and we have noted a fall in the production of corn, cacao, rice, bananas, to such an extent that we cannot get our investment back."

The Chone 2, Puerto Nuevo and La Playera communities on the Tetetes road, in the parishes of Pacayacu, reported damage to their crops and animals. Likewise, they spoke of severe damage and health problems in the border community of Cohembí.

1.f Government actions

On July 2, 2001, the Ecuadorian Government requested the Colombian Government:

- "that the applications of chemical formulas used on its territory take place **at least 10 kilometers away from the Ecuadorian border,** so as to prevent the dispersion caused by winds from reaching Ecuadorian territory and producing toxic effects on persons and plant life." [9]

The Ministry of Foreign Affairs of Colombia replied to this request [10] on July 14, 2001 and stated:

To check the distance of the fumigations made on the border, the verification mission entered Colombian territory and, with GPS equipment, proceeded to identify the zones fumigated in Colombia and their distance from the San Miguel River. It obtained the following results:

GPS points and distance to the border from Colombia					
Place	**Point**	**Elevation**	**18° North**	**UTM**	**Distance to Ecuador**
La Pedregosa (Col)	7	248 m	0317989	0029601	6 m
Nueva Granada (Col)	8	266 m	0318341	0031095	1,412 m
Nueva Granada (Col)	9	275 m	0318295	0031318	1,635 m
La Pedregosa (Col)	10	270 m	0318088	0030359	706 m
Los Cristales (Col)	14	270 m	0333976	0037515	8,285 m
Aguas Blancas (Col)	15	276 m	0332612	0035459	6,981 m
Aguas Blancas (Col)	16	292 m	0332616	0035463	6,986 m

- In Pedrera (point 7), six meters from the San Miguel River, signs of crops destroyed by fumigation, possibly from wind drifts, were found.

- At point 10, severe impacts were observed, since the area was sprayed directly at 706 meters away from the border.

- In the precinct of Nueva Granada (points 8 and 9), at 1,600 meters from the border, eye-witness accounts by the population reported that, between August 30 and September 6, planes fumigated directly onto their houses. As proof of this, on the football field, located in the middle of the town, there were large rings of chlorosis. The schoolteacher stated that her 35 students fell ill with headaches, sore and runny eyes, and fever.

- In Aguas Blancas (points 15 and 16), at a distance of 7 to 8 km from the border, there were clear signs that all kinds of crops had been destroyed.

- In Los Cristales (point 14), there were eye-witness accounts of airplanes flying over the houses and spraying them on August 1 and 18, 2002, without any consideration for how it would be affecting homes, food crops, and water sources.

GPS points and distance to border from Ecuador					
Place	**Point**	**Elevation**	**18° North**	**UTM**	**Distance to Colombia**
Frente La Pedregosa	12	257 m	0318397	0028996	186 m
Puerto Nuevo	17	276 m	0327151	0027838	13 m
Chone – 2	18	260 m	0331636	0025646	1,236 m
Chone – 2	19	255 m	0331462	0026463	584 m
Playera Oriental	20	263 m	0330474	0027463	526 m
Playera Oriental	21	257 m	0329942	0027781	743 m
Playera Oriental	22	253 m	0330071	0027817	622 m
Playera Oriental	23	277 m	0330098	0027662	702 m
Playera Oriental	24	256 m	0331031	0027533	Reference river 0 m
Chone - 2	26	261 m	0331624	0025628	1,257 m

- In La Playera Oriental and Chone 2 (between 1 and 1,257 m from the bank of the San Miguel River, evident damage from the fumigation of September 6, 2002 on the Colombian

side of the banks of the San Miguel River was observed. At all points, soil and plant samples were taken, health data on the population were gathered, and eye-witness accounts on social impacts were recorded.

- In front of La Pedregosa (point 12, at 186 m inside Ecuadorian territory) damage was found in the banana plantations and other crops, which showed signs of chlorosis (yellowing), as a result of the proximity of fumigations in Colombia. The accounts pointed out that these impacts stemmed from the fumigations done on the Colombian side between August 30 and September 6, 2002.

What was observed by the verification mission, the results from the samples that were taken, the eye-witness accounts that were recorded, and the interviews that were conducted enable us to assert that the fumigations in Colombia are taking place less than 10 kilometers away from the Ecuadorian border. On the basis of the above, it can be concluded that, at the time of the mission, the request made by the Ministry of Foreign Affairs and the Ecuadorian Ambassador to Colombia had not been met.

In some cases, there were fumigations as close as the banks of the San Miguel River. The drifting of sprayed products has caused severe harm to the Ecuadorian border population.

3.b Objective 2: Check the reports of impacts of fumigations on the health of the inhabitants of the zone and corroborate a report on the death of five persons in Cohembí (Ecuador).

In June 2001, Ecological Action published a Research Report [16] on the impacts of fumigations of January 2001 on the border of Sucumbíos. The report showed that:

- 100% of the population living in the border zone had been intoxicated by the Roundup Ultra fumigations over a 5 km strip, and 89% of the population, if the strip is extended to 10 km.

- Three months after the fumigations, the population up to 5 km kept showing symptoms of chronic intoxication with signs of neurological impairment, skin problems and conjunctivitis.

- There is a direct linkage, in terms of time, between fumigations and the appearance of disease.

- There is a direct linkage between the distance of site that was fumigated and symptomatology. The symptomatology in the population declines in proportion to the distance of the fumigated site.

- The possibility of new fumigations on the population that is already suffering from symptoms of chronic intoxication may cause an impact of incalculable consequences for their lives.

- The population, which has suffered from the impacts of the fumigation, has become frantic. They do not benefit from any economic support, compensation, or suitable care for their health, which has been undermined by a fumigation program that renders them invisible.

can be appreciated in the chart on the "Impacts of fumigations on health in Ecuador and Colombia".

From the clinical histories that were examined, we can infer the following:

- A large majority of the population after the fumigations has felt adverse impacts such as headaches and eye irritation and tearfulness. In the Colombian communities that were more intensely fumigated, it was common to find digestive problems, with dizziness, abdominal pains, vomiting and nausea, diarrhea, fatigue and loss of energy. This symptomatology is typical of organophosphates, which is the group that Roundup Ultra belongs to. The presence of fever in Colombia is also significantly more widespread than in Ecuador.

- Another group of symptoms appears because of skin diseases. A great deal of pruritus (itchiness) is associated to different diseases, ranging from dermatitis (inflammation) to the appearance of pimples for different reasons. The irritation caused by the chemical is evident in this symptomatology, which also occurs in the eyes, which has a higher incidence on the Ecuadorian side than the digestive symptoms.

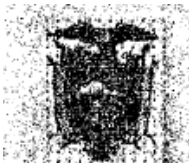
- Some campesinos indicated that there are two types of fumigations: one involving a whitish or transparent fluid and the other a dark color, after which there is a powerful "itch."

- The psychological impact that the fumigations exert on the campesinos of Ecuador is different from that on Colombia. Whereas the former display stress which leads to insomnia, the Colombians are depressive as a result of the complex reality that the inhabitants of this zone have to live through, heightened by the impacts of fumigations.

The symptomatology described by the population is consistent with what is produced as a result of the inactivation of cholinesterase, which is the impact of the organophosphates. The central nervous system is overstimulated, which in turn causes: headaches, dizziness, nausea, vomiting, stomachaches, and fatigue. This symptomatology is accompanied by the specific components of this product, which produces acute eye and skin irritation.

Annex 33

Letter from Victor Velasco Tapia, Government of Sucumbios, Republic of Ecuador, to Lourdes Luque, Minister of Health, Republic of Ecuador (Oct. 2002)



Republic of Ecuador
Governorship of Sucumbíos

Proceeding No. 511-GS-2002
Nueva Loja, 16 October 2002

Eng. Lourdes Luque
MINISTER OF ENVIRONMENT
In your Offices

Dear Madam:

With the present letter, I allow myself to express my cordial greetings to you and to wish you much success in your job functions. At the same time, I would like to take advantage of this opportunity to notify you of the following:

In light of the various complaints, in writing as well as through various means of communication, with respect to damages caused to peasants in the bordering area with Colombia, especially from peasants who are located on the riverbanks of Río San Miguel, in the province of Sucumbíos, due to anti-narcotic fumigations conducted in neighboring Colombia as part of Plan Colombia, for this reason I personally visited the area on 15 October of this year at these locations and was able to confirm that as a result of the fumigations the orito, plantain, banana, corn, and yucca crops, and, in general, all the different agricultural crops that are basis of sustenance for peasants in the area were burnt. Similarly, the fish in pools, which comprise part of the sector's industry, have died. Barnyard fowl has also been affected. As a result, negative effects exist which harm the inhabitants of the Border with Colombia. I was also able to confirm the effects caused to individuals' health, such as itchiness, boils on their bodies, skin affectations and respiratory problems.

For your heightened awareness, I hereby enclose copies of the complaint filed by Mr. Víctor Mestanza with the Ombudsman of the Village of Sucumbíos.

Annex 33

I allow myself to inform you of this situation, awaiting your instructions, which will be fulfilled by this Governorship.

Sincerely,
GOD, COUNTRY AND FREEDOM

Signed

Mr. Víctor Velasco Tapia
Governorship of Sucumbíos

República del Ecuador
Gobernación de Sucumbíos

Oficio No. 511-GS-2002
Nueva Loja, 16 de Octubre de 2002

Señor Ing.
Lourdes Luque
MINISTRO DEL AMBIENTE
En su Despacho

De mis consideraciones:

Por medio del presente me permito expresar mi saludo cordial y mi deseo que siga teniendo los mejores éxitos en las funciones que usted desempeña, a la vez que aprovecho la oportunidad para poner en su conocimiento lo siguiente:

En vista de las diferentes denuncias tanto escritas como por los diferentes medios de comunicación, en torno a los perjuicios causados a los campesinos del sector de la Frontera con Colombia, especialmente los que se encuentran en la Rivera del Río San Miguel, en la provincia de Sucumbíos, por las fumigaciones antidrogas que se están realizando en el vecino país de Colombia, como parte del Plan Colombia, razón por lo que en forma personal el día 15 de octubre del año que decurre me trasladé a dichos lugares pudiendo constatar que efectivamente, por efectos de la fumigación, se encuentran quemadas las plantaciones de: orito, plátano, guineo, maíz, yuca, en fin, las diferentes plantaciones agrícolas que son la base del sustento de los campesinos del lugar; igualmente se han muerto los peces de las piscinas, que son parte de la actividad del sector, las aves de corral, también han sido afectadas, en consecuencia, si existen efectos negativos que perjudican a moradores de la Frontera con Colombia. También se pudo constatar los efectos causados en la salud de las personas, como son picazón, granos en el cuerpo, afecciones a la piel y problemas respiratorios.

Para su mayor conocimiento, adjunto copias de denuncia interpuesta en la Defensoría del Pueblo de Sucumbíos, por el señor Víctor Mestanza.

Particular que me permito informar a usted, a la espera de las instrucciones, que serán cumplidas por esta Gobernación.

Atentamente,
DIOS, PATRIA Y LIBERTAD.

Sr. Víctor Velasco Tupiza
GOBERNACION DE SUCUMBIOS

GOBERNACION DE LA PROVINCIA DE SUCUMBIOS
NUEVA LOJA

Annex 33

Annex 34

Memorandum from Peter P. Trent, INL/RM/ASD, PSC Bogota, to Grant Harden, INL/RM/ASD, COR (4 July 1996)

UNCLASSIFIED

RELEASED IN PART
B4, B6

	Action	Info
CC		✓
CCS		
COR		
DO	JULY 04, 1996 ✓	
OAA		
SP		
SE	✓	
LG	✓	
MX	✓	
QC	✓	
PC		
OPR		
CA	✓	
Read File		
Central File		

(Send to Action addressees first)

G16

TO: Grant Harden, INL/RM/ASD, COR

FROM: Peter P. Trent, INL/RM/ASD,PSC Bogota

SUBJECT: Monthly Evaluation - JUNE 1996

MANAGEMENT

The overall rating for June 1996 is Excellent.

<u>Business Management</u>

This area is graded Excellent. Contractor responded to and resolved, a number of high visibility problems that were beyond his control or ability to forecast. Repositioning of maintenance equipment to handle heavy maintenance requirements, maintenance personnel realignment, and active interaction with host nation customs personnel all combined to turn a problem beset month of operations into a reasonably successful effort. Improvements in methods of operation and administration were undertaken to increase efficiency and daily operations and to improve performance standards. Detailed in the remainder of this monthly evaluation, these efforts demonstrate the contractor's desire to preempt problems and achieve high quality standards. This month's supply difficulties with engine serial numbers, lost oil coolers, and poor pre-shipment inspections of items sent down range, made life for the Colombian operation more difficult than it had to be. Manning shortfalls in maintenance and operations showed significant improvement at month's end and will do much in the way of insuring accomplishment of program objectives.

<u>Contract Management</u>

This area is rated Excellent. The critical review of methods of operation and program requirements netted gains in several areas. Renewed focus in the areas of manpower utilization and equipment needs and availability have brought local operations to a higher level of contract management. This management has taken the form of not simply insuring contract standards are maintained, but that they are maximized. The requests for additional personnel, test equipment, and aircraft equipment upgrades were all geared to ensuring the government receives the capabilities it expects. These types of initiatives are just as valid as indicators of contract management, as they are of business management. Cost control and resource monitoring remain excellent, and calls for expenditures to increase capability are in line with value for the dollar thinking. Examples of this are the request for analog data modification to PR-1000. This is a contractor initiative and is an attempt to provide a means of early detection of engine abuse and the preempting of expensive overhaul requirements, spend a little and save a lot approach.

UNCLASSIFIED

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Schedule

Scheduling is graded Outstanding. The scheduling of aircraft this month was extremely challenging and the contractor maximized the resources at his disposal. The return of the C-208 and windfall of additional support aircraft flying time was fully exploited. Judicious use of the airframe allowed full support of the PR-1000 repair, engine change requirement on T-02 and the intensified San Jose FOL effort. Battle damage repairs and resulting T-65 shortfalls were handled as effectively as possible given the shared scheduling authority of the T-65 aircraft.

TECHNICAL

Operations

This area was graded Excellent. There still are no standard operating procedures published for the Colombian operation. This is offset, to a high degree, by the fact that the level of effort required to ensure host nation procedures remain within acceptable limits has been enormous. Active participation by operations personnel in assisting and guiding host nation personnel in operational planning and procedures was indispensable and the PSC's number one priority. The contractor responded very well to the challenge.

1. Operation Planning: This area was the focus of attention this month. The development of operational plans and standards has become a critical area of concern for the program. The employment of INL aircraft, once students have been qualified, is a central issue in the overall success of the program. The push by the CNP to increase the overall effectiveness of the counter narcotics effort has resulted in their call to evolve or improve employment tactics and expand operations. These new concepts of operation have in some cases caused serious difficulties because the concepts have not fully addressed T-65 operational capabilities and limitations. Operations personnel have responded to these new CNP initiatives by producing upgraded briefing guides, operational plans and methods of operation. Rules of engagement that detail operational standards have served to define operational limits and give both the CNP and NAS personnel a common, and firm, guide from which to work.

2. Operational Readiness: Excellent. Aircraft are in flyable condition and available if it is physically possible to do so. Battle damage or lack of parts are the only things that prevent an aircraft from being mission ready. Oversights and lack of effort do not exist in this team.

3. Training: Training operations continued to grow this month despite the lack of new students. The expansion of operations, detailed in the Operation Planning paragraph, has brought with it associated problems in Colombian contract pilot capability. The

Annex 35

Memorandum from David Johnson, INL/C/ASD, to Grant Harden, INL/C/ASD (14 Nov. 1996)

Unclassified
MEMORANDUM

November 14, 1996

G 50

TO: INL / C / ASD - Grant Harden

FROM: INL / C / ASD - David Johnson

SUBJECT: Safety Award Fee Evaluation for October 1996

The overall rating for this period is excellent.

a. 4.3.1 Safety personnel rating is excellent.

- The PSD Safety Manager and Safety Specialist are highly qualified and proactive in their duties.
- All sights have trained and qualified safety representatives.

b. 4.3.2 The Flight Safety Program is rated low acceptable.

- The monthly aviation safety topic "Hazard of Hedge Hopping" was trained at all sights and provided in both English and Spanish.

Safety could be improved with the OV-10 pilots. An incident occurred that revealed pilots lack of experience in the OV-10 and discipline in following published checklist procedures were at fault. This incident resulted in a precautionary landing but results could have been catastrophic. Pilot's management also did not adequately deal with the pilots lack of discipline. Corrective actions did not deal with individual system inadequacies.

c. 4.3.3 Ground Safety Program is rated excellent.

- Weekly safety topics were trained at all sights and provided in both English and Spanish.

d. 4.3.4 Safety Inspections/Surveys are rated excellent.

- PSD Safety Specialist conducted safety inspections of the hangar, block house, and logistics warehouse with no major shortcomings being identified.
- Safety surveys were completed at all down range sights.

e. 4.3.5 Incident/Accident Reporting is rated excellent.

- All reports have been submitted in accordance with DoS / ASD directives.
- The PSD Safety Manager reviews all incident reports to search for trends.
- The PSD Safety Manager is currently using the automated incident reporting system and maintaining all related data tables.

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Annex 36

Memorandum from David Johnson INL/C/ASD to Grant Harden, INL/C/ASD (12 Dec. 1996)

Unclassified
MEMORANDUM

December 12, 1996

TO: INL / C / ASD - Grant Harden

FROM: INL / C / ASD - David Johnson

SUBJECT: Safety Award Fee Evaluation for November 1996

The overall rating for this period is acceptable.

a. 4.3.1 Safety personnel rating is outstanding.

- The PSD Safety Manager and Safety Specialist are highly qualified and proactive in their duties.
- All sights have trained and qualified safety representatives.

The PSD Safety Manager has aggressively worked to improve program safety. He has made *tough* recommendations that may not have been what management wanted to hear; but, these recommendations were in the best interest of the program and were the right and safe things to do. He is critical to the flight safety of this program and has done an outstanding job.

b. 4.3.2 The Flight Safety Program is rated marginal.

- The monthly aviation safety topic "Visual Illusions" was trained at all sights and provided in both English and Spanish.

The contractor developed pilot training program for the OV-10 does not yet meet FAR requirements. Since there is no FAA or DoS approved pilot training program, pilots with less than 50 airframe hours are signed off as instructor pilots. These instructor pilots are in turn training other instructor pilots and plans are to sign them off as instructor pilots with the same minimum training.

The pilots being trained are also demonstrating lapses of pilot discipline, professionalism, and ability to follow published guidance. Early in the month, three T-65 aircraft were shot because they were not following established operational procedures. These same pilots are scheduled for OV-10 training. This apparent lack of discipline is singularly the most dangerous safety of flight issue in the OV-10 program.

These issues have been brought to PSD management attention by the PSD Safety Manager, but management has maintained their focus on meeting deadlines while sometimes jeopardizing safety. Management is not adequately supporting program safety.

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Annex 37

Memorandum from Tim Doty, COR, INL/RM/AS to Dyncorp, PSD Manager (28 May 1997)

UNCLASSIFIED

42

RELEASED IN PART
B4, B6

Unclassified

MEMORANDUM May 28, 1997

TO: DYNCORP [redacted] PSD MANAGER B4, B6

FROM: INL / RM / AS - TIM DOTY, COR

SUBJECT: MONTHLY EVALUATION - March 1997

This is the consolidated monthly evaluation of DynCorp's and it's subcontractors performance for the month of March 1997. Please contact the COR if you have any comments or questions about the evaluation.

