

Protecting Honey Bees From Pesticides

Pesticide Problems

Honey bees and other insect pollinators play an important role in the production of many crops in Alabama. However, since most crops must be protected from insect pests and diseases, pesticide poisoning is the most serious problem for pollinating insects in agricultural areas. Protecting pollinators, especially honey bees, from pesticide poisoning should be part of any pesticide program. The following recommendations can help minimize bee kills.

Pesticides on Blossoms.

The blossom is usually the only part of a plant that bees visit. To avoid killing bees, do not apply pesticides hazardous to bees during the blooming period. When the treated area contains the only attractive plants in bloom within flight range, injury may occur to colonies several miles away. Treating non-blooming crops with a hazardous pesticide when cover crops, weeds, or wild flowers are in bloom within (or near) the treated field may also cause heavy bee losses.

Drift of Pesticides. Drift occurs from nearly all spray or dust applications of pesticides from a short distance to miles downwind. Pesticide dusts drift farther than sprays. Pesticides applied by plane usually drift farther than those applied by ground equipment. Generally, it is less hazardous to apply pesticides near apiaries with ground equipment than by plane. Drift

can be reduced by applying pesticides in the evening or early morning when the air is calm.

Time of Application.

Ideally, pesticides should be applied when there is no wind and when bees are not visiting plants in the area. The time and intensity of bee visitation to a given crop depends on the abundance and attractiveness of the bloom. For example, apple trees or clover in bloom may be attractive to bees all day while cucumbers and corn are usually attractive in the morning and early afternoon hours. In general, evening or early night applications are the least harmful to bees.

Formulation of Pesticides.

Dusts are usually more hazardous to bees than sprays. Wettable powders often have a longer residual effect than emulsifiable concentrates. Granular pesticides seem to present very little hazard. Ultra-low volume (ULV) formulations of some pesticides are much more toxic than regular sprays. No effective repellent has been developed that can be added to pesticides to keep bees from treated areas.

Toxicity of Pesticides. Most agricultural pesticides have been tested for their toxicity to honey bees. However, laboratory and field results do not always coincide, due to peculiarities of bee behavior, length of residual life of the pesticide, or the effects of different formulations.

Insecticides affect bees in one or more ways: as stomach poisons, as contact poisons, and

as fumigants. Pyrethroids, organophosphates, and carbamates vary in their toxicity to bees from relatively non-hazardous to very hazardous, depending upon the individual material or combination of materials. Some bacteria, protozoans, and viruses that are currently recommended for biological control pose a serious hazard to bees.

Herbicides, defoliants, and desiccants such as paraquat, MAA, and MSMA reportedly were extremely toxic when fed to newly emerged worker honey bees or when sprayed onto older bees in field tests. Most tests have shown other materials in this class to be nonhazardous to bees, except that they kill or damage nectar- or pollen-producing plants.

Fungicides seem to cause little trouble for bees. Captan at field dosages has caused brood damage.

Sex Lures, Attractants, and other Hormones usually cause no problem for bees. Occasionally, a few honey bees and bumblebees have been found in traps containing Japanese beetle lures.

Precautions for Farmers and Applicators

- Apply pesticides only when needed.
- Use the recommended pesticides at the lowest effective rate.

- Use the pesticide least hazardous to bees that will control the pest involved. If all recommended pesticides are equally hazardous to bees, use the one that has the shortest residual effect.

- Use sprays or granules instead of dusts.
- Use ground equipment instead of aerial application to apply pesticides near bee hives.
- Apply pesticides in late afternoon or at night when bees are not working the blooms.
- Avoid drift of pesticides onto plants that are attractive to bees.
- Notify beekeepers several days before applying any pesticide that is hazardous to honey bees. This will give them a chance to protect their colonies. However, notifications are not a release of responsibility.

Precautions for Beekeepers

- Place colonies where they will be away from fields that are routinely treated with hazardous pesticides and will not be subjected to pesticide drifts.
- Identify your apiary. Post your name, address, and phone number in a conspicuous place near your apiary. Let farmers and custom applicators in your area know where your apiaries are located so they will not unknowingly poison them.
- Be familiar with pesticides commonly used in your area and what their application dates are.
- Relocate colonies that are exposed repeatedly to hazardous pesticides. Also, remember that soon after colonies are moved to a new location, foraging bees search for water. They may collect water that has been contaminated with pesticides. To reduce the chance of bee losses, provide clean water near the hives.

