

Lesson Number 4

Title: Pesticides and Toxicity

Purposes / Objectives

- To learn what 'toxic' and 'toxicity' mean.
- To learn how pesticides can enter the human body.
- To compare the toxic effects of pesticides on humans.
- To discuss ways to manage the toxic effects of pesticides.

Materials

- A toxicity comparison demonstration set (four jars)
- Paper
- Pencil

Methods

Ask the growers the questions listed in Results/Data. Ask questions or give hints if needed to help them reach the conclusions described.

Results / Data

First:

Ask growers to tell you what the words 'toxic' and 'toxicity' mean. If they cannot tell you, you tell them!

Toxic = poisonous.

Toxicity = a measure of how poisonous something is.

Tell growers that some substances are more toxic to certain groups of living things. For example, many insecticides are not toxic to plants. Some insecticides are more toxic to insects than they are to people.

Second:

Ask growers how pesticides can enter the human body to cause ill effects. Ask them to give examples -- to tell how each could happen.

Help them list these three routes of entry:

- By mouth (oral) = eating or drinking pesticides, or eating or drinking materials contaminated with pesticides.

Examples:

Most people would not knowingly eat or drink a pesticide. However, if a farmer reuses a pesticide container for water, people who drink out of the container could be poisoned. If a farmer has pesticide on his or her hands and eats, drinks or smokes before washing, they may get pesticides into their body through their mouth.

- Through the skin (dermal) = spilling pesticide concentrate or mixture on your body.

Examples:

If a person is mixing pesticides or filling a sprayer, some of the concentrate or mixture might splash onto their skin during these handling operations. Many liquid pesticides can penetrate (soak through) skin and enter the body.

- Breathing pesticides (inhalation) = inhaling dusts, spray mists, or vapors.

Examples:

Farmers or others nearby might inhale fine mists from certain types of sprayers. Farmers who use pesticide dusts might inhale some fine particles as they apply these dusts. Some pesticides can evaporate due to heat, and if this happens people may breathe these vapors.

Also, you might wish to discuss one other:

- Into the eyes (ocular)

Examples:

Farmers might splash pesticide into their eyes while pouring a pesticide concentrate or mixture. People who get pesticides on their hands or gloves or clothing and then rub their eyes might also get pesticides in their eyes. Many pesticides irritate sensitive places like a person's eyes.

Third:

Show the growers the set of jars. Each jar contains salt. The amount of salt in the jar represents the amount of a certain pesticide (in pure form) scientists think it would take to kill an average person if eaten.

- | | | |
|----|---|-----------------------------|
| I | Extremely toxic (5 - 50 mg/kg)
Furadan/carbofuran (8 mg/kg) | pinch to teaspoon |
| II | Very toxic (50 - 500 mg/kg)
Decis 12 EC/deltamethrin (128mg/kg)
Sumicombé/fenitrothion and fenvalerate (250mg/kg and 451 mg/kg) | teaspoon to two tablespoons |

Dursban/chlorpyrifos (96-270 mg/kg)

III Moderately toxic (500 - 5,000 mg/kg) two tablespoons to two cups
(an ounce to a pint)

Basedin/diazinon (1,250 mg/kg)

IV Slightly toxic (5,000 - 15,000 mg/kg) two cups to four cups
(a pint to a quart)

Neem/azadirachtin (>5,000 mg/kg)

Give them time to study each jar, and to compare each one in the set.

Fourth:

Discuss how to minimize toxic effects. In general, there are two ways:

1. If and when possible, reduce your use of pesticides.
For example, use non-chemical alternatives like sticky traps. Check your fields often and find pests early -- before pest problems become severe. It may be that one early-season pesticide application can do the job of many late season sprays.
2. If possible, use the least toxic effective product. If two insecticides will kill the problem pest, use the one that is least toxic to humans.

Discussion

Summarize and review the growers' responses. Be sure all the points they want to make and any questions they ask are recorded.

Conclusion(s)

FFS Leader:

Today's lesson was about pesticides and toxicity. Most pesticides are poisonous. Some are more poisonous than others are.

Here are two ways to manage the poisonous effects and risks of using pesticides: If possible:

- use pesticides that have a very bad effect on pests, but not such a bad effect on people.
- do not use pesticides if there other effective ways to manage pests.

Next time we will talk about another way to manage pesticide risk -- reducing your exposure to them.

End the lesson by thanking the farmers for their time and participation.

Notes

Neem (azadirachtin):

Effects on Birds:

No significant effects.

Effects on Aquatic Organisms:

Neem is not expected to kill fish at recommended rates. However, it may cause a fish kill if large concentrations reach waterways.

Effects on Other Animals (Nontarget species):

Neem is relatively harmless to spiders, butterflies, and insects such as bees that pollinate crops and trees, ladybugs that consume aphids, and wasps that act as parasites on various crop pests. This is because neem must be ingested to be effective. Thus, insects that feed on plant tissue succumb, while beneficial insects that feed on nectar or other insects rarely contact significant concentrations of neem.

Environmental Persistence:

Neem breaks down rapidly (in two to four days) in water or light. It is not likely to accumulate or cause long-term effects on soil or water supplies.

Decis (deltamethrin):

Effects on Birds:

Decis is less toxic to birds than it is to humans.

Effects on Aquatic Organisms:

Decis is highly toxic to fish under laboratory conditions. However, in field conditions under normal conditions of use, fish are not killed. Nonetheless, Decis can cause harm to fish because it is poisonous to the small aquatic insects and simple water plants (algae) fish eat.

Effects on Other Animals (Nontarget species):

Deltamethrin is toxic to bees, which are beneficial because they pollinate flowering plants. It is also highly toxic to spiders.

Environmental Persistence:

In soil, Decis breaks down within 1-2 weeks. In pond water, Decis does not persist very long. Most is adsorbed by sediment and taken up by plants. About 10 days after application, deltamethrin residues are not detected on plants.

Source for Notes:

EXTOXNET: Extension Toxicology Network, a cooperative effort of University of California-Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho (USA.)