MANAGEMENT

Excellent

BUSINESS MANAGEMENT

Excellent

The contractor continued to work a host of management and technical issues involving the OV-10 such as ejection seats, propellers and engines and management issues with the expansion of the eradication program in Colombia. The eradication program in Colombia continues to be very dynamic, especially the growth of the program. The contractor and subcontractors resolved all problems associated with this expansion in an excellent manner. This growth continues to strain personnel resources. The effective use of available manpower for March was outstanding especially recognizing that the contract calls for a main base and two forward operating locations, yet the contractor has been spreading personnel across as many as six locations simultaneously. In Bolivia, the contractor recently has been inundated with engine work and management decisions in prioritizing the work load minimized the impact on the flow of the engines undergoing the ASAM modification. The PASA in Peru rated management of the program in Peru as satisfactory and perceives that the contractor is not moving towards the goal of Peruvianization as quickly as possible. Peru also experienced a few problems with parts being received from Patrick Support Division which were not in working order and the contractor personnel in Peru not catching it until the parts were installed on an aircraft. This caused delays in getting aircraft back to mission ready status.

Operational Planning
Excellent

Bolivia

There have been some problems with operational planning resulting in non-optimum use of the aircraft. This problem is now reflecting in the operational readiness rate and aircraft availability for missions (too many aircraft in phase inspection or about to go into phase inspection, at the same time). The contractor has now realized there are some areas for improvement and is addressing the issue.

Colombia

Mission planning in Colombia was executed successfully in the face of numerous unprogrammed requirements and operational changes created by the CNP. At the FOLs, mission planning was accomplished prior to each day's reconnaissance and eradication missions. Although some difficulties were encountered when host nation escort aircraft ignored previously agreed to operational plans, contractor personnel took swift and decisive action to correct these situations.

Peru

The contractor continued to assist the NAS and PNP in planning operational deployments, with appropriate mixes of aircraft, personnel, and spares to permit continuous operations.

Operational Readiness
Satisfactory

Colombia

The contractor's performance at the main El Dorado base was commendable, especially given the program's rapid expansion during this rating period. At the FOLs, reconnaissance and eradication missions were accomplished successfully; however, it was noted that some CNP pilots operating out of the San Jose base were flying too fast and too high on spray passes. This substandard performance was compounded by a lack of positive control by the contractor IP who was flying in the same formation. The contractor has taken steps, however, to correct this situation and to prevent its reoccurrence.

Training
Excellent

Bolivia

The contractor has developed a CASA training program and is prepared to provide pilot training for two RDTF copilots.

strived to make real improvements in these programs. The overall safety and environmental records attest to this.

FLIGHT SAFETY PROGRAM

Low Excellent

The monthly aviation safety topic "When Your Plane Goes Down" was trained at all sites and provided in both English and Spanish.

The contractor was directed by the DoS/AD Chief in February 1997 to further develop recon with FLIR tasks. They were also directed to take advantage of spray testing to develop OV-10 spray tasks. In reviewing the OV-10 ATM and discussions with the contractor, no progress has been made in this area. The OV-10s are apparently operating in Colombia without a base of reference to operate from and are developing tasks as they need. Considering the hostile environment and the harsh operating conditions, this seems to be the least safe approach and dramatically increases the risk associated with the mission. Contractor operations should have taken a more proactive approach as directed by the DoS/AD Chief to prevent this situation.

GROUND SAFETY PROGRAM

Excellent

Weekly safety topics were trained at all sites and provided in both English and Spanish.

Developed procedures and identified required equipment to be used with the prop erosion control kit to be used on the OV-10 in order to meet respiratory protection requirements.

SAFETY INSPECTIONS / SURVEYS

Low Excellent

PSD Safety Specialist conducted safety inspections of the hangar, blockhouse, and logistics warehouse with no major shortcomings being identified.

Safety surveys were completed at all down range sites.

Though monthly safety inspections are being completed at all sites, findings are not being forwarded to DoS for review. All findings that cannot be corrected at the local level must be forwarded to prioritize program corrective actions and also to track trends for analysis.

INCIDENT / ACCIDENT REPORTING

Outstanding

All reports have been submitted ahead of required time lines and in all cases have exceeded reporting requirements. Notification of incidents occurs immediately with hard copy reports following usually within 24 hours. The contractor has fully implemented the automated safety management system. The program is working very well and valuable data is being obtained and analyzed

Annex 37

Annex 38

Memorandum from Tim Doty, COR, INL/RM/AD, to Dyncorp, PSD Manager (Aug. 1997)

UNCLASSIFIED

H.10

RELEASED IN PART
B4, B6

Unclassified

MEMORANDUM

TO: DYNCORP - [redacted] PSD MANAGER B4, B6

FROM: INL / RM / AD - TIM DOTY, COR

SUBJECT: MONTHLY EVALUATION - AUGUST 1997

MANAGEMENT

Low Outstanding

BUSINESS MANAGEMENT

Excellent

CONTRACT MANAGEMENT

Outstanding

SCHEDULE

Outstanding

TECHNICAL

OPERATIONS

Excellent

Operational Planning

Outstanding

Bolivia

The Contractor is not normally responsible for operational planning and execution, except in the case of the CASA 212 crew. Performance in this area continued to be outstanding.

Colombia

Operational planning performance continued to be strong. Planning and preparations for unprogrammed requirements was outstanding, and coordination with host nation personnel was very effective. The Operations Manager and Operations Coordinators at the two FOL's should be commended for their exceptional performance in this area.

Peru

The OPSCOs continued to provide operational advice and council to the PNP leadership. The site additionally advised the PNP on planned deployments to a variety of locations to support simultaneous eradication and enforcement activities.

Operational Readiness

Excellent

Bolivia and Peru

In Bolivia and Peru, the availability of qualified contractor personnel and equipment support necessary to meet operational requirements was superior.

Colombia

Despite the fact the site experienced shortages in personnel during the month, the Contractor was able to satisfy mission requirements through creative scheduling. All aspects of readiness were performed in an outstanding manner, with the exception of the performance of some of the spray pilots. Recent verification of a series of complaints by local farmers in the Caqueta Department of Colombia provided clear examples that some spray pilots were using poor judgment. This, combined with unacceptable techniques resulted in collateral damage to legitimate crops and pastures. The overall damage to the image of the program this month by these pilots was significant.

Training

Acceptable

Bolivia

Rotary wing pilot training has been slow. The single contractor standardization pilot has been kept busy performing administrative duties which distracts him from his other responsibilities. He has additionally been instructed to complete the unit SOP, which includes night operations, external load operations, multi-ship operations, and search and rescue operations. In order to meet real time demands the SP should be augmented by an administrative person or an additional Standardization Pilot.

Colombia

The training program was both responsive and productive in most areas. However, more training is needed in the area of fumigation techniques and coca crop recognition, and the Contractor has been proactive in addressing this issue.

Annex 39

Memorandum from Stephen H. Harris, INL/RM/AD, to Dyncorp (21 June 1999)

UNCLASSIFIED

921

RELEASED IN PART
B4, B6

Unclassified

MEMORANDUM

21 June 1999
In reply refer to:
990621.3043

TO: DYNCORP - [redacted] PSD MANAGER B4, B6

FROM: INL / RM / AD - STEPHEN H. HARRIS, COR

SUBJECT: MONTHLY EVALUATION - MAY 1999

MANAGEMENT

Excellent

DynCorp did an outstanding job in responding to a short term request to provide support for a visit by a senior State Department official, Under Secretary Frank Loy. The visit demonstrated the effectiveness of the training and eradication program in Latin America and provided the Under Secretary with first hand knowledge of the complicated mission the Aviation Division performs.

State is pleased with the management attention that is finally being placed in improving the logistics system with a bar-coding system. This has been a requirement that has been too long being implemented. We are expecting significant progress in the near furture and expect to be rewarded with improved inventory control and property accountability.

We commend management on the operational success of the RARE deployments during this period. All of the posts have provided excellent results and are looking forward to future deployments. We expect RARE missions to become more frequent and a permanent mode of operation in the future. However, State encourages a stronger supervisory chain for RARE deployments. Many problems that arise could be prevented with clearer lines of communication and RARE leads with the authority to make decisions.

Management has taken excellent steps towards exploring a new Management Information System. We look forward to your proposal in the near future.

Colombia

The contractor has continued to support all aspects of the contract in an excellent manner. The contractor supported 3 FOL's, a prolonged RARE deployment to Latin America and the Bogota Main Base. The contractor sprayed 7040 hectares (unadjusted) of coca during this period, is about twice as much as was sprayed in April. However, it still reflects continued marginal weather conditions for spraying. The contractor accomplished this despite splitting

contractor. Special care must be taken that institution building initiatives are not disrupted by hiring personnel that the host nation is counting on being part of their long term program.

Effective Assignment and Utilization of Manpower

Bolivia

The site manager has kept the PASA staff fully informed during his search for avionics, engines, and structural technical advisors. We are very pleased with his initial selection and look forward to other recruits of similar caliber.

CONTRACT MANAGEMENT

Excellent

Colombia

The contractor has continued to place emphasis on efficiency and cost accountability. The contractor has continued to conduct 100% inventory audits and cyclic inventories in Bogota and the FOL's. The May inventory of Bogota parts showed a 94% accuracy. [redacted] B4, B6 conducted a spot inventory check in San Jose and found that all items that he checked were 100% accurate. The contractor continues to look for ways to reduce costs and improve efficiency to the program. The contractor personnel have identified a potentially new Bogota facility with hangar. This new location would be perfect for our future operations. NAS Admin Officer has been introduced to the current owner of the facility and the procurement/rental process has started. This section is being rated satisfactory for two reasons: first, the contractor (PSD and Bogota) failed to provide adequate OV-10 experience level at the Larandia FOL, second, for almost six months the contractor has not provided adequate OV-10 standardization oversight of the OV-10 program, which may have contributed to the OV-10 incident.

Effectiveness of Property and Material Control to Include Overall Management of Property Such as Minimizing Loss and Damage to Property and Property Accountability

Bolivia

The following is a correction to the April report: Last month's mention was made of the discovery of five stored fuel blivets. There are actually only two fuel blivets in storage here, the other items being ground sheets for use with blivets.

Quality of Management Reports (Substantive, Accurate, Comprehensive, Clearly Written with Facts Documented)

Bolivia

Annex 40

Aviation Resource Management Inspection of Air Wing Colombia Site (23 March 2000)

A1.

Aviation Resource Management Inspection Of Air Wing Colombia Site

EXECUTIVE SUMMARY

A six-member team composed of representatives from operations, maintenance, safety and management performed an inspection of the Colombia site March 12-18, 2000. The team visited the FOLs at Larandia, San Jose, Tolemaida and the MOB at Bogota. The team was well received at all locations and the interviews conducted were frank and very informative. General conclusions indicate a well-motivated, interested workforce who believe and understand the mission of the Air Wing in Colombia. The quality of the personnel is outstanding and the success of the operations in Colombia can be attributed to them. However, deficiencies were noted that indicate a need for improvement and requires immediate attention by management. These areas are the overall organization and chain of command which have led to several complications and an overall confusion about duties and responsibilities. Overall complacency towards safety is a primary concern and needs to be corrected immediately.

The report will address all areas inspected in the following format. Findings will be identified with recommendations for corrective action and a timeline for corrective action. General observations will be provided with recommendations as required. The issues addressed in order will be management, operations, standardization, logistics, maintenance, quality control and safety.

[redacted]
Team Chief
23 March 2000

B4

Annex 40

1. MANAGEMENT

1.1 Findings

1.1.1 Finding:
Job descriptions for the majority of personnel are non-existent at all levels of the work force - management and line level.

1.1.1 Discussion:
Interviews were conducted with FOL Mangers at Larandia, San Jose, Tolemaida; logistics personnel and managers at Larandia, Tolemaida and Bogota; Site Manager in Bogota; maintenance managers at Larandia, Tolemaida and Bogota; safety manager at Tolemaida. FOL managers and logistics personnel had no record of a job description or briefings as to duties and responsibilities. Maintenance manager at Bogota had recently been provided a job description and the maintenance lead at Larandia declared that he had a job description.

1.1.1 Recommendation:
Provide job descriptions to all personnel and have supervisors brief them on their duties and responsibilities. Update job descriptions as needed.
Completion date: 30 days from date of this report.

1.1.2 Finding:
The chain of command is confusing and leads to ineffective decision-making.

1.1.2 Discussion:
Interviews with the various managers indicates a reporting chain that in most cases leads directly back to Patrick, by-passing the FOL Manager and Site Manager. This chain of command causes micro management from Patrick directly to the FOL Leads and often causes contradictory information and, in some cases, policy making at the lowest level.

1.1.2 Recommendation:
Establish a formal chain of command that includes the FOL manager in the rating chain for all leads at the FOL. The Site Manager must be included in the chain for the FOL Managers.
Completion date: 15 days from date of report

1.1.3 Finding:
Span of control is too large for several managers.

1.1.3 Discussion:
Interviews with several mangers indicates that the span of control is too large for several of the mangers. The span for the maintenance lead at Larandia at the time of the interview was 22 personnel, the Site Manager rates 12 personnel, the logistics manger rates 12-14 personnel. These large spans of control make it difficult to efficiently supervise personnel. Additionally, breaking down the duties and responsibilities will allow for development of supervisors.

1.1.3 Recommendation:
Review the spans of control of all supervisors to determine the validity of developing smaller span of control for efficiency and task assignments.
Completion date: 30 days from date of report

1.1.4 Finding:
There are no in-processing checklists at the FOLs or Site.

1.1.4 Discussion:
Personnel arriving at the Colombia Site or FOLs are not provided any formal in-processing. Local rules and procedures are not briefed, provided or discussed. Any in-processing is done by the leads but is dependent on the lead on duty at the time and thoroughness depends on the time he has available.

1.1.4 Recommendation:
Develop and in-processing checklist for the Colombia Site in Bogota and for each FOL. When personnel have completed the checklist it should be placed in his training/personnel folder.
Completion date: 30 days from date of this report

1.1.5 Finding:
Personnel at various sites did not have the appropriate Plans, SOPs or LOIs.

1.1.5 Discussion:
FOL Managers at Larandia and San Jose did not have copies of the Operations, Program Management, Maintenance or Quality Control Plans.

1.1.5 Recommendation:
Provide copies of all approved plans, SOPs, LOIs, ATMs, etc. to the Site and the FOLs on CD.
Completion date: 30 days from date of this report

1.1.6 Finding:
No suggestion program exists.

1.1.6 Discussion:
A suggestion program allows line personnel to identify areas of concern or make suggestions for changes or improvement. No process exists for personnel to make these recommendations.

1.1.6 Recommendation:
Study the feasibility of establishing a suggestion program.
Completion date: 60 days from date of this report

1.1.7 Finding:
No self-inspection program exists except for a limited quality control audit program.

1.1.7 Recommendation:
Develop self-inspection program for all the functional areas – operations, logistics, maintenance and safety.
Completion date: 60 days from date of this report

1.1.8 Finding:
Several FOLs are short of spares/parts for GSE, fire bottles are missing, ramp and storage facilities are inadequate.

1.1.8 Recommendation:
Review all issues that require NAS action. Provide written requests to Air Wing Aviation Advisors for needed support.
Completion date: 60 days from date of this report

1.1.9 Finding:
Computer support equipment is outdated and inefficient.

1.1.9 Recommendation:
Coordinate with Patrick to update equipment.

Completion date: 60 days from date of this report

1.2 Observations

1.2.1 Observation:
All personnel interviewed have received a performance feedback and were generally satisfied with their feedback.

1.2.2 Observation:
Supervisory personnel generally felt well trained for their positions but acknowledged a need for more training as supervisors.

1.2.3 Observation:
Managers are unfamiliar with the contract and technical directives.

1.2.4 Observation:
Managers appear to be taking a reactive, somewhat complacent view towards safety rather than being truly proactive.

1.2.5 Observation:
Tolemaida FOL has taken several steps to be proactive in establishing the training program for the COLAR. In some cases they have gotten ahead of the program and created SOPs that were already established.

1.2.6 Observation:
There is a need for all personnel to be briefed on general policies and procedures in country such as medical benefits, individual status and medevac procedures.

1.2.7 Observation:
Information on professional training should to be provided to all personnel. This should be worked through the training officer. A review on ancillary training (HAZMAT, CPR, First Aid, special handling – ammo, etc.) should be made and provided to all pertinent personnel.

1.2.8 Observation:
Spanish language ability needs to be reviewed and care must be taken to ensure positions that require daily use of the language have qualified personnel.

1.2.9 Observation:
Documents that need to be translated into Spanish for training or daily use (ATMs, SOPs, Plans, MSDS) should to be identified and translated.

1.2.10 Observation:
Scheduling calendar published on a weekly basis at Tolemaida is an excellent tool for keeping personnel informed.

1.2.11 Observation:
Consideration should be taken to institute an individual safety award program – certificates, T-shirts, etc for each year of safe operations.

2. OPERATIONS

The INL/OA Director of Operations inspected the INL Aviation Program in Colombia for compliance with INL requirements in two broad areas. These areas are compliance with the administrative requirements as set forth in the INL/OA Operations directive and INL Operations Plan; and compliance of procedures as directed by or in operational guidance provided to the contractor on a daily basis by INL PASA's, by INL/OA Task Orders, Task Directives, and contract modifications, and of INL approved procedures such as tactics and actual conduct of missions. Generally speaking, compliance with administrative requirements is good. Compliance with procedures, while good, has some areas that need to be improved to increase both safety of personnel involved and effectiveness of our mission.

Administrative Requirements.

The following items were inspected at Larandia, San Jose, Tolemaida, and Bogota: Colombia SOP, Aircrew Individual Reading File, Mission Briefing sheets (for the past 30 days) and Risk Assessment sheets.

2.1 Findings

2.1.1 Finding:
The reading file and SOP at Tolemaida have been constructed as "stand alone" documents, and do not contain the same material as the other FOL's or MOB.

maximum employee participation without impeding the mission. (Both rotations require coordination).

(d) FOL Managers read and understand the requirements of the DynCorp Safety Plan as it applies to required safety training.

(e) Site Safety Manager documents all monthly safety training with memo listing the topics covered and an attached attendance roster.

(f) Site Safety Manager maintains a file copy all training memo's and forward a copy to the PSD Program Safety Manager.
Completion Date: 30 days from date of report

7.1.3 Finding:
The Site Safety Manager in Colombia is not conducting required safety inspections, surveys and hazard analysis in Larandia and San Jose, IAW, DynCorp Safety Plan, PSS-2606, Page 1 of 6, Section III, Paragraph A (1) (c & f).

7.1.3 Discussion:
Although there were some hazard surveys conducted by FOL, QC personnel, I found there were erroneous findings made and that there was little or no follow-up or corrective action taken by the site safety manager or FOL managers.

7.1.3 Recommendation:
(a) The site safety manager accomplishes monthly safety inspections, surveys and hazard analysis.

(b) The site safety manager takes immediate, corrective action to rectify all noted deficiencies and hazards.

(c) The site safety manager coordinates with and involves the PSD safety manager, any managers and/or leads at any level for support, if needed to correct deficiencies.

(d) Site safety manager coordinates with QC to accompany them periodically while they conduct their surveys.

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Annex 41

U.S. Department of Agriculture, Agricultural Research Service, *Colombia Coca Verification Mission April-May 200*1 (7 July 2001)

COLOMBIA COCA VERIFICATION MISSION
APRIL-MAY 2001

[redacted] (b)(6)
Agricultural Research Service, U.S. Department of Agriculture
Beltsville, Maryland USA

July 7, 2001

****

This contains basic findings and conclusions from the Coca Verification Mission conducted in Colombia, April 22-May 4, 2001. It also includes imagery of coca leaf tissue collected; selected photographs of field sites; data compilations and statistical evaluations; and additional recommendations not available in the Draft Report released to NAS/Bogota on 5/7/01. All conclusions and recommendations are those solely of the author unless otherwise stated.

