

Protecting Honeybees From Pesticides

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Beekeeping is an important industry in North Dakota. Bees produce honey and they are equally important as pollinators so they aid in the production of fruits, vegetables, legume seeds and pasture crops.

The honey bee is the only insect that can be moved quickly and in the desired numbers to effect the pollination of cultivated crops, commercial gardens and orchards.

Many pesticides used to control weeds, plant diseases and insects can be poisonous to bees and other beneficial insects. Most insecticides are especially injurious.

Fortunately, pesticides and other agricultural chemicals are not incorporated into the honey. Bees that collect pesticide-contaminated nectar or pollen usually die away from the hive. If foraging bees return to the hive with contaminated nectar or pollen, there are natural provisions that protect the honey from contamination. Bees will usually leave the hive if they become poisoned. Pollen is stored in combs for feeding the brood (young bees). Contaminated pollen may kill the nurse bees and the brood.

Colonies of bees can be affected severely by improper use of pesticides. It may require several weeks before the working force (field bees) can return to suitable numbers. This can reduce honey production, especially if the bees are killed during a heavy nectar flow. To protect bees and other beneficial insects, always use the safest recommended pesticides.

Grower Precautions

Use insecticides with low hazard to bees for pest control.

Farmers hiring an aerial applicator to spray their fields should alert

Bee Alert



beekeepers with hives in the intended spray area so they can take appropriate protective measures. Since the hives may have to be moved, the beekeeper should be given notice at least one to two days before spraying.

**Know beehive locations
before spraying.**

If hives cannot be adequately protected (moved or covered) before spraying begins, the aerial applicator should be alerted to the exact location of the hives so that they will not be contaminated by direct spraying or drift.

Timing of insecticide application is important. Never spray a crop in bloom unless it's absolutely necessary. If spraying a crop in bloom is necessary, do the spraying when there is minimal bee activity, preferably during the evening hours. During most summer evenings, honeybees leave fields by 8 p.m. and do not return until 8 a.m. or later the following day.

Hazards to bees can be reduced by controlling weeds in crop areas. Bees often forage on wild mustard and other weeds in bloom. Elimination of weeds will thus reduce bee kills during peak weed bloom.

All too frequently fields in North Dakota are sprayed unnecessarily with insecticides when insect population levels are not serious enough to warrant such treatment. Several sites in any given field should be accurately and carefully sampled to be absolutely sure that insect pest population levels are high enough to warrant control measures.

Applicator Precautions

Use insecticides that have low hazard to bees.

Timing of insecticide application: Never spray a crop in bloom unless it's absolutely necessary. If spraying a crop in bloom is necessary, spray when there will be minimal bee activity, preferably during the evening hours. Evening spraying also allows the insecticide to dry on the crop before bee activity begins the next morning.

Modify control programs according to weather. Cold temperatures prolong the residual of insecticide while warm temperatures break down insecticides more rapidly. Warm temperatures in late afternoon, early evening or early morning can "hold" bees in blooming fields for longer periods. Pay attention to wind direction and velocity in relation to nearby beeyard locations.

Applicators who are unsure of where beehives are located should find out by consulting with farmer-customers or contacting the state apiary inspector, North Dakota Department of Agriculture, in Bismarck. (Phone: 701/224-4997 or 701/224-2231)

When spraying close to beeyards when the hives cannot be moved or covered, use a drift reducing additive such as Nalco-Trol to minimize drift.

Bee research investigations in the state of Washington demonstrated that stickers such as Bond or Surstix will improve the safety of emulsifiable concentrate insecticides relative to bees (and other non-target organisms).

Beekeeper Precautions

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 the poisoning risk:

Select an apiary location with low pesticide risk whenever possible.

Notify growers and commercial applicators in the area as well as the county agent and the office of the state apiary inspector at the North Dakota Department of Agriculture in Bismarck (phone: 701/224-4997 or 701/224-2231) of the exact location of your hives. Make sure your hive locations are registered with the North Dakota Department of Agriculture.

Make sure that your current address and phone number are legibly printed on your hives so that you can be quickly contacted prior to a pesticide spraying in the area of your apiary location.

Learn as much as you can about the pesticides being used in your area. If long residual pesticides with high bee toxicity are being applied to area crops, it may be best to move your hives out of the area if possible. The new site should be at least three miles away from the spray area.

