PESTICIDES and HONEY BEES

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MANY PESTICIDES that are necessary in crop production are highly toxic to honey bees. Properly used, the materials benefit beekeepers as well as farmers by providing greater acreages of plants capable of producing food for bees, livestock, and people, instead of being damaged or eaten by pests. Bee losses from pesticides cannot be entirely avoided but they can be minimized by the cooperative efforts of spray operators, beekeepers, and farmers.

Where to start

Proper dosages of pesticides and adherence to the recommendations on the label are the first considerations in preventing losses of bees as well as avoiding injury to people and farm animals. In any case, highly toxic materials should not be applied to any flowering plants on which honey bees are working. If an application must be made, consider whether the bee colonies can be moved or other, less toxic materials and better timing can be used. These measures may control the insect pest with less danger to bees.

Methods of application

Ground application of pesticides is generally safer for bees than air application. The hazard from air application may be somewhat reduced by not turning the aircraft over blooming crops or transporting materials back and forth across them. Applications of pesticides to large areas, as in the control of grasshoppers, mosquitoes, armyworms, and cereal leaf beetles, and repeated applications to limited areas, increase the hazard to honey bees.

Selection of materials

The formulation of the material plays an important role in its toxicity to bees. In general, sprays are safer than dusts, and emulsifiable concentrates are less toxic than wettable powders. Granular materials usually are not hazardous to bees. At present there are no safe, effective repellents that can be used to keep bees away from treated areas.

Fungicides, acaricides (miticides), herbicides, and

blossom thinners are relatively nontoxic. These materials and the insecticides can be placed in three groups in relation to their effects on bees.

Highly toxic. This group includes materials that kill bees on contact during application as well as for several days after treatment. Bees should be removed from the area if these are used on plants the bees are visiting. Among materials in this group are:

aldrin
arsenicals
azinphosmethyl (Guthion)
BHC
carbaryl (Sevin)
chlordane
diazinon
dieldrin
dimethoate
EPN
heptachlor
lindane
malathion, dilute*
malathion, low-volume
Metacide
methyl parathion
Mevinphos
naled (Dibrom)
parathion
phosphamidon
sabadilla*
TEPP*

* Kills bees primarily on contact.

Moderately toxic. These materials can be used with limited damage to bees if not applied over bees in the field or at the hives. Correct dosage, timing, and methods of application are essential. This group includes:

carbophenothion (Trithion)
DDT
disulfoton (Di-Syston)
endosulfan (Thiodan)
endrin
Eradex
isodrin
methyl demeton
Perthane
phorate
tartar emetic
TDE (DDD)

Relatively nontoxic. Materials in this group can be used around bees with few precautions and a minimum of injury to bees. The greatest number of materials is in this group which includes:

allethrin
Aramite
captan
demeton
dicofol (Kelthane)
dioxathion (Delnav)
ethion
methoxychlor
Neotran
nicotine
ovex
pyrethrum
rotenone
ryania
schradan (OMPA)
sulfur
tetradifon (Tedion)
toxaphene
trichlorfon (Dylox)

Time of application

The proper timing of applications allows the use of the moderately toxic materials on crops visited by bees. Applications can be made between 7 p.m. and 7 a.m. when bees are not foraging. Evening applications are safer than early morning applications except when they are made over or near apiaries on hot nights when bees may be clustered on the fronts of the hives. Adjustments in timing may also be necessary on warm mornings when bees are flying earlier than usual. Some crops, such as sweet corn and cucurbits (melons, squash), shed pollen early in the day. By 4 p.m. they are unattractive and are no longer visited by bees.

Plants that may present problems

Treatments that include any of the following crops and wild plants may create bee poisoning problems.

— Legume seed crops in bloom (sweetclover, red clover, lespedeza).

— Cucurbits in bloom (squash, cucumber, cantaloupe, watermelon).

— Vegetable seed crops in bloom (onion, carrot, asparagus).

— Cut-flower and flower seed crops in bloom.

— Cover crops in bloom beneath orchard trees (white clover, chicory, dandelion).

— Weeds in bloom in grain fields (mustard).

— Sorghum and corn, especially sweet corn, when shedding pollen.

— Soybeans in bloom after July 15.

— Cotton throughout the season (blooms and extrafloral nectaries).

Other hazards to bees

Although most bee losses result from their visits to treated blossoms, they may also occur when bees collect water or honeydew (sweet insect secretions) from foliage or other objects in the treated area. Drift of pesticides over apiaries or onto blooming nontarget crops may be just as lethal as direct application.

Exchange of information

The prevention of bee losses is the joint responsibility of the spray operator, the farmer, and the beekeeper. It is fostered by mutual understanding and cooperation which includes the exchange of information before pesticides damaging to bees are used. Prior notice to the beekeeper is essential to allow him to arrange for protection or movement of his colonies. In many cases the bees cannot be moved because of wet ground, the weight of individual colonies, or the lack of alternative apiary sites.

The beekeeper's obligation

The beekeeper's responsibility for preventing pesticide damage to his bees begins when he establishes an apiary, either permanently or for crop pollination. He should familiarize himself with the cropping practices in the area and the pest-control methods in use. In some cases he can *expect* damage to his bees and, if so, he must weigh the risk against the anticipated returns from honey or pollination fees. Pest-control operations in orchards and on cotton, lima beans, and sweet corn have made many areas off-limits to bees. Bees for fruit pollination should be held in locations away from the orchards until prebloom spraying is completed and trees are 10 to 25 percent in bloom. Bees should be moved out of the orchard after three or four days of good pollinating weather, thereby avoiding the calyx sprays.

In emergency situations bees can be confined to their hives for short periods. This is practical only for applications of materials with short residual toxicity that must be applied to a blooming crop with bee hives in the field or nearby. Loose-fitting covers are placed over the hives during the night or early morning when the bees are not flying. They are removed two or three hours after the application or at least by midmorning. Black polyethylene sheeting is most commonly used but burlap is better if the colonies are not directly exposed to the spray. Confinement for longer periods — a day or more — is possible by keeping the burlap covers damp.

Beekeepers should always provide their name, address, and telephone number to owners of land on which their apiaries are located for notification of farm operations affecting their bees. All apiaries should be identified by a placard bearing the owner's name, address, and telephone number in letters legible at a distance of 50 feet or more. Such signs often deter vandalism and are valuable when people wish to contact the apiary owner.

The growing complexity of farming places additional responsibility on the beekeeper. He should be familiar with commonly used pesticides and their toxicity to bees. He should also know as much as possible about the relations of his bees to the nectar and pollen plants in his territory. For example, the beekeeper must be aware that bees collect pollen on corn and melons primarily in the morning. He should also expect to find bees visiting soybean blossoms in late July and early August when other legumes become less attractive. Only with such information can he take an active part in minimizing losses of bees from pesticides.

Additional sources of information

Farm advisers and extension specialists in apiculture and entomology can provide additional information about honey bees and pesticides. The following publications, frequently revised, are valuable sources of information about the toxicity of specific compounds.

L. D. Anderson, E. L. Atkins, Jr., F. E. Todd, and S. E. McGregor. Toxicity of pesticides to honeybees. California Agricultural Extension Service One Sheet Answer 170 (Revised). 1966.

Carl Johansen. Bee poisoning: A hazard of applying agricultural chemicals. Washington Agricultural Experiment Station Circular 356 (Revised). 1965.

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