Protecting Honeybees

Causes of Honey Bee Poisoning ................................................................. 1-45
Ways to Reduce Honey Bee Poisoning ...................................................... 1-45
Relative Toxicity of Pesticides to Honey Bees by Laboratory and Field Tests ................................................. 1-46
Honey bees are a valuable service to apiculture and agriculture not only because of they produce honey and beeswax, but they are the most important pollinators of cultivated crops. Pesticide poisoning of honey bees, and other beneficial insects, can be a serious problem. Every effort should be made to minimize the exposure of honey bees to pesticides in treated areas.

**Causes of Honey Bee Poisoning**

1. The majority of honey bee poisoning occurs when pesticides are applied to crops in bloom. This includes crop plants such as sweet corn, which is routinely sprayed when in tassel. Honey bees do not pollinate corn; however, they will collect pollen from corn tassels and transport it back to the honey bee hive.

2. The application of pesticides to fields with weeds in bloom. The spring application of pesticides to alfalfa fields with flowering weeds is a particular problem in Virginia.

3. The drift of toxic sprays or dusts to adjoining crops or weeds in bloom.

4. The contamination of flowering ground-cover crops in orchards treated with pesticides.

5. The contamination of water or dew on foliage and flowers. This includes the water collected by honey bees for drinking and cooling the honey bee hive.

6. The application of systemic pesticides and the potential contamination of nectar and pollen collected by foraging honey bees. The use of neonicotinoid pesticides (e.g., clothianidin, imidacloprid, and thiamethoxam) is a concern for honey bee poisoning; although, there is a need for more research evidence.

The most serious poisonings result with honey bees that collect pesticide-contaminated pollen or nectar and transport these materials to the honey bee hive. Pesticide dusts (e.g., Sevin) and encapsulated pesticides are especially dangerous. These pesticides can adhere to foraging honey bees, be transported to the hive, and stored for long periods of time. Such pesticides may cause honey bee mortality in the hive for several months.

**Ways to Reduce Honey Bee Poisoning**

1. Contact beekeepers with honey bee hives near areas to be treated with pesticides that are hazardous to honey bees.

2. Do not apply pesticides that are toxic to honey bees on crops in bloom.

3. Use pesticides that are less toxic to honey bees when such choices are consistent with pest control recommendations (e.g., see table of relative pesticide toxicities).

4. Choose the least hazardous pesticide formulations when possible. Pesticide dusts and encapsulations are more toxic than sprays of the same material. Pesticides applied as wettable powder sprays tend to have longer residual effects (and are more toxic) than the emulsifiable concentrate sprays. Granular applications of pesticides are typically the safest method of treatment in areas with honey bee hives.

5. Avoid drift of toxic pesticide sprays onto ground-cover plants, weeds, and crops in nearby fields.

6. Control weeds in fields and avoid direct pesticide applications to flowering weeds when possible. Mow before pesticide application, if orchards have ground-cover plants in bloom.

7. Apply pesticides in the late evening or early morning when honey bees are not actively foraging. This is important with crops such as corn, since pollen is released in the morning. The evening application of pesticides to such crops are less hazardous and will reduce the unintentional poisoning of honey bees.

8. Do not apply pesticides if temperatures are expected to be unusually low following pesticide treatment. Pesticide residues can remain toxic to honey bees for longer periods of time under low temperature conditions.

9. Avoid the direct application of pesticides over honey bee hives.

10. Allow beekeepers an option to move or confine honey bee hives that are near areas to be treated with pesticides, if there is a potential for honey bee loss.
Relative Toxicity of Pesticides to Honey Bees by Laboratory and Field Tests

**Group I. Highly Toxic**

Severe losses may be expected if these pesticides are used when honey bees are present at treatment time or within a day thereafter.

