

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 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.

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
Nemacur 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
Taron 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 Acaracides (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
Paarlan, isopropalin
paraquat 1,9
Planavin, nitralin
Pramitol, prometon
Preforan, fluorodife

princep ⬠, simazine
 Probe ⬠, methazole
 Prowl ⬠, pendimethalin
 Ramrod ⬠, propachlor
 Radox ⬠, CDAA
 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

- 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.
- Laboratory- and field-tested mainly on alfalfa, citrus, cotton, ladino clover, milo and sweet corn; all other chemicals were laboratory-tested only.
- 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.
- 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.
- Nematicide.
- Di-Syston ⬠ (disulfoton) and other systemic pesticides used as seed treatments have not caused bee losses.
- 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.
- Defoliant.
- Desiccant.
- DDT has been withdrawn for most uses in U.S.A.
- Field doses have caused brood damage.
- The microencapsulated formulation of methyl parathion, known as Pennncap-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. Pennncap-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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