How to Reduce Bee Poisoning from Pesticides
Michigan State University Extension Service
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HOW TO REDUCE
BEE POISONING

FROM PESTICIDES

WREP 15

Carl Johansen, Professor of Entomology, Washington State University

CAUSES OF BEE POISONING

Most bee poisoning occurs when insecticides are applied to crops during the blooming period. Other hazards are:

- Drift of toxic sprays or dusts on to adjoining crops or weeds that are in bloom.
- Contamination of flowering cover crops when orchards are sprayed.
- Insecticidal dusts adhere to foraging bees and ultimately become packed with the pollen onto the hind legs (Penncap-M and Sevin are especially dangerous because they may be stored with pollen in the hive and fed to newly emerged workers the following season).
- Bees drinking or touching contaminated water on foliage or flowers.
- Bees collecting contaminated pollen or nectar.

BEE POISONING SYMPTOMS

The most common symptom of bee poisoning is the appearance of excessive numbers of dead bees in front of the hives. Aggressiveness in bees may be caused by most pesticides. Stupefaction, paralysis, and abnormal activities of bees are commonly caused by DDT, other chlorinated hydrocarbons, and organophosphorus insecticides. Regurgitation of the honey stomach contents is often caused by poisoning with organophosphorus insecticides. Bees have been observed performing abnormal communication dances on the horizontal landing board at the hive entrance while under the influence of insecticide poisoning. Disorganized behavior patterns may lead to lack of recognition of affected field bees by guard bees.

Many bees poisoned with Sevin or dieldrin slow down and appear as though they had been chilled; such bees may take two to three days to die. Beekeepers familiar with Sevin poisoning quickly learn to recognize the "crawlers" that move about in front of the hive but are unable to fly. Dead brood in or in front of the hive is typical of Sevin, microencapsulated methyl parathion (Penncap-M), or arsenical poisoning. When not enough hive bees are left to cover the brood frames or care for the brood, desiccation or starvation kills the larvae. In severe cases, few bees in the hives survive, or the entire colony may be dead.

One forager returning to the hive with a load of contaminated pollen or nectar can cause extreme agitation and death of a number of bees. Several such foragers can seriously disrupt and damage the colony. Often, the queen is superseded because of the agitation of the workers, possibly aggravated by a reduction in the secretion of queen substance.

Queens may be affected, especially by slow-acting materials such as arsenicals, Sevin, and microencapsulated methyl parathion (Penncap-M), which may be taken into the hive with pollen. Queens may behave abnormally: for instance,

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lay eggs in a poor pattern. Severely weakened or queenless colonies will not live through the following winter. Queenlessness the following fall has been associated with the use of a wide variety of insecticides including arsenicals, Penncap-M, Sevin, and parathion. Typically, severe Sevin or Penncap-M poisoning makes at least half of the colonies queenless within 30 days.

BEEKEEPER-GROWER COOPERATION

A major consideration for the reduction of bee poisoning is beekeeper-grower cooperation. Many cases could be cited where a grower, simply through ignorance of the hazard to bees, has caused tremendous damage to a large number of colonies. The timing or materials of his pest control program could have been modified so that little or no poisoning occurred. Usually this can be done without unduly increasing the control cost or inconveniencing the grower.

Beekeepers should get acquainted with the farmer on whose land they are placing hives. They should find out about his pest-control practices and other special problems that might occur.

When the grower rents colonies for pollination of his crop, definite verbal or written agreements can be made. One type of written contract emphasizes crop production and has the desirable effect of encouraging closer cooperation between the grower and the beekeeper. Such contracts should include details of the responsibility of the beekeeper in providing strong and effective colonies and of the farmer in safeguarding the bees from poisoning. In modern agriculture, the beekeeper often depends on the grower for bee forage and the grower depends on the beekeeper for pollination. Cooperation and understanding of each other's problems are essential.

