

Precautions with Pesticides

Pesticides are designed to poison or otherwise manage pests. Many pesticide products may poison people, pets, livestock, wildlife, ornamental plants, and other non-target organisms. Pesticide applicators and their families are at increased risk of pesticide exposure. It is important to keep all pesticide exposures to an absolute minimum.

You must protect your family members, field workers, and other people from pesticide injuries. Most pesticide accidents result from careless practices or lack of knowledge about safe handling. The time you spend to learn about the safe use of pesticides is an investment in the health and safety of you, your family, and others.

The Environmental Protection Agency places certain restrictions on the use of pesticide chemicals. These restrictions apply to chemicals applied to control insects, mites, plant diseases, weeds, nematodes, and other pests. Such restrictions may prohibit the use of a chemical or allow residue tolerances on harvested vegetables. Growers must know what chemical to use on each vegetable; how to apply the products; the post-treatment re-entry interval, if any; when to use the chemicals with respect to farm worker and/or picker safety; and the environment and the harvest of each vegetable crop.

Growers must follow all label instructions regarding harvest restrictions to assure consumers that the food is free of dangerous residues and to comply with the law to prevent seizure of their crops. Here are some rules for the safe use of pesticides:

- Only mix the amount of a pesticide you can use in one day
- If you do have leftover spray mix, the best way to dispose of it is by applying it to a labeled crop in a legal manner
- Never dispose of surplus pesticides in a way that will result in the contamination of ground or surface waters
- Rinse all empty containers three times before disposal.
- Pour the rinse water into the spray tank. Puncture or break triple-rinsed containers to facilitate drainage and to prevent reuse for any other purpose.
- Then dispose of the container according to label directions.

Rules for Pesticides with "Danger" Signal Word

Formulations of Monitor[®], Lannate[®], Thimet[®], DiSyston[®], Guthion[®], and Gramoxone[®] are highly poisonous. They should not be applied unless applicators strictly follow all precautions listed on pesticide labels.

Some label precautions include:

- Wearing the proper respiratory equipment when handling or applying
- Wearing protective clothing that covers as much of the body as possible
- Always using rubber gloves, not leather or cloth gloves, and certain never bare hands to handle pesticides
- Not breathing in these pesticides when opening containers or mixing into spray tanks
- Always washing hands, arms, and face immediately after handling, and before eating or smoking
- Never smoking while handling or applying
- Reducing all possible hazards of coming into direct contact with spray drift, and avoiding spraying if conditions are too windy
- Showering or bathing thoroughly after each day's work, and changing clothes
- Washing spray clothes separately from the family wash, then running another complete hot water and detergent wash cycle before washing other clothes
- Wearing clean overalls, underwear, socks, and cap each day you spray
- Always keeping pesticides in their original labeled containers, and storing in a safe place
- Storing and disposing containers according to information on pesticide labels

Reduced-risk/Biopesticides **BP** **RR**

Every pesticide has a different impact on human health and the environment. Until recently, it has been impossible for growers to know the impact of the pesticides they apply. Now, however, the U.S. Environmental Protection Agency (EPA) lists biopesticides and pesticides that have reduced risks in specific areas.

Pesticides classified as reduced-risk by the EPA are conventional products that have:

- Low impact on human health.
- Low toxicity to nontarget organisms (birds, fish, and plants)
- Low potential for groundwater contamination.
- Lower use rates.
- Low pest resistance potential.
- Compatibility with Integrated Pest Management.

The EPA bases reduced-risk decisions on specific uses of pesticide combinations. Thus, a pesticide may be considered reduced risk for one vegetable, but not another.

Biopesticides are derived from natural materials such as animals, plants, bacteria, and certain minerals. Biopesti-

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cides fall into three major classes: microbial pesticides, plant-incorporated protectants, and biochemical pesticides. The active ingredient in a microbial pesticide (or mycoinsecticide) is a microorganism (bacterium, fungus, virus, or protozoa). These are highly selective in activity against specific target insect pests. Plant-incorporated protectants are substances that plants produce based on genetic material that is incorporated into plants. Biochemical pesticides are naturally occurring substances that control insect pests through nontoxic mechanisms such as sex pheromones or scented plant extracts.

The EPA defines biopesticides as products that include: “naturally occurring substances that control pests (biochemical pesticides), microorganisms that control pests (microbial pesticides), and pesticidal substances produced by plants containing added genetic material (plant-incorporated protectants) or PIPs.”

