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SUBJECT: **Comments on the U.S. Environmental Protection Agency “Ecological Risk Assessment For the Use of Glyphosate Herbicide As Part of the U.S. Supported Aerial Eradication Program of Coca in Colombia” submitted as part of the U.S. Department of State Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia**

Under Title II of the Foreign Operations, Export Financing, and Related Programs Appropriation Act 2002 (2002 Foreign Aid Act) the State Department is required to determine and report to the Committees on Appropriations that the following conditions related to the aerial eradication program in Colombia are satisfied, (1) "aerial coca 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 (2) 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..."

On September 4, 2002 the State Department delivered to Congress the *Report on Issues Related to the Aerial Eradication of Illicit Coca in Colombia*, in which it determined that the above-mentioned conditions had been satisfied. Following a thorough review, we find that the ecological risk assessment provided in this report does not substantiate the conclusion that the chemicals used in the aerial fumigation of coca, in the manner in which they are applied, do not pose unreasonable risks or adverse effects on the environment. In what follows we discuss the inadequacies of the EPA *Ecological Risk Assessment For the Use of Glyphosate Herbicide As Part of the U.S. Supported Aerial Eradication Program of Coca in Colombia* and identify factors that should be assessed prior to determining the environmental safety of the U.S. supported aerial eradication program in Colombia.

General Assessment

We conclude that the ecological risk assessment submitted by the U.S. EPA Office of Prevention, Pesticides and Toxic Substances as part of the US Department of State report is not an adequate assessment of the potential ecological impacts of the chemicals being sprayed in the aerial coca eradication program in Colombia for the following reasons:

- 1) **The toxicological and environmental fate studies mentioned in the review are based on North American species and temperate ecosystems and therefore, may not apply to the actual use of the glyphosate in the eradication program in Colombia.** No field studies have been conducted in Colombia or in countries with similar climatic and environmental conditions. Furthermore, no attempt has been made to assess the impact on the specific ecology of regions of Colombia that are being sprayed.
- 2) **The report ignores or dismisses a large body of scientific literature that shows significant negative effects of glyphosate formulations on mammals, soil macro and microorganisms, amphibians and potentially beneficial insects.**
- 3) **The report does not adequately assess the ecological risks posed by the particular pesticide formulation used in Colombia.** The report does not discuss any toxicological studies of the pesticide formulation used in Colombia, nor any studies on the persistence or environmental risks of the added surfactant Cosmo-flux 411-F. Furthermore, the studies cited in the report focus almost exclusively on the pesticide active ingredient, glyphosate, rather than the complete glyphosate formulation. The pesticide is applied as a combination of active and inert ingredients, and some of these inert ingredients are known to be as toxic or even more toxic than the glyphosate itself. The EPA report acknowledges that glyphosate formulations are more toxic than glyphosate alone.
- 4) **The report does not address the potential environmental impacts at the ecosystem level.** Glyphosate destroys the primary producers of ecosystems, thus potentially affecting entire communities of consumers that depend upon them. Any toxicity test made on individual animals in the laboratory is not relevant to potential effects on the complex tropical ecosystems of Colombia.

Specific points

1. **The EPA did not discuss any ecological field tests conducted in Colombia, but rather reviewed studies of toxicological impact of glyphosate in the United States and on temperate species.** The tests reported by EPA (pg. 42) on birds were done on bobwhite quail and mallard ducks. Mallard ducks are exclusive from North America, while bobwhite quails have a wider distribution. However, since the species name was not mentioned in the report, it is impossible to know if it was a species present in Colombia .
2. **The EPA report does not examine any studies regarding the potential increase in toxicity of glyphosate formulations in the warm climates of a tropical country.** A study with bluegill and rainbow trout shows that glyphosate toxicity doubled when the temperature of the water was increased from 45 to 63 degrees F (Folmar et al., 1979).

3. The EPA report does not examine the extensive literature on deleterious effects of glyphosate formulations on aquatic and soil biota. In a report prepared for the Ministry of Environment of Ecuador, mycotoxicologist Jeremy Bigwood presents numerous studies (more than 150 references) indicating that some of the ingredients of the formulations used in Colombia can have deleterious effects on aquatic life, soil ecosystems and insect life. The authors of the EPA report commented on only a handful of these studies and stated that "The Agency needs to obtain and review the literature cited in Mr. Bigwood's report in order to comment on other suggested risks" (pg. 50). Given the magnitude of the coca eradication program in Colombia, and the fact that there is an extensive scientific literature showing deleterious effects on flora and fauna as well as on entire ecosystems, the EPA should have taken the time to review this extensive literature before reaching conclusions regarding the potential environmental risks of the US supported eradication program in Colombia.