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Annex 41

EXECUTIVE SUMMARY

Recent coca eradication effectiveness, in Colombia, was evaluated via a Coca Verification Mission conducted on April 22-May 4, 2001. The illicit crop had been sprayed with glyphosate herbicide within the period of June 2000 through January 2001. Seventy-four fields were rated in southern Colombia (50 in Putumayo, 14 in Caqueta, 10 in Cauca) and 15 fields in northern Colombia (Antioquia).

Coca Control

For *southern Colombia*, the mean coca control within the spray swath (using aerial or, when available, ground-based ratings) was 87%, or ca. 5% lower effectiveness than achieved 1-2 years ago. Part of this decreased efficiency may be due to spraying under less than optimal weather conditions, and in at least one case, at too high an altitude. Aggressive action by growers to counteract spraying, especially by timely plant pruning, seems to account for no more than 2% of this decrease.

The *northwestern* coca production nucleus near Caucasia, Antioquia was sprayed for the first time in November-December 2000, using T-65 aircraft only. **Control based on this verification mission was a disappointing 57%**; however, for reasons discussed, this estimate of swath control has a much higher degree of uncertainty (standard deviation of 38%) than did that for the other fields (SD = 17%). The Antioquia coca is grown entirely in very steep, high-altitude terrain similar to that of opium poppy produced in Huila and Tolima Departments. Marijuana was being grown on at least one field.

The mean coca swath control for all 89 fields rated on this Mission was 82% (SD = 25%).

Pruning Impact

Pruning by growers soon after coca is sprayed with glyphosate is used increasingly as a method to save their crop. Of 89 rated fields, 26 (or 29%) were pruned, at least partially; 44% of those in Putumayo had been pruned. Verification Raters differed in their estimates of the success of this technique, but in general, it seems that growers were successful about 1/3 of the time. However, even those pruned fields are out of production for at least 9 months, so cocaine production is reduced. Coca swath control ratings were not significantly reduced by pruning, so no special adjustment to eradicated acreage (as "compensation" for pruning's impact on leaf supply) is recommended at this time.

APPENDIX E

Special Observations: Collateral Damage to Forest or Non-Coca Crops

This documents any mention of collateral damage (to forest, pasture, trees within coca fields, or legitimate crops within or near coca fields) that was associated with eradication of glyphosate-sprayed coca crops. It is based on field notes reported during debriefings of the April-May 2001 Verification Mission. In one instance, major environmental damage (soil erosion) caused by the land clearing and cultivation for coca is also reported.

Listings are in order of site visitation. Overspray refers to damage (normally to forest) at beginning and/or end of spray swath.

Site no.	Department	Rater	Observation
83	Caqueta		Very narrow row of trees between base of eradicated coca field and pasture was injured or killed.
			Minor tree damage; damage to guinea grass in pasture just beyond the coca field.
75	Caqueta		Overspray, with some collateral damage to trees.
71	Caqueta		Some collateral damage to natural vegetation and grass.
79	Caqueta		Significant tree damage at swath end (overspray).
76	Caqueta		Very heavy soil erosion in isolated field (start of a watershed) surrounded by forest. **Damage caused solely by deforestation and coca production.** See Figs. H6A-C.
84	Caqueta		Minor overspraying into forest.
81	Caqueta		Serious overspraying, in this area of small fields. Recommends use of T-65 (rather than OV-10) for such fields), to avoid overspraying.
34	Putumayo		Minor overspray damage.
9	Putumayo		Near target, significant tree damage in swath (overspray); coca 100% controlled in the swath.

Annex 41

Site no.	Department	Rater	Observation
10	Putumayo		Some damage to bananas within coca field.
18	Putumayo		Moderately severe damage to trees.
			Much collateral damage to trees. Believes that corn planted adjacent to coca field was sprayed and killed.
			Damage to jaruma and balsa trees [susceptible species, early succession plants after forest clearing].
48	Putumayo		Very small corn field likely had been sprayed and killed. Although it might simply have matured, heavy weed regrowth strongly suggested that plant death had occurred much earlier. [Field was sprayed on 1/9/01.]
53A	Putumayo [Site in MDIS "Area Alpha"]		Minor damage to fringe trees; however, no damage to large tree within spray swath, in the field.
			Minor drift damage.
29	Putumayo		Believes that corn had been intercropped with coca, and killed. [Coca control on this site was 96%, mean rating.]
65A	Putumayo [Site in MDIS "Area Alpha"]		Minor collateral damage.
124	Cauca		Some overspray and drift.
122	Cauca		Overspray damage to trees (end of swath).
			Overspray damage to trees (end of swath).
			Drift and overspray, in this ca. 20-ha field.
125*	Cauca		Probable damage to trees. [redacted] comment: Sites 125 and 123 were part of the same coca field complex. The tree damage reported by [redacted] (in Site 125) is very likely to be the same as reported by [redacted] and [redacted] for Site 123).
123*	Cauca		Tree damage along spray swath pathway, between fields. Believes pilot did not shut off spraying.

Site no.	Department	Rater	Observation
			Collateral damage.
153	Putumayo		Damage to small bananas (natural) in field.
67	Putumayo [Site in MDIS "Area Alpha"]		Collateral damage to trees in ravine (within coca field), along spray swath; very steep field site. See Fig. H5A.
154	Putumayo		Collateral damage to trees in ravine (within field) in swath; very large, hilly site.
50	Putumayo		Exactly one-half of a large tree, apparently directly under one side of the spray swath, was entirely defoliated; the other half grew normally. The tree was inside the coca field (which itself was totally eradicated).
147	Putumayo		Minor overspray damage to native vegetation.
88	Antioquia		Very minor damage to trees on fringe of field.
90	Antioquia		Minor collateral damage.
87	Antioquia		Minor collateral damage.
96	Antioquia		Slight collateral damage in an area with much deforestation.
85	Antioquia		Some collateral damage.
85 to 98	Antioquia		Enroute from Site 85 to Site 98, passed area of killed coca that also had a substantial swath of killed native vegetation.
97 to 92	Antioquia		Enroute from Site 97 to Site 92, passed small area of remaining natural vegetation and susceptible trees that were injured. Within a complex of killed coca, and by a small laboratory.
95	Antioquia		Within swath, a tree was damaged [yet field ratings of coca control were all 0%].

Annex 41

Annex 42

United States Congressional Research Service, *Andean Regional Initiative (ARI): FY2002 Assistance for Colombia and Neighbors* (14 Dec. 2001)

Order Code RL31016

CRS Report for Congress
Received through the CRS Web

Andean Regional Initiative (ARI): FY2002 Assistance for Colombia and Neighbors

Updated December 14, 2001

K. Larry Storrs
Specialist in Latin American Affairs
Foreign Affairs, Defense, and Trade Division

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Specialist in International Security Affairs
Foreign Affairs, Defense, and Trade Division

Appendix D. Controversy over Spray Eradication Efforts in Southern Colombia

The following discussion of the controversy over spray eradication (i.e., fumigation) of illegal coca crops in southern Colombia was prepared in response to the controversy over this effort in southern Colombia. This short synopsis of available information on the effects of fumigation of coca crops in Colombia is only meant to provide a summary of various claims; it is not a judgment on their validity.

In its U.S.-supported coca eradication program, the government of Colombia sprays coca crops from aircraft with a mixture of the herbicide glyphosate, manufactured by the U.S. company Monsanto and marketed as "Roundup," and two additives or "adjuvants."[15] According to the State Department (in its report of January 23, 2001, submitted to Congress consistent with the provisions of the Statement of Managers accompanying Title III, Chapter 2 of the Emergency Supplemental Appropriations Act. P.L. 106-246, which provided funding for Plan Colombia), the Environmental Protection Agency (EPA) has found that "the use of glyphosate, as labeled for use in the U.S., is acceptable provided that the regulatory controls required by the EPA – the labeled instructions – are followed." The State Department also claims that the ingredients in the two additives (COSMO FLUX-411F, a surfactant, and COSMO-iN-D, an anti-foaming additive[16]), both produced in Colombia, are on an EPA list of acceptable chemicals "for use on food crops when the label instructions are followed." This report states an EPA review of "adequate scientific studies" shows that when properly used glyphosate "will not cause adverse effects in humans," and "does not cause risks of concern for birth defects, mutagenic effects, neurotoxic effects, reproductive problems, or cancer." It does, however, state that "splashes" of glyphosate "can cause transient irritation to skin and eyes,"although at the same level of irritation as baby shampoo according to one cited study. For its conclusion that there are "no grounds to suggest concern for human health" from the spray mixture used in Colombia, the State Department cited a recent study published in *Regulatory Toxicology and Pharmacology.*[17]

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[15] The active ingredient in Roundup is isopropylamine salt of N-(phosphonomethyl) glycine, commonly known as glyphosate, Chemical Abstract Registration Number 38641-94-0, EPA Registration Number 000524-004445. "Adjuvant" is a term for an ingredient that facilitates or modifies the action of the principal ingredient.

[16] COSMO FLUX-411F, according to the State Department report, "increases the herbicide penetration through the waxy layer of the coca leaf by allowing ore of the spray to stick to the plant. When more of the spray solution sticks to the plant, the herbicide becomes more effective which means it can be applied in smaller doses." COSMO-IN-D "is used to minimize the foam created by the mixture-circulating pump inside the aircraft spray hopper" in order to avoid the creation of a vacuum within the spray pressure pump which could shut off the spray system during flight.

[17] Gary M. Williams, Robert Kroes, and Ian C. Munro. Safety Evaluation and Risk Assessment of the Herbicide Roundup and its Active Ingredient, Glyphosate, for Humans. *Regulatory Toxicology and Pharmacology*. Vol. 31, No. 2, April 2000. Available through [http://www.ciponline.org/colombia/12301.htm] from a hyperlink at the bottom of the text of the State Department's January 23, 2001 report. This publication is the official journal of the

(continued...)

Since spraying began in December 2000 in Colombia's Putumayo province (where it is now indefinitely suspended), however, there have been many allegations that the spray mixture has caused extensive harm to humans, other crops, and livestock. The ill health effects on thousands of children and adults most commonly reported in the areas of Putumayo fumigation include fever, eye and gastrointestinal irritation, and skin and bronchial irritation and infections. There have also been allegations of increased incidence of brain damage in children in these areas since fumigation was started. In addition, critics claim, many crops other than coca have been sprayed, depriving peasants of food crops and other sources of income, and livestock reportedly have suffered ill effects, including hair loss in cattle from moderate exposure, abortion among pregnant cows (possibly due, one source notes, from stampedes caused by the noise of overhead helicopters) and the death of fowl from spraying or drinking contaminated water. (The effects on livestock and fowl are taken from the "Counter-Fact Sheet" of February 9, 2001, prepared by Acción Andina, a non-governmental organization, and posted at [http://usfumigation.org/Literature/FactSheets/ContraDoS/AA-IPS-RAPAL%20Fact%20Sheet%20-English.htm].) Supporters of aerial fumigation, however, state that negative health and environmental effects can be attributed to drug producers themselves, whom, they claim, also use Roundup to suppress weeds around coca bushes, and who pollute Colombian rivers with chemicals used in processing and refining coca into cocaine in their drug labs.

Some U.S. officials assert that many of the complaints come from those with an interest in continuing coca production, especially as aerial spraying of coca crops has taken place for many years in other areas of Colombia without the outcry that the spraying in Putumayo has produced. However, according to a *Washington Post* article of January 7, 2001, about the spraying in Putumayo: "Until recently, spraying focused almost entirely on remote industrial-sized coca and poppy plantations....Now the planes are targeting more populous farming areas...where coca...is often grown side by side with corn, yucca, pineapple and livestock. Often it shares a plot next to the farmer's tin-roofed shack." ("Aerial Attack Killing More than Coca," by Scott Wilson.) Regarding crop damage, the *Post* reporter stated that his "inspection of fields in the area suggested that food crops have been hit at least as hard as coca." Critics have attributed food crop damage to the side-by-side plantings of legal and illegal crops in Putumayo, but also charge that spray planes fly higher than normal for crop dusting operations elsewhere in order to avoid ground fire, and under unacceptable wind conditions, thus leading to the dispersion of spray beyond intended targets.[18]

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[17] (...continued)
International Society of Regulatory Toxicology and Pharmacology.

[18] One website's ([http://www.farmsource.com]) discussion of the use of Roundup (accessed through the Monsanto website, [http://www.monsanto.com]) notes that Roundup should "only be applied from aircraft when the potential for drift to adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g. when the wind is blowing away from sensitive areas)." It gives detailed instructions for aerial applications, including the maintenance of an appropriate buffer zone from "any desirable vegetation or crops," i.e., normally some 100 feet, but 500 feet if the wind

(continued...)

Some analysts, however, have noted that complaints of ill effects to humans and animals may not be entirely inconsistent with State Department assertions of safety under controlled circumstances as the health and environmental effects could vary depending on the exact formulation of the spray mix, the manner of its application, and the conditions under which it was used. Some critics have argued that Roundup is not being applied in a manner consistent with U.S. usages and with the manufacturer's recommendations, and that not all issues related to ingredients used in the mixture applied in Colombia have been explored.

- The World Wildlife Fund, in an October 30, 2000 statement, "Comments on Glyphosate," states that existing studies "may not be adequate to assess the impacts resulting from Plan Colombia's actual use of glyphosate (aerial applications, product formulation, frequency and rate of application, etc.), especially given the soils, topography, climatic conditions (temperature, rainfall, etc.) plant and animal species found in Colombia." (Online at: [http://www.ciponline.org/colombia/103001.htm]).

- In a February 9, 2001 statement calling for the end of aerial eradication, representatives of three non-governmental organizations claimed that "there is evidence that herbicide concentrations much higher than ones recommended are being applied in Colombia" and that "there are no toxicological studies...regarding the effects of mixing the Cosmoflux-4111F surfactant with pesticides."[19] The statement also noted that Roundup Ultra (which opponents say is the actual variety of Roundup being used in Colombia, although the State Department report cited above does not refer to either trade name) "contains other ingredients besides glyphosate and the two adjuvants." The World Wildlife Fund, in the October 2000 statement cited above, found that studies on the effects of Roundup "focus on the pesticide active ingredient alone, not the combination of inert ingredients actually applied, thereby giving an incomplete assessment of the toxic threat," and asserted that "the inert ingredients mixed with the Roundup to increase its effectiveness can be as, or more, toxic to humans, wildlife and foodwebs than the pesticide itself." The Monsanto website states that the "new ingredients" in Roundup Ultra are on an EPA approved list (#4B), but the specific "new" ingredients are not named.

- An analysis by agronomist Elsa Nivia, identified as associated with the non-governmental *Red de Acción en Plaguicidas y Alternativas - América Latina*, RAP-AL. PAN-Colombia (Pesticide Action Network), claims that the aerial fumigation of illegal crops in

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[18] (...continued)
is blowing up to five miles an hour, and more at greater windspeeds.

[19] *Forced Aerial Eradication of Illicit Crops: A Reply to the State Department*, signed by Ricardo Vargas M. of Acción Andina Colombia, Martin Jelsma of Transnational Institute, TNI, and Elsa Nivia of RAPALMIRA. Posted at [http://www.usfumigation.org].

> Colombia with Roundup is "very different from the recommended agricultural use in the United States," citing the concentration as 26 times greater than that recommended, with negative effects intensified by the use of Cosmoflux 411F. Even though the authors of the report cited by the State Department had found glyphosate and Roundup to be at most mildly toxic, Ms. Nivia's conclusion from their discussion of the effects of accidental and occupational exposures to higher concentrations, and of the doses that proved lethal in people attempting suicide, is that higher than recommended concentrations or applications could help to explain the severe ill effects reported in the fumigated areas. (See *Las fumigaciones aéreas sobre cultivos ilícitos si son peligrosas - Algunas aproximaciones*, by Elsa Nivia. Paper given at a conference on The Wars in Colombia: Drugs, Guns and Oil, held at the University of California at Davis, May 17-19, 2001, accessible through [http://www.usfumigation.org].)

The State Department is funding a study, with design assistance supplied by the Center for Disease Control (CDC) and the EPA, of the health effects of aerial eradication in Putumayo Department. Results are anticipated by late 2001.

Annex 42

Annex 43

Memorandum from Stephen H. Harris, COR, DoS/INL/A, to
Dyncorp, PSD Manager (Dec. 2001)

UNCLASSIFIED

RELEASED IN PART
B4, B6

L36

Unclassified
MEMORANDUM

XX XXX XXXX
In reply refer to:

TO: DYNCORP - [redacted] PSD MANAGER B4, B6

FROM: DoS/INL/A - STEPHEN H. HARRIS, COR

SUBJECT: MONTHLY EVALUATION – **December 2001**

MAIN OPERATING BASE (MOB)/ DEPLOYMENTS

OVERALL RATING:

Management
Overall Rating:

Technical
Overall Rating:

Operations
Overall Rating:

Operational Planning
Rating:

Operational Effectiveness
Rating:

Business Management
Rating: *Excellent*

During November 2001:

- Supported four FOL's and main Base (Bogota, Villa Garzon, Tolemaida and Larandia).
- Flew 2106.6 total flight hours on all aircraft.
- OV-10 and T-65 sprayed a total of 6584 hectares of coca and zero hectares of Poppy
- The COLAR N model unit flew over 1371,3 hours of flight time moving over 2,754 pax and 44,450 pounds of cargo.
- The C-27 moved over 53,037 pounds of cargo and over 1,612 pax total
- The Site completed 6 phase and 22 intermediate inspections and 11 depot repairs
- T-65 operated from Villa Garzon in a satisfactory manner.
- Site Manager continues to provide outstanding leadership, and management of his staff.

Contract Management
Rating: *Satisfactory*

- Maintenance, and Logistics has been excellent during this period.
- The C-27, a workhorse program, continues to be managed in an excellent manner and flew a total of 94.5 hours this month.
- Outstanding management of the UH-1N program continues to provide excellent support to COLAR counter narcotics operations, both in training and operational support. The COLAR program supported 3 MEDEVAC missions and numerous drug interdiction operations.
- Operations personnel providing oversight of the T-65 program failed to enforce/or at least notify SAA of problems with INL policies.

Schedule
Rating: *Excellent*

- Scheduling in all areas—flight operations, maintenance, production control, and training—performed satisfactorily during this rating period.

Technical
Overall Rating: ***Excellent***

Operational Planning
Rating: *Excellent*

- The Contractor managed to spray 3657 hectares of coca in Larandia (unadjusted) and provided oversight to the PNC T-65 program, which sprayed 2927 hectares of coca in Villa Garzon for a total of 6584 hectares. This is a slight decrease over the previous month but was affected by weather and OV-10 maintenance and pilot problems.
- Contractor support and planning for night spraying was excellent.

Annex 44

Memorandum from Lowell E. Neese, SAA, DoS/INL/A (Bogota), to Stephen H. Harris, COR, DoS/INL/A (13 Mar. 2002)

UNCLASSIFIED

MO

RELEASED IN PART
B4, B6

Unclassified Memorandum

March 13, 2002

To: DoS/INL/A - Stephen H. Harris, COR

From: DoS/INL/A (Bogota) – Lowell E. Neese, SAA

Subject: Monthly Evaluation – March 2002

COLOMBIA

Overall Rating: Excellent

1. Management

Rating: Excellent

The contractor coordinated COLAR Program operations under severe financial restrictions imposed by the funding problems and managed to complete all missions requested.

The management of the COLAR Program earned an excellent this reporting period. Management was down graded from what would have been an outstanding due to the key position of the COLAR Operations Manager remains unfilled. The contractor did fill the vacant Operations Coordinator position in Larandia.