If the pesticide being used has a short residual life, you may be able to confine your bees until the danger has passed. Be sure the hive does not overheat if you choose this method.

Pollen traps may help reduce the amount of contaminated pollen admitted to the hives and thus minimize losses.

Get to know the aerial applicators that spray near your beeyards. They are as interested in protecting your bees as you are.

Table 1. Relative toxicity of pesticides to honey bees determined by laboratory and field tests.

(CALIFORNIA, 1950 through 1980) (Number-keyed notes on their uses can be found at the end of this section)

Group 1 -- Highly toxic:

Severe losses may be expected if used when bees are present at treatment time or within a day thereafter, except where noted to the contrary.

Pesticides (trade name and/or common name)

aldrin2
 Ambush◆ 2,18, permethrin
 arsenicals 1,2
 Asana◆, esfenvalerate
 Avermectin◆ 17
 Azodrin◆ 1,2, monocrotophos
 Baygon◆ 2, propoxur
 Baytex◆ 2, fenthion
 Bidrin◆ 1,2, dicrotophos
 Bux◆, bufencarb
 carbosulfan 2, FMC-35001

Cygon 2, dimethoate
 Cythion 2,4, malathion
 Dasanit 5, fensulfothion
 DDVP 2, dichlorvos
 Dibrom 2,3, naled
 Decis 2, decamethrin
 De-Fend 2, dimethoate
 diazinon 2, Spectracide
 dieldrin 1,2
 Dimecron 2, phosphamidon
 Dursban 2, chlorpyrifos
 Ekamet, etrimfos
 EPN 1,2
 Ethyl Guthion, azinphos-ethyl
 Famophos, famphur
 Ficam, bendiocarb
 Folithion, fenitrothion
 Furadan 2,5, carbofuran
 Gardona 1,2, stirofos
 Guthion 1,2, azinphos-methyl
 heptachlor 1,2
 Imidan 2, phosmet
 Lannate 2, methomyl
 Lorsban, chlorpyrifos
 malathion 2,4
 Matacil, aminocarb
 Mesurol, methiocarb
 methyl parathion 1,2,11,12
 Monitor 2, methamidophos
 Namacur 5, fenamiphos
 Nudrin 2, methomyl
 Orthene 2, acephate
 parathion 1,2
 Pay-Off
 Phosdrin 1,2,3, mevinphos
 phosphamidon 2, Dimecron
 Pounce 2,18, permethrin
 Pydrin 2, fenvalerate
 resmethrin, Synthrin
 Sevin 2, carbaryl
 Spectracide 2, diazinon
 Sumithion, fenitrothion
 Sumithrin, d-phenothrin
 Supracide 2, methidathion
 Tamaron 2, methamidophos
 Temik 1,2,5,7, aldicarb
 tepp 1,2,3
 Vapona 2, dichlorvos TM

Group II -- Moderately toxic:

Can be used around bees if dosage, timing, and method of application are correct, but should not be applied directly on bees in the field or on the hives.

Insecticides (trade name and/or common name)

Abate ♦ 2, temephos
 Agritox ♦, trichloronate
 Bolstar ♦, sulprophos
 Carzol ♦ 2, formetanate hydrochloride
 chlordane 2
 Ciodrin ♦, crotoxyphos
 Counter ♦, terbufos
 Croneton ♦, ethiofencarb
 Curacron ♦, profenofos
 DDT 1,2,10
 Di-Syston ♦ 1,2,6,18, disulfoton
 Dyfonate ♦, fonofos
 endrin 1,2
 Korlan ♦, ronnel
 Larvin ♦ 2, thiodicarb
 Metasystox-R ♦ 2, oxydemeton-methyl
 Mocap ♦, ethoprop
 Perthane ♦, ethylan
 Pyramat ♦
 Sevin ♦ 4-Oil2, carbaryl
 Sevimol ♦ 2, carbaryl
 Syston ♦ 1,2,18, demeton
 Thimet ♦ 1,2,6, phorate
 Thiodan ♦ 2, endosulfan
 Trithion ♦ 2, carbophenothion
 Vydate ♦ 2, oxamyl
 Zolone ♦, phosalone

Group III -- Relatively nontoxic:

Can be used around bees with minimum injury.