4. The EPA report ignores scientific studies showing that glyphosate formulations are toxic to mammals. Most toxicity studies cited by EPA investigate toxicity through oral or dermal exposure routes (pg. 42). However, studies show that the toxicity of glyphosate and the common surfactant POEA is much greater through inhalation routes of exposure (Martinez and Brown, 1991; Adam et al., 1997), which is a likely scenario for the aerial spraying program in Colombia. Furthermore, glyphosate has also been found to have toxic effects on mammalian sperm, and therefore is a potential endocrine disrupter (Youssef et al., 1995; Walsh et al., 2000).

5. The EPA report dismisses scientific studies showing adverse impacts to reptiles and amphibians. The assessment mentions US data on adverse reactions in iguanas eating dandelions sprayed with glyphosate. Jeremy Bigwood's literature review for the Ecuadorian government cites evidence from Australia that tank mixes similar to those used in Colombia may be toxic to tree frogs and tadpoles. On both these accounts, the EPA dismisses this data on the grounds that the agency does not have any test protocols nor does it require toxicity testing on reptiles or amphibians, (p. 50, 51).

6. The EPA report does not assess potential risks to soil ingesting organisms. The report indicates that glyphosate adsorbs strongly to soils and sediments (pg. 47), yet it provides no assessment on the potential impacts to aquatic filter feeders, bottom-feeding fish, earthworms or other organisms that are known to ingest significant quantities of soil or suspended sediments (Welten et al., 2000).

7. The EPA report does not examine potential risks to endemic, endangered, or threatened species. A third of the plants reported for Colombia are endemic to that country, making the aerial spraying of a broad-spectrum herbicide a potential threat to the conservation of those endemic species. A recent study suggests that the illicit crop destruction in the northern basin of the Putumayo river, where most of the glyphosate aerial spraying is taking place, may negatively affect endemic and threatened bird species in the region (Alvarez, 2002). It should be noted that Colombia is one of the hotspots of biodiversity in the world. According to the Ministry of Environment of Colombia, the country is number one and number two in the world in terms of numbers of birds and plant species respectively.

8. The EPA report predicts significant adverse impacts to non-target vegetation, but fails to examine the ecological implications of these impacts. When sprayed according to the protocols recommended by the State Department for use in Colombia, the herbicide formulation is expected to cause measurable reductions in dry weight in 50% of young crop plants within 150-600 feet downwind from the target due to drift (p.43). These estimates are based on a drift model built with numerous uncertainties regarding the inputs used for modeling the spray applications, including actual topography of the areas being sprayed, environmental conditions, and droplet size. In spite of the uncertainties, the model predicted significant impacts on non-target vegetation. The implications of this are not examined in the report, and may include:

- a. Increased deforestation rates that may result when farmers clear new areas to cultivate food crops after their crops have been damaged by the spraying. (Henkel, 1995; Young, 1996; Kaimowitz, 1997).
- b. Reductions in the habitat value of the ecological matrix of farms and at the landscape level, including the degradation of biological corridors between and around farm fields.
- c. Impacts on endangered, threatened, and/or endemic species. The destruction of habitats for endemic birds, plants and other organisms would result in their global extinction.
- d. Indirect impacts on organisms that use those habitats. The loss of plant biomass from aerial spraying would lead to a loss of diversity of insects, mammals, birds, and other organisms that utilize these habitats (Santillo et al, 1989; Connor and McMillan, 1990).

9. The EPA report does not discuss the potential risk of herbicide application at the ecosystem level. Some potential impacts are:

- a. Glyphosate can act as a phosphorous source and could accelerate the process of eutrophication in some waterways, ponds and other small bodies of water (Austin et al., 1991)
- b. Glyphosate has been found to be toxic to nitrogen-fixing bacteria, mycorrhizae fungi and actinomycetes in soils, all of which are extremely important for nutrient cycling and other soil processes (Carlise and Trevors, 1988).
- c. By inhibiting the growth of some beneficial microorganisms in the soil, glyphosate allows the growth of others, including some that are plant pathogens (Levesque, 1987; Estok et al., 1989; Lavesque and Rahe, 1992; Sonogo, 2000), potentially changing not only the soil's micro-community but also the plant community that develops on those soils.

Note: It is important to note that Section 4 of the report, which concerns ecological risks, provides no references of the studies mentioned in the report. This makes it very difficult to evaluate the applicability of the particular studies mentioned with regards to determining environmental impacts of the herbicide formulation used in aerial eradication program.

Conclusion

In summary, we conclude that the EPA report does not provide an adequate assessment of the environmental risks posed by the use of glyphosate in the eradication program in Colombia. In our professional opinion there is enough scientific evidence that the chemicals used in the aerial fumigation of coca in Colombia, in the manner in which they are being applied, pose risks and have adverse effects on the environment, and should be stopped immediately before causing irreversible damage.

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