Abamectin
Acetamiprid, Assail, Tristar
Acramite (bifenazate)
Actara, Centric, Platinum, Helix, Cruiser, Adage (thiamethoxam)
Acephate
Admire, Advantage, Gaucho, Merit, Premise, Touchstone (imidacloprid)
Advantage
Ambush (permethrin)
Ammo (Fury) (>0.25 lb/A) (cypermethrin)
Apollo, Ovation (clofentezine)
Asana (esfenvalerate)
Avaunt (Advion) (indoxacarb)
Avid (avermectin)
Azodrin (monocrotophos)
Baygon (propoxur)
Baytex (fenthion)
Baythroid (cyfluthrin)
Biden (dicrotophos)
Capture, Annex, Brigade (bifenethrin)
Carzol
Cidial (phenthoate)
Clutch (clothianidin)
Commodore (lambda-cyhalothrin)
Comply (fenoxycarb)
Curacron (profenofos)
Cygon (dimethoate)
Cymbush
Danitol (fenopropathin)
Dasanit (fensulfothion)
DDVP (dichlorvos)
Decis (decamethrin)
Delegate, Radiant (spinetoram)
Denim (emamectin benzoate)
Dibrom (naled)
De-fend, Dimate (dimethoate)
Diazinon (spectracide)
Dimecron (phosphamidon)
Dinotefuran
Dursban, Eradex (chlorpyrifos)
Ectrin (fenvalerate)
Endigo
Enidor (spirodiclofen)
EPN
Famparos (fenphur)
Ficam (bendiocarb)
Flagship (thiamethoxam)
Folimat
Fipronil
Furadan F (carbofuran)
Fury (zeta-cypermethrin)
Guard Star (permethrin)¹
Imidan (permethrin)
Karate
Lannate D (methomyl)
Lindane
Lorsban (chlorpyrifos)
Malathion
Matacil (aminocarb)
Mesurol (methiocarb)
Monitor (methamidophos)
Nexter (pyridaben)
Nudrin (methomyl)
Orthene (acephate)
Pay Off (fluvalinate)
Pirimiphos-methyl (Execute, Actellic)
Poncho, Titan, Clutch, Acceleron, Arena, Belay, Celero (clothianidin)
Pounce (permethrin)
Prallethrin
Proclaim (emamectin)
Provado (imidacloprid)
Pylon, Phantom (chlorfenapyr)
Pyramite
Rebelate (dimethoate)
Resmethrin
Scout (tralomethrin)
Sevin (carbaryl)²
Sniper
Spectracide
Steward (indoxacarb)
Sumithion (fenitrothion)
Supracide (methiathion)
Swat (bonyl)
Synthrin (resmethrin)
Talstar
Tameron (methamidophos)
Tefluthrin (Force)
Temik (aldicarb)
TEPP
Tralomethrin (Saga)
Trimax
Vapona (dichlorvos)
Venom (dinotefuran)
Warrior (lambda-cyhalothrin)
Zectran (mexacarb)
Zephyr (Agri-Mek)
Zeta-cypermethrin

¹Can be applied to ground in front of honey bee hives for the control of small hive beetles.
²Can be applied in the late evening at rate of 0.1 lb/A or less.
³Some formulations of Sevin XLR are rated as moderately toxic to honey bees.
**Group II. Moderately Toxic**

These can be used around honey bees if dosage, timing, and method of application are correct, but should not be applied directly on honey bees in the field or at the honey bee hive.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abate</td>
<td>Temephos</td>
</tr>
<tr>
<td>Acramite, Floramite, (bifenazate)</td>
<td>Bifenazate</td>
</tr>
<tr>
<td>Assail</td>
<td>(acetamiprid)</td>
</tr>
<tr>
<td>Banol</td>
<td>(carbanolate)</td>
</tr>
<tr>
<td>Bolstar</td>
<td>(sulprofos)</td>
</tr>
<tr>
<td>Calypso</td>
<td>Thiaciplorpid</td>
</tr>
<tr>
<td>Carzol</td>
<td>Formetanate</td>
</tr>
<tr>
<td>Ciodrin</td>
<td>(crotoxyphos)</td>
</tr>
<tr>
<td>Coumaphos</td>
<td>(Agridip, Asunthol)</td>
</tr>
<tr>
<td>Counter</td>
<td>(terbufos)</td>
</tr>
<tr>
<td>Decis, Battalion</td>
<td>Ethodan</td>
</tr>
<tr>
<td>Di-Syston</td>
<td>(disulfoton)</td>
</tr>
<tr>
<td>Dyfonate</td>
<td>(fonofos)</td>
</tr>
<tr>
<td>Elgetol</td>
<td>(dinitrocesol)</td>
</tr>
<tr>
<td>Esteem</td>
<td>(pyriproxyfen)</td>
</tr>
<tr>
<td>Folinicamid</td>
<td>(fenpyroximate)</td>
</tr>
<tr>
<td>Fujimite, Akari</td>
<td>(fenpyroximate)</td>
</tr>
</tbody>
</table>

