

# Beekeeping

Department of Entomology

## PROTECTING HONEY BEES FROM PESTICIDES

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Honey bees are a vital part of our agricultural system, as are many other species of pollinators. The annual value of honey bee pollination in the U.S. has been estimated at 14.6 billion dollars. Although this (or any such estimate) is approximate at best, the value of bee pollination is staggering.

Our intense agricultural practices have greatly affected the pollination picture in Indiana. The increased use of pesticides, reduction in the number of wild colonies, and the increased value of both bees and the crops they pollinate have all added to the importance of protecting bees from pesticides.

### When Poisoning May Occur

Many plants produce nectar and/or pollen that is attractive to foraging bees. Bees are also attracted to some plants that produce sweet exudates from extrafloral nectaries or from aphids feeding on plants. Pools and puddles of water also attract bees, particularly during dry periods. Bees may be attracted to a crop that is in bloom, or may be attracted into treated fields by the presence of blooming weeds even though the crop itself is not in bloom. Dandelion, wild mustard, white clover, yellow rocket, sweet clover, milkweed, goldenrod, and aster blossoms all attract bees. Bees will sometimes forage in field crops when these are producing pollen, including field corn and soybeans.

### Communication and Cooperation

Many bee poisoning problems could be prevented by better communication and cooperation among the grower, pesticide applicator, and the beekeeper.

Because of the nature of bees, all beekeepers within 2 to 3 miles of the area to be treated should be notified at least the evening before the insecticide is to be applied. Bees forage up to 3 miles or more from their hive under some conditions, and they begin foraging very early in the day. If the beekeeper is to move or confine his bees, he must do so the night before the treatment.

Since many decisions to use an insecticide are made only a few hours before the application is made, growers and applicators should be aware of the location of all hives within 3 miles of their crops and know how to contact the

beekeeper who owns them. If this information is not available from a resident of the area, local county extension personnel may be of assistance. Most beekeepers register the location of their hives with the State Apiary Inspector. The names of beekeepers in your area can be obtained by writing: State Apiary Inspector, Department of Natural Resources, 420 W. Washington St., Indianapolis, IN 46204, PH: 317-232-4120; e-mail: [kprough@dnr.state.in.us](mailto:kprough@dnr.state.in.us).

The most valuable resource to aid in this effort is the Driftwatch website, located at <http://www.driftwatch.org/>. This site allows apiarists to register their site location(s) online so that pesticide applicators are aware of pesticide-sensitive areas.

### Always Consider Alternatives First

Pesticide application is a decision that should not be made lightly. Before using an insecticide, make absolutely sure that chemical control is necessary and that it is the best management alternative. Use the principles of pest management and the information provided by your Cooperative Extension Service. Consult the specific economic thresholds and control options for your pest situation when making management decisions.



Honey bee on a dandelion

### Reducing the Hazard (Growers)

If insecticides must be used, several steps can be taken by the grower to reduce the hazard to bees. Avoid using dusts wherever possible. Dust may be unavoidable in some cases, such as during the planting of treated corn and soybean seeds – the treatments used on these seeds is very highly toxic to bees. Use chemicals with reduced risk to bees whenever possible (see Tables below). Apply insecticides in the late evening, night, or early morning when fewer bees will be foraging, and when spray drift and volatilization due to extreme heat are at a minimum. Do not spray when winds favor drifting, and use ground applications instead of air where possible. Avoid spraying when the crop or other plants in the field or nearby (including weeds) are in bloom.

### Reducing the Hazard (Beekeepers)

If an insecticide with high toxicity to bees is to be used in an area where your bees are foraging, be prepared to take steps to reduce risk of poisoning.

One of the most important steps in protecting your bees is the selection of an apiary location with low pesticide risk. Be sure to notify growers and applicators in the area, the county agent, and the State Apiary Inspector of the location of your hives.