Bee Kill Estimations

0 - 100 dead bees per day
Normal Die-off

200 - 400 dead bees per day
Low Kill

500 - 900 dead bees per day
Moderate Kill

1,000 or more dead bees per day
High Kill

The Insecticide Container Label

Though not a long document, the insecticide label represents vast amounts of research, legal regulations, and instructions. There are thousands of registered pesticide formulations. Each label clearly gives a brand name in bold letters across the

label while the common name and chemical ingredients follow in the section called "Active Ingredients". For example, the Chevron Chemical Company manufactures Orthonex (brand name). In the "Active Ingredients" section of the label, the name acephate (common name), is followed by the chemical name.

The following partial list of pesticides represents groups of materials ranked by toxicity to honey bees and is presented for general information only. Toxicity ranking may vary depending on the formulation of a pesticide. For specific information on the effects of a specific pesticide on honey bees, contact your county Extension office.

Pesticides Grouped According to Their Relative Degree of Hazard to Honey Bees. (Common name first, followed by a brand name example)

Group I.

Hazardous: Generally, these materials kill bees on contact during application and for one or more days after application.

Highly Toxic

2, 4-D (Weed-B-Gone*)	flucythrinate (Pay-Off*)
abamectin (Zephyr*)	fonofos (Dyfonate*)
acephate (Orthene*)	heptachlor
azinphos-methyl (Guthion*)	lindane (Lindane)
bifenthrin (Capture*)	malathion (Malathion 50*, Malathion ULV)
carbaryl (Sevin*)	methamidophos (Monitor*, Tamaron*)
carbosulfan (Advantage*)	methidathion (Supracide*)
chlormephos (Dotan*)	methiocarb (Mesurl*)
chlorpyrifos (Lorsban*, Dursban*)	methyl parathion (PennCap-M*)
cyfluthrin (Baythroid*)	mevinphos (tech) (Phosdrin*)
d-phenothrin (Sumithrin*)	monocrotophos (Azodrin*)
demeton-s-methyl (Metasystox (i)* (50-% Premix))	naled (Dibrom*)
diazinon (Spectracide*)	omethoate (Folimat*)
dichlorvos (DDVP)	oxydemethon-methyl (Metasystox-R*)
dicrotophos (Bibrin*)	oxydisulfoton (Disyston S*)
dimethoate (Cygon*, De-Fend*)	parathion (Bladan*)
esfenvalerate (Asana* XL)	permethrin (Ambush*, Pounce*)
ethion (tech) (Ethanox*)	phosmet (Imidan*)
etrimfos (Ekamet*)	phosphamidon (Dimecron*)
fenitrothion (Sumithion*)	propoxur (Baygon*)
fenpropathrin (Farmatox*)	pryazophos (Afugan*)
fensulfothion (Dasanit*)	resmethrin (Chryson*)
fenthion (Baytex*)	tetrachlorvinphos (Gardona*)
fenvalerate (DSMO) (Belmark*)	tralomethrin (Scout X-TRA*)

Group II.

Moderately Hazardous: These materials can be used with limited damage to bees if not applied on bees in the field or on hives near the field. Correct application rate, timing, and method of application are factors that can reduce pesticide kills.

Moderately Toxic

acetochlor (Acenit*)	fluvalinate (tau-fluvalinate) (Mavrik*, Spur*)	endosulfan (Thiodan*)
aclonifen (Challenge*)	formetanate hydrochloride (Carzol*)	terbufos (Counter*)
allethrin (Pynamin*)	mancozeb (Manzate*, Dithane*, Fore*)	endrin (Hexadrin*)
alphacypermethrin (Fastac*)	methanearsonic acid (MAA)	thiocyclam hydrogen oxalate (Evisect*)
ametryn (Evik*)	neburon (Granurex*, Propuron*)	ethoprop (Mocap*)
bromopropylate (Acarol*)	pebulate (Tillam*)	thiodicarb (Larvin*, Nivral*)
cinmethylin (Argold*)	phorate (Geomet*, Thimet*)	flufenoxuron (Cascade*)
crotoxyphos (Ciodrin, Decrotox*)	pirimiphos-methyl (Acetellic*)	triforine (Denarin*, Funginex*)
DCPA (Dacthal*)	sethoxydim (Poast*)	
diphenamid (Dymid*)	sulfosate (Touchdown*)	
disulfoton (Disyston*, Ekanon*)		

Group III.

Relatively Nonhazardous: These materials can be applied with little harm to bees. Regardless, follow label instructions.