**Group III. Relatively Nontoxic**

These can be used around honey bees with a minimum of injury; safest if applied in the evening or early morning.

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Active Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acaraben</td>
<td>Chlorbenzilate</td>
</tr>
<tr>
<td>Acarol</td>
<td>Brompropylate</td>
</tr>
<tr>
<td>Agri-Mek</td>
<td>Avermectin</td>
</tr>
<tr>
<td>Allethrin</td>
<td>(tebufenozide)</td>
</tr>
<tr>
<td>Altosid</td>
<td>(methoprene)</td>
</tr>
<tr>
<td>Amitraz</td>
<td>(buprofezin)</td>
</tr>
<tr>
<td>Apollo, Ovation</td>
<td>Clofentizine</td>
</tr>
<tr>
<td>Baam</td>
<td>(amitraz)</td>
</tr>
<tr>
<td>Bacillus</td>
<td>Thuringiensis</td>
</tr>
<tr>
<td></td>
<td>(Accoate, Biotrol, Dipel, Thuricide)</td>
</tr>
<tr>
<td>Birlane</td>
<td>(chlorfenvinphos)</td>
</tr>
<tr>
<td>Calypso</td>
<td>Thiaciplorpid</td>
</tr>
<tr>
<td>Chlorantraniliprole</td>
<td>(deltamethrin)</td>
</tr>
<tr>
<td>Chloparacide</td>
<td>Chlorbenside</td>
</tr>
<tr>
<td>Confirm, Mimic</td>
<td>(tebufenozide)</td>
</tr>
<tr>
<td>Cyd-X</td>
<td>(CM granulovirus)</td>
</tr>
<tr>
<td>Cyroide</td>
<td>(dibutylxanth)</td>
</tr>
<tr>
<td>Demize</td>
<td>(D-Limonene)</td>
</tr>
<tr>
<td>Dessin</td>
<td>(dinosbuton)</td>
</tr>
<tr>
<td>Dimilin</td>
<td>(difubenzuron)</td>
</tr>
<tr>
<td>Dinocap</td>
<td>(Karathane)</td>
</tr>
<tr>
<td>Dylox</td>
<td>(trichlorfon)</td>
</tr>
<tr>
<td>Endeavor</td>
<td>(Pymetroxine)</td>
</tr>
<tr>
<td>Ethrel</td>
<td>(ethephon)</td>
</tr>
<tr>
<td>Esteem</td>
<td>(pyriproxyfen)</td>
</tr>
<tr>
<td>Ethlon</td>
<td>(Ethion)</td>
</tr>
<tr>
<td>EthoTrans</td>
<td>(thiocarb)</td>
</tr>
<tr>
<td>Metasystox</td>
<td>(demeton-s-methyl)</td>
</tr>
<tr>
<td>Metasystox R</td>
<td>(oxydemeton-methyl)</td>
</tr>
<tr>
<td>Mocap</td>
<td>(ethoprop)</td>
</tr>
<tr>
<td>Systox</td>
<td>(demeton)</td>
</tr>
<tr>
<td>Oil sprays</td>
<td>(superior type)</td>
</tr>
<tr>
<td>Trigard</td>
<td>(cyromazine)</td>
</tr>
<tr>
<td>Thimet</td>
<td>(phorate)</td>
</tr>
<tr>
<td>Thiodan</td>
<td>(carbophenothion)</td>
</tr>
<tr>
<td>Trithion</td>
<td>(oxyamyl)</td>
</tr>
</tbody>
</table>

1Checkmite (coumaphos) strips can be used in honey bee hives to treat for varroa mites and small hive beetles.

