

1971

EC71-1501 Entomology : Use Pesticides Safely

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Use Insecticides
SAFELY



Extension Service, University of Nebraska College of Agriculture Cooperating with the
U.S. Department of Agriculture and the College of Home Economics
E. F. Frolik, Dean J. L. Adams, Director

1051-11501

Use Insecticides SAFELY

Robert E. Roselle^{1/} and Carol R. Angle, M.D.^{2/}

Insecticides are poisonous chemicals. There are many kinds, and they differ greatly in toxicity and hazard of use. They create hazards if not used properly and carefully; however they can be used safely if the necessary precautions are followed. Under conditions of proper use insecticides are very valuable for controlling insects that carry human and animal disease causing organisms, destroy our food, fiber, and crops, damage our homes, and are general nuisances.

KINDS OF INSECTICIDES

The three most generally used groups of insecticides are the chlorinated hydrocarbons, organic phosphates, and carbamates. Chlorinated hydrocarbons as a class are usually persistent, resulting in longer control, but may cause residue problems if not used properly. Organic phosphate insecticides break down rapidly and reduce the problem of unwanted residues in food and forage crops. In each class there are high, moderate, and low toxicity materials.

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CHLORINATED HYDROCARBONS: The highly toxic chlorinated hydrocarbon insecticides in use are endrin and dieldrin. These materials must be used with special care to avoid hazards. Endrin should be used only by trained and responsible commercial operators.

The moderately toxic chlorinated hydrocarbons are aldrin, heptachlor, toxaphene, Thiodan (endosulfan), BHC, lindane, DDT, Kepone, and chlordane.

The low toxicity chemicals in this group are Kelthane, ovex, TDE, Sulphenone, chlorobenzilate, methoxychlor, and Tedion (tetradifon). These must be used carefully, but they do not present undue hazards.

ORGANIC PHOSPHATES: The highly toxic organic phosphate insecticides are Bidrin, Metasystox-R, Mocap, TEPP, Di-Syston (disulfoton), Thimet (phorate), Dasanit, Dyfonate, ethyl parathion, methyl parathion, Systox (demeton) Phosdrin (mevinphos), EPN, and Trithion (carbophenothion). Such insecticides should be used only by trained commercial operators. Low percentage granules of Thimet, Di-Syston, Dyfonate, Dasanit, and Mocap can be used by farmers (for corn rootworm larvae control) providing the safety precautions on the labels are carefully followed.

The moderately toxic organic phosphate insecticides are: DDVP (dichlorvos or Vapona), Delnav (dioxathion), ethion, diazinon, Co-Ral (coumaphos), Cygon (dimethoate), Dibrom (naled), and Dylox (trichlorfon). Moderately toxic phosphate insecticides require special care to avoid exposure.

The low toxicity materials in this group are malathion, Gardona, and Korlan (ronnel). These should be used with care to avoid unnecessary or extended exposure.

CARBAMATES: The most generally used carbamates are Sevin (carbaryl) for yards, gardens, livestock, and field crops; Bux and Furadan (carbofuran) for corn rootworm control; Baygon for household insects, Dimetalin poisoned bait strips for houseflies, Zectran for insects of ornamental plants. Sevin is low in toxicity, Bux moderate, Furadan is highly toxic orally, but low dermally, and Zectran is highly toxic.

AVOID ILLEGAL RESIDUES

Federal and state laws establish certain tolerances for insecticides in most food and livestock feeds. Tolerances are expressed in parts per million. The tolerance for insecticides have been set to provide a wide margin of safety for humans and animals. There has not been clinically documented a case of poisoning following the correct use of insecticides on food crops, and we must strive to maintain this record.

Foods or feeds that have insecticide residues in excess of established tolerances can be seized by federal or state authorities and destroyed. To avoid losses due to insecticide residues, it is essential that registered materials be used in the amounts recommended, and the prescribed waiting period before harvest be followed.

Any insecticide used on feed or food crops must be used according to the recommendations for each crop listed on the label.

PROTECT FISH AND WILDLIFE

Fish are highly sensitive to insecticides. To avoid killing fish never apply insecticides to fish-bearing waters, or adjacent to fish-bearing waters where drifting or runoff is likely to occur.