Key critical problem area was identified by the FOB Manager in the area of care for Ground Support Equipment (GSE). Due to current fiscal constraints additional GSE personnel cannot be hired.

Although management currently is undermanned due to the lack of an effective operations manager, the FOB manager has done an exemplary job and has taken on many of the task himself. He has been involved and is partly responsible for the detailed mission planning and execution of one of our most complex joint (UN-1N and Eradication) operations ever conducted by the Air Wing. Planning consisted in the movement of over 600 counter-narcotics soldiers into a hostil area of southern Colombia in support of an aggressive spray program along the eastern side of the River Caguan.

Management completed the sight survey of the Port of Santa Marta which led to success in the delivery, preparation, nationalization, flight planning and movement of six COLAR Huey IIs and one Eradication UH-1N to Tolemaida without incident.

The Site Manger continued to demonstrate excellent judgment and management capability in his handling of the OV-10 accident, the memorial service and transporting of the deceased pilot's, to Argentina.

The Communications Manager, [redacted] continued to work as the Operations Manager for the majority of the month as [redacted] was getting his feet on the ground. [redacted] did a great job in the position and is a key member to the DynCorp team in Colombia. B4, B6

The Eradication Program helicopter and SAR crews performed exemplary recovery operation after the fatal OV-10 accident. All actions were conducted as outlined in the Pre-Accident Plan.

2.2 Training and Institution Building

Rating: Satisfactory

The Contractor continues with flight and academics training for the COLAR. Over 240 flight hours were flown in mission training of new COLAR pilots. Academics training consisted of classes in cockpit resource management, night vision goggles and theory of operation, and maintenance. The Contractor completed training on one Air Wing Instructor Pilot and one COLAR Unit Trainer. Six gunners completed mission training as well. The Standardization Instructor Pilot continues to do an outstanding job in the areas of no-notice evaluations, maintenance of aircrew training folders and his effective overall oversight of the training process which has led to an exemplary COLAR safety record.

The contractor failed to notify the Advisor Staff of two major engine problems in the T-65 program, the staff was notified two days after the event when the PNC was looking for replacement engines. These engine problems were a major cost impact on the program; they affected T-65 eradication operations and reflect a systemic failure in following of aircraft operational procedures.

2.3 Quality Control

Rating: Satisfactory

Quality Control is being down graded from excellent to satisfactory due to some safety issues at Tolemaida and Larandia. General house keeping of the grounds and maintenance hangers is unsatisfactory. Trash, unserviceable equipment, GSE and such are scattered in both locations. I have directed the FOB manager to ensure the problem area is resolved. Quality Control and Safety have a substantial quantity of safety equipment which was requested and purchased which has yet to be put to use.

Quality control continues to be excellent in the maintenance of aircraft log books and implementation of the quality control plan.

Annex 45

United States Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, *Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia, Response from EPA Assistant Administrator Johnson to Secretary of State* (19 Aug. 2002)

U.S. DEPARTMENT OF STATE
DIPLOMACY IN ACTION

Response from EPA Assistant Administrator Johnson to Secretary of State, August 19, 2002

Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia
BUREAU FOR INTERNATIONAL NARCOTICS AND LAW ENFORCEMENT AFFAIRS
September 2002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

The Honorable Colin L. Powell, Secretary
U.S. Department of State
Washington, D.C. 20520

Dear Secretary Powell:

We are enclosing our consultation review as per your request to Environmental Protection Agency (EPA) Administrator Christine Todd Whitman, for consultation on the potential human health and environmental effects of the aerial coca eradication program in Colombia, pursuant to the Foreign Operations, Export Financing, and Related Programs Appropriation Act (P.L 107-115). Administrator Whitman has asked me to respond on her behalf because my office has primary oversight responsibility for pesticides, and the nature of this consultation centers around the technical aspects of chemicals used in the aerial fumigation of coca.

The Foreign Operations, Export Financing, and Related Programs Appropriation Act specifically requires the Department of State to consult with EPA on whether (1) "aerial coca fumigation is being carried out in accordance with regulatory controls required by the EPA as labeled for use in the United States .... ; and (2) whether the chemicals used in the aerial fumigation of coca, in the manner in which they are being applied, do not pose unreasonable risks or adverse effects to humans or the environment..."

As part of our consultation review, we considered the full range of available scientific information from laboratory and field testing and incident reports. Our consultation review evaluates the potential impact to human health and the environment from the eradication program, based on information provided by Department of State, on the pesticide used (glyphosate), inert ingredients, and the application rates and methods, In addition, Agency scientists reviewed scientific studies on glyphosate, conducted a limited literature search for human health incidents related to glyphosate use, and examined information on glyphosate use conditions in the United States. We also considered information provided by non-governmental organizations, concerning effects reportedly connected to coca eradication in Colombia.

Glyphosate is widely used in the United States. Based upon EPA reviews of domestic use conditions, glyphosate appears to be one of the most safely-used pesticides in the U.S. EPA's regulatory authority for domestic pesticide use allows significant controls through pesticide labeling and compliance and enforcement infrastructure implemented with the states and other federal agencies. Recognizing that these mechanisms are not available to EPA in Colombia, the Agency has evaluated potential risks associated with the coca eradication program and identified areas where Department of State should pay particular attention to minimize the potential for adverse effects.

I trust that the attached document will assist you in preparing your response to Congress. Please let me know if you have additional questions concerning this consultation review.

Sincerely,

Stephen L. Johnson
Assistant Administrator

U.S. Environmental Protection Agency Office of Pesticide Programs Details of the Consultation for Department of State Use of Pesticide for Coca Eradication Program in Colombia, August 2002

Table of Contents

EXECUTIVE SUMMARY

CONSULTATION REVIEW OF THE USE OF PESTICIDE FOR COCA ERADICATION IN COLOMBIA

BACKGROUND

The Department of State currently assists the Government of Colombia with training, contractor support, financial assistance, and technical and scientific advice for an aerial pesticide spraying program designed to eradicate illicit crops (coca and poppy). In accordance with a provision in its 2002 Appropriations Bill, Department of State has consulted with the U.S. Environmental Protection Agency (EPA) on two specific questions: that fumigation is "...being carried out in accordance with regulatory controls required by the Environmental Protection Agency as labeled for use in the United States" and, that the chemicals being used "...in the manner they are being applied, do not pose unreasonable risks or adverse effects to humans or the environment."

FINDINGS

EPA has reviewed information provided by Department of State concerning the pesticide formulation applied (combination of the pesticide active ingredient, glyphosate, and inert ingredients), and application rates and methods. According to the most recent figures (1999 sales and usage) glyphosate is the most widely used conventional pesticide in the United States. The Agency evaluates all pesticides used in the U.S. to determine whether they meet the U.S. safety standard of no unreasonable adverse effects. Consequently, EPA has a significant amount of information about glyphosate from a health and environmental standpoint because of our reviews of use conditions in the U.S. In the U.S., the Agency can assure significant controls on use and potential health and environmental impacts through the pesticide label, and through a state infrastructure which governs label compliance to address issues such as drift and worker and bystander exposure.

Based on a comparison of the glyphosate use pattern in Colombia, as described by the Department of State, and use in the U.S., EPA determined that the most equivalent U.S. uses of glyphosate would be forestry or rights-of-way. The glyphosate product which has been identified to us as used in Colombia is registered in both the U.S. and Colombia, although it has never been marketed in the U.S. The Agency found application rates described as used in Colombia to be within the parameters listed on U.S. labels. The addition of a spray adjuvant (to facilitate the formulation adhering to and penetrating the coca plant) is also in keeping with U.S. practice. While the specific spray adjuvant product identified as that used in Colombia is not sold in the U.S., similar substances and products are commonly used. Most U.S. labels for forestry and right-of-way use of glyphosate suggest application by helicopter. Since application in Colombia is done by fixed-wing aircraft, it is likely conducted at a higher speed and from a greater altitude, than would be typical in the U.S. Department of State has assured the Agency that mixers/loaders and applicators of the glyphosate formulation receive training comparable to U.S. label requirements for glyphosate products including the use of personal protective equipment such as gloves and goggles.

As for potential human health effects of the coca eradication program, there are no risks of concern for glyphosate, *per se*, from dermal or inhalation routes of exposure, since toxicity is very low. There is concern for acute eye toxicity due to an inert ingredient in the glyphosate formulated product used to treat coca. The potential eye effects are related to an inert ingredient, not the glyphosate itself,

and greatest potential for exposure is expected for workers mixing and loading the concentrated glyphosate product. The components of the spray adjuvant, Cosmoflux 411F, are substances with low oral and dermal toxicity that have been approved for use in/on food by EPA and the Food and Drug Administration. There are no expected toxicological effects of concern for acute (short-term) or chronic (long-term) dietary exposure through food and water from the coca eradication program. Incident data from Colombia involving humans, livestock, mammals and birds, are based on potential exposure to glyphosate from fumigation of poppy fields, which may differ from use of and exposure to glyphosate from coca eradication, so conclusions should be made cautiously.

Relative to the potential environmental effects of the spraying program based on U.S. data, phytotoxicity to non-target plants outside of the application zone would be expected, since glyphosate is a broad spectrum herbicide. Given the application method described by Department of State, offsite exposure from spray drift is probable, as it would be under similar uses in the U.S. This proposed use of glyphosate itself does not appear to pose a significant direct risk to terrestrial or aquatic animals, although secondary adverse effects from the temporary loss of habitat in the spray area could occur. EPA would not expect any risk to birds and mammals, including livestock, based on dietary exposure to the active ingredient glyphosate. Anticipated effects to animals are based on an extrapolation of data related to North American species. Glyphosate does not have a high potential to leach to ground water or reach surface water as dissolved runoff but does have potential to contaminate surface water as a result of residues suspended in runoff water. A more refined assessment is difficult due to uncertainty regarding the exact formulation of the spray solution.

As part of its consultation, EPA reviewed available scientific studies and information on the human health and environmental effects of glyphosate and the inert ingredients and on exposure pathways; conducted a literature search for human health incidents related to glyphosate use in the U.S.; and summarized use patterns for glyphosate in the U.S., including use sites, methods and rates of application, and differing formulations. In addition, the Agency considered information, provided by non-governmental sources, concerning adverse effects reportedly connected to the eradication program.

Details of the Agency's findings are provided in the attached document.

SECTION 1. Description of Glyphosate Use in the U.S. for Comparison to Use in Colombia for Coca Eradication

INTRODUCTION: The Biological and Economic Analysis Division (BEAD) within the Office of Pesticide Programs, Environmental Protection Agency, has been asked to describe the use of glyphosate within the United States with a more detailed description of its use in forestry sites so that methods of use in the United States may be used as a basis for comparison for coca eradication in Colombia (1).

SUMMARY: Glyphosate is the herbicide most widely used in the United States[1] (2). In agriculture this popularity is due, in large part, to the development of crops that are highly tolerant to broadcast applications of glyphosate which allows growers to use this non-selective herbicide as their principal method of weed control in certain crops. Growers have rapidly adopted glyphosate-based weed control programs with glyphosate tolerant crops because they are simple and economical (3). In addition, due to it's unique properties, glyphosate is also widely used for non-agricultural weed control situations including home lawns and gardens, forestry and other non-crop sites where total vegetation control is desired.

[1]EPA's (BEAD's) biannual pesticide sales and usage report estimates that in 1999, glyphosate was the most used conventional pesticide in the U.S. (83 to 95 million pounds of glyphosate applied) in all markets. It was second behind atrazine in the agricultural market (67 to 73 million pounds of glyphosate applied); and second behind 2,4-D in the non-agricultural market (16-22 million pounds of glyphosate applied). In the agricultural market, data for 2000 and 2001 suggest that the usage of glyphosate has increased to as much as 100 million pounds. Data is not yet available for 2000 and 2001 for the non-agricultural market.

Glyphosate must be applied to the target plant's foliage to be effective. Glyphosate is non-selective in action, controlling a wide variety of plants. Once absorbed, it circulates to untreated portions of the plant; and it has no residual activity after contact with soil. Glyphosate may be applied using hand-held, ground-driven or aerial equipment; the choice of equipment is determined by the site to be treated. Although higher rates of application are allowed, actual rates per application in agricultural sites average less than 0.75 pounds of the active ingredient glyphosate per acre (Table One). For the non-agricultural site, forestry, use is allowed at rates per application ranging from 2 to 10 pounds per acre (2.2 to 11.2 kilograms of active ingredient/ hectare) of glyphosate in the form of the isopropylamine salt (6). This rate of use may also be expressed as 1.5 to 7.5 pounds per acre of acid equivalent (pure glyphosate; not a salt). A more detailed discussion of the use of glyphosate in the U.S. follows.

USE OF GLYPHOSATE IN THE UNITED STATES: Products containing glyphosate are registered with the U.S. Environmental Protection Agency, which means they may legally be used within the United States if used in accordance with label instructions.

Glyphosate may be used on over 400 crop and non-crop sites. The largest agricultural use sites include soybeans, cotton and field corn. The following table summarizes estimates the use of glyphosate in three primary agricultural use sites.

Table One. 2000 Glyphosate Use in U.S. Agriculture: In Total and for the Three Major Use Sites

Site	Acres Grown (million acres)	Base Acres Treated (million acres)[1]	Percent of Crop Treated[2]	Total Acres Treated (million acres)[3]	Pounds Applied (million lbs ai)	Avg. Number of Apps	Avg. Application Rate (lbs ai/acre/app)
All Ag. Sites	-	-	-	102.7	73.5	-	-
Corn	73.8	6.6	9%	7.3	4.4	1.1	0.59

Cotton	14.4	8.1	56%	13.8	9.5	1.7	0.67
Soybeans	71.0	44.0	62%	57.2	41.8	1.3	0.68

Source: USDA, National Agricultural Statistics Service (NASS) 2000 field crop chemical use (May, 2001), and EPA proprietary data.

[1]Base acres treated = acres treated 1 or more times with glyphosate.

[2]Percent of crop treated = base acres treated with glyphosate divided by acres grown.

[3]Total acres treated = based acres treated with glyphosate multiplied by the average number of applications of glyphosate.

In addition to agricultural use, EPA estimates that 16-22 million pounds of the technical grade active ingredient were applied to non-agricultural sites in 1999 (this is the most recent year for which adequate data are available). The estimate includes both home owner and professional applications as well as use on forested lands (11). Based on EPA data for 1999, an estimated 1-2 million pounds of glyphosate was applied to forest acres, with more than 650,000 forest acres treated.

AGRICULTURAL SITES: In certain annual crops, glyphosate may be applied before planting (preplant) to control existing weeds; often replacing tillage as a weed control measure in "no-till" crop culture systems designed for reducing soil erosion. However, most of the glyphosate currently used in agricultural sites is used in a cropping system employing crop varieties that have been developed to be resistant to glyphosate so that glyphosate may be applied "over-the-top" of the resistant crop to kill susceptible weeds. The most prevalent of these systems is the Round-up Ready Soybean® system. These soybeans, which are highly tolerant to glyphosate, were marketed starting in 1996. Since then this system has been widely and rapidly adopted; in 1990-1991, glyphosate ranked 11th among conventional pesticides used in the U.S. with annual use estimated to be 18.7 million pounds (4). In 2000, glyphosate was the most widely used herbicide in soybeans; nearly 42 million pounds of glyphosate were applied to soybeans alone (2) with over 60 percent of soybeans surveyed by USDA's National Agricultural Statistical Service treated with glyphosate (5). Round-up®, a glyphosate product marketed for agricultural use is formulated with a surfactant during manufacture to facilitate foliar absorption. The following table (Table Two) summarizes the use rates specified in label instructions for Roundup Original™ product herbicide concentrate (12) which contains the isopropylamine salt of glyphosate for use in glyphosate-tolerant soybeans.

Table Two. Allowed Rate of the Isopropylamine Salt of Glyphosate Per Application in Tolerant Soybeans

Maximum for Application Timing	Quarts of Product/Acre	Pounds of Active Ingredient/Acre	Kilograms of Active Ingredient/Hectare
For Entire Season	8	8	9
Before Crop Emergence	5	5	5.6
In Crop	3	3	3.4
Up to Two Weeks Prior to Harvest	1	1	1.1

NON-AGRICULTURAL USES INCLUDING FORESTRY: BEAD has been asked to describe the use of glyphosate in U.S. forestry sites since that use most closely corresponds to the use of glyphosate in Colombia for coca control. For simplicity this document only refers to Accord® which is intended specifically for forestry use (6). This product contains the isopropylamine salt of glyphosate (41.5%), and is labeled for non-agricultural uses including Forestry Site Preparation and Utility Rights-of Way, Forestry Site Conifer and Hardwood Release, and Wetland Sites in the U.S. Table Three describes the rates at which it may be used. It is recommended for use in site preparation prior to planting any tree species, including Christmas tree and silvicultural nursery sites (7). Specific methods of application for forestry uses include: aerial spraying; spraying from a truck, backpack or hand-held sprayer; wipe application; frill treatment; cut stump treatment (7).

For forestry site preparation it may be applied using either ground or aerial equipment at rates from 2 to10 pounds glyphosate active ingredient per acre which is equivalent to 2.2-11.2 kilograms of active ingredient per hectare (Table Three). It may also be applied using hand-held equipment. Product instructions specify that a non-ionic surfactant be added to the spray mixture for all forestry uses at a rate of 0.5 to 1.5 percent by spray volume (2 to 6 quarts of surfactant per 100 gallons of spray solution). It may also be combined with certain residual herbicides to extend the period of weed control beyond that obtained with glyphosate alone.

The isopropylamine salt of glyphosate may also be used in forestry conifer and hardwood release as a directed spray or by using selective equipment. This product may also be used in or around wetland sites generally at no more than 5 quarts of product per acre (5 lbs isopropylamine salt of glyphosate per acre which is equal to 5.6 kg/ha) using over-water broadcast application (5).

Table Three. Rate of Isopropylamine Salt of Glyphosate Per Application For Certain Use Sites

Use Site	Quarts of Product/Acre	Pounds of Active Ingredient/Acre	Kilograms of Active Ingredient/Hectare
Forestry Site Preparation and Utility Rights-of Way	2-10	2-10	2.2-11.2
Forestry Site Conifer and Hardwood Release	2-10	2-10	2.2-11.2
Wetland Sites	2-5	2-5	2.2-5.6

PROPERTIES OF GLYPHOSATE: Glyphosate is a foliar-active herbicide; to exert herbicidal properties it must enter the plant through foliage (or in some cases, the stem). Glyphosate applied to foliage is absorbed by leaves and rapidly moves through the plant. It acts by preventing the plant from producing an essential amino acid. This reduces the production of protein in the plant, and inhibits plant growth.

Glyphosate has systemic activity, meaning that it circulates through the plant's vascular system; affecting the entire plant, not just the treated foliage. Other foliar-active herbicides, like paraquat for example, are contact herbicides; affecting only the portion of the plant onto which they are applied. After treatment with a contact herbicide, a plant may then regrow from untreated portions, often necessitating re-treatment for complete control. The advantage to a systemic herbicide is that if applied at an appropriate dose, it can kill an entire plant, thus preventing regrowth from an untreated plant part such as a root.

Glyphosate has no residual activity, once adsorbed to soil it quickly becomes unavailable to plants and no longer has herbicidal activity. This means that a plant that would ordinarily be susceptible to glyphosate can be planted shortly after an application of glyphosate; this is common practice in U.S. agriculture. In contrast, some herbicides have month-long or even year-long residual activity which limits the plants that may be grown following their use.