If the insecticide to be used has a long residual life and is being applied to a plant where bees are foraging, it may be best to move your bees out of the area. Remember that the new site must be at least 3 miles away to prevent bees from returning to the old site. Make sure the new site is safe and notify the growers and applicators in that area of your intentions. If the insecticide has a short residual life, you may be able to confine your bees until the danger has passed. Be



Honey bee hives

sure the hive does not overheat if you choose this method. Learn as much as you can about the chemical to be used before making a decision on how to protect your bees.

### Other Pesticides

Most poisoning problems come from insecticides, but some other pesticides may cause problems for bees. Be sure to read all labeling with any pesticide, especially any specific warning pertaining to bees.

Reference to products in this publication is not intended to be an endorsement to the exclusion of others that may be similar. Persons using such products assume responsibility for their use in accordance with labeling.

| <b>Table 1. Highly Toxic Pesticides. This group includes materials that kill bees on contact during application and for one or more days after treatment. Bees should be moved from the area if highly toxic materials are used on plants the bees are visiting.</b> |                                       |
|--|---------------------------------------|
| <b>Common Name</b>   | <b>Trade Name</b>                     |
| abamectin (Agri-Mek)   | Admire, Provado (imidacloprid)        |
| acephate (Orthene, Address)  | Agri-Mek (abamectin)                  |
| avemectin (AVID)   | Altacor/Coragen (chlorantraniliprole) |
| azinphos-methyl (Guthion)  | Ambush, Pounce (permethrin)           |
| bifenthrin (Capture)   | Ammo (cypermethrin)                   |
| carbaryl (Sevin)   | Apollo (clofentezine)                 |
| carbofuran (Furadan)   | Asana (esfenvalerate)                 |
| chlorantraniliprole (Altacor/Coragen)  | Avaunt (indoxacarb)                   |
| chlorpyrifos (Dursban, Lorsban)  | AVID (avemectin)                      |
| chlorethoxyfos (Fortress)  | Baygon (propoxur)                     |
| clofentezine (Apollo)  | Baytex (fenthion)                     |
| clothianidin (Belay, Clutch, Poncho seed treatment)  | Baythroid, Baythroid 2 (cyfluthrin)   |
| cyfluthrin (Baythroid)   | Belay, Clutch (clothianidin)          |
| cyhalothrin (Warrior)  | Capture (bifenthrin)                  |
| cypermethrin (Ammo)  | Cruiser (thiamethoxam)                |

**Table 1 (Continued) Highly Toxic Pesticides. This group includes materials that kill bees on contact during application and for one or more days after treatment. Bees should be moved from the area if highly toxic materials are used on plants the bees are visiting.**