REGULATIONS

Many states have regulations that attempt to reduce the hazard of insecticide applications to bees. These are based on the safest timing and bloom conditions for given chemicals on given crops.

REDUCTION OF BEE POISONING

Following are some of the ways to help reduce bee poisoning:

What the Pesticide Applicator Can Do

- Do not apply insecticides that are toxic to bees on crops in bloom, including cover crops in orchards and adjacent crops or interplants. With aerial application, do not turn the aircraft or transport materials back and forth across blossoming fields. Ground application is generally less hazardous than aerial application because there is less drift of the pesticides and smaller acreages are treated at one time.

- Apply certain chemicals only in late evening, night, or early morning while bees are not actively foraging (generally between 6 p.m. and 7 a.m. in the north and 8:30 p.m. to 4 a.m. in the south). Evening applications are generally less hazardous to bees than early morning applications. When high temperatures cause bees to start foraging earlier or continue later than usual (5:30 a.m. to 8:00 p.m.) shift time accordingly.

- Do not apply insecticides when temperatures are expected to be unusually low following treatment. Residues will remain toxic to bees for a much longer time under such conditions.

- Do not dump unused dusts or sprays where they might become a bee poisoning hazard. Sometimes bees collect any type of fine dust material when pollen is not readily available. Under such conditions, they may actually carry pesticide dusts back to the colony.

- Use insecticides that are relatively nonhazardous to bees whenever such choices are consistent with other pest control considerations.

- Choose the less hazardous insecticide formulations. Our tests have consistently indicated that dusts are more hazardous than sprays of the same insecticide. Emulsifiable (liquid) formulations usually have a shorter residual toxicity to bees than do wettable powders. Granular formulations are low in hazard to bees.

- Contact the beekeeper and ask him to remove his colonies from the area (or keep the bees confined during the application period) before applying hazardous pesticides when such measures are feasible and of value.

- When roadside and other weed control operations involve 2,4-D and similar compounds on blooming plants, select the formulations or derivatives known to be least harmful to bees. Our tests have shown that at maximum dosage, alkanolamine salts and isopropyl esters are more toxic than other forms. Oily formulations seem to be more hazardous to bees. Spraying in late afternoon or evening will also lessen the hazard, since bees will not visit the blooms after they become curled. The only highly toxic herbicides are arsenicals, DNOSBP, and Endothal.

- Observe State Department of Agriculture regulations aimed at reducing bee poisoning.

What the Grower Can Do

- Mow or beat down orchard cover crops before applying sprays hazardous to bees. Treatment with 2,4-D is the best way to remove dandelion blooms. This is especially important in relation to the first cover spray on apples, which is applied during a critical foraging period when bees will fly several miles to obtain pollen and nectar from even a few blooms of dandelion, mustard, etc.

- Blossom-thinning sprays have not been hazardous to bees in Washington orchards. However, Sevin used as a fruit thinner 15 to 25 days past full bloom of apples is highly hazardous if cover crop blooms become contaminated.

- Learn the pollination requirements of the crops you raise. Such information is not generally known for some insect-pollinated crops, such as lima beans. Application of insecticides hazardous to bees on these crops, or driving beekeepers out of your area by the use of insecticides on other blossoming crops will likely cause poor yields.

- When insect pests have been damaging a crop every season, use a preventative program of early season application before pest populations increase, foliage growth, and weather conditions reduce the effectiveness of insecticides. Such a program is usually less dangerous to pollinating bees and other beneficial insects as well.

- Learn about the beekeeper's problems with chemical poisoning and enter into mutually advantageous agreements with him to best produce bee-pollinated crops.

What the Beekeeper Can Do

- Do not leave unmarked colonies of bees next to orchards or fields to be treated. Post your name, address, and phone number in printing large enough to be read at some distance in all apiaries so you can be contacted readily to move the colonies when hazardous sprays are to be applied. Several regulations concerning such marking of apiaries are in effect in the Pacific Northwest.