Glyphosate is non-selective. Some herbicides are selective in their action, controlling only grassy weeds in a broadleaf crop like soybeans, for example. However, glyphosate exerts herbicidal action on a variety of plants; it is active on grasses, herbaceous plants including deep rooted perennial weeds, brush, some broadleaf trees and shrubs, and some conifers. However, glyphosate does not control all broadleaf woody plants. Plants vary in their susceptibility to glyphosate, so the treatment of dose in important. Plants of certain species and older plants are less susceptible to glyphosate Timing is critical for effectiveness on some broadleaf woody plants and conifers.

FORMULATIONS OF GLYPHOSATE: Glyphosate and four salts of the parent glyphosate molecule are currently used as active ingredients in registered pesticide products in the U.S.(9). These products are registered with the U.S. EPA for use in the U.S. in many different crop, non-crop, industrial and residential sites.

Table Four. Number of Products and Sites for Different Formulations of Glyphosate

Active Ingredient	Number of Products	Number of Sites
Glyphosate acid	28	more than 250
Ethanolamine salt	2	more than 200
Ammonium salt	16	more than 300
Isopropylamine salt	237	more than 400
Trimesium salt	6	more than 100
Sesquisodium salt	no currently active products	no active sites

GLYPHOSATE USED WITH SURFACTANT FOR FOLIAR ABSORPTION: Since glyphosate is only effective if absorbed by plant foliage, glyphosate is combined with a surfactant to facilitate its absorption. Many herbicide concentrates, including glyphosate, are mixed with water before application. Without a surfactant, the aqueous spray mixture is repelled by the plant's waxy cuticle layer ("beads up"), and quickly runs off the plant's surface, preventing absorption.

Surfactants are commonly used as wetting agents with herbicides and in other products such as laundry and dishwashing detergent. Non-ionic surfactants, which are comprised of alcohols or fatty acids and considered an all-purpose surfactant are commonly used with glyphosate-containing products. Surfactants are frequently added during manufacture of the herbicide concentrate. If not, a non-ionic surfactant is generally mixed with the herbicide and water before spraying to enable the liquid to make better contact with the waxy cuticle of the plant. These glyphosate products, which are formulated without a surfactant, are considered "non-loaded" (10).

A short description of international usage of glyphosate, including Colombia, appears after the following references to the above discussion.

REFERENCES:

(1) Description of Use of Glyphosate in Coca Eradication in Colombia in attachment to a letter from Secretary of State Colin Powell to Environmental Protection Agency Administrator Governor Christine Whitman.

(2) Donaldson, D., T. Kiely, and A. Grube. Pesticide Industry Sales and Usage, 1998 and 1999 Market Estimates. June 2002. Biological and Economic Analysis Division, Office of Pesticide Programs, U.S. Environmental Protection Agency.

(3) Gianessi, L.P., Silvers, C., Sankula, S., and Carpenter, J. Plant Biotechnology: Current and Potential Impact for Improving Pest Management in U.S. Agriculture - An Analysis of 40 Case Studies. June 2002. National Center for Food and Agricultural Policy.

(4) Glyphosate - Reregistration Eligibility Decision. United States Environmental Protection Agency. September 1993.

(5) Agricultural Chemical Usage - 2000 Field Crops Summary. May 2001. United States Department of Agriculture. National Agricultural Statistics Service.

(6) Accord® Herbicide Specimen Label. Available on-line from CDMS.

(7) Pesticide Fact Sheet. Prepared for the U.S. Department of Agriculture, Forest Service.

(8) D. Lantagne., M. Koelling, and D. Dickman. Effective Herbicide Use in Christmas Tree Plantations. Michigan State University Extension.

(9) U.S. Environmental Protection Agency, Office of Pesticide Programs. Search of the Reference Files System dated June 11, 2002.

(10)Miller, P., and P. Westra. Crop Series: Production. Colorado State University.

(11) EPA Proprietary Information

(12) Roundup Original Herbicide™ Supplemental Labeling for Postemergence Applications to Soybeans with Roundup Ready® Gene. Available online from CDMS.

BEAD was asked to report on the use of glyphosate in forestry sites since it seemed similar to the use pattern for coca eradication. However, it is not clear how closely this use approximates that for coca eradication. Glyphosate is typically applied to forestry sites using helicopters at air speeds of 50-70 knots (about 60-80 miles per hour). Application to forestry sites by fixed wing aircraft, if practiced at all, is extremely rare (1). The recommended rate of application for pine release (conifer release) is 1.5 to 2 pounds active ingredient per acre.

Aerial application to other sites comprises less than one percent of the total amount of glyphosate applied in the United States (3).

In addition to surfactants, drift control agents may be added to the spray mixture for forestry uses in an effort to prevent drift to off target sites. BEAD has not investigated the prevalence of use or the effectiveness of these products.

BEAD estimates total global use of glyphosate to be between 350 and 360 million pounds of glyphosate per year. Annual use in the United States is approaches 100 million pounds of active ingredient and an estimated 250 to 260 million pounds of glyphosate is used outside of the United States. Use of glyphosate in Colombia accounts for between four and five million pounds of this use. Primary sites in Colombia include coffee, bananas, pasture-land and rice (3).

REFERENCES:

(1) Personal communication between Virginia Werling, United States Environmental Protection Agency and John Taylor, United States Forest Service on August 9, 2002.

(2) Hamilton, R.A. "2002 North Carolina Agricultural Chemicals Manual - Chemical Weed Control In Forest Stands" Extension Forest Resources Department, North Carolina State University. Available on-line at http://ipm.ncsu.edu/agchem/chptr8/821.pdf

(3) United States Environmental Protection Agency Proprietary Data.

SECTION 2. Human Health Risk Assessment for the Use of Glyphosate Herbicide as Part of the Aerial Eradication Program of Coca in Colombia, S.A.

I INTRODUCTION

The Department of State has requested that the US Environmental Protection Agency (EPA), Office of Pesticide Programs (OPP) provide a human health risk assessment for the aerial coca eradication in Colombia. The Department of State (DoS) has requested that the risk assessment address whether or not the aerial eradication program in Colombia is being carried out in accordance with regulatory controls required by the EPA as labeled for use in the United States, and the chemicals used, in the manner in which they are being applied, do not pose unreasonable risks or adverse effects to humans and or the environment. According to information provided by DoS, the eradication program, includes the use of a spray mixture of a glyphosate containing pesticide product, an adjuvant (Cosmo-Flux 411F) and water. The glyphosate tank mixture is applied in an over the top aerial foliar application in certain provinces within Colombia. To facilitate the request, the DoS met with members of OPP on April 18 and sent a written request, dated May 8, 2002, with documentation on the coca eradication program, including a description of the pesticide spray mixture components, application methods, target site identification, and potential exposures. DoS also supplied EPA with incident reports for aerial eradication of illicit poppy in Colombia.

The Field and External Affairs Division (FEAD) of OPP, which has the responsibility of managing the EPA's role of providing technical information and assistance to DoS for this program, forwarded the DoS request to Health Effects Division (HED), the Environmental Fate and Effects Division (EFED), and the Biological and Economics Assessment Division (BEAD) for scientific assessments. The HED of OPP is charged with estimating the risk to human health from exposure to pesticides. Registration Action Branch 1 (RAB1), Reregistration Branch 1 (RRB1) and the Chemistry and Exposure Branch (CEB) of HED as a team have performed the assessment requested by the Department of State and have evaluated the potential hazard, exposure, and risk to human health from the U.S. supported coca eradication program Colombia.

A summary of the findings and an assessment of human risk resulting from the use of glyphosate in Colombia to eradicate coca is provided in this document.

Unless otherwise specified, all information pertaining to the U.S. supported coca eradication program in Colombia was provided to the Agency from two sources: (1) Department of State (DoS) Presentation, DoS Coca Eradication Program, 4/18/02, (2) DoS document

entitled Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application.

II EXECUTIVE SUMMARY

USE PATTERN

According to the State Department, the glyphosate tank mixture is applied as an over the top aerial foliar application to coca in certain provinces within Colombia. The tank mixture sprayed for eradication of coca in Colombia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). Up to two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons of product/Acre. In order to assess the hazard of what was sprayed in Colombia, components of the mixture were evaluated separately.

HAZARD ASSESSMENT

The **Cosmo-Flux 411F** adjuvant used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. All ingredients identified as contained in this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. Cosmo-Flux 411F consists mainly of *(information not included as it may be entitled to confidential treatment)* with a nonionic surfactant blend primarily composed of *(information not included as it may be entitled to confidential treatment)*.

The available hazard data base on experimental animals indicates that the **Glyphosate** technical grade active ingredient (TGAI) has low acute toxicity via the oral and dermal routes. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2 generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which resulted in evidence of appreciable parental toxicity.

The Food Quality Protection Act (FQPA) Safety Factor Committee (SFC) concluded that the safety factor, to protect infants and children, of 10x be removed (reduced to 1x). The Hazard Identification Assessment Review Committee (HIARC) met on March 26, 1998 and, again, on November 20, 2001. The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary exposure and residential/occupational exposure. No endpoints were selected for the acute Reference Dose (RfD) since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no concerns for developmental or reproductive toxicity. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term 1-30 days, intermediate term- 1 to 6 months, or long term- 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate. HIARC did identify an incidental oral endpoint for short- and intermediate-term exposure. The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. Glyphosate was not mutagenic in a full battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a "Group E" chemical (no evidence of carcinogenicity to humans).

EXPOSURE

An exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential for exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for acute dietary, dermal, or inhalation exposures. Therefore, quantitative estimates of risk for these exposure durations have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002).

Acute **dietary exposure** is possible for persons consuming livestock or food crops which have been inadvertently sprayed as a result of the aerial eradication program in Colombia. However, since glyphosate is a contact herbicide that systemically kills plants after absorption through leaves, dietary exposure due to consumption of treated crops is expected to be limited. In addition, since an acute dietary endpoint was not identified in the hazard database, no significant risk due to acute dietary food exposure to glyphosate residues is expected. Based on the fact that a coca field is sprayed no more than twice to eradicate the crop, no chronic food exposure is expected.

Handler (e.g., individuals mixing the concentrated formulated product to prepare the tank mix and loading the tank mix in the aircraft) exposure is anticipated for short-term (1-30 days) and, possibly intermediate-term (1-6 months) durations based on the frequency of application and duration of the spray program.

Based on the use pattern described by the DoS, short-term dermal **post-application exposures** are expected for persons pruning, or leaf pulling treated coca plants immediately after spray events. In cases such as glyphosate, where the vapor pressure is negligible, OPP experience with post-application data suggests that inhalation exposure is minimal and OPP does not quantitatively assess post-application inhalation exposure. Intermediate- and long-term post-application exposures are not expected due in part to the fact that a coca field is sprayed twice to eradicate the crop. Additionally, glyphosate is a translocated herbicide which is rainfast within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal.

DoS states that pilots are instructed not to spray fields where people are present. Therefore, incidental oral exposure (hand-to-mouth) resulting from individuals being directly sprayed by glyphosate was not assessed. Non-dietary incidental oral exposure was not quantitatively assessed for the use of glyphosate in Colombia.

There is potential for exposure to bystanders in areas near those targeted for spraying. However, the technology and other safeguards described by DoS as being used in this program are consistent with common approaches in the United States for reducing **spray drift**. Therefore, it is likely that drift is minimized in this program if all procedures are adhered to and operational equipment is in working order.

From the review of Colombian glyphosate product human **incident reports** for poppy eradication, it should be emphasized that the overwhelming majority (95%) of the illnesses reported are likely background incidents unrelated to the spraying of herbicide to poppy. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incidence data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There are data to suggest that the poppy spray eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

A direct comparison of the epidemiological data in Colombia (which is from aerial application to poppy) to the conditions of use, (as presented at the April 18, 2002 briefing for aerial application to coca by DoS to OPP risk assessors), would be limited. The briefing and the materials provided did not address the conditions of use for poppy. Nor was the Agency provided any human incident data for the coca eradication program. Subsequent to the April 18 briefing HED received an e-mail communication from OPP/Field and External Affairs Division, stating that DoS informed EPA that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. The Agency also has questions as to the geographical area differences, the frequency of repeated applications, and the size of the area treated on each spray mission. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

The *glyphosate formulated product* used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* is classified as toxicity category III for primary eye irritation and toxicity category IV for acute dermal and oral toxicity, and skin irritation. It is not a dermal sensitizer. However, the surfactant used in the *formulated* product reportedly can cause severe skin irritation and be corrosive to the eyes, as would be expected for many surfactants. The label for the *formulated* product used in the coca eradication program in Colombia includes the "Danger" signal word. These findings suggest that any of the reports of toxicity to the eye may be due to the surfactant, not glyphosate per se. The product has been determined to be toxicity category I for eye irritation, causing irreversible eye damage.

There may be a correlation between the ocular toxicity caused by the surfactant and reported incidents of ocular effects. This is supported by data obtained from the California Pesticide Illness Surveillance Program (1982-2000). In 1992 the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that use of the reformulated glyphosate product since 1992, has resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to reduction in eye injuries.

The greatest potential for **eye exposure** is expected for workers mixing and loading the concentrated glyphosate product. There is also the potential for eye exposure as a result of entering treated fields after treatment to perform pruning or harvesting activities.

During an April 18 briefing, the Department of State agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix. To date this information has not been received. Until such information is supplied to the Agency, EPA cannot evaluate the potential ocular or dermal toxicity resulting from direct contact with the tank mixture. Therefore, due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternative glyphosate product (with lower potential for acute toxicity) in future coca and/or poppy aerial eradication programs.

III BACKGROUND

EPA regulates pesticides under two statutes, the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the Federal Food, Drug, and Cosmetic Act (FFDCA). FIFRA provides the authority to register and review pesticides as well as the authority to suspend and cancel if use poses unreasonable risks. FFDCA provides authority to set maximum residue levels (tolerances) for pesticides used in or on foods or animal feeds.

Section 3 of FIFRA provides authority to register (license for sale and distribution) pesticide products. The label of the pesticide product specifies the use (pest and crop/site), amount of product to be applied, frequency, timing of use, restrictions, storage and disposal practices and precautionary statements. The active ingredient in a pesticide product is the "ingredient which will prevent, destroy, repel, or mitigate any pest." The inert or other ingredient(s) in a pesticide product is "an ingredient which is not active." The registrant must provide data for the Agency to assess potential environmental and human health risks. The data required to make a safety finding are dependent on the intended use, e.g., food use vs non-food use. The data requirements for pesticides may be found in 40 CFR Part 158.

For human health risk assessment, data is required to permit characterization of hazard and exposure.

Data requirements on the chemical identity and composition of the formulated pesticide product, may be found in 40 CFR 158.150. The list of ingredients for a pesticide product and the percent of each ingredient in the formulation are contained in the confidential statement of formula (CSF). The CSF is FIFRA confidential business information (CBI) and is entitled to treatment as trade secret or proprietary information. Agency risk assessments do not typically contain this information. **In finalizing the current document, FEAD and HED consulted with OPP's Information Resources and Services Division/Public Information and Records Integrity Branch regarding CBI. It was determined that the document did contain some CBI and therefore, some sections have been adapted**.

Residue chemistry data required as per 40 CFR 158.240 support the ability of the Agency to estimate the amount of pesticide that will result in food as a result of application of the pesticide according to the product labels directions for use. The magnitude of the residue studies for crop field trials use the typical end use product as the test material. The livestock feeding studies are required whenever a pesticide residue will be present in livestock feed. The livestock feeding studies evaluate the magnitude of the resulting pesticide residue in meat, milk, poultry, and eggs. The studies are conducted with the technical grade of the active ingredient or the plant metabolites Residue chemistry data are also required to identify any potential metabolites of concern. These data are used to determine the tolerances for the parent and or metabolites. Additional data is required on environmental fate, degradation, metabolism, and dissipation.

Hazard data required for human health risk assessment are provided in 40 CFR 158.340. The use of the active ingredient (i.e., food use or non-food use) will determine what studies are required. The acute toxicity data on the technical grade of the active ingredient are used for classification and precautionary labeling for protective clothing requirements, and worker reentry intervals. The only studies that are required to be conducted on the manufacturing use product or end use product are the acute toxicity studies. The remaining toxicology studies (e.g., developmental toxicity, reproduction, subchronic, chronic feeding, or carcinogenicity studies) require that the test substance is the technical grade of the active ingredient. Subchronic toxicity studies provide data on potential target organ toxicity and are also used to select dose levels for long term or chronic toxicity studies. Chronic toxicity or carcinogenicity studies are conducted for food use chemicals to determine potential effects following prolonged or repeated exposure that may have a latency period for expression. The test animals are exposed orally for a significant portion of their life span. Developmental toxicity studies are required in two species (usually the rat and rabbit) for food use chemicals. They are conducted to detect alterations in the normal development of fetuses following *in utero* exposure. The 2-generation rat reproductive toxicity study is required to assess potential alterations in gonadal function, estrus cycles, mating, conception, birth, lactation, weaning, as well as growth and development of offspring. The Agency also requires a battery of mutagenicity studies to assess the potential induction of changes in the genetic material of cells. The above studies are required for food use active ingredients. In general, less data is required for non-food use active ingredients and inerts unless a concern has triggered additional testing.

The Agency conducts separate risk assessments for all pesticide active ingredients and has conducted risk assessments for some inerts. The remaining inerts are cleared by the Agency. It should be understood that whenever the inert ingredient was cleared, whenever the tolerance exemption was established, the inert met the standards of the time. Inert ingredients, also known as "other ingredients," are the carrier for the active ingredients which allow the product to deliver the active ingredient at a specific rate and ensure proper distribution during application. Currently there are over 3200 inert ingredients cleared by EPA for use in various domestic pesticides products. There are two major classifications: non-food use (such as lawn care products and bathroom cleaners), and food-use, which require an exemption from the requirement of a tolerance and can also be used in non-food products.

The Agency has a newly developed methodology for evaluating low or low/moderate toxicity chemical substances by way of a screening process that incorporates elements of a tiered approach (US EPA, May 2002). Use of this process will permit the Agency to clear more chemicals of low to moderate toxicity for use in pesticide products. The Agency is aware that some chemicals may be used as inert ingredients in some formulations and as active ingredients in other formulations. EPA believes this methodology is appropriate for evaluating some low toxicity chemicals regardless of whether they are categorized as active or inert ingredients. The new process will permit the Agency to be able to conduct more in-depth evaluations of other ingredients that are of potentially higher toxicity. Chemicals of higher toxicity that can not be appropriately addressed in the lower tiers would be evaluated in a manner substantially similar to that of an active ingredient. Later as the Agency begins to review chemical-specific or surrogate information in the open literature, the preliminary tier determination may be revised (US EPA, May 2002).

Inert ingredients that are exempt from tolerance are listed in 40 CFR 180.1001 (c). The inert ingredients in the glyphosate formulation have been approved by the Agency. The components of the adjuvant (Cosmo-Flux 411F), that DoS indicates have been sprayed on coca plants in Colombia have also been determined to be approved for use on food by the Agency.

The two federal statutes for regulating pesticides in the US give EPA limited authority to regulate the sale, or use of adjuvants in the US. EPA only has authority to regulate the pesticide product itself. For example, if a chemical in an adjuvant was intentionally included in the formulation of a pesticide product, the chemical would be regarded as an inert ingredient. In the US as with all countries, adjuvants are commonly used and added to pesticides as wetting agents, spreaders. emulsifiers, antifoamers, penetrants, or for other purposes. These may contain surfactants, solvents, or other types of chemicals to achieve the desired purpose.

An adjuvant is a subsidiary ingredient or additive product added to a pesticide in a mixture that aids the effectiveness of the primary or active ingredient. Adjuvants are most commonly added to tank mixes of pesticide products prior to application to the site to be treated. Adjuvants are not directly subject to FIFRA registration if no pesticidal claims are made. Pesticide manufacturers choose whether or not to address on their product labels the use of adjuvants with their product(s). However, when added to a tank mix for application to a food or feed crop/site, the individual components must be cleared under FFDCA. While adjuvant products are not registered on the federal level, they are subject to registration under some state laws. The states of Washington and California are two states that register adjuvants. The adjuvant (Cosmo-Flux 411F) used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Department of State has agreed to provide the Agency with acute toxicity data performed on the actual tank mix that has been

sprayed in Colombia.