Relatively Non-Toxic

2, 4-D butoxyethyl ester (Aqua-Kleen*)	chloramben (Amniben*)	diflubenzuron (Dimilin*)
2, 3, 5-T (2, 3, 5-T)	chloranil (Chloranil)	dikegulac sodium (Atrimmec*)
alachlor (Lasso*)	chlorbromuron (Maloran*)	dimethirimol (Milcurb*)
aldicarb (Temik*)	chlordimeform (Chlordimeform)	diniconazole-M (Spotless*)
aldoxycarb (Standak*)	chlorflurenol (Maintain A*)	dinocap (Karathane*)
alloydim sodium (Kusagard*)	chloridazon (Pyramin*)	diquat dibromide (Reward*)
amitraz (Tactic*)	chlormequat chloride (Cycocel*)	dithianon (Delan*)
amitrole (Kytrol*)	chlorobenzilate (Benzilan*)	dithiocarbamates (Metam-sodium, Dithane*)
ammoniacal copper sulfate (Copac*)	chlorophacinone (Caid*, Rozol*)	diuron (Seduron*)
anilazine (Dyrene*)	chloropicrin (Chlor-O-Pic*)	dodemorph acetate (E.C.) (Meltatox*)
anthraquinone (Corbit*)	chlorothalonil (Bravo*)	dodine (Melprex*)
atrazine (tech) (AAtrex*)	chlorotoluron (Dicuran*)	endothall (Entothal*)
maneb (Manex*)	chloroxuron (Tenoran*)	epoxiconazole (OPUS*)
azadirachtin (Margosan-O*)	chlorpropham (Taterpex*, Bud Nip*)	ethephon (Cerone*)
azamethiphos (Alfacron*)	clofentezine (Apollo* SC)	ethidmuron (Ustilan*)
azocyclotin (Peropal*)	copper oxide (Nordox*)	ethion (Ethiol*)
Bacillus thuringiensis (Gnatrol*)	copper oxychloride (form) (Recoup*)	ethirimol (Ethirimol)
benomyl (Benlate*)	cyanazine (Bladex*)	ethofumesate (Nortron*)
bantazon (Basagran*)	cycloate (Ro-Neet*)	ethylfluralin (Sonalan*)
bitertanol (Baycor*)	cycloxydim (Focus*)	fenaminsulf (Lesan*)
Bordeaux mixture (Nutra-Spray*)	cyhexatin (Metaran*)	fenamiphos (Nemacur*)
bromacil (Hyvar*)	cyproconazole (Sentinel*)	fenarimol (Rubigan*)
bromadiolone (Boot Hill*, Maki*)	dalapon (Dalacide*)	fenfuram (Pano-ram*)
bromofenoxim (Faneron*) (WP)	daminozide (B-Nine*)	fenpropimorph (Funbas*)
bromoxynil (Emblem*)	dazomet (Basamid*)	fenitrohydroxide (Brestanid*)
buminafos (Trakephon*)	DCNA (Botran*)	fenuron (Fenuron)
bupirimate (Nimrod*)	desmetryn (Semeron*)	ferbam (Carbamate*)
butylate (Sutan+*)	dibromochloropropane (Nemagon*)	fluometuron (Cotoran*)
butylate (Anelda* Plus)	dicamba (Banvel*)	fluorodifen (Peforan*)
captfol (Haipen*)	dichlobenil (Casoron*)	fluoroglycofen (Complete*)
captan (Captanex*)	dichlofenthion (form) (VC-13 Nemacide*)	folpet (Folpan*)
carbendazim (Delsene*)	dichloroprop-P (Duplosan* DP)	fosamine ammonium (Krenite*)
carbetamide (Carbetamex*)	dichlorprop (Polymone*)	fuberidazole (Fuberidazol)
carboxin (Vitavax*)	diclofop-methyl (Hoelon* 3EC)	furalaxyl (Fongarid*)
chinosol (Beltanol L*)	dicofol (Kelthane*)	
	dienochlor (Pentac*)	

Group III continued on p. 4

Group III (continued)

gibberellic acid (ProGibb*, Gibrel*)
glyodin (Glyodin)
glyphosate (Round-Up*)
glyphosate (Pondmaster*)
guazatine (Kenopel*)
indole-3-butyric acid (Hormodin*)
iprodione (Chipco*)
isopropanol (Paarlan*)
isoproturon (Alon*)
lenacil (Venzar*)
linuron (Lorox*)
MCPA (Chiptox*, Weedar*)
MCPB (Thistrol*)
mecoprop (Propal*)
mecoprop-p (Duplosan* KV)
MEMC (Bagalol*)
mepiquat chloride (Pix*)
metalaxyl (Ridolim*)
metalaxyl (Apron*, Subdue*)
metaldehyde (Slug N' Snail*)
methamitron (Goltix*)
methazole (Probe*)
methoxychlor (Marlate*-EC Non-toxic, Dusts toxic)
methyl bromide (Meth-O-Gas*)
metiram (Polyram* DF)
metobromuron (Patoran*)
metolachlor (Dual*, Pennant*)
metoxuron (Dosanex*)
metribuzin (Sencor*)
monalide (Potablan*)
monolinuron (Aresin*)
MSMA (Diumate*, Daconate*)
nabam (Spring-Bak*)
napropamide (Devrinol*)
neptalam acid (Alanap*)
naptalam (Alamap*-L, Rescue*)
nicotine (Nicotine)
nitralin (Planavin*)
nitrpyrin (N-Serve*)