| Common Name                              | Trade Name  |
|--|---|
| deltamethrin (Decis, Delta Gold)         | Cygon, Dimethoate, Rebelate (dimethoate)                |
| diazinon (Diazinon, Spreticide)          | Cythion (malathion), low volume                         |
| dichlorvos (DDVP, Vapona)                | DDVP, Vapona* (dichlorvos)                              |
| dimethoate (Cygon, Dimethoate, Rebelate) | Decis, Delta Gold (Deltamethrin)                        |
| emamectin (Proclaim)                     | Delegate/Radiant (spinetoram)                           |
| esfenvalerate (Asana)                    | Diazinon (diazinon, diazitol, basudin, spectracide)     |
| ethyl parathion (Parathion)              | Dibrom (naled)  |
| fenpropathrin (Danitol)                  | Dimecron (phosphamidon)                                 |
| fenthion (Baytex)                        | Dursban, Lorsban (chlorpyrifos)                         |
| hexythiazox (Savey/Onager)               | Envidor (spirodiclofen)                                 |
| imidacloprid (Admire, Provado)           | Fortress (chlorothoxyfos)                               |
| indoxacarb (Avaunt)                      | Furadan (carbofuran)                                    |
| malathion (Cythion), low volume          | Fury, Mustang (zeta-cypermethrin)                       |
| methamidophos (Monitor)                  | Guthion (azinphos-methyl)                               |
| methidathion (Supracide)                 | Imidan (phosmet)  |
| methiocarb (Mesurol)                     | Lannate (methomyl)                                      |
| methomyl (Lannate)                       | Mesurol (methiocarb)                                    |
| methyl parathion (Pennac-M)              | Monitor (methamidophos)                                 |
| mevinphos (Phosdrin)                     | Movento (spirotetramet)                                 |
| naled (Dibrom)                           | Nexter (pyridaben)                                      |
| novaluron (Rimon)                        | Orthene, Address (acephate)                             |
| permethrin (Ambush, Pounce)              | Parathion (ethyl parathion, folidol, fosofex, thiophos) |
| phosmet (Imidan)                         | Pennac-M (methyl parathion)                             |
| phosphamidon (Dimecron)                  | Phosdrin (mevinphos)*                                   |
| propoxur (Baygon)                        | Poncho (clothianidin)                                   |
| pyridaben (Nexter)                       | Proaxis (gamma-cyhalothrin)                             |
| resmethrin (Synthrin)                    | Proclaim (emamectin)                                    |
| spinosad (Tracer)                        | Rimon (novaluron)                                       |
| spinetoram (Delegate/Radiant)            | Savey, Onager (hexythiazox)                             |
| spirodiclofen (Envidor)                  | Scout (tralomethrin)                                    |
| spirotetramet (Movento)                  | Sevin (carbaryl)  |
| thiamethoxam (Cruiser seed treatment)    | Spectracide (diazinon)                                  |
| tralomethrin (Scout)                     | Supracide (methidathion)                                |
| zeta-cypermethrin (Fury, Mustang)        | Synthrin (resmethrin)                                   |
|  | Tracer (spinosad)                                       |
|  | Warrior (lambda-cyhalothrin)                            |

\*Short residual activity. Can usually be applied safely when bees are not in flight. Do not apply over hives.

**Table 2. Moderately Toxic Pesticides. These materials can be used with limited danger to bees if not applied over bees in the field or the hives. Correct dosage, timing, and method of application are essential. This group includes:**

| Common Name                           | Trade Name                                  |
|---------------------------------------|---|
| acetamiprid (Assail) - Moderate       | Abate (temephos)                            |
| aldicarb (Temik)                      | Acramite (bifenazate) - Moderate            |
| bifenazate (Acramite) - Moderate      | Actra, Platinum (thiamethoxam)              |
| carbaryl (Sevin XLR formulation only) | Assail (acetamiprid) - Moderate             |
| carbophenothion (Trithion)            | Calypso (thiacloprid) - Moderate            |
| disulfoton (Disyston)                 | Confirm (tmethoxyfenozide) - Moderate       |
| endosulfan (Thiodan)                  | Counter (terbufos)                          |
| ethoprop (Mocap)                      | Disyston (disulfoton)                       |
| fonofos (Dyfonate)                    | Dyfonate (Fonofos)                          |
| malathion (Malathion)                 | Esteem (pyriproxyfen)                       |
| methoxyfenozide (Confirm) - Moderate  | Korlan (ronnel)                             |
| methyl demeton (Metasystox)           | Larvin (thiodicarb)                         |
| oxamy (Vydate)                        | Malathion (malathion)                       |
| oxydemeton-methyl (Metasystox R)      | Metasystox (methyl demeton)                 |
| phorate (Thimet)                      | Metasystox R (oxydemeton-methyl)            |
| pyriproxyfen (Esteem)                 | Mocap (ethoprop)                            |
| ronnel (Korlan)                       | Oberon (spiromesifen) - Moderate            |
| spinosad (SpinTor)                    | Sevin XLR (a specific carbaryl formulation) |
| spiromesifen (Oberon) - Moderate      | SpinTor (spinosad)                          |
| temephos (Abate)                      | Temik (aldicarb)                            |
| terbufos (Counter)                    | Thimet (phorate)                            |
| thiacloprid (Calypso) - Moderate      | Thiodan (endosulfan)                        |
| thiamethoxam (Actara, Platinum)       | Trithion (carbophenothion)                  |
| thiodicarb (Larvin)                   | Vydate (oxamyl)                             |