IV HISTORICAL REGULATORY INFORMATION

The glyphosate product used in Colombia according to the Department of State was registered in the US in April 1974. From 1974-1992 the product was registered for use on a number of agricultural and nonagricultural sites. The product had a "Warning" signal word for eye irritation. In 1992, the registrant submitted an eye irritation study that was categorized as Toxicity Category I and required a "Danger" signal word. The registrant decided that they did not want to market a glyphosate product with a "Danger" signal word. Around July 1992, the registrant registered a reformulated glyphosate product for use in the United States that had the percentage of surfactant reduced to a level that produced Toxicity Category II eye irritation. The original product was re-labeled - "Not for use in the United States". Because the Agency never rescinded the registrations for the use sites that were on the initial label before it was changed, the product technically remains registered for use on numerous agricultural and nonagricultural sites although it is not currently labeled for these uses. In November 2001, the Company submitted a label for the original product for ground and aerial application to control undesirable vegetation in nonagricultural sites. This registration was intended to register a glyphosate product that corresponds to the product being used in Colombia. In February 2002 the product name was changed and the maximum application rate was reduced as per the request of the registrant.

V HAZARD IDENTIFICATION

Hazard identification is the first step in the risk assessment process. The objective is to qualitatively characterize the inherent toxicity of a chemical. Scientific data are evaluated to establish a causal relationship between the occurrence of adverse health effects and exposure to a chemical. Because high quality controlled toxicology studies on humans are frequently unavailable, regulatory scientists rely on animal data to estimate hazard to support regulatory decision making. Prior to and subsequent to initial registration, the Agency has required the registrants of glyphosate products to submit appropriate studies according to contemporary study requirements and testing protocol requirements.

Glyphosate

The available hazard data base on experimental animals indicates that glyphosate has low acute toxicity via the oral and dermal routes with LD_{50}s > 5000 mg/kg. It is a mild eye irritant and a slight dermal irritant. It is not a dermal sensitizer. The requirement for an acute inhalation study was waived since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats. In the subchronic and chronic oral toxicity studies (1-year dog, 24-month mouse, 2-year chronic/carcinogenicity rat, and 2-generation rat reproduction), systemic toxicity manifested most commonly as clinical signs, decreases in body weight and/or body weight gain, decreased food consumption, and/or liver and kidney toxicity at doses equal to or above the limit dose (1000 mg/kg/day). No dermal or systemic toxicity was seen following repeated dermal exposures. There was no quantitative or qualitative evidence for increased susceptibility in fetuses following *in utero* exposure to rats and rabbits in developmental toxicity studies or following pre/post-natal exposure to rats in the 2-generation reproductive toxicity study in rats. Effects in the offspring were observed only at or above treatment levels which resulted in evidence of appreciable parental toxicity. Glyphosate was not mutagenic in a full battery of assays. Based on the lack of evidence for carcinogenicity in two acceptable studies in mice and rats, glyphosate is classified as a "Group E" chemical (no evidence of carcinogenicity to humans).

Components of the Glyphosate Product

1. Polyoxyethylene alkylamine (POEA). POEA is a compound that is used as a surfactant with many glyphosate formulations. In a safety evaluation and risk assessment of glyphosate, the Roundup formulation and the surfactant POEA, Williams *et al.* (2000) reported that POEA can cause severe skin irritation and be corrosive to the eyes. In subchronic oral studies, POEA was mainly a gastrointestinal irritant in rats at high doses (~ 100 mg/kg/day) and in dogs at lower doses (30 mg/kg/day). In a developmental toxicity study in rats, POEA did not cause any developmental effects up to 300 mg/kg/day, but did induce maternal toxicity at 100 and 300 mg/kg/day (Farmer *et al.*, 2000). The concentrated formulated Roundup product can also be strongly irritating to the eyes and slightly irritating to the skin (Williams *et al.*, 2000).

2. *(information not included as it may be entitled to confidential treatment)* are substances that are not highly toxic by oral or dermal routes and are not irritating to the skin. They may cause mild, transient eye irritation. Many *(information not included as it may be entitled to confidential treatment)* are known not to be sensitizers *(study citation not included as it may be entitled to confidential treatment)*. The molecular weight of a *(information not included as it may be entitled to confidential treatment)* determines its biological properties, and, thus, its toxicity. The lower molecular weight *(information not included as it may be entitled to confidential treatment)* tend to be more toxic than the higher-weighted *(information not included as it may be entitled to confidential treatment)* and are absorbed by the digestive tract and excreted in the urine and feces, while the higher molecular weight *(information not included as it may be entitled to confidential treatment)* are absorbed more slowly or not at all *(study citation not included as it may be entitled to confidential treatment)*. *(information not included as it may be entitled to confidential treatment)* have low acute and chronic toxicity in animal studies. No significant adverse effects have been noted in inhalation toxicology studies, carcinogen testing, or mutagen assays. High oral doses have resulted in toxic effects to the kidneys and loose feces *(study citation not included as it may be entitled to confidential treatment)*. Topical dermal application of *(information not included as it may be entitled to confidential treatment)* to burn patients with injured skin has resulted in toxicity *(study citation not included as it may be entitled to confidential treatment)*.

Cosmo - Flux 411F (**Adjuvant)**

The Cosmo-Flux 411F adjuvant product used in the glyphosate tank mix is produced by a Colombian company and is not sold in the U.S. The Agency is not in possession of toxicity data from direct dosing of test animals with Cosmo-Flux 411F. However, the Agency has made

a hazard assessment based on the toxicity of the individual components. As stated above, sale or use of spray adjuvant products in the U.S. are generally not regulated by EPA. However, the DoS has provided the EPA with a copy of this product's label and a description of the product ingredients. To be able to provide an opinion on hazard characterization of the Cosmo-flux ingredients, the EPA relied on available technical information from various sources. Cosmo-Flux 411F consists mainly of *(information not included as it may be entitled to confidential treatment)* with a nonionic surfactant blend primarily composed of *(information not included as it may be entitled to confidential treatment)*. All ingredients of this product are substances that are not highly toxic by oral or dermal routes. They may cause mild eye and skin irritation. All components of the adjuvant have been approved for use in/on food by EPA (40 CFR 180.1001, Letter from R.Forrest/EPA, to R.Woolfolk/DoS, 7/30/2001).

Components of Cosmflux

1. *(information not included as it may be entitled to confidential treatment)*. The *(information not included as it may be entitled to confidential treatment)* can cause dermal and ocular irritation and, in high doses orally, can cause significant toxicity. However, small amounts are not a concern and these substances have been approved as food additives by the FDA and are exempt from tolerances by EPA on certain commodities.

2. *(information not included as it may be entitled to confidential treatment)*. The other major component of Cosmo-Flux 411F, *(information not included as it may be entitled to confidential treatment)*, is not considered highly toxic. It may cause mild eye and skin irritation. The corresponding *(information not included as it may be entitled to confidential treatment)*, has low subacute, subchronic and chronic oral toxicity and is used as a direct food additive and a component in cosmetics. The higher molecular weight *(information not included as it may be entitled to confidential treatment)* is less likely to be absorbed orally or dermally and most likely of less toxicological concern. The other minor components, are not known to be highly toxic compounds and would not be of toxicological concern at the concentrations and conditions in which they are used.

VI DOSE RESPONSE ASSESSMENT

Dose response analysis is the second step in the risk assessment process i.e.; characterization of the quantitative relationship between exposure (dose) and response based on studies in which adverse health effects have been observed. The objective is to identify endpoints of concern which correspond to the route and duration of exposure based on the exposure patterns.

HED selects doses and endpoints (effects of concern) for risk assessment via an internal peer review process. HED uses a standing Committee - the Hazard Identification Assessment Review Committee (HIARC), to consider the available hazard data (studies required to be submitted by registrants in 40 CFR part 158 and open peer reviewed literature) to identify endpoints for use in risk assessment.

Ideally, each safety study identifies a dose level that does not produce a biologically or statistically significant increased incidence of an adverse effect or no observable adverse effect level (NOAEL). The threshold dose is the smallest dose required to produce a detectable effect. Below this dose, there is no detectable response. **Glyphosate**

On **March 26, 1998 and, again, on November 20**, **2001** the HED HIARC met to examine the hazard data base and identify dietary endpoints for Females 13-50 years old, as well as the General Population, the chronic reference dose. The HIARC also considered toxicological endpoints for incidental oral exposure (on 20-NOV-01) appropriate in residential exposure risk assessments.

The most recent report of the HIARC for glyphosate has the complete assessment of the endpoints selected for dietary and residential/occupational exposures (W. Dykstra, 01/22/02; TXR# 0050428). OPP calculates acute (24 hour or single day) and chronic (continuous lifetime exposure) RfDs for the purposes of calculating dietary risk for food and drinking water. The RfD is calculated by dividing the appropriate no observed adverse effect level by a ten fold factor for interspecies variability ("average" human sensitivities might be up to 10 times that of lab animals) and a ten fold factor for intraspecies variability (i.e., some individuals within a population might be 10 times more sensitive than the "average" person).

For glyphosate, no endpoints were selected for the acute RfD since no hazard attributed to a single dose was identified from the oral toxicity studies, and there are no specific concerns for toxic effects on the developing fetus or infants and children. In addition, the HIARC did not identify endpoints of concern for dermal and inhalation exposures for any exposure period (short term- 1 to30 days, intermediate term- 1 to 6 months, or long term- 6 months to lifetime) since no hazard was identified due to the low toxicity of glyphosate (TXR No. 0050428, W. Dykstra, 22-JAN-2002). The chronic dietary RfD of 1.75 mg/kg/day was based on diarrhea, nasal discharge, and mortality in a rabbit developmental toxicity study. A summary of doses and toxicological endpoints selected for various relevant exposure scenarios are summarized in Table 1.

Table 1. Glyphosate Endpoint Selection Table

EXPOSURE SCENARIO	DOSE (mg/kg/day)	ENDPOINT	STUDY
Acute Dietary (24 hour or single exposure)	An effect of concern attributable to a single dose was not identified from the oral toxicity studies; there are no concerns for developmental or reproductive toxicity.		
Chronic Dietary (continuous lifetime exposure)	NOAEL = 175 uncertainty	Maternal toxicity based on clinical signs (diarrhea and nasal discharge) resulting in mortality of some dams at 350 mg/kg/day	Developmental toxicity -Rabbit

Occupational Handler and Post-application Exposure

Use Pattern Information

The tank mixture sprayed for eradication of coca in Colombia contains 55% water, 44% of glyphosate herbicide product, and 1% adjuvant (Cosmo-Flux 411F). No more than two applications of the glyphosate tank mixture are sprayed over coca crops at a maximum of 1.25 gallons/Acre (equivalent to 1.1 gallons/Acre of glyphosate product, 0.03 gal/Acre of Cosmo-Flux 411F, and 0.12 gal/Acre of water). DoS also stated that the average field size for coca in Colombia is 3-5 hectares (approximately 7-12 acres). The program for aerial eradication of coca treats a maximum of 1000 Acres/day, during 3-5 missions/day.

Handler Exposure

Exposure is expected for workers mixing and loading the glyphosate formulated product and tank mix, and applicators applying the pesticidal mixture via fixed-wing aircraft. Mixers, loaders, and applicators (handlers) have the potential for dermal exposure to the concentrate glyphosate formulated product or tank mix from droplets contacting the skin. There is also the potential for inhalation exposure to the concentrated glyphosate formulated product or mixed formulation from breathing in aerosolized spray droplets.

According to the DoS, the mixer/loaders are trained on the label requirements for handling the chemicals in the spray mixture, first aid, and use of personal protective equipment (PPE). The required PPE according to the label includes long-sleeved shirts and long pants, waterproof gloves, shoes and socks, and protective eyewear. PPE is expected to mitigate potential exposure to handlers. Exposure to handlers is anticipated for short-term (1-30 days) durations. There also may be the possibility for intermediate-term(1-6 months) handler exposure for individuals mixing, loading, and applying the glyphosate mixture to multiple fields for more than 30 days. However, the Agency does not have information pertaining to the duration of coca spray programs or number of days spent mixing, loading, and applying the glyphosate mixture.

An occupational handler exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure to handlers (i.e., mixers, loaders, applicators, etc.) during use. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for dermal or inhalation short- and intermediate-term exposures. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002). No significant handler risk is expected.

Post-application Exposure

According to the DoS, Colombian coca plants (Erythroxylum species) are woody perennial shrubs native to the Andean region. Coca plants have leaves with waxy cuticles which retard herbicide uptake in the plant. The coca bushes grow to approximately chest level and are harvested mainly by leaf pulling, 4 to 5 times per year. Coca plants grow from seedlings to a harvestable plant in 12 to 18 months. Representatives from DoS indicated that, growers will prune the coca plants, immediately after spraying, in order to salvage the coca crop. Specifically, since glyphosate is a contact herbicide that works systemically to kill the plant after absorption through the leaves, workers may enter fields immediately after spraying in order to prune or pull off the coca leaves in order to prevent the coca plant from dying. In the US, most uses of glyphosate are applied to kill weeds - which are the target. In general, glyphosate is not applied in the US to destroy or kill the raw agricultural commodity. The intended US uses are for undesired vegetation in and around crop fields, forests, industrial areas and residential areas (for more detailed information, please refer to the June 28, 2002 memorandum entitled *Description of Glyphosate Use in the U.S. for Comparison to Use in Colombia for Coca Eradication from Virginia Werling and Timothy Kiely to Jay Ellenberger).*

DoS states that pilots are instructed not to spray fields where people are present. Therefore, based on the use pattern described by the DoS, potential short-term dermal exposures are expected for persons pruning, or leaf pulling treated coca plants immediately after spray events. These activities are expected to result in dermal exposure from treated foliage contacting the skin. In cases such as glyphosate, where the vapor pressure is negligible, HED experience with post-application data suggests that inhalation exposure is minimal and therefore, HED does not quantitatively assess post-application inhalation exposure. Intermediate- and long-term post-application exposures are not expected due in part to the fact that a coca field is sprayed no more than twice.

Additionally, glyphosate is a translocated herbicide which is rainfast (unable to be rinsed off by water) within 48 hours after spraying. Therefore, potential exposure to dislodgeable residues of glyphosate after 48 hours is expected to be minimal. Glyphosate has no residual soil activity. Results from the first 12 months of bareground field dissipation trials from eight sites show that the median half-life (DT50) for glyphosate (Roundup) applied at maximum annual use rates (7.95 lb a.i./acre, 10.7 lb a.i./acre) was 13.9 days with a range of 2.6 (Texas) to 140.6 (Iowa) days. Acceptable aerobic soil, aerobic aquatic and anaerobic aquatic metabolism studies demonstrate that under those conditions at 25^{o}C in the laboratory glyphosate degrades rapidly with half-lives of approximately 2, 7 and 8 days respectively. The reported half-lives (DT50) from the field studies conducted in the coldest climates, i.e. Minnesota, New York. and Iowa, were the longest at 28.7, 127.8, and 140.6 days respectively indicating that glyphosate residues in the field are somewhat more persistent in cooler climates as opposed to milder ones (Georgia, California, Arizona, Ohio, and Texas) (Memo, J.Carleton, 10/26/98, D238931). The climate in Colombia would favor a shorter half life than the colder regions of the US. Thereby, HED believes glyphosate would not be persistent or be available for intermediate-term or long-term post-application exposures in the Colombian climate.

A post-application exposure and risk assessment is required for an active ingredient if: (1) certain toxicological criteria are triggered and (2) there is potential exposure. Upon review and analysis of the hazard database in total, the Agency's HIARC did not identify a hazard of concern for these durations or routes of exposure. Therefore, quantitative estimates of risk for short-term dermal and inhalation have not been conducted (TXR No. 0050428, W. Dykstra, 22-JAN-2002). No significant post-application risk due to glyphosate exposure is expected as a result of this use.

X RISK CHARACTERIZATION

Risk characterization combines the assessments of the first three steps to develop a qualitative or quantitative estimate of the probability, that under the assumed conditions or variables of the exposure scenario, that harm will result to an exposed individual. Risk is equal to hazard multiplied by exposure. For the scenarios that are relevant to the subject use, the Agency has not identified toxic effects attributable to a single oral exposure, short- or intermediate-term dermal, or short- or intermediate-term inhalation exposures (TXR No. 0050428, W. Dykstra, 22-JAN-2002). Therefore, no quantification of exposure or risk was performed. Nonetheless, it is appropriate to qualitatively characterize the potential for risk concerns for this use.

From the review of glyphosate product incident reports for the use on poppy, it should be emphasized that the spraying reported to have occurred in 2000 and not in 1999 suggests, that the overwhelming majority (95%) of the illnesses reported would be background incidents unrelated to the spraying of herbicide. The remaining 5% increase could be due to a variety of causes and do not support a conclusion that the spraying of the glyphosate tank mixture was responsible for these complaints. Furthermore, the individual with the highest potential for exposure would be the mixer loader. They are handling the concentrated glyphosate product and the tank mix. The incident data that has been submitted to the Agency by DoS, does not include any incident reports for those individuals. There is some data to suggest that the poppy eradication program could have resulted in minor skin, eye, or respiratory irritation, and perhaps headache or other minor symptoms. However, the detailed information on the use, timing of application, history of exposure, and medical documentation of symptoms related to exposure to glyphosate tank mix were not available. The evidence collected and presented in the epidemiology report cannot confirm that the glyphosate tank mixture used in Colombia as the likely cause of a single illness. There is suggestive evidence in the form of reported increases of morbidity and reports from municipalities that some cases of relatively mild complaints could have occurred in relation to the spraying eradication program. Some of the reports appear to be similar to those reported in the literature and by California. These cases report irritation to skin, eyes, and respiratory passages and suggest that the Cosmo-Flux 411F added to the glyphosate product in Colombia has little or no effect on the overall toxicity of the formulated product. The information so far collected indicates that any increase in health problems is likely to be relatively small at most and the severity of those symptoms is likely to be minor to moderate at most. The Amazon Alliance and Earth Justice submission provided little, if any, information on the number of persons affected, age and sex, symptoms of illness, or diagnosis or treatment received. Without such information EPA cannot even begin to characterize the extent and pattern of the health effects claimed to result from glyphosate application. Given the limited amount of documentation, none of the data in the report from Colombia provide a compelling case that the spraying of the glyphosate mixture has been a significant cause of illness in the region studied. Prospective tracking of reports of health complaints, documenting times of exposure and onset of symptoms, are recommended during future spray operations to evaluate any potential health effects and ameliorate or prevent their occurrence.

The *glyphosate formulated product* used in the coca eradication program in Colombia contains the active ingredient glyphosate, a surfactant blend, and water. The acute toxicity test of the *glyphosate technical* is classified as category III for primary eye irritation and category IV for acute dermal and oral toxicity, and skin irritation. It not a dermal sensitizer. However, the surfactant used in the *formulated* product reportedly can cause severe skin irritation and be corrosive to the eyes, as would be expected for many surfactants. The label for the *formulated* product used in the coca eradication program in Colombia includes the "Danger" signal word. The product has been determined to be toxicity category I for eye irritation, causing irreversible eye damage. Some of the findings reported in the incident data are in alignment with that, reports of toxicity to the eye due to the surfactant, not glyphosate *per se.* This is supported by data obtained from the California Pesticide Illness Surveillance Program (1982-2000). As stated previously, in 1992 the glyphosate product was reformulated in the US to reduce the amount of surfactant which posed a hazard to the eye. From 1982 through 1991, there were 221 illnesses involving the eye or 22.1 cases per year. From 1994 (allowing 2 years for the product to be introduced into trade and widespread use) through 2000, there were 65 illnesses involving the eye or 9.3 cases per year, a decline of 58%. Therefore, these data support the finding that the use of the reformulated glyphosate product since 1992, has resulted in a significant drop in illnesses. Overall, the total illnesses due to glyphosate declined by 39% from the 1982-1991 time period to the 1994-2000 time period, largely due to the reduction in eye injuries.