- Do not move hives back into parathion-treated fields until at least 36 hours after the application. Our tests have shown that about 90 percent of the killing of bees by parathion occurs during the first 24 hours after application.

- Choose apiary sites that are relatively isolated from intensive insecticide applications and not normally subjected to drift of chemicals. Establish holding yards of honey bee colonies at least four miles from orchards being treated with toxic materials.

- Learn about pest control problems and programs so you can develop mutually beneficial agreements with growers concerning pollination service and prudent use of pesticides.

- Be careful how you control insect pests around beekeeping storage facilities or apiaries. *Ethylene dibromide* used for wax moth control can burn the skin and irritate the lungs when mishandled. Do not use so much EDB that it drips down over combs being fumigated. *Chlordane* used for ant control has an affinity for beeswax and will kill bees whenever contaminated combs are used. Chlordane is volatile enough to cause severe problems in closed beekeeping storage facilities. Vapona "No Pest Strips" will also contaminate beeswax and kill bees when the combs are put in colonies later. Use relatively low-hazard materials, such as mirex bait granules for ant control and pyrethrum aerosols for fly control.

- Cover honey bee colonies with wet burlap for two or three days to protect them from the initial hazards of an insecticide. Such covers should be put over the hives during the night before the crop is treated and should be kept wet during use. This suggestion is listed last because it has been of limited benefit and most find it impractical.

POISONING OF WILD BEES

Little research data on the effects of insecticides on species of wild bees have been published. WSU's work on the effects of chemicals on the alkali bee, *Nomia melanderi,* and the alfalfa leafcutting bee, *Megachile pacifica,* has been the most extensive to date.

The alfalfa leafcutting bee can be safeguarded by storing the nest units in a cool room or root cellar for a few days while the field is being treated. Nests with females in the ends of the tunnels can be moved at night. This bee is nearly inactive at 70°F and completely inactive at 60°F. Leafcutter nest shelters can be built to be covered or closed during insecticide applications to reduce the drift of dusts or sprays into the nest structures. When placing leafcutters on fields in a rotation plan, do not move nest shelters in until at least one week after toxaphene, Cygon, Supracide, Furadan, or malathion ULV treatments.

Do not allow insecticide dusts or sprays to drift onto alkali bee nest sites or blooming crops on which these bees are foraging. Do not spray chemicals on or burn adjacent wild land or fence rows around red clover, cranberry, or other berry crops. Such areas provide nest sites for bumble bees that aid materially in pollinating these crops. A classification of the relative hazard of insecticides to wild bees is presented in Table 4.

SPECIAL PRECAUTIONS

1. There is a special tendency for Penncap-M to adhere to bees foraging on contaminated flowers. Ultimately, this material is combed from the bee hairs and deposited with the pollen on the pollen baskets. It can become a long-term hazard when it is stored in pollen in beehive frames from one season to the next.
2. Do not use Thimet G, Di-Syston G, Phosdrin, TEPP, and methyl parathion where there is a possible fumigation hazard to alfalfa leafcutting bee shelters, alkali bee nest sites, or honey bee apiaries.
3. Undiluted or ultralow volume technical malathion spray treatments can retain a high residual toxic hazard to honey bees for at least five days and to alfalfa leafcutting bees, for at least seven days.
4. Bees are temporarily inactivated by direct contact with oil sprays and some loss may occur.
5. Acidified spray mixtures with Dylox are more hazardous to bees than nonacidified sprays of this material. Do not use more than recommended rates of acidifiers.
6. Alfalfa leafcutting bees are much more sensitive to all chemicals after they have been in the field for three weeks or more. Time late applications to be six to seven weeks after the start of activity in the field to coincide with the natural lull between peaks of bee emergence.
7. Specific miticides such as Kelthane and Comite should not be applied in mixtures with insecticides because this increases the hazard to bees.
8. Do not treat during warm evenings when honey bees are clustered on the outside of the hives.

Table 1. Toxicity of Insecticides and Acaricides to Honey Bees

Do NOT apply on blooming crops or weeds.