**Table 3. Relatively Nontoxic Pesticides. Materials in this group can be used with few precautions and a minimum of injury to bees. Fungicides are indicated by an "F". The greatest number of materials are in this group which includes:**

| Common Name   | Trade Name                                 |
|---|--|
| allethrin (Pynamin)   | Acaraben (chlorobenzilate)                 |
| amitraz (Mitac)   | Beleaf (flonicamid)                        |
| azadirachtin (Neemix, Align)  | Belt (flubendiamide)                       |
| <i>Bacillus thuringiensis</i> or Bt (Biobit, DiPel, Full-Bac, Javelin, MVP, etc.) | Benlate (benomyl) - F                      |
| benomyl (Benlate) - F   | Biobit ( <i>Bacillus thuringiensis</i> )   |
| binapacryl (Morocide) - F   | Bordeaux mixture - F                       |
| Bordeaux mixture - F  | Captan - F                                 |
| captan - F  | Confirm (teufenozide)                      |
| chlorobenzilate (Acaraben)  | Cyprex (dodine) - F                        |
| chlorothalonil (Brazo) - F  | Dimilin (diflubenzuron)                    |
| copper compounds (Kocide) - F   | Dipel ( <i>Bacillus thuringiensis</i> )    |
| cyromazine (Trigard)  | Dithane (zineb) - F                        |
| dicofol (Kelthane)  | Dithane M-22 (maneb) - F**                 |
| diflubenzuron (Dimilin)   | Dithane M-45 (mancozeb)                    |
| diodine (Cyprex) - F  | Dylox (trichlorfon)                        |
| ethion (Ethion)   | Ethion (ethion)                            |
| etoxazole (Zeal)  | Fulfill (pymetrozine)                      |
| fenpyroximate (Portal)  | Full-Bac ( <i>Bacillus thuringiensis</i> ) |
| flonicamid (Beleaf)   | Javelin ( <i>Bacillus thuringiensis</i> )  |
| flubendiamide (Belt)  | Kelthane (dicofol)                         |
| fluvalinate (Spur)  | Kocide (copper compounds) - F              |
| kaolin (Surround)   | Marlate (methoxychlor)                     |
| mancozeb (Dithane M-45) - F   | Mitac (amitraz)                            |
| maneb (Dithane M-22) - F**  | Morocide (binapacryl) - F                  |
| metiram (Polyram) - F   | MVP ( <i>Bacillus thuringiensis</i> )      |
| pymetrozine (Fulfill)   | Neemix, Align (azadirachtin)               |
| pyrethrum (nature)  | Omite (propargite)                         |
| rotenone (Rotenone)   | Polyram (metiram) - F                      |
| sulfur - F  | Portal (fenpyroximate)                     |
| tebufenozide (Confirm)  | Pynamin (allethrin)                        |
| trichlorfon (Dylox)   | Rotenone (rotenone)                        |
| zineb (Dithane)   | Spur (fluvalinate)                         |
|   | Sulfur - F                                 |
|   | Surround (kaolin)                          |
|   | Trigard (cyromazine)                       |
|   | Zeal (etoxazole)                           |

\*\*Twenty-percent dust may cause bee losses

READ AND FOLLOW ALL LABEL INSTRUCTIONS. THIS INCLUDES DIRECTIONS FOR USE, PRECAUTIONARY STATEMENTS (HAZARDS TO HUMANS, DOMESTIC ANIMALS, AND ENDANGERED SPECIES), ENVIRONMENTAL HAZARDS, RATES OF APPLICATION, NUMBER OF APPLICATIONS, REENTRY INTERVALS, HARVEST RESTRICTIONS, STORAGE AND DISPOSAL, AND ANY SPECIFIC WARNINGS AND/OR PRECAUTIONS FOR SAFE HANDLING OF THE PESTICIDES.

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