The acute toxicity of the undiluted glyphosate product is most pertinent to mixers and loaders, who are potentially exposed to that form of the glyphosate product. On April 18, 2002, during a consultation with the DoS, in preparation for the current risk assessment, the DoS agreed to supply the Agency with a full battery of the six acute toxicity tests on the tank mix. To date, the Pesticide Program has not received this data. Until such information is supplied to the Agency, EPA cannot evaluate any potential acute toxicity effects resulting from direct contact with the tank mixture. Therefore, due to the acute eye irritation caused by the concentrated glyphosate formulated product and the lack of acute toxicity data on the tank mixture, the Agency recommends that an alternative glyphosate product (with lower potential for acute toxicity) be used in future coca and/or poppy aerial eradication programs.

A direct comparison of the epidemiological data in Colombia (which is from aerial application to poppy) to the conditions of use, (as presented at the April 18, 2002 briefing for aerial application to coca by DoS to OPP risk assessors), would be limited. The briefing did not address the conditions of use for poppy. Subsequent to the April 18 briefing HED received an e-mail communication from OPP/ Field and External Affairs Division, stating that the application rate for poppy was lower than that for coca. According to the DoS, the use pattern of the glyphosate mixture on poppy differs from the use on coca. Other details of the differences between the two spray programs have not been supplied to the Agency. Specifically, the Agency has no information as to the exact makeup of the tank mixture sprayed on poppy, or whether the same glyphosate product and adjuvants used in the coca eradication program were used in the poppy eradication program. The Agency also has questions as to the geographical area differences, the frequency of repeated applications, and the size of the area treated on each spray mission. Therefore, generalized conclusions drawn from human incident data as a result of application to opium poppy, in comparison to conditions of use for the coca eradication program should be made with caution.

In summary, HED concludes that:

- There are no risks of concern for glyphosate, *per se*, from the dermal or inhalation routes of exposure, since toxicity is very low.
- The identified components of the adjuvant Cosmoflux 411F are not highly toxic by the oral and dermal routes; they have been

approved for use in/on food by the Agency.

- Glyphosate is not highly toxic. Based on the conditions of glyphosate use described by DoS, there is likely minimal exposure or concern for acute and chronic dietary or incidental oral risks.
- The incident data from Colombia based on the poppy use may differ from use of glyphosate as part of the coca eradication program, so conclusions should be made with caution.
- There is concern for acute eye toxicity because of an inert ingredient present in the glyphosate formulated product used to treat coca. The potential for eye effects is primarily for mixers/loaders of the concentrated glyphosate product, which should be mitigated by protective eye wear which DoS states is being used.
- Due to the acute eye irritation caused by the concentrated glyphosate product and the lack of acute toxicity data on the tank mixture, the Agency recommends that DoS consider using an alternate glyphosate product in future coca and/or poppy aerial eradication efforts.

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SECTION 3. Review of Glyphosate Incident Reports with special reference to aerial spraying in Colombia

BACKGROUND

On May 8, 2002 the U. S. Department of State requested that the U.S. Environmental Protection Agency provide consultation on the U.S.-supported aerial coca eradication program in Colombia. Specifically, the Department of State requests advice on whether the aerial application program may pose unreasonable risks or adverse effects to humans or the environment. This review is part of a health risk assessment performed by the Health Effects Division of the glyphosate product used in Colombia. This review will focus on reports of human health effects reported from the leading pesticide poisoning surveillance data sources in the United States, which include Poison Control Centers and the California Pesticide Illness Surveillance Program. The California data source is especially useful for this review because of it's high quality, documentation going back to 1982, and because glyphosate is the second most widely used pesticide in California affording ample opportunity for unintentional exposures. The world scientific literature on glyphosate and a report from Colombia examining reports of the adverse health effects are also reviewed.

The aerial spray mixture used in Colombia consists of water, glyphosate formulation, and 1 percent Cosmo-Flux 411F. According to documentation supplied by the Department of State, this diluted mixture is applied to coca at the rate of 2.53 gallons per acre (U. S. Department of State 2002). "The commercial glyphosate formulation used in the spray mixture is registered with U. S. Environmental Protection Agency (EPA) for sale in the United States for non-agricultural use and contains 41 percent glyphosate salt and 59 percent inert ingredients. Approximately three fourths of the inert ingredient content are water and the remainder is a surfactant blend. A surfactant is essentially a soap that enhances the ability of the herbicide to penetrate the waxy cuticle of the leaf surface."(U. S. Department of State 2002).

This review will not be able to fully assess the formulation containing 1 percent Cosmo-Flux 411F because that particular surfactant has not been used in the United States. Nevertheless, it will consider the summary of the investigation in Colombia of the formulation which does contain this additional surfactant. Though all aspects of glyphosate human poisoning data will be considered, this review will focus on one particular scenario, namely the effects of dermal and inhalation exposure from spray drift or residues, that result from aerial application.

The following data bases have been consulted for the poisoning incident data on the active ingredient glyphosate (PC Code: 103601):

1) Poison Control Centers - as the result of a data purchase by EPA, the Office of Pesticide Programs (OPP) received Poison Control Center data covering the years 1993 through 1998 for all pesticides. Most of the national Poison Control Centers (PCCs) participate in a national data collection system, the Toxic Exposure Surveillance System which obtains data from about 65-70 centers at hospitals and universities. PCCs provide telephone consultation for individuals and health care providers on suspected poisonings, involving drugs, household products, pesticides, etc. Note that Poison Control Center data does not have information on the type of application. So it is not possible to limit the review to the aerial application scenario or to limit it to only those persons secondarily exposed to drift or residue. However, it will be possible to exclude oral exposures which are inconsistent with the focus of the present review.

and §158.590 (Nontarget insect data requirements).

All non-target terrestrial and aquatic animal toxicity studies, and aquatic plant studies, are performed using the technical grade active ingredient (TGAI). Non-target terrestrial plant toxicity tests are performed with pesticide in a formulated product (as sold to users). Aquatic fish and invertebrate toxicity studies using formulated product are also required if the use of the formulation is expected to lead to transport to water bodies, either directly or through runoff. The potential exposure and toxicity of each pesticide are considered to characterize the potential of ecological risk.

The present environmental fate assessment is based on regulatory environmental fate studies submitted to the Agency to support the registration of glyphosate salts and their formulated pesticide products. These studies were conducted under Good Laboratory Practices (GLP), as required under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The studies used in the assessment have been deemed acceptable and have served to generate previous environmental and ecological risk assessments for glyphosate.

The number and types of environmental fate studies required for each pesticide depends on its proposed use pattern (terrestrial, aquatic, forestry, indoors, greenhouse). The required studies consist of a series of core laboratory studies for all pesticides and field dissipation studies for pesticides used on outdoor crops (terrestrial/aquatic), non-crops (terrestrial/aquatic), and forestry. Each study provides specific data that, together with the physical and chemical properties of the pesticide, are then combined to produce an integrated environmental fate assessment and to identify the potential of the pesticide to leach to groundwater, and/or reach surface water, and/or bioaccumulate in aquatic organisms. The data are also used as input parameters in models to estimate exposure concentrations in the environment. Monitoring data, if available, are also incorporated into the assessment.

The limited number of species and environmental systems tested can introduce a degree of uncertainty when attempting to extrapolate the data outside the experimental conditions of the studies, such as different soils, geographical regions, and ecosystems. As part of the overall risk characterization of a pesticide, the Agency also identifies uncertainties associated with the available data and those introduced by the assumptions needed to estimate concentrations using models.

III Ecological Risk Assessment

Glyphosate

Terrestrial

The Agency does not expect any risk to birds and mammals based on dietary exposure to active ingredient glyphosate. Acute avian dietary studies using bobwhite quail and mallard ducks resulted in no mortality at concentrations up to 5200 ppm, and no reproductive effects were seen up to 1000 ppm, the highest levels tested. Toxicity tests involving feeding or direct contact of honey bees to glyphosate also resulted in no mortality at the highest rate tested (100 micrograms/bee). Acute LD_{50} values could not be established in oral and dermal mammalian studies at concentrations up to and including 5000 mg/kg, and chronic mammalian effects were only seen in a series of studies at 1000 mg/kg/day or higher. The Agency waived the requirement for an acute inhalation study for mammals with active ingredient glyphosate since no respiratory or systemic toxicity was seen following subchronic inhalation exposure in rats.

Risk to non-target terrestrial plants is likely from exposure to glyphosate as a result of its use in the coca eradication program. Glyphosate is a foliarly applied, broad spectrum herbicide effective at very low exposure rates. Vegetative vigor studies for North American crops reviewed by the Agency in 1999 indicate that 25% of exposed plants can be damaged by exposure to glyphosate applied at rates as low as 0.07 lb ai/A.

Table 1. Vegetable Vigor Toxicity of Glyphosate Wettable Powder to US Crops

Species	Parameter	EC_{25} (lbs ai/A)	NOEL (lbs ai/A)
Cucumber	phytotoxicity	0.074	0.049
Lettuce	dry weight	0.217	0.148
Oilseed rape	phytotoxicity	0.098	0.049
Okra	dry weight	0.172	0.049
Radish	phytotoxicity	0.235	0.148
Soybean	dry weight	0.126	0.049
Sugarbeet	"	0.277	0.148
Corn	phytotoxicity	0.227*	0.148
Oat	dry weight	0.201	0.148
Purple nutsedge	"	0.805*	0.445
Winter wheat	"	0.176*	0.049

*Determined by linear interpolation.

The application rate of glyphosate recommended by the State Department for the coca eradication program is 3.34 lb ai/A in acid equivalents. This is well above the rates listed in the table above. AgDrift modeling of potential spray drift from the use in Colombia

(detailed below) simulates that non-target plants hundreds of feet away may be exposed to a fraction of this glyphosate application. Based on the toxicity data for North American crops, AgDrift indicates the possibility that 50% of young crop plants would be expected to show measurable reductions in dry weight from150 to nearly 600 feet downwind (depending on spray and wind conditions). Some affected plants would likely recover while more sensitive plants may die, have reduced reproductive success, or reduced yields (crop plants).

Aquatic

Laboratory studies indicate glyphosate is slightly toxic to fish, invertebrates and aquatic plants. The lowest resulting acute LC_{50} values (concentrations at which half the test animals died) were in parts-per-million (ppm) for active ingredient glyphosate. For instance, the most sensitive freshwater fish (fathead minnow) had an LC_{50} of 85 ppm, while chronic effects were not seen in another study at the highest test concentration of 26 ppm. The EC_{50} (level at which adverse effects are seen in half the test animals) for the freshwater invertebrate *Daphnia magna* was 134 ppm, and the chronic NOEL 50 ppm.

OPP exposure models indicate that surface-water exposure in the parts-per-billion could be expected from the use on coca. OPP also considered a more conservative exposure scenario of the direct application of 3.75 lb acid eq./acre of glyphosate to a 1-acre, 6-foot deep pond[2]. The calculated maximum concentration of 230 ppb is well below the glyphosate toxicity values measured for aquatic organisms in the laboratory. Therefore, aquatic organisms should not be at risk from exposure to glyphosate. The environmental fate assessment which is the basis of this exposure calculation is described in the following section.

[2]Salts of glyphosate (isopropylamine, diamine, and trimesium) are registered in the United States for a wide variety of agricultural and non-agricultural uses. All of the salts of glyphosate generate the "free acid of glyphosate" (glyphosate acid), the actual herbicide-active chemical. The glyphosate acid equivalents vary from salt to salt to salt, as it depends on the ratio of the molecular weight of the glyphosate free acid to that of the salt. For this reason, application rates are generally expressed in terms of "glyphosate acid equivalents" when estimating exposure concentrations of glyphosate in water and soil. The ratio of glyphosate acid to the glyphosate isopropylamine salt is 0.75. Thus, each pound of this salt is equivalent to 0.75 pounds of glyphosate acid (or 1 g of the salt is equivalent to 0.75 g of the acid)

It is possible that much greater exposure could occur from direct overspray of water bodies much smaller than a 1-hectare, 6-foot deep pond, but such simulation is not a standard component of Agency risk assessments. The product label of the specific glyphosate product DoS indicates is being used against coca, and the DoS application guidelines, prohibit direct overspray of water bodies. It is possible that some ecologically important water bodies too small to appear on maps could be sprayed directly in a project as large as the coca eradication program. EPA has registered other glyphosate products for direct application to aquatic sites to kill undesirable vegetation.

Freshwater aquatic plants also seem unlikely to be at risk from exposure to active ingredient glyphosate. Submitted studies resulted in EC_{50} values of 12.5 ppm for green algae (*Selenastrum capricornatum)*, 21.5 ppm for duckweed (*Lemna gibba)* and 38.6 ppm for the freshwater diatom *Navicula pelliculosa*. These values are well beyond the 230 ppb exposure calculated for direct overspray in the pond simulation described above.

Risk Specific to Formulations of Glyphosate

Ecological toxicity studies submitted to EPA for some of the formulations of glyphosate products that EPA has registered have shown them to be more toxic than glyphosate alone. The results of these studies indicate that the formulations will pose a risk primarily to non-target plants, as described above. For instance, the minimum bluegill sunfish LC_{50} of 5.8 ppm reported for a 41.8% glyphosate formulation in EPA's glyphosate reregistration eligibility document (RED, 1993) is 20 times more toxic than the bluegill sunfish LC_{50} observed for technical glyphosate, but is still much higher than exposure levels expected in the environment. The bluegill sunfish LC_{50} for a test with surfactant MONO818 by itself was 1.0 ppm.

The risk to non-target terrestrial and aquatic animals from formulated glyphosate used for coca eradication is uncertain because the Agency does not have relevant toxicity data for the Colombian formulation, nor for the adjuvant Cosmo-Flux 411F. An adjuvant is a subsidiary ingredient or additive in a mixture that adds to the effectiveness of the primary or active ingredient. Adjuvants are most commonly added to tank mixes of pesticide products before they are applied. Further discussion is provided in the Health Effects Division's assessment of the coca eradication program.

Potential Spray Drift of Glyphosate

The AgDrift model (version 2.01) was used to estimate downwind deposition of aerial applications of herbicide sprays during coca eradication efforts. The aerial part of the AgDrift model, which was used in this assessment, was developed from USDA Forest Service models designed to estimate deposition of forestry applications. The model has been the subject of a Scientific Advisory Panel (SAP) meeting[3] and showed a good correlation with field trial data of downwind deposition. Reviews and descriptions of AgDrift have been published.[4]

AgDrift uses a number of input parameters associated with the application equipment and the meteorology during application in calculating deposition levels. An attempt was made to enter important input parameters appropriate for coca eradication applications in Colombia as described by the Department of State (DoS) in their presentation[5] to the Office of Pesticide Programs (OPP) or in documents provided by DoS to OPP. Many input parameters in AgDrift do not greatly affect deposition levels and a number of default inputs were used for these parameters. The inputs considered to be more important in determining drift levels that were used to model coca eradication spraying are listed in Table 1 below.

[3]http://www.epa.gov/scipoly/sap/1997/december/spraydrift.htm

[4]Hewitt AJ, DR Johnson, JD Fish, CG Hermansky, and DL Valcore. 2002. Development of the Spray Drift Task Force database for aerial applications. Environmental Toxicology and

range. In the DoS presentation the VMD was stated to be 200 to 300 microns during application conditions. In addition to the wide range of VMD values presented, VMD is not a good descriptor of droplet size spectra for estimating spray drift. Spray drift is predominately associated with finer sprays and VMD does not define the amount of small droplets contained in spray. Although specific data on droplet size under application conditions was not provided, it is unlikely that very coarse sprays would be achievable due to shearing effects of releasing droplets at high airspeeds. Large droplets released into the turbulence created by an aircraft traveling in excess of 120 mph tend to break into smaller more driftable droplets.

[6]Chemicals Used for the Aerial Eradication of Illicit Coca in Colombia and Conditions of Application. An undated, unsigned, 9-page document provided to OPP by the State Department.

Other uncertainties associated with inputs include inputs for meteorology and release height. AgDrift modeling requires site-specific inputs for meteorology. In coca eradication efforts (as well as agricultural applications in the US) wind speed, temperature and humidity are measured at the airport which may not be representative of these parameters at the application site. The applicator is ultimately given the responsibility of determining if conditions at the target site are acceptable. DoS reports that the coca eradication program selects experienced applicators for spray missions with the expectation they will better be able to identify unacceptable conditions and make applications within specified parameters.

In order to capture the range of deposition values expected during coca eradication applications, AgDrift was run with two droplet size spectra and at two wind speeds. The droplet size spectra were extremely coarse to very coarse and medium. The definitions refer to the American Society of Agricultural Engineering (ASAE) Standard 572 definition of droplet size spectra. The wind speeds used were 3 mph and 10 mph. AgDrift was run in tier 3 to estimate downwind depositions shown in Figure 1 below.

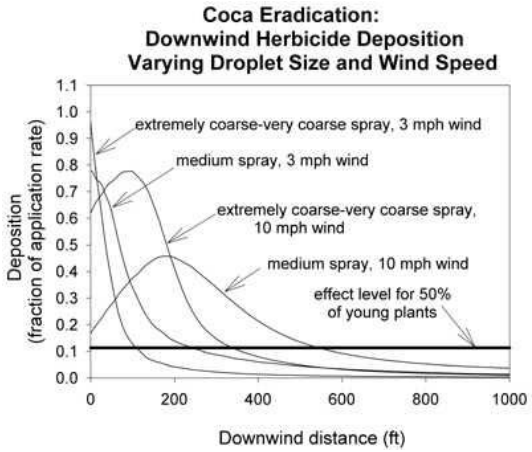

Figure 1 shows the lowest levels of drift are associated with applications using the extremely coarse to very coarse sprays at a 3 mph wind speed. The highest levels of drift are associated medium sprays at wind speeds of 10 mph. Downwind deposition levels from coca eradication spraying is likely to be bounded by these estimates. The effect level for 50% of young plants@ is based on glyphosate toxicity studies on ten crop plants. At the level corresponding to approximately 11% of the application rate, 50% of plants species would be expected to show measurable reductions in dry weight. Of the affected plants some would likely recover while more sensitive plants may die, have reduced reproductive success, or reduced yields (crop plants).

V. Environmental Fate and Transport Assessment of Glyphosate

Integrated Environmental Fate Assessment- Summary

The major route of transformation of glyphosate identified in laboratory studies is microbial degradation. In the field, glyphosate dissipation appears to correlate with climate, being more persistent in cold than in warm climates. Dissipation of glyphosate in Colombia may therefore be more rapid than in the U.S. Glyphosate was not observed in laboratory studies to break down by abiotic processes such as hydrolysis and direct photolysis.

Glyphosate is very soluble, and has a low potential to volatilize, but adsorbs strongly to soils and sediments. Therefore, glyphosate does not have a high potential to leach to ground water or reach surface water as dissolved runoff. However, glyphosate has the potential to contaminate surface water as a result of residues adsorbed to soil particulates suspended in runoff water. Offsite exposure is also possible due to spray drift or inadvertent direct overspray.