Advantage
aldrin
Ambush (permethrin)
Ammo (more than 0.025 lb/acre) (cypermethrin)
Avermectin (more than 0.025 lb/acre)
Azodrin (monocrotophos)*
Baygon (propoxur)
Baytex (fenthion)
Bidrin (dicrotophos)
Cidial (phenthoate)
Cygon (dimethoate)
Cymbush (cypermethrin)
Dasanit (fensulfothion)
De-Fend (dimethoate)
diazinon
Dibrom D (naled)
dieldrin
DNBP (dinoseb)
Elgetol (dinitrocresol) (1.5 qt/100 gal or more)
EPN
Ficam (bendiocarb)
Folimat (omethoate)
Furadan F (carbofuran)
Guthion (azinphosmethyl)
heptachlor
Imidan (phosmet)
Lannate D (methomyl)
lead arsenate
lindane
Lorsban (chlorpyrifos)
malathion D
malathion ULV (8 fl oz/acre or more)
Matacil (aminocarb)(1 lb/acre or more)
Mesurol (methiocarb)
methyl parathion
Monitor (methamidophos)
Nudrin D (methomyl)
Orthene (acephate)
parathion
Penncap-M (methyl parathion)*
Phosdrin (mevinphos)
phosphamidon
Pounce (permethrin)
Pydrin (over 0.1 lb/acre)
Rebelate (dimethoate)
Sevin WP (carbaryl)
Sevin-4-oil (carbaryl) (more than 0.5 lb/acre)
Sevin XLR (carbaryl) (more than 1.5 lb/acre)
Sumithion (fenitrothion)
Supracide (methidathion)
Swat (bomyl)
Temik G (aldicarb) (applied at least 4 weeks before bloom)
Vapona (dichlorvos)
Zectran (mexacarbate)

*Can cause serious problems if allowed to drift onto vegetable or legume seed crops.

Apply ONLY during late evening. (See caution at end of table.)

Avermectin (0.025 lb/acre or less)
Dibrom WP (naled)
malathion EC
Pydrin (fenvalerate)(0.1 lb/acre or less)
Thimet EC (phorate)
Thiodan (endosulfan)(more than 0.5 lb/acre)
Tiovel (endosulfan)(more than 0.5 lb/acre)

Apply ONLY during late evening, night, or early morning. (See caution at end of table.)

Ammo (0.025 lb/acre or less)
Aspon (propyl thiopyrophosphate)
Baygon ULV (propoxur) (0.07 lb/acre or less)
Baytex ULV (fenthion) (0.1 lb/acre or less)
Carzol (formetanate)
chlordane
DDT
Delnav (dioxathion)
Dibrom EC (naled)
dieldrin G
Di-Syston EC (disulfoton)
Dursban ULV (chlorpyrifos) (0.05 lb/acre or less)
Dyfonate (fonofos)
Dylox (trichlorfon)
Elgetol (dinitrocresol) (1.5 pt/100 gal or less)
endrin
ethion
Gardona (stirofos)
heptachlor G
Lannate LS (methomyl)
Larvin
Malathion ULV (3 fl oz/acre or less)
Matacil ULV (aminocarb) (2.4 oz/acre or less)
Metasystox-R (oxydemetonmethyl)
methoxychlor
Mobilawn (dichlorfenthion)

(Continued on next page)

(Continued)

Morocide (binapacryl)
Nemacide (dichlorfenthion)
Nudrin LS (methomyl)
oil sprays (superior type)
Perthane (ethylan)
Pirimor (pirimicarb)
Rhothane (TDE)
Savit (carbaryl) (1.5 lb/acre or less)
Sevin-4-oil (carbaryl) (0.5 lb/acre or less)
Sevin XLR (carbaryl) (1.5 lb/acre or less)
(not $>$1:19 dilution)
Systox (demeton)
TEPP
Thanite (isobornyl thiocyanate)
Thimet G (phorate)
Thiodan (endosulfan) (0.5 lb/acre or less)
Tiovel (endosulfan) (0.5 lb/acre or less)
Torak (dialifor)
toxaphene
Trithion (carbophenothion)
Vapona ULV (dichlorvos) (0.1 lb/acre or less)
Vydate (oxamyl)
Zolone (phosalone)

Can be applied at any time with reasonable safety to bees.

