
USE OF BEES WITH VEGETABLE CROPS

In most vegetable plants, seed or fruit development depends on pollination and fertilization. In most cases, this involves the transfer of pollen from the male portion of the flower to the female portion. Pollen is also used as a source of protein by a wide spectrum of insects. It is especially important to bee species specializing in pollen collection. In the process of collecting this valuable food source, these insects provide the pollen transportation link that many plants need for reproduction. A single honey bee can carry up to five million pollen grains on its body, and a strong honey bee colony may bring in well over 50 pounds of pollen during a season.

Other factors influence the honey bee's role as the pollinating leader. Only honey bees are significantly socially developed to overwinter as a colony. This is the key element that makes it possible for humans to manage honey bees. Populations of naturally occurring bee species have been declining for the last few decades. This may be due to a number of factors, including the reduction of natural habitats, parasitic mites, brood diseases, and pesticide use.

At least 90 crops grown in the United States depend to some extent upon bees as pollinators, either for seed or fruit production. The exact number of hives needed will depend on a number of factors, including strength and condition of colonies, magnitude of the natural pollinator community, amount of wild flower material competing with the crop, attractiveness of the crop to bees, projected yield, and the weather. The following are guidelines for the number of hives to use when supplemental pollination is desired:

cucumber	(2 to 3 colonies per acre)	squash	(1 colony per acre)
muskmelon	(2 to 3 colonies per acre)	watermelon	(1 to 2 colonies per acre)
pumpkin	(1 colony per acre)		

The following vegetables will set fruit without bees, but bee activity has shown to increase yields:

eggplant lima bean okra pepper

Honey bees do not assist in the pollination of the following crops, but will collect pollen and nectar from them:

peas snap bean sweet corn tomato

Many growers currently purchase pollination services from beekeepers for their vegetable fields. To ensure mutual satisfaction of both grower and beekeeper, a pollination contract should be signed by both. The following points should be considered in the contract: rental price, number of colonies, strength of colonies, timing of placement in the fields and removal from fields, field location, responsibility for maintenance of the colonies, access for the beekeeper to the hives, liability for stings, and protection from pesticides.

Generally, a grower should require that any hive he rents for pollination should have two deep supers (boxes), a good egg-laying queen, at least 4 to 5 frames of brood, and 20+ pounds of surplus honey, and be disease free. Hives should only be placed in fields after some of the crop's flowering has begun. If hives are placed before there are available flowers, bees will forage in surrounding areas and may not return to pollinate the flowers of the intended field. Also, when planning where to place the hives, growers should remember that honey bees usually pollinate flowers most thoroughly within 100 yards of their colony, although if forced to, they will travel much farther. Thus, hives should be distributed in groups throughout the field rather than in a single location, with convenience to the beekeeper in mind as well as uniform pollination.

Certain pesticides and pesticide application practices pose a serious hazard to honey bees. In general, applications made at night pose the least hazard to bees, with applications made in early morning second best. The application of a single pesticide is usually less dangerous than applying combinations. Systemic insecticides are usually very safe to bees, as are granular formulations. Emulsifiable or water soluble formulations are safer than wetttable powders of the same material. The list on page 15 classifies insecticides by the degree of toxicity to honey bees. A list of chemicals and methods of application that are mutually agreeable to the grower and beekeeper may be added to the pollination contract.

For protection of the honey bees and his own liability, a grower should work closely with the beekeeper in developing a program regarding pesticide application scheduling and application.

USE OF BEES WITH VEGETABLE CROPS (CONT.)

Highly Toxic Insecticides

Severe bee losses can be expected if the following materials are used when honey bees are present at treatment time or within a day thereafter.

Ambush, Ammo, Asana, Baythroid, Diazinon, Dibrom, Dimethoate, Furadan, Fury, Guthion, Imidan, Lannate, Lorsban, Malathion, Monitor, Mustang, Orthene, Penncap-M, Pounce, Scout X-Tra, Sevin, Warrior

Moderately Toxic Insecticides

These can be used in the vicinity of honey bees if the dosage, timing, and method of application are correct. However, they should not be applied directly on honey bees in the field or at the hives.

Admire, Di-Syston, Metasystox R, Provado, Thiodan, Thimet, Vydate

Relatively Non-Toxic Insecticides and Acaricides

This group of materials can be used around honey bees with a minimum of injury.

Bacillus thuringiensis (MVP, Dipel, Javelin, Agree, Biobit, Lepinox, M-Trak, etc.), Adios, Intrepid, Kelthane, Methoxychlor, Omite, Pyrethrum

RE-ENTRY STANDARDS/WORKER PROTECTION

EPA's revision of the Worker Protection Standard is "...designed to reduce the risk of illness or injury resulting from workers' and pesticide handlers' occupational exposures to pesticides used in the production of agricultural plants on agricultural establishments..." After April 21, 1994, all products covered by the rule must bear the WPS. The actual Worker Protection Standard that will be referenced on the pesticide label is 15 printed pages. It covers workers who are in contact with pesticides, workers who handle pesticides, or workers who are employed in the production of agricultural plants on four types of establishments -- farms, forests, nurseries, and greenhouses.

Pesticide Safety Training. Training instructions will have to be provided on a five-year cycle. The pesticide safety training that employers will provide their workers will include information on routes of entry, symptoms of poisoning, and emergency first aid. Those workers handling pesticides will need additional training on label interpretation, environmental impact from drift and runoff, wildlife hazards, and pesticide handling.

Pesticide Safety Information. Employers will establish a central location, accessible to all workers and handlers, for displaying pesticide information: a pesticide safety poster, emergency medical care information, and basic pesticide safety concepts.

Application Notification. Workers will be notified of specific locations where pesticides have been applied, as well as any re-entry restrictions that may apply. Depending on the particular pesticide product, notification may be oral or written and may require posting.

Entry Restrictions. Workers not involved in the application will not be permitted to enter or remain in an area being treated. Under no circumstances may early-entry workers enter a treated area until at least four hours following completion of the pesticide application. Early-entry workers must be equipped with personal protective equipment as required by the pesticide label.

Personal Protective Equipment. Employers must provide pesticide handlers with whatever protective gear is required by the pesticide label. They also must ensure that the equipment fits properly and is used correctly, and that it is clean, intact, and in good operating condition.

Decontamination Site. Water for routine washing and emergency eye flushing, soap, single-use towels, and a change of clothing will have to be provided at a clean site.

Emergency Assistance. If a worker or handler is poisoned or injured from a work-related pesticide exposure, the employer is responsible for making prompt transportation available to an emergency medical facility. The employer also will need to provide product-specific information from the label (product name, EPA registration number, active ingredients, antidote, first aid), and will need to know the circumstances relevant to the application and exposure.
