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## Managing Insects in the Vegetable Garden

Insects are a fact of life in the vegetable garden. The properties that make vegetables nourishing and palatable for people are also attractive to insects. With the following techniques, you can keep these creatures from spoiling your harvest:

First, determine whether the insects present are actually causing trouble. Over 90 percent of the insects you will find in your garden are benign; some are beneficials that eat pest insects. Inspect your plants regularly; if you catch an infestation in an early stage, it will be much easier to manage. Cooperative Extension can help you sort out the good from the bad. (There is a nominal fee for insect identifications.)

Next, determine whether the damage is worth treating. Will the plant outgrow the injury? Can you cut out the affected portion? Is frost right around the corner? It may not make sense to treat the problem if the damage is negligible or if the season is almost over.

If the injury does require treatment, there are many cultural or non-chemical methods you can use. Pesticides should only be employed as a method of last resort. If necessary, choose least-toxic products such as insecticidal soap, horticultural oil or *Bacillus thuringiensis* (Bt.).

### Cultural Management Tools

**Keep plants healthy** – sick plants attract more insects. Make sure your plants have adequate sunlight and moisture. Vegetables require six to eight hours of direct sun and at least one inch of water per week to grow normally. Keep weed competition to a minimum. Mulching the soil keeps down weeds and conserves moisture. Fertilize as indicated by a soil test; do not add more than necessary. Excess fertilizer is a water pollution hazard, and excess nitrogen creates weak growth that attracts sucking insects such as aphids, scale and also mites. Incorporate plenty of organic matter (compost) into your soil.

**Handpick.** This method is effective for large insects, such as beetles. Simply knock them into a can of soapy water.

**Exclude.** Floating row covers allow light and moisture to penetrate, but exclude insects. Be sure to bury the edges so insects can't crawl underneath. In most seasons, row covers will need to be removed during hot weather since they trap heat beneath them. Also remove row covers as insect pollinated plants begin to flower. Your plants will still benefit from an insect-free head start.

**Wash.** Small insects such as aphids and spider mites can be dislodged with a strong stream of water (make sure this is not so strong that the plant is injured). Used every three days, water may interrupt the pest's life cycle.

**Attract beneficials.** Beneficial insects may keep pests from building up to damaging levels. Ladybugs, lacewings and others will come if their prey is present. Learn to identify the good "bugs"– avoid toxic chemicals that could damage beneficial insects as well as pests. Encourage beneficials by planting flowers near your vegetables (these insects feed on nectar and pollen as well as other insects) and by providing a water source such as a birdbath.

**Fall Cleanup.** Many insects overwinter on or under plant debris. Remove and compost spent vegetables promptly throughout the season. Some insects overwinter beneath the soil. A rough tilling at the end of the season may expose these insects to predators and freezing temperatures (don't rake the soil smooth).

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## **Insecticides**

If you employ a variety of cultural management tools, situations that require insecticides will be rare occasions. If a pest population does get out of control, consider the least-toxic pesticide option. Insecticides do not prevent insect outbreaks – spray only when and where an infestation occurs. Be sure to identify and locate the pest before you spray. Consider the following least-toxic materials; call Cooperative Extension for advice:

### **Bt Bacteria** (Caterpillar Attack, DIPEL)

#### What it is and how it is used:

Bt stands for *Bacillus thuringiensis* – one of more than 80 different bacteria found in nature that control specific insect pests. Bt is a stomach poison that releases toxins inside the alkaline stomachs of many insects. Fortunately, it will not harm people, pets, birds or bees because their stomachs are mostly too acidic for the bacteria to release the toxin.

Bt is available in powdered or liquid form at your local garden center. Dust or spray onto plants, as recommended on the label, for insects to ingest as they chew on plants. Bt must be consumed by insects in order to be effective. It may take a few hours to a few days for the toxin to slow the insect down and cause it to stop eating. Care should be taken to avoid spraying non-target areas where beneficial relatives of the pest insects may be affected.

#### What is it effective against?

Different strains of Bt manage the following pests: caterpillars such as cabbageworms, tomato hornworms; larvae of mosquitoes, black flies and fungus gnats; Colorado potato beetle; Japanese beetle grubs.

### **Horticultural Oil**

#### What it is and how it is used:

Horticultural oil is a highly refined petroleum or soybean oil specifically manufactured to manage plant pests. It kills insect and mite pests by suffocating them or disrupting their feeding. Eggs, immature forms and soft-bodied adults are particularly susceptible. Horticultural oil has very low toxicity to humans and wildlife, is relatively safe for plants and leaves no toxic residue.

Horticultural oil can be applied with a sprayer to infested plants at any time of the year that weather conditions are suitable. Use horticultural oils at temperatures below 85 degrees F. and during times of low humidity. Complete coverage of the infested parts of the plant with oil is essential. Don't spray drought-stressed plants.

#### Horticultural oil is effective against the following insects:

Aphids, leafhoppers, scales, mealybugs, mites, spider mites, whiteflies

### **Insecticidal Soap**

#### What is and how it is used:

Insecticidal soaps contain sodium or potassium salts combined with fatty acids. Insecticidal soap is one of the safest choices available for managing pests on edible plants.

Insecticidal soap must contact the insect directly to be effective. When soap is applied to a susceptible insect, the fatty acids penetrate the insect's covering and cause the cells to collapse, leading to the death of the insect. Soap will not prevent pests or affect those that walk across it once the soap has dried. You must get good coverage of the pest when you apply the soap – be sure to spray the underside of the leaves. Don't spray drought-stressed plants.

#### Soaps are effective on these common pests:

Adelgids, aphids, young cabbageworms, flea beetles, leafhoppers, mites, lace bugs, mealybugs, young plant bugs, young rose slugs, vulnerable stages of whiteflies, exposed thrips, young stink bugs, young squash bugs, immature scale insects

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*The information on pest management for New York State contained in this publication is dated December 2009. The user is responsible for obtaining the most up-to-date pest management information. Contact any Cornell Cooperative Extension county office or PMEP (<http://pmep.cce.cornell.edu/>), the Cornell Cooperative Extension pesticide information website. The information herein is no substitute for pesticide labeling. The user is solely responsible for reading and following manufacturer's labeling and instructions.*