nitrofen (Nip*, Tok*)
norflurazon (Evital*, Predict*)
nuarimol (Trimdal*)
oryzalin (Surflan*)
ovex (Sappiran*)
oxycarboxin (Plantvax)
oxyfluorfen (Goal*)
oxythioquinox (Morestan*)
paraquat (Gramoxone*, Starfire*)
PCNB (Terrachlor*, Turfcide*)
pendimethalin (Prowl*)
phenmedipham (spin-aid*, Betanal*)
picloram (Grazon*, Tordon*)
phosalone (Asovene*, Zolone*)
pirimicarb (Pirimor*)
PMA (Unisan*)
prochloraz (Abavit*, Omega*)
procymidone (Sumilex*)
profluralin (Tolban*)
prometon (Pramitol*)
pronamide (Kerb*)
propachlor (Ramrod*)
propam (Birgin*)
prometryn (Caparol*)
propamocarb hydrochloride (Bandi, Preveex*)
propargite (Comite*, Omite*)
propazine (Milo-Pro*, Primatol* P)
propineb (Anone*, Antracol*)
prothiocarb (Previcur*)
pyrethrins (EC toxic, sprays, repellent effects)
pyridate (Tough*)
pyroquilon (Coratop*, Fongorene*)
quinlorac (Facet*)
quizalofop-ethyl (Assure*)
rotenone (Prentox*, Prenfish)
ryania (Natur-Gro R-50)
sabdilla (Sabdilla)
sethoxydim (Poast*, Vantage*)
simazine (Princep*)
sulfur (Uniflow*, Sulfox*, Cosan*)

TCA (TCA)
terbacil (Sinbar*)
terbumetron (Caragard*)
terbutryn (Terbutrex*)
tetradifon (Tedion*)
thiabendazole (Arbortect*, Mertect*)
thiophanate-methyl (Pinnacle*)
thiram (AAttack*, Chipco*)
triadimefon (Bayleton*)
triadimenol (Baytan*)
tribufos (Folex*, DEF*)
trichlamide (Hataclean*)
trichlorfon (Dipterex*, Proxol*)
triclopyr (Garlon*, Pathfinder*, Remedy*)
trietrazine (Trietrazine)
trifluralin (Treflan*)
triphenyltin hydroxide (Brestanid*)
validamycin A (Validacin)
vernolate (Vernam*)
vinclozin (Curalan*, Ornalin*)
warfarin (Co-Rax*, Cov-R-Tox*)
WSSA (Herbisan* 5 EXD, Sulfasan*)
zineb (Cuprothex*)

*Brand name of proprietary product.

Information taken from: Farm Chemicals Handbook, '95, Meister Publishing Company.

Pollinator Protection, 1990.

Johansen & Mayer, Wicwas Press, The New Pesticide User's Guide, Bert L. Bohmont, Reston Publishing Company.

If you have had a serious pesticide kill and need to know the pesticide responsible, dead bee samples must be sent to chemical laboratories for analysis. This service is for hire and is not always easily obtainable. Contact your county Extension agent for assistance.

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Use pesticides only according to the directions on the label. Follow all directions, precautions, and restrictions that are listed. Do not use pesticides on plants that are not listed on the label.

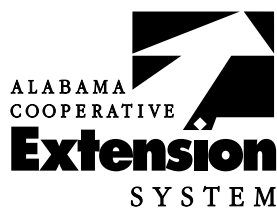
The pesticide rates in this publication are recommended only if they are registered with the Environmental Protection Agency or the Alabama Department of Agriculture and Industries. If a registration is changed or cancelled, the rate listed here is no longer recommended. Before you apply any pesticide, check with your county Extension agent for the latest information.

Trade names are used only to give specific information. The Alabama Cooperative Extension System does not endorse or guarantee any product and does not recommend one product instead of another that might be similar.

For more information, call your county Extension office. Look in your telephone directory under your county's name to find the number.

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