

# HAZARDS AND SAFEGUARDS IN APPLYING INSECTICIDES TO CROPS IN BLOOM

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Last Updated: 2004

## CAUSES OF BEE POISONING

Most bee poisoning occurs when insecticides are applied to crops during the blooming period. Other causes of bee poisoning are:

- drift of toxic sprays or dusts onto adjoining crops that are in bloom.
- bees coming into contact with insecticide residues on plants.
- bees drinking or touching contaminated water on foliage or flowers or from empty pesticide containers.
- bees collecting contaminated pollen or nectar .
- bees collecting unused pesticide dust or spray.

A major consideration for the reduction of bee poisoning is beekeeper-grower co-operation. The beekeeper often depends

## BEEKEEPER-GROWER CO-OPERATION

on the grower for bee forage

and the grower depends on the beekeeper for pollination. Co-operation and understanding of each other's problems are essential.

Safeguarding bees - If an insecticide has been applied to a crop to control pest insects and leafcutting bees are ready but have not been released, the incubator temperatures can be lowered to about 10°C and the bees held until the poisonous residue has disappeared

from the crop (see following table). Shelters can be covered or closed during application of short-residual insecticides to prevent drift of insecticides into shelters. In extreme northern areas bees may not get back to the shelters at night so evening application of insecticides is not advisable. Apply recommended insecticides during the bloom period after foraging has ceased on warm evenings only, to allow the bees good flight conditions to return to the shelters.

Do not apply insecticides to blooming crops or weeds. Do not allow insecticide dusts or sprays to drift onto bumble bee nest sites or blooming plants on which wild bees are foraging.

**FIELD APPLICATION HAZARD OF INSECTICIDES TO BEES<sup>a</sup>**  
**Hazard Rating<sup>b</sup>**

Insecticide	Honey Bee	Leafcutter Bee	Residue Hazard <sup>c</sup> (days)
acephate	1	1	2.5
allethrin			
azinphos-methyl	1	1	5
<b><i>Bacillus thuringiensis</i></b>	<b>none</b>	<b>3</b>	<b>none</b>
bendiocarb	1	- <sup>d</sup>	-
carbaryl	1-3	1-3	none -7
carbofuran	1	1	3-5
chlorpyrifos	1	1	2-3.5
<b>clothianidin - seed dressing</b>	<b>n/a<sup>e</sup></b>	<b>n/a</b>	<b>none</b>
<b>cyhalothrin-lambda</b>	<b>1</b>	<b>?</b>	<b>1</b>
cypermethrin	1	?	1
deltamethrin	2	2	1
diazinon	1	1	1-2
dichlorvos	1	1	-
dimethoate	1	1	7
endosulfan	2	1	2
fenvalerate	1	1	1
fonofos	2	-	-
<b>imidacloprid - seed dressing</b>	<b>n/a</b>	<b>n/a</b>	<b>none</b>
lindane	1	-	-
malathion	1-2	1	2 (6-LCB)
methamidophos	1	1	1
methidathion	1	1	7
methomyl	1	1	1.5
methoprene	1	?	?
methoxychlor	2	2	0.5
naled	1	1	1-1.5
oil sprays	2	-	-
oxydemeton methyl	2	2	0.5
parathion	1	?	?
permethrin	1	1	5
pirimicarb	2	2	0.5
propoxur	1	1	-
pyrethrins	3	-	none
rotenone	3	-	none
<b>spinosad</b>	<b>2</b>	<b>?</b>	<b>none</b>
trichlorfon	2	2	0.5

**Notes:**

<sup>a</sup> Most of these chemicals have not been tested for bee toxicity under Western Canadian conditions; the data herein are for a general guideline only.

<sup>b</sup> Hazard ratings for field application where bees are, or will be, foraging:

1. Very poisonous to bees; do not apply to crops or weeds in bloom unless bees are kept off for the period that residue on the crop is a hazard.
2. Moderately poisonous to bees; may be applied with minimum hazard in the evening when bees are not foraging.
3. Not very poisonous to bees; may be applied with minimum hazard to bees.

<sup>c</sup> Residue hazard represents the average time in days that residue poisonous to honey bees will remain on the foliage.

<sup>d</sup> No data available.

<sup>e</sup> n/a - not applicable; no direct contact between insecticide and bees

#### References -

1. Atkins *et al.*, Reducing Pesticide Residues to Honey Bees, Univ. Calif., Leaflet No. 2883, 1981.
2. Bailey *et al.*, Apidologie 36:623-633 (2005).
3. Craig, Pest. Res. Rep. 1973:168.
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5. Johanson, How to Reduce Bee Poisoning from Pesticides, Wash. State Univ., Western Region Extension Publication No. 15, 1983.
6. Pesticide-pollinator interactions, Rept. Assoc. Comm. Sci. Crit. Environ. Qual., Nat. Res. Council Can., No. 18471, 1981.
7. Peach *et al.*, J. Econ. Entomol. 87: 311-317.
8. Gregory *et al.*, J. Agric. Entomol. 9:109-115.

## REDUCTION OF BEE POISONING

### Reduction of bee poisoning: What The Pesticide Applicator Can Do

- (1) Do not apply insecticides that are toxic to bees on crops or weeds in bloom.
- (2) Apply certain chemicals only in late evening when bees are not actively foraging (see following table).
- (3) Ground application is generally less hazardous than aerial application because there is less drift of the pesticides and smaller areas are treated at one time.
- (4) Do not dump unused dusts or sprays where they might become a bee-poisoning hazard. Sometimes bees collect any type of fine dust material when pollen is not readily available. Under such conditions, they may actually carry pesticide dusts back to the colony.
- (5) Use insecticides that are relatively non-hazardous to bees whenever such choices are consistent with other pest control considerations.
- (6) Notify beekeepers in the area of your application plans at least 48 hours before applying hazardous pesticides.

### **What The Grower Can Do**

- (1) Learn the pollination requirements of the crops you raise. Application of insecticides hazardous to bees on these crops or driving beekeepers out of your area by the use of insecticides on other blossoming crops may contribute to poor yields.
- (2) When insect pests have been damaging a crop every season, use a preventive program of monitoring and early season application before pest population increase, foliage growth, and weather conditions reduce the effectiveness of insecticides.
- (3) Learn about the beekeeper's problems with chemical poisoning and enter into mutually advantageous agreements to produce bee-pollinated crops.

### **What The Beekeeper Can Do**

- (1) Give a map of apiary locations to your municipality office, extension agrologist, local aerial applicators, and the provincial apiculturist.
- (2) Post your name, address, and phone number in printing large enough to be read at some distance in all apiaries so that you can be contacted readily to move the colonies when hazardous sprays are to be applied.
- (3) If possible, choose apiary sites which are relatively isolated from intensive insecticide applications and which are not normally subjected to drift of chemicals.
- (4) Cover honey bee colonies with plastic or tarpaulin to protect them from direct contact with insecticide during application.