In this guide, products that are defined as reduced risk for a given vegetable or vegetable group are denoted by the symbol **RR**. Biopesticides are denoted by the symbol **B**.

As with any product, investigate these or any new products before you need them. If a product is not commonly used in your area, it may not be locally or quickly available.

More information about the EPA's Reduced Risk Pesticide Program is available at www.epa.gov/opprd001/workplan/reducedrisk.html. More information about the EPA's biopesticide program is available at www.epa.gov/oppbppd1/biopesticides/whatarebiopesticides.htm.

Symptoms of Pesticide Poisoning

Poisoning symptoms include headache, blurred vision, pinpoint pupils, weakness, nausea, cramps, diarrhea, and discomfort in the chest. Symptoms can begin almost immediately after exposure or may be delayed

for several hours. Call a physician any time you are concerned about illness due to contact with pesticides.

If you experience any of these symptoms during exposure to pesticides, stop spraying or dusting immediately, and have someone take you (or go yourself) to a doctor. Do not resume spraying or dusting until you have consulted a doctor and the tests show it is safe to continue. When going to the doctor, take along the pesticide label or a sample label of the pesticide you have been using, the material safety data sheet, and, if possible, the manufacturer's phone number. This information is extremely critical for the doctor to make a proper diagnosis.

Emergency Treatments

Medical antidotes should be prescribed or given only by qualified physicians. First aid treatments should be given by someone with a specific knowledge of pesticide poisoning first aid. Prepare in advance a thorough plan of action to follow in the event of a pesticide accident. First aid can initially help a victim while medical help is on the way, or can be administered to a victim en route to qualified help.

In an emergency, call a doctor, emergency medical service, or Area Poison Information Center for immediate help. Know whether the pesticide label has an emergency telephone information number on it. Poison Information Centers have been established in Illinois, Indiana, Iowa, Minnesota, Missouri, and surrounding states to provide physicians with current information on diagnosing and treating accidental poisoning cases.

The nationwide emergency poison center toll-free number is (800) 222-1222.

See the inside back cover of this publication for poison control information for your state.



Workers applying pesticides or entering an area before the restricted entry interval (REI) period expires must wear the proper personal protective equipment (PPE) described on each pesticide label. For more information, see the EPA publication, *Recognition and Management of Pesticide Poisonings*, www.epa.gov/pesticides/safety/healthcare/handbook/handbook.htm.

After calling a doctor or hospital, give the information about the poisoning, especially the name of the pesticide product. If they do not have a poison information center there, they should be able to put you in contact with the nearest one. If not, consult your local hospital, and get the name, address, phone number, and director of the center nearest you. You should get this information now just to have it available should the need arise.

Using 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 also is a source of protein for a wide spectrum of insects. It is especially important to bee species that specialize in collecting pollen. While collecting this valuable food source, these insects provide the pollen transportation link many plants need for reproduction. A single honeybee can carry up to five million pollen grains on its body, and a strong honeybee colony may bring in more than 50 pounds of pollen during a season.

There are several factors that influence the honeybee's role as the pollinating leader. First, only honeybees have developed a significant social system that allows them to overwinter as a colony. This makes it possible for humans to manage honeybees. Populations of naturally occurring bee species have been declining over the last few decades due to reduced natural habitats, parasitic mites, brood diseases, pesticides, and other factors.

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 to pollinate a crop depends on a number of factors, including the 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 weather.

The following are guidelines for the number of hives to use when supplemental pollination is desired:

cucumber	(2 to 3 colonies per acre)
muskmelon	(2 to 3 colonies per acre)
pumpkin	(1 colony per acre)
squash	(1 colony per acre)
watermelon	(1 to 5 colonies per acre — the pollination requirements of seedless varieties are generally greater than seeded)

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

eggplant	okra
lima bean	pepper

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

pea	sweet corn
snap bean	tomato

Many growers currently purchase pollination services for their vegetable fields from beekeepers. To ensure the mutual satisfaction of growers and beekeepers, both should sign a pollination contract. 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 rented for pollination should have two deep supers (boxes), a good egg-laying queen, at least four to five frames of brood, produce more than 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 flowers are available, 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 honeybees 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 serious hazards to honeybees. In general, nighttime applications pose the least hazard to bees, with early morning applications second best. Applying 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 wettable powders of the same material. The list on page 26 classifies insecticides by the degree of toxicity to honeybees. A list of chemicals and methods of application that are mutually agreeable to growers and beekeepers may be added to pollination contracts.

Growers should work closely with beekeepers to develop a pesticide application scheduling and application program to protect their liability and the honeybees.