2Thimet EC should only be applied during late evening.

**Note:** tau-Fluvalinate is used in Apistan strips to treat honey bee hives for varroa mites. It is illegal to use Mavrik in honey bee hives.
Fungicides
As a general rule, fungicides are safe to use around honey bees.

Afgan (pyrazophos)
Arasan (thiram)
Bayleton (trialdimefon)
Benlate (benomyl)
Bordeaux mixture
Boscalid (emerald, endura, pristine)
Bravo (chlorothalonil)
Captan
Carbendazim (Fungisol, Polyphase)
Copper oxides
Copper oxychloride sulfate
Copper sulfate
Cupric hydroxide (Kocide)
Cyprin (dodine)
Cyprodinil
Daconil (chlorothalonil)
Dessin (dinobuton)
Difenoconazole
Difolatan (captafol)
Dithane D-14 (nabam)
Dithane M (maneb, manzeb)
Dithane Z (zineb)
Du-Ter (fentin hydroxide)
Dyrene (anilazine)
Ferbam
Fluoxastrobin
Glyodin
Hinosan (edifenphos)
Indar (butrizol)
Iprodione2
Indar (triflumizole)
Karathane
Lesan (fenamisulfuron)
Mane
Mancozeb
Morestan (oxythioquinox)
Morocide (binapaeryl)
Myclobutanil
Mylone (dazomet)
Phygon (dichlor)
Plantvax (oxycarboxin)
Polyram (metriam)
Propiconazole1
Propiconazole (Alamo, Banner)
Pyraclostrobin2
Pyrimethanil1
Ridomil
Rovral (iprodione)2
Sulfur
Sylit (dodine)
Terraguard1, Procure
Tetraconazole (Domark, Eminent)
Thiram
Thylate
Vinclozolin2
Vitavax (carboxin)
Zineb

1 May increase the toxicity of neonicotinoid pesticides to honey bees if used together.
2 May cause loss of honey bee larvae. Use with caution where honey bees are foraging.

Herbicides, Defoliants and Desiccants

2,4-D
2,4-DB
2,4-DP (dichlorprop)
Alachlor
Alanap (naptalam)
Alopex (clofop-isobutyl)
Amiben (chloramben)
Amitrol
Ammate
Atrex (atrazine)
Avenge (difenozoquat)
Balan (benfimide)
Banvel (dicamba)
Basagran (bentazon)
Betanal AM (bentanex)
Bladex (cyanazine)
Blazer (acifluorfen)
cacodylic acid
Cambliene (2,3,6-TBA)
captafol
Caparol (prometryn)
Chloro-IPC (chloroiprop)
Cotoran (fluometuron)
Daconate (MSMA)
Dalapon
Diquat
DSMA
Dual (metolachlor)
Endothall (endothall)
Eptam
Evik (ametryn)
Evital (norflurazon)
Exhalt 800
Folex (desmedipham)
Garlon (triclopyr)
Glyphosate
Gramoxone (paraquat)
Herbisan (EXD)
Hoelon (diclofop-methyl)
Hyvar (bromacil)
IPC (propanil)
Karau (propanil)
Karbex (diuron)
Kerb (proamidine)
Lasso (alachlor)
Lorox (linuron)
MCPA
Methar, DSMA
Milogard (propazine)
Modown (bitenox)
MSMA
Mylone (dazomet)
Nortron (ethofumesate)
Oxylflurifen1
Paarlan (isopropalin)
Parquat
Pendimethalin1 (Prowl)
Phenmedipham (Betanal)
Pramitol (prometone)
Princep (simazine)
Probe (methazole)
Propanil1
Prowl (pendimethalin)
Pyram (chloridazon)
Ramrod (propachlor)
Randox
Ronstar (oxadiazon)
Sancap (dipropetryn)
Sencor (metribuzin)
Sinbar (terbacin)
Surflan (oryzalin)
Sutan (butylate)
Telvar (monuran)
Tolban (profluralin)
Tordon (picloram)
Treflan ( trifluralin)1
Vegadex
Zorial (norflurazon)