Acarol (bromopropylate)
allethrin
BAAM (amitraz)
Bacillus thuringiensis (Bactospeine, Bactur, Bakthane, Bug Time, Cekubacilina, Certan, Dipel, or Sok-Bt)
Baygon G (propoxur)
chlorobenzilate
chloropropylate
Comite (propargite)
cryolite
Dasanit G (fensulfothion)
Dikar
Dimilin (diflubenzuron)
Di-Syston G (disulfoton)
Furadan G (carbofuran)
Heliothis polyhedrosis virus (Elcar)
Karathane (dinocap)
Kelthane (dicofol)
Lethane 384 (butoxy thiocyanodiethyl ether)
lime-sulfur
malathion G
Mavrik (fluvalinate)
Micasin (chlorfensulphide)
Milbex (chlorfensulphide)
Mitac (amitraz)
Morestan (oxythioquinox)
nicotine sulfate
Ovex (chlorfenson)
Omite (propargite)
Pentac (dienochlor)
Plictran (cyhexatin)
pyrethrum
rotenone
ryania
schradan
Sevin bait G (carbaryl)
Sevin G (carbaryl)
sodium fluosilicate baits
sulfur
Tedion (tetradifon)
Vendex (fenbutatin-oxide)

CAUTION: Timing of insecticide applications in respect to bee poisoning hazard can be drastically modified by abnormal weather conditions. If temperatures are unusually low following treatment, residues on the crop may remain toxic to bees up to 20 times as long as during reasonably warm weather. Conversely, if abnormally high temperatures occur during late evening or early morning, bees may actively forage on the treated crop during these times.

Table 2. Toxicity of Herbicides, Blossom and Fruit Thinners, Desiccants, and Plant Growth Regulators to Honey Bees

Do NOT apply on blooming crops or weeds.

arsenic trioxide and other inorganic arsenicals
DNBP (dinoseb)
Elgetol (dinitrocresol) (1.5 qt/100 gal or more)
Sevin WP (carbaryl)

Apply ONLY during late evening, night, or early morning on blooming crops or weeds.

Amino Triazole (amitrole)
2,4-D (alkanolamine salts)
2,4-D (butoxyethanol ester)*
2,4-D (isopropyl ester)
Elgetol (dinitrocresol) (1.5 pt/100 gal or less)
endothall
Fusilade (fluazifop-butyl)
Hyvar X (bromacil)
Savit (carbaryl)
Sevin XLR (carbaryl)
Simazine
Weedone LV4 (butoxyethanol ester of 2,4-D)*

Can be applied at any time with reasonable safety to bees.

Alar (daminozide)
Amiben (chloramben)
Ammate (AMS)
atrazine
Avenge (difenzoquat)
Banvel (dicamba)
Butoxone (2,4-DB)
Carbyne (barban)
Chloro IPC (chlorpropham)
2,4-D (butyl ether ester)*
2,4-D (isooctyl ester)
2,4-D (sodium salts)
dalapon
2,4-DB
Desiccant (arsenic acid)
diquat
Eptam (EPTC)
Ethrel (Iethephon)
Goal (oxyfluorfen)
IPC (propham)
Karmex (diuron)
Kerb (pronamide)
Lasso (alachlor)
MCPA
Monobor-chlorate
NAA (naphthaleneacetic acid)
paraquat
Roundup (glyphosate)
Sencor (metribuzin)
Silvex (2,4,5-TP)
Sinbar (terbacil)
2,4,5-T
Tordon (picloram)
Treflan (trifluralin)

*There is field evidence that butyl derivatives of 2,4-D have a long-term chronic toxicity to bees, especially when certain plants such as blackberry, fireweed, and true clovers (*Trifolium* spp.) are treated.