To avoid losses to wildlife do not use excessive amounts of any insecticide. In the past some losses have occurred. These have been due to excessive amounts or careless application.

SAFETY RULES

A few safety rules, if followed carefully, will help avoid accidental poisoning by insecticides. The following rules should be followed when using all insecticides:

1. STUDY THE LABEL: Always study the label before opening an insecticide container. It will tell how much to use, what crops to use it on, waiting periods following use, and safety precautions that must be followed. All of the most important information relative to any specific insecticide will be found on the label.

2. KEEP INSECTICIDES UNDER LOCK AND KEY: Most serious accidents result from very young children ingesting insecticide concentrates. Keep all materials out of the reach of children, pets, and irresponsible adults at all times.

3. DO NOT BREATHE DUSTS OR SPRAYS: Mix and apply insecticides so that dusts or fumes are down-wind. Be certain drift does not reach other crops, livestock, or inhabited areas. If the label directs that a respirator be used, obtain a good respirator with the correct cartridge and use it. Up-to-date lists of respirators are available from the United States Department of Agriculture, and University of Nebraska College of Agriculture and Home Economics.

4. DO NOT SPILL SPRAYS OR DUSTS: When mixing, avoid spilling on skin or clothing. If insecticides are spilled, remove clothing and wash the skin immediately with soap and water.

5. ALWAYS KEEP INSECTICIDES IN ORIGINAL CONTAINERS: Never place poisonous materials in other bottles or cartons. Should the identity of a material be lost, bury this material at least sixteen inches in the ground.

6. WASH AND CHANGE CLOTHING: After applying insecticides, wash thoroughly with soap and water, and change to clean clothing. Launder clothing after each day's use. Never wear contaminated clothing. Always wash before eating or smoking.

7. CHECK FOR LEAKS: Before mixing insecticides be certain spraying equipment has no leaks, and that nozzles are not plugged.

8. NEVER COMBINE INSECTICIDES: If there is some reason for combining insecticides, be certain it is safe to do so. NEVER combine organic phosphate insecticides, as a more toxic material may result.

9. KEEP A RECORD: Always keep a record of material and amounts used, and date of application.

10. AVOID DRIFT: Insecticide drifting from one crop to another can contaminate livestock feed and result in serious economic losses, especially to milk producers. Drift of hazardous materials can also be dangerous to humans and livestock.

11. DESTROY THE CONTAINER: It is very important to destroy insecticide containers as soon as they are emptied. Metal cans should be punctured, crushed, and buried. Glass containers should be broken and buried. Paper sacks and boxes should be buried. Spilled or left-over insecticides should be buried at least sixteen inches in the ground in a safe area.

12. TAKE PATIENT TO A PHYSICIAN: In case of accidental poisoning, take the patient to the nearest hospital or physician. It is very important that the physician know what the chemical agent was, so, if possible, take the container or a label along.

EMERGENCY TREATMENT OF INSECTICIDE POISONING INFORMATION FOR PHYSICIANS

CHOLINESTERASE INHIBITORS (Organic Phosphates and Carbamates)

Onset of Toxicity: From minutes to one hour. Skin absorption somewhat slower with progressively severe toxicity. Inhibition of cholinesterase leads to the toxic effects of accumulated acetylcholine.

Symptoms and Signs: Headache, giddiness, nervousness, blurred vision, weakness, nausea, cramps, diarrhea, tightness in chest. Signs of excessive respiratory tract

secretions, vomiting, cyanosis, papilledema, uncontrollable muscle twitches, bradycardia, A-V block, convulsions, coma, loss of reflexes and sphincter control, severe muscle weakness with loss of respiratory effort.

Treatment: In very severe cases, with convulsions, coma or respiratory embarrassment:

1. Artificial Respiration. Clear oropharynx of excessive secretions. Use an oropharyngeal airway or endotracheal intubation if necessary. Positive pressure respiration should be used, beginning with mouth-to-mouth resuscitation in emergencies. Continued, adequate respiration is a primary factor in survival.
2. Atropine Sulfate. 2-4 mg. (1/30 to 1/15 grains) I.V. as soon as cyanosis overcome. (Atropine in a cyanotic patient may induce ventricular fibrillation). Repeat at 5 to 10 minute intervals until signs of atropinization appear (dry, flushed skin and tachycardia above 140/min.) and sustain atropinization until patient stabilized. Decrease over 2-3 days. Adult doses of 50-100 mg. per day may be needed and do not produce toxicity in true poisoning.
3. Pralidoxime (Protopam, Ayerst) reactivates cholinesterase inhibited by many of the organic phosphates, is variably effective in poisoning by carbamates and contraindicated in poisoning due to Sevin. In all cases it is only an adjunct to atropine that may help relieve the generalized weakness and fasciculations.

