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Letter to the Editor

Nature and Occurrences of Pesticidal Deaths in India (1960–2005) for Analytical Consideration

Sir:

In India, suicides resulting from pesticide ingestion are of special importance and may account for up to 80% of the total number of poisoning cases. The reasons for this incidence are partly socioeconomic factors and the availability of pesticides. These are not only used in agriculture but also to control pests domestically. The more prevalent pesticides are the organochloro and organophosphorous compounds, followed by the carbamates and phosphides, and there are a few cases in which others (1–3) have been used (See Table 1). Since the 1970s pesticide poisoning has exceeded that from all other sources, including plants, metals and drugs (1).

During the 1970s pesticide deaths was caused mainly by DDT, gammaxene, aldrin, dieldrin, endrin, parathion, carbaryl, and zinc phosphide (2), with parathion and also endrin being the most widely used. In the 1980s other pesticides were also used and these included methyl parathion and related compounds, rogor, metasys tox, demeton-*O* and -*S* methyl, propoxur (3). A number of those used during the 1970s and 1980s were replaced by newer pesticides in the 1990s including endosulfan, carbofuran, quinalphos, and aluminum phosphide (4) and since then herbicides and fungicides have also been used.

Pesticide formulations are mainly emulsifiable concentrate containing colored dyes and either kerosene or a mineral oil as a diluent. It is also available as black or violet colored wettable granules. It is therefore not unusual to see stomach contents containing colored liquid, or black or violet particles and with a smell of kerosene, organochloro or oganophosphorous compounds or phenols resulting from the hydrolysis of carbamates.

Samples from suspected death are sent to forensic science laboratories for testing. These samples often include stomach contents, liver, kidneys, etc. and non biological materials such as food products containing pesticide residues. These specimens are often inadequately preserved and may contain fatty acids, degraded amines, and colored dyes that can interfere with analysis. These interferences can be difficult to resolve using the procedure available in the Indian forensic laboratories (5,6) and the analysis of pesticides and their metabolites is an ongoing research and development initiative.

The misuse of pesticides continues to be a major issue in the Indian subcontinent and their analysis in cases of poisoning remains a major challenge for the forensic laboratories.

TABLE 1—*Pesticide poisoning in India (1970–2005).*

Class	Compounds
Organochloro	DDT, Chlordane, Aldrin, Dieldrin, Endrin, Endosulfan
Organophosphorous	Parathion, Methylparathion, Phosphamidon, Phorate, Dichlorovos, Dimethoate, Chlorpyriphos, Edifenphos, Malathion, Sumithion, Rogor, Metasystox, Diazinon, Dementon-*O* and -*S* methyl, Quinalphos
Carbamates	Carbaryl, Propoxur, Carbofuran
Phosphide	Zinc and Aluminum phosphide
Pyrethroids	Fenvalerate, Permethrin, Deltamethrin, Cypermethrin
Fungicides	Chloranil, Captan
Herbicides	Atrazine; Triazine; 2,4-D; 2,4,5-T

Dhurjati Sengupta, M.Sc., Ph.D., L.L.B, C.Chem.
Forensic Science Laboratory
Government of West Bengal
37/1/2 Belgachia Road
Kolkata 700 037, India