Table 3. Toxicity of Fungicides to Honey Bees

Apply ONLY during late evening, night, or early morning.

Morocide (binapacryl)

Can be applied at any time with reasonable safety to bees.

Arasan (thiram)
Baycor (bitertanol)
Bayleton (triadimefon)
Benlate (benomyl)
Bordeaux mixture
captan
copper sulfate
Cyprex (dodine)
Dessin (dinobuton)
Dikar (Dithane and Karathane)
Dithane M-22 (maneb)
Dithane M-45 (manzeb)
Dithane Z-78 (zineb)
ferbam
fixed copper
Funginex (triforine)
glyodin
Karathane (dinocap)
lime-sulfur
maneb
manzeb
Morestan (oxythioquinox)
Phygon (dichlone)
sulfur
Tag (PMA)
Thylate (thiram)
Vitavax (carboxin)
Zerlate (ziram)

Table 4. Toxicity of Insecticides to Wild Bees

ALFALFA LEAFCUTTING BEE (See 5 under Special Precautions, p. 4.)

Do NOT apply on blooming crops or weeds.

Advantage
Ambush (permethrin)
Ammo (more than 0.025 lb/acre)
Avermectin (more than 0.025 lb/acre)
Azodrin (monocrotophos)
Baygon (propoxur)
Bidrin (dicrotophos)
Carzol (formetanate)(0.5 lb/acre or more)
Cidial (phenthoate)
Cygon (dimethoate)
Cymbush (cypermethrin)
De-Fend (dimethoate)
diazinon
Dibrom EC (naled)
Di-Syston (disulfoton)
DDT
endrin
ethion
Furadan F (carbofuran)
Gardona D (stirofos)
Guthion (azinphosmethyl)
Imidan (phosmet)
Lannate (methomyl)(0.5 lb/acre or more)
malathion
methoxychlor D
methyl parathion
Monitor (methamidophos)
Nudrin (methomyl)(0.5 lb/acre or more)
Orthene (acephate)
parathion
Penncap-M (methyl parathion)
Phosdrin (mevinphos)
phosphamidon
Pounce (permethrin)
Primicid (pirimiphos-ethyl)
Pydrin (fenvalerate)
Rebelate (dimethoate)
Sevin (carbaryl)
Supracide (methidathion)
Temik G (aldicarb)(applied at least 4 weeks before bloom)
TEPP
Thiodan (endosulfan)(more than 0.5 lb/acre)
Tiovel (endosulfan)(more than 0.5 lb/acre)
toxaphene
Trithion (carbophenothion)

Apply ONLY during late evening. (See caution at end of table.)

Actellic (pirimiphos-methyl)
Gardona EC (stirifos)
Lannate (methomyl)(0.25 lb/acre or less)
Metasystox-R (oxydemetonmethyl)
methoxychlor WP
Nudrin (methomyl)(0.25 lb/acre or less)
Thiodan (endosulfan)(0.5 lb/acre or less)
Tiovel (endosulfan)(0.5 lb/acre or less)

Apply ONLY during late evening, night, or early morning. (See caution at end of table.)

Ammo (0.025 lb/acre or less)
Avermectin (0.025 lb/acre or less)
Carzol (formetanate)(0.5 lb/acre or less)
Delnav (dioxathion)
Dylox (trichlorfon)
Larvin
Mavrik (fluvalinate)
methoxychlor EC
Pirimor (pirimicarb)
Sevin XLR (carbaryl) (1.5 lb/acre or less)
Systox (demeton)
Tedion (tetradifon)
Thimet G (phorate)
Vydate (oxamyl)
Zolone (phosalone)

Can be applied at any time with reasonable safety to bees.