Insecticides and Acaricides (trade name and/or common name)

Acaraben ♦, chlorobenzilate
 allethrin, Pynamin ♦
 Altosid ♦ 17, methoprene
 Baam ♦, amitraz
 Bacillus thuringiensis 17, Bactur ♦
 Bactospeine ♦, Bakthane ♦, Dipel ♦, Thuricide ♦
 Birlane ♦, chlofenvinphos
 Comite ♦, propargite
 cryolite 2, Kryocide ♦
 Delnav ♦, dioxathion
 Dessin ♦, dinobuton
 Dimilin ♦ 17, diflubenzuron
 Dylox ♦ 2, trichlorfon
 ethion
 Fundal ♦, chlordimeform
 Galecron ♦, chlordimeform
 Heliothis polyhedrosis virus
 Kelthane ♦ 1, dicofol
 Mavrik ♦ 2, fluvalinate
 methoxychlor 2, Marlate ♦

Mitac❖, amitraz
 Morestan❖, oxythioquinox
 Morocide❖, binapacryl
 Murvesco❖, fenson
 nicotine 2
 Omite❖, propargite
 Pentac❖, dienochlor
 pirimor❖ 2, pirimicarb
 Plictran❖ 2, cyhexatin
 pyrethrum (natural)
 rotenone 2
 sabadilla 2
 Sayfos❖, menazon
 Sevin❖, SL2, carbaryl
 Sevin❖ SLR2, carbaryl
 Smite❖, sodium azide
 Tedion❖, tetradifon
 Tetram❖
 Tokuthion❖, prothiophos
 Torak❖, dialifor
 toxaphene 1,2
 Zardex❖, cycloprate

Fungicides (trade and/or common name)

Afugan❖ 2, pyrazophos
 Arasan❖, thiram
 Bayleton❖, triadimefon
 Benlate❖, benomyl
 Bordeaux mixture 2
 Bravo❖, chlorothalonil
 captan 11
 copper oxychloride sulfate
 copper 8-quinolinolate
 copper sulfate
 cuprex❖, dodine
 cupric oxide
 cupric hydroxide, Kocide❖
 Delan❖, dithianon
 Dessin❖, dinobuton
 Difolatan❖, captafol
 Dithane❖ D-14, nabam
 Dithane❖ M-22, maneb
 Dithane❖ M-45, manzeb
 Dithane❖ Z-78, zineb
 Du-Ter❖, fentin hydroxide
 Dyrene❖, anilazine
 ferbam
 glyodin
 Hinosan❖, edifenphos
 Indar❖, butrizol
 Karathane❖, dinocap
 Lesan❖, fenaminosulf
 Morestan❖, oxythioquinox
 Morocide❖, binapacryl
 Mylone❖, dazomet
 Phaltan❖, folpet
 Plantvax❖, oxycarboxin

Polyram◆, metiram
 Ridomil◆
 Sisthane◆, fenapanil
 Smite◆, sodium azide
 sulfur 2
 Thiram, Thylate◆
 Thyfural
 Vitavax◆, carboxin
 ziram, Zerlate◆

Herbicides, Defoliants, and Desiccants (trade and/or common name)

Aatrex◆, atrazine
 Alachlor
 Alanap◆, naptalam
 Alopex◆, clofop-isobutyl
 Amex◆ 820, butralin
 Amiben◆, chloramben
 amitrole
 Ammate◆, AMS
 Aquathol K◆, endothall, dipotassium
 Avenge◆, difenzoquat
 Balan◆, benefin
 Banvel, dacamba
 Basagran◆, bentazon
 Basalin◆, fluchloralin
 Betanal◆, phenmedipham
 Betanex◆, desmedipham
 Bladex◆, cyanazine
 Blazer◆, acifluorfen
 butachlor
 butam
 cacodylic acid 1
 Cambilene◆ 1, 2.3.6-TBA
 Caparol◆, prometryn
 Casoron◆, dichlobenil
 Chloro IPC◆, chlorpropham
 Cotoranr, fluometuron
 2,4-D 1,2
 DEF◆ 8
 Desiccant L-10◆ 1,9, arsenic acid
 Devrinol◆, napromamide
 Dichlorprop 1, 2.4-DP
 dinoseb 9, dinitrobutylphenol
 diquat 8,9
 Dual◆, metalachlor
 endothall, sodium salt, Accelerate◆
 Eptam◆, EPTC
 Eradicane◆, EPTC+safener
 Evik◆, ametryn
 Evital◆, norflurazon
 Folex◆ 1,8, merphos
 Garlon◆, triclopyr
 Goal◆, oxyfluorfen
 Hoelon◆, diclofop-methyl
 Hydrothol 191◆, endothall
 monopotassium salt
 Hyvar◆, bromacil