Adult: 1 gm. I.V. slowly. Repeat in one hour or sooner if overwhelming intoxication or weakness not relieved.

Child: 25-50 mg/kg I.V. but can be given I.M.

4. Decontamination: Remove clothing, wash skin thoroughly with soap and water; if available, wash with baking soda solution and/or alcohol. Rinse eyes with tap water. Gastric lavage if indicated.
5. Anticonvulsants, if indicated: Sodium thiopentothal 2.5% I.V.; or tridione I.V. 600 mg/M² every 15 minutes. Diazepam (Valium) I.V. 2-5 mg. for a child or 5-10 mg. to an adult is useful in status epilepticus.
6. Contraindicated: morphine, aminophylline, phenothiazine, succinyl choline, long-acting barbiturates.

Caution: In cases of heavy skin contamination the operator should take precautions against self-contamination by wearing rubber gloves and other protective clothing.

In Moderately Severe Cases, not requiring artificial respiration or anticonvulsants, but with some muscle weakness:

1. Atropine Sulfate, 1 to 2 mg. (1/60 to 1/30 grain) I.V. If excessive secretions appear, keep patient fully atropinized by repeating this dose every hour up to 25-50 mg/day.
2. Decontamination of skin, stomach and eyes.
3. 2-PAM, slowly, I.V., in single dose of 1.0 gm. for adults, 25 mg/kg in child. Do not use for Sevin poisoning.

In Mild Cases, a single oral dose of atropine 1-2 mg. plus pralidoxime 1-2 gms. to an adult will produce relief within an hour. All cases should be closely observed for 24 hours.

Prophylactic: Atropine 0.5 mg. and pralidoxime 3.0 gms., both as a single oral dose to adult repeated at end of exposure or q. 4 h. may be employed but does not substitute for adequate protection.

CHLORINATED HYDROCARBONS

Onset of Toxicity: Usually within a few hours, signs of central nervous system and gastrointestinal irritation appear. Delayed symptoms may be due to the insecticide or the hydrocarbon solvent, causing petroleum pneumonitis, liver damage, bone marrow depression, renal failure.

Symptoms and Signs: Paresthesia, hyperaesthesia, dizziness, ataxia, nausea, diarrhea, tremor, and convulsions. Chronic exposure may lead to malaise, headache and peripheral neuritis. Remission of acute symptoms occurs within 1-3 days; almost all deaths in first 24 hours.

Treatment:

1. Decontamination: Thorough washing of skin with soap and water. If ingested, immediate emesis or gastric lavage. In cases of ingestion of dilute insecticide in a petroleum vehicle, lavage should be done cautiously to avoid aspiration; do not give fats or oils by mouth.
2. Adequate Oxygenation
3. Anticonvulsants, if indicated: Pentobarbital or phenobarbital in sufficient doses to control seizures.
4. Contraindicated: Epinephrine, which may predispose to development of cardiac arrhythmias.

Emergency Consultation Service for Physicians:

Wayland J. Hayes, Jr., M.D., Ph.D.
Vanderbilt University School of Medicine
Nashville, Tennessee
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Childrens Memorial Hospital
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Hospital: 402-553-5400

Poison Control Center
Bryan Memorial Hospital
Lincoln, Nebraska 68500
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Poison Control Center
Denver General Hospital
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Hospital: 303-244-6969

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Reporting of Cases, Cholinesterase Assay: All cases of insecticide poisoning should be reported to the County Health Department and reports plus samples of separated plasma and rbc for ChE assay should be sent to:

U. S. Public Health Service
Pesticides Program
National Communicable Disease Center
Atlanta, Ga. 30333

Ref: Clinical Handbook on Economic Poisons, 1967, (U.S. P.H.S. Publ. No. 476), United States Government Printing Office, Washington, D.C. 20402 (55¢)