Physical and chemical properties of glyphosate acid

Glyphosate belongs to the glycine family of herbicides. Glyphosate is a phosphono derivative of glycine, the simplest of all of the amino acids. It works as an herbicide by inhibiting the enzyme A5- enolpyryl-shikimate-3-phosphate@ synthase (i.e., it is an ESPS inhibitor).

Annex 45

Annex 46

Memorandum from Lowell Neese, Senior Aviation Advisor, DoS/INL/A (Colombia), to Paul O'Sullivan, COR, DoS/INL/A (21 Apr. 2003)

N28

UNCLASSIFIED MEMORANDUM 21 April 2003

TO: DoS/INL/A Paul O'Sullivan, COR

FROM: DoS/INL/A (Colombia) Lowell Neese, Senior Aviation Advisor

SUBJECT: MONTHLY EVALUATION – March 2003

COLOMBIA

As a reminder, we are doing the evaluation separately for both programs.

COLAR Program

Overall Rating: Satisfactory

1. MANAGEMENT

Rating: Satisfactory

- The continued lack of an in-country SIP remains a concern to the COLAR Aviation Advisor. No positive steps have been taken this month to ensure that an SIP for the Colombia Program is available at all times. This caused a downgrade from excellent to satisfactory.
- Of the three K-Max helicopters recently received by the contractor, two are presently located in Tolemaida, and one was deployed forward to Larandia to conduct external load operations in support of the CD Brigade and the continuing SAR operation; their use is resulting in significant cost savings in UH-60 and UH-1N blade hours.
- The lack of DOS INL/A approved ATP, ATM, checklist and SOP is hindering K-MAX operations. Contractor lacked foresight in the development of the required documents and SOPs knowing full well that the aircraft were arriving and would immediately go into operations.

2. TECHNICAL

Overall Rating: Satisfactory

2.1 Operations

Annex 46

2.3 Quality Control:

Rating: Excellent

- Provided Special inspection support for the airworthiness inspection for the C-208 Caravan as required by the U.S. Embassy and provided QC support to 4 eradication sites despite not having the personnel to do so.

- Provided research and support to correct T-65 SHADIN installation and ITT warning discrepancies.

2.4 Maintenance:

Rating: Excellent

- With the exception of the AT-802s, all aircraft met or exceeded the customer requirements regarding Operational Readiness rates. One Air Tractor continued NMC for the entire month with low engine torque. The aircraft was flown to Bogotá and the engine removed for inspection by a Pratt & Whitney representative. The remaining three 802s maintained an O.R. rate of 89%.
- Non-Mission Capable due to Maintenance
  - 4 AT-802 67% O.R. while flying 216 hours. 75% O.R. required.
  - 1 C-208 98% O.R. while flying 40 hours. 50% O.R. required.
  - 2 C-27 50% O.R. while flying 89 hours. 50% O.R. required.
  - 10 OV-10 82% O.R. while flying 335 hours. 80% O.R. required
  - 4 T-65 95% O.R. while flying 150 hours. 75% O.R. required
  - 8 UH-1N 80% O.R. while flying 404 hours. 80% O.R. required
  - Eradication average: 80% mission capable while flying 1,234 total hrs.
- During the month, there were 16 incidents of hostile fire resulting in 47 individual small arms hits. Approximately 2,000 maintenance man-hours were devoted to repairing these battle damage incidents.

2.5 Material Support

Rating: Excellent

Non-Mission Capable Supply

- The following NMCS rates applied to the various Eradication aircraft:
  - AT-802 – 15%
  - C-208 – 0%
  - C-27A – 3%
  - OV-10 – 1%
  - T-65 – 1%
  - UH-1N – 6%.

Annex 47

Memorandum from Lowell Neese, Senior Aviation Advisor, DoS/INL/A (Colombia), to Paul O'Sullivan, COR, DoS/INL/A (9 May 2003)

UNCLASSIFIED

RELEASED IN FULL

N30

UNCLASSIFIED MEMORANDUM 9 May 2003

TO: DoS/INL/A Paul O'Sullivan, COR

FROM: DoS/INL/A (Colombia) Lowell Neese, Senior Aviation Advisor

SUBJECT: MONTHLY EVALUATION – April 2003

COLOMBIA

As a reminder, we are doing the evaluation separately for both programs.

COLAR Program

Overall Rating: Outstanding

1. MANAGEMENT

Rating: Outstanding

- The lack of in-country SIPs, reported previously, has finally been addressed by the Contractor. Two IPs are in CONUS at this time undergoing flight training to prepare them to be SIPs. These IPs, for the UH-1H Huey II and UH-1N programs, should be returning within two weeks to assume their new duties. Their arrival will give the Contractor and INL/A much better control over the individual flight programs should speed up flight training. Their arrival will also help to ensure that all required flight records are kept updated according to DOS standards.
- The lack of DOS INL/A approved ATP, ATM, checklist and SOP that was hindering K-MAX operations has now been fully addressed. The factory checklist has been approved for pilot's use. The factory training guide was also approved by PSD for use as the aircraft's ATM.
- The management team for the COLAR program demonstrated superior flexibility and adaptability. This was demonstrated by the Contractor providing full logistical support to aircraft deployed forward to four different geographical locations (San Jose, San Vicente del Caguan, Tumaco and Cali) while maintaining a high OPTEMPO at the two main operating bases in Tolemaida and Larandia. The Contactor's dedication and ability to provide full support to all these bases allowed forward deployment of Plan Colombia aircraft namely K-MAX, and Huey IIs to support aerial eradication in San Jose and Miraflores. This capability permitted PC/COLAR to begin planning the long awaited move of the 1st CN Battalion to the department of Narino to begin counter narcotics operations.

- The QC department has been in constant communication with the company that installed the Shadin system in the lone T-65. Concern has been raised by QC that the Shadin system will not allow for an audible tone in the pilot's helmet in the event of an over torque. Several solutions have been suggested to Shadin to resolve the issue and the decision remains outstanding.

2.4 Maintenance:

Rating: Excellent

- Colombia's eight OV-10 recorded 1,989 depot hours (83 days) for battle damage repairs. These repairs required assigning OV-10 mechanics to both San Jose and Larandia. The 83 days equates to almost 3,000 maintenance man-hours. The four T-65 recorded 169 depot hours (seven days) for battle damage repairs requiring almost 100 maintenance man-hours. The 3000+ maintenance man-hours detracted from aircraft availability and increased the time required to complete routine scheduled maintenance.
- Even with the high severity of the battle damage sustained taking maintenance personnel away from the normal maintenance, the O.R. rates exceeded all expectations.
- Non-Mission Capable due to Maintenance

  Four AT-802 78% O.R. while flying 218 hours. 75% O.R. required.

  One C-208 72% O.R. while flying 44 hours. 50% O.R. required.

  Two C-27 70% O.R. while flying 89 hours. 50% O.R. required.

  Ten OV-10 83% O.R. while flying 335 hours. 80% O.R. required

  Four T-65 84% O.R. while flying 150 hours. 75% O.R. required

  Eight UH-1N 81% O.R. while flying 404 hours. 80% O.R. required

- One T-65 was lost from the fleet due to a fatal accident while spraying poppy near Pasto.

2.5 Material Support

Rating: Excellent

Non-Mission Capable Supply

- The following NMCS rates applied to the various Eradication aircraft:

AT-80	– 12%
C-208	– 11%
C-27A	– 4%
OV-10D	– 0%
T-65	– 5%
UH-1N	– 7%

- The waiting for engine parts caused the high NMCS rate for the AT-802.

Annex 48

Memorandum from David A. Campbell, COR, DoS/INL/A,
to Dyncorp, PSD Manager (Feb. 2004)

UNCLASSIFIED

022

RELEASED IN PART
B4, B6

February 2004

Unclassified
MEMORANDUM

XX XXX XXXX
In reply refer to:

TO: DYNCORP – [redacted] PSD MANAGER
FROM: DoS/INL/A - DAVID A. CAMPBELL, COR
SUBJECT: MONTHLY EVALUATION – FEBRUARY 2004

B4, B6

MAIN OPERATING BASE (MOB)/ DEPLOYMENTS

Management:

Business Management: Excellent

The program Vice President traveled to the Fixed Wing training site at Kirtland AFB to ad upper management emphasis in assisting identify and resolve issues found as a result of the accident in January. His Assistant, [redacted] traveled to Colombia to inspect and assist resolve issues.

Air Wing is in an ongoing dialogue with DynCorp Management over slow hiring to fill open positions from extension 2. We understand the difficulty in attracting personnel during the contract re-compete process, but strongly encourage DynCorp Management to push as hard as possible to fill the numerous vacant slots impacting on performance right now.

DynCorp is being very proactive with the newly-identified issue of ITAR and technology export licensing, and this month brought a subject matter expert from Dyn Ft. Worth to assist address the problem with Dyn PSD. This is an excellent initiative on their part of the contractor, and is in fact ahead of the government on it.

recommended systems are cost effective, and consist of units currently standardized throughout the program, and repairable locally. This is an example of the Contractor's ability to devise creative, inexpensive solutions.

Operations Planning: Excellent

The Contractor was suffering from incomplete and inaccurate cartographic data and was highlighted in January's award fee input. The Contractor has taken positive steps to correct the errors and product quality is improving. The Contractor has taken on the additional responsibility for the threat data on the maps and ensuring that all intelligence arrives in the FOL's without delay. Although there are obstacles to negotiate the Contractor continues to make progress in all aspects related to ensuring that all information is accurate and timely.

Operational Effectiveness: Excellent

A total of 12,569 hectares of coca and 110 hectares of poppy were eradicated for the month compared to 15,822 hectares for coca and 0 hectares for poppy for the same period of the previous year. While this is not a record pace, set backs due to weather and aircraft availability have been overcome to meet and exceed requirements. Coca goal for the month of February was 12,000 hectares. While still early in the year, the contractor is on track to meet and exceed 2004 goal of 130,000 hectares of coca and 3,000 hectares on poppy.

Training and Institution Building: Satisfactory

INL/A would encourage the Contractor to continue to fill needed positions in the standardization arena with highly-qualified personnel. With the immense size of the program in Colombia key positions cannot continue to go unfilled. INL/A is sensitive however to the Contractor's inability to recruit at present due to the status of the current contract and the recompete.

Quality Control: Satisfactory

Maintenance: Satisfactory

While maintenance Operational Readiness rates here show that the Contractor is within contract requirements bar the OV-10's, the number of hours for depot repair is extremely high. Battle damage is considerably down this year in comparisons to last and yet aircraft availability is decreasing. The cause is the aging fleet of helicopters and OV-10's. Immediate steps will need to be taken to keep the aircraft serviceable for future operations and to reduce cost with commercial aviation upgrades and retrofits. The Contractor however must fill approved and open maintenance positions to ensure continued spray mission success.

Annex 49

Memorandum from Stephen H. Harris, COR, DoS/INL/A, to Dyncorp, L 55 (Undated)

L55

Unclassified
MEMORANDUM

XX XXX XXXX
In reply refer to:

TO: DYNCORP – [redacted] PSD MANAGER B4, B6

FROM: DoS/INL/A - STEPHEN H. HARRIS, COR

SUBJECT: MONTHLY EVALUATION – **OCTOBER 2001**

MAIN OPERATING BASE (MOB)/ DEPLOYMENTS

Overall Rating: Excellent

Management

Overall Rating: Excellent

Technical

Overall Rating:

Operations

Overall Rating: High Satisfactory

Operational Planning
Rating: **Excellent**

Accuracy of Maintenance reports
Rating: **LOW SATISFACTORY**

The focal point during this reporting period has been the implementation of AERO -DYN. Down range sites continue to report critical shortcomings, not user friendly features, and time consuming tasks that continue to consume valuable time during the course of their duty day.

A timeline and specific goals need to be reviewed, defined, and accomplished in order to implement successfully the new system. It is understood that connectivity and other complex issues affect implementation of IN-AIR's product. An aggressive program and definition of end goals is recommended.

Subcontractor / DOD Maintenance
Rating: **EXCELLENT**

The contractor continues to review and audit vendor practices and have managed well all related internal and external support requirements on this period.

Maintenance
Overall Rating: **SATISFACTORY**

Not Mission Capable Maintenance –NMCM
Rating: **LOW SATISFACTORY**

The composite **NMCM** rating with Depot for the month of October was **11.5 %. In Colombia,** the **OV-10** NMCM rate was an **unsatisfactory 24.5 %. 1243. 0 NMCM hours were reported for engine change, surge, torque control unit, and flameout problems.** Last month NMCM rate was reported at 25.9 %. On both reporting periods the OV-10 fleet continues to have problems associated with engines. The **C-27** reported a 17. 6 % NMCM rate which is 2.6 % over the allowed standard, however the C-27 achieved the required OR for the reporting period. Last month, the reported NMCM rate for the C-27 was 23.9 %. The **C-208** reported a 26.3 % NMCM rate. A phase was accomplished on the aircraft while deployed. It is apparent that a trend is developing. Improvement for the NMCM rates on the OV-10 and the C-27 is expected. Additionally, it was observed in **COLAR** that controlled substitutions are on the rise. Management is expected to take corrective measures to remedy this trend.

NOTE: For a second month in a row, a shortage of maintenance technicians has been reported in the UH-1N Eradication program. The NMCM rate and the observed substandard condition of the aircraft are a direct reflection of being understaffed as described in the monthly report. **IMMEDIATE** attention in this area is recommended!

Annex 50

United States Department of State, Evaluation Summary Technical Operations, G 111 (Undated)

Operations

Operations is rated excellent. In Colombia, the Contractor continued to press ahead, increasing the optempo. The net result was the fumigation of 4334 hectares of coca, up some 200 hectares from the previous month's total, and up approximately 1800 hectares from February. Although some difficulties were noted with certain pilots flying faster than prescribed airspeeds, the Opscos took appropriate action in correcting this situation.

In Peru, the Opscos continue to perform in an outstanding manner despite numerous challenges created by continuous deployments to and from Tarapoto.

In Bolivia, operations have remained stable and the Contractor has continued to support as required.

Operations Planning

Operations planning is rated excellent. In Colombia, operational and training missions were planned with great success. An important factor in this success was the assignment of Opsco's at the main base and two Fols, which dramatically improved mission planning, host nation coordination, crew selection, and mission briefings.

In Peru, operations continued in normal fashion, with the Contractor providing the appropriate mix of personnel and equipment to conduct operations while maintaining contractual maintenance standards.

Operational Readiness

Operational readiness is rated excellent.

NSTR.

Training

Training is rated excellent. There was a distinct emphasis on flight training during April, with new Bell 212 and T-65 pilots being brought on board the program. All training was accomplished in an outstanding manner. Flir training was also accomplished for selected CNP operators.

In Peru, the majority of training conducted was in the area of mission planning. The contractor also took action to correct observed deficiencies in performance planning on the part of some PNP pilots. Remedial training in the form of classroom and practical application was conducted with positive results.

In Bolivia, the Contractor has completed the first two phases of training on the two Bolivian student pilots and are preparing to proceed to the next phase, which is instrument qualification.

Annex 50

Annex 51

Memorandum from Michael J. Kenna, INL/RM/AD, Senior Aviation Advisor, to Steve Harris (COR) and George Arzente, INL/RM/AD/COR, L 14 (Undated)

UNCLASSIFIED

RELEASED IN FULL

L14

Unclassified memorandum

To: INL/RM/AD/COR Steve Harris (COR)
George Arzente

From: INL/RM/AD Michael J Kenna
Senior Aviation Advisor

Subject: Monthly Award fee evaluation for the month of January 2001.

The overall evaluation for this reporting period is **Excellent.**

Management Overall –Excellent

Business Management- Satisfactory
The contractor has continued to support most aspects of the contract in an excellent manner. The contractor's performance during this period included his continuing support to 4 FOL's, and the Bogota Main Base. In addition, the contractor has tasked all DynCorp in country managers to file written trip reports associated with their travel to the field. In preparation for the "INAIR" program, contractor has set up new Internet access. However, even though the contractor is paying for this new access we have not been able to use the capability due to a software problem. The Management Information folks here have requested help from PSD for almost a month to resolve the software issue; nothing has been forthcoming from PSD DynCorp. Contractor has finally filled the FOB manager and the production control position in Tolemaida. Furthermore, contractor has filled several other positions that had been vacant in the UH-1N project. This will facilitate the assimilation of the additional 15 UH-1N helicopters. Additionally, several months ago Site Manger attempted to discipline an employee with a suspension and two months without pay, PSD allowed the employee to return after one-week suspension and has returned the employee to Colombia this month.

Contract Management-Excellent
Contractor, specifically the Logistics Office, completed ten LDD's during this period. Contractor has continued to manage the C-27 hours in an excellent manner. While the new C-27 schedule is in place adhering to the schedule continues to be a challenge. Contractor has continued to excel in management of the UH-1N program. For example, they successfully supported the Anti-narcotics Brigade, the 12th Brigade and Joint Task Force South. While this exceeds the support laid out in the LOA (only to the Anti-Narcotics Battalions) this has been directed by the Embassy. Contractor was also pro-active in setting up the maintenance-training course in Tolemaida. Bottom-line is that the UH-1N program has continued to support the requirements of the DOS in an outstanding manner. Kudos to the Contractor. Contractor also successfully renewed the contracts in the UH-1N program.

Schedule- High Satisfactory
The contractor has improved on his bi-weekly schedule and now provides a weekly schedule. As mentioned previously this schedule needs to be adhered to as much as possible. An OV-10, UH-1N and C-208 schedule now needs to be accomplished. Maintenance scheduling, that includes phase scheduling, TBO's etc., in both programs is managed in an outstanding manner. We are working close with the Colombian Army to put the UH-1N's on a schedule. So far this has been a challenge but we are making progress.

Technical Overall- Outstanding

Operational Planning-Excellent
Contractor for the month of January sprayed 8722 hectares of coca and provided oversight of the PNC coca operation that sprayed 12,621 hectares of coca. Execution of the OV-10 spray program continues to need oversight; we had a recent case where we sprayed in one of the no spray zones. However, it appears that the majority of the spray was accomplished in an excellent manner. Furthermore, the technical support in planning provided to the Counter-narcotics battalions was accomplished in an outstanding manner. MIS personnel adroitly handled the transfer of the 6 UH-1N's. MIS personnel also handled the visit of PSD personnel to evaluate the VSAT telecommunications upgrade. MIS personnel continue to provide outstanding service to the PASA's and the contractor. In the UH-1N program the contractor has implemented a new mini-gun checklist that has been approved pending final approval from AW. Contractor has accomplished minor miracles with new communications in Villa Garzon,
They have brought new hardware and improved our capability, cudos to the Contractor for this initiative. ALSE personnel have installed three active noise reduction kits, completed 6 NVG inspections and inventoried new shipments of ALSE equipment.

Operational Effectiveness-Excellent
This month the Contractor has continued to place emphasis on safety, compliance with procedures, and safety management. Operations generated 1539 sorties for a total of 2171 flight hours. Operations supported the Putumayo push with additional aircraft, pilots and mechanics. Maintenance supported this effort by working 7302 man-hours and corrected 3552 discrepancies. In addition, maintenance supported operations by repairing a total of 12 aircraft, some that required extensive. The C-27 program, despite some maintenance problems, continues to provide excellent support to both the eradication and UH-1N program. However, on several occasions the C-27 crews have not been provided adequate guidance from Operations. For example, on a day prior to a rotation Operations allowed the C-27 crew to accomplish some night training. Needless to say, this delayed the next day rotation by about 5 hours. On the other hand, the contractor was extremely effective in managing the UH-1N program. They supported the Colombian Army with 730 hours of airlift, moving 2190 passengers. In addition, the Contractor received six additional UH-1N's in Tolemaida and started training new pilots and additional crewmembers. In addition, the contractor continues to effectively manage the UH-1N fuel accountability program with a 100% accountability rate. Furthermore, the contractor