Igran[◆], terbutryn
 IPC[◆], propham
 Karmex[◆], diuron
 Kerb[◆], pronamide
 Lasso[◆], alachlor
 Lorox[◆], linuron
 Maloran[◆], chlorbromuron
 MCPA 1
 Methar[◆] 1, DSMA
 Milogard[◆], propazine
 Modown[◆], bifenox
 MSMA 1
 Mylone[◆], dazomet
 Nortron[◆], ethofumesate
 Paarlant[◆], isopropalin
 paraquat 1,9
 Planavin[◆], nitralin
 Pramitol[◆], prometon
 Preforan[◆], fluorodife
 princep[◆], simazine
 Probe[◆], methazole
 Prowl[◆], pendimethalin
 Ramrod[◆], propachlor
 Radox[◆], CDA
 Ronstar[◆], oxydiazon
 Roundup[◆], glyphosate
 Sancap[◆], dipropetryn
 Sencor[◆], metribuzin
 silvex 1, 2.4.5-TP
 Sinbar[◆], terbacil
 Smite[◆], sodium azide
 Surflan[◆], oryzalin
 Sutan[◆] +, butylate
 2.4.5-T 1,2
 Telvar[◆], monuron
 Tenoran[◆], chloroxuron
 TOK[◆], nitrofen
 Tolban[◆], profluralin
 Tordon[◆], picloram
 Treflan[◆], tribluralin
 Turf Herbicide[◆], endothall, disodium
 Vegadex[◆], CDEC
 Zorial[◆], norflurazon

Nematicides and Miscellaneous (trade and/or common name)

endothall 13
 Exhalt[◆] 800 14
 gibberellic acid 13
 Mocap[◆] 5, ethoprop
 Mylone[◆] 5, dazomet
 N-Serve[◆] 15, nitrapyrin
 Polaris[◆] 16, glyphosine
 Smite[◆] 5, sodium azide
 Sustar[◆] 13,16

Number-keyed Notes on Pesticide Use

1. California state regulations require permits for most uses of these chemicals, also for 2,4-D and 2,4,5-T as herbicides but not as sprays on citrus.
2. Laboratory- and field-tested mainly on alfalfa, citrus, cotton, ladino clover, milo and sweet corn; all other chemicals were laboratory-tested only.
3. Dibrom◆, Phosdrin◆, and tepp have such short residual activity that they kill only bees contacted at treatment time or shortly thereafter. Usually safe to use when bees are not in flight; not safe to use around colonies.
4. Malathion has been applied on thousands of acres of alfalfa in bloom without serious loss of bees. However, occasional heavy losses have occurred, particularly under high temperature conditions. If applied to alfalfa in bloom it should be only as a spray, and application should be made during the night or early in the morning when bees are not foraging in the field. Undiluted technical malathion spray (ULV) should not be used around bees.
5. Nematicide.
6. Di-Syston◆ (disulfoton) and other systemic pesticides used as seed treatments have not caused bee losses.
7. Temik◆ (aldicarb), although highly toxic to bees as a contact poison, is used only in granular form, and extensive field usage has not caused bee losses.
8. Defoliant.
9. Desiccant.
10. DDT has been withdrawn for most uses in U.S.A.
11. Field doses have caused brood damage.
12. The microencapsulated formulation of methyl parathion, known as Penncap-M◆ is highly toxic to foraging bees, young hive bees, and brood. Overall, it is 13 times more hazardous to honey bees than the EC (emulsifiable concentrate) formulation. Penncap-M◆ is too hazardous to be applied to any area or within 1 mile of any area where and when bees are present.
13. Plant growth regulator.
14. Sticker/extender.
15. Nitrification inhibitor.
16. Chemical ripener.
17. Insect growth regulator.
18. Honey bee repellent.

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