Baygon G (propoxur)
Comite (propargite)
Di-Syston G (disulfoton)
Furadan G (carbofuran)
Kelthane (dicofol)
Omite (propargite)

ALKALI BEE

Do NOT apply on blooming crops or weeds.

Ambush (permethrin)
Azodrin (monocrotophos)
Baygon (propoxur)
Bidrin (dicrotophos)
Carzol (formetanate) (1 lb/acre or more)
Cidial (phenthoate)
Cygon (dimethoate)
De-Fend (dimethoate)
diazinon
Dibrom EC (naled)
dieldrin
Lorsban (chlorpyriphos)
EPN
Furadan F (carbofuran)
Gardona D (stirofos)
Guthion (azinphosmethyl)
Lannate (methomyl)(0.5 lb/acre or more)
methyl parathion
Monitor (methamidophos)
Nudrin (methomyl) (1/2 lb/acre or more)
Orthene (acephate)
parathion
Penncap-M (methyl parathion)
Phosdrin (mevinphos)
phosphamidon
Pounce (permethrin)
Pydrin (fenvalerate)(over 0.1 lb/acre)
Rebelate (dimethoate)
Sevin (carbaryl)
Supracide (methidathion)
Temik G (aldicarb) (applied at least 4 weeks before bloom)
Thiodan (endosulfan)

Apply ONLY during late evening. (See caution at end of table.)

endrin
Imidan (phosmet)
Lannate (methomyl)(0.25 lb/acre or less)
malathion EC
Mavrik (fluvalinate)
Metasystox-R (oxydemetonmethyl)
methoxychlor WP
Pydrin (fenvalerate)(0.1 lb/acre or less)
Trithion (carbophenothion)
Vydate (oxamyl)

Apply ONLY during late evening, night, or early morning. (See caution at end of table.)

Avermectin
Carzol (formetanate)(0.5 lb/acre or less)
DDT
Di-Syston EC (disulfoton)
Dylox (trichlorfon)
Gardona EC (stirofos)
Larvin
methoxychlor EC
Pirimor (pirimicarb)
schradan
Systox (demeton)
TEPP
Thimet G (phorate)
toxaphene
Zolone (phosalone)

Can be applied at any time with reasonable safety to bees.

Baygon G (propoxur)
Comite (propargite)
Di-Syston G (disulfoton)
Furadan G (carbofuran)
Kelthane (dicofol)
Omite (propargite)
Tedion (tetradifon)

BUMBLE BEES

Do NOT apply on blooming crops or weeds.

Bidrin (dicrotophos)
Cygon (dimethoate)
De-Fend (dimethoate)
diazinon
Furadan F (carbofuran)
Guthion (azinphosmethyl)
malathion ULV
methyl parathion
Orthene (acephate)
parathion
Penncap-M (methyl parathion)
Rebelate (dimethoate)
Sevin (carbaryl)
Supracide (methidathion)
Temik G (aldicarb) (applied at least 4 weeks before bloom)

Apply ONLY during late evening. (See caution at end of table.)

Dibrom (naled)
malathion EC
TEPP

Apply ONLY during late evening, night, or early morning. (See caution at end of table.)

Carzol (formetanate)
DDT
Di-Syston EC (disulfoton)
Dylox (trichlorfon)
Lannate (methomyl)
Metasystox-R (oxydemetonmethyl)
Nudrin (methomyl)
Systox (demeton)
toxaphene

Can be applied at any time with reasonable safety to bees.

Baygon G (propoxur)
Comite (propargite)
Di-Syston G (disulfoton)
Furadan G (carbofuran)
Kelthane (dicofol)
Omite (propargite)

CAUTION: Timing of insecticide applications in respect to bee poisoning hazard can be drastically modified by abnormal weather conditions. If temperatures are unusually low following treatment, residues on the crop may remain toxic to bees up to 20 times as long as during reasonably warm weather. Conversely, if abnormally high temperatures occur during late evening or early morning, bees may actively forage on the treated crop during these times.