



## Bug-Wise

No. 8  
June 2, 2009



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**Insecticides for the Home Vegetable Garden:** There are a lot of questions to ask yourself when choosing an insecticide to use in your home vegetable garden. Is the product labeled for the crop I plan to treat? How long do I have to wait before I can pick again?. Will this product control the pest(s) I need to control, or will it make them worse? How do I apply this product? What safety equipment do I need to wear? The answers to these questions are on the label. Read the label—before you spray.

There's a big difference between spraying ornamental plants and spraying vegetables. You're going to eat the vegetables, and you want to be sure you are not exposing your family and friends to harmful pesticide residues. Many insecticides are labeled for use on ornamental plants but not on edible plants. And of the insecticides that are labeled for use on vegetables, few are labeled for use on every vegetable in the garden. Be sure the insecticide is labeled for use on the vegetable crop you plan to treat. Read the label—before you spray!

Observe the pre-harvest Interval, or PHI. This is the amount of time that must elapse between making an insecticide application and harvesting the crop. PHIs vary greatly, depending on the insecticide being used and the particular vegetable crop being treated. For example, the PHI for carbaryl (Sevin) is 2 days on corn, 3 days on tomatoes, 7 days on Irish potatoes, and 14 days on turnips. Failure to observe PHIs will result in excessive insecticide residues. Read the label—before you spray!

Don't spray insecticides in the garden unless you have a good reason. When you do spray, target insecticide sprays to specific situations. Know what insects you are trying to control, what crop they are attacking, and what insecticide you need to use.

This doesn't mean that you have to wait until the bugs have already eaten half your crop to start spraying. If your tomatoes have begun to set fruit, it's probably time to start adding some permethrin in with your fungicide spray to control tomato fruitworms and hornworms. But avoid the tendency to spray this on your eggplants as well, just because you are spraying. Permethrin can flare spider mite populations. If your pinkeye peas have begun to bloom, and you are concerned about cowpea curculios, start spraying the peas with Sevin (three applications, five days apart), but don't feel you need to spray everything else in the garden with Sevin also. Sevin can flare spider mite populations.

Following are brief descriptions of some of the insecticides that are most useful in the home vegetable garden. These are listed by active ingredient, because a given active ingredient may be sold under many different brand names. See Extension Publication 2347, Insect Pests of the Home Vegetable Garden for more details on insect pests of vegetable crops and how to control them.

## Insecticides for Use In Home Vegetable Gardens

(Active ingredients followed by an \* may be acceptable for organic gardening.)

**Carbaryl:** Carbaryl is most commonly sold under the brand name Sevin. This product has been a standard for insect control in the home vegetable garden for many years, but today we have better products available for many of the pests that carbaryl was traditionally used against. Carbaryl is effective against a wide range of pests and is labeled for use on most vegetables, but it is especially useful against beetles, such as cowpea curculio, cucumber beetles, and bean leaf beetles. Be aware that carbaryl has a tendency to flare spider mites when used excessively.

**Malathion:** Malathion is another long time standard insecticide in the home vegetable garden. Like carbaryl, it controls a wide range of pests and is labeled on most vegetables. Also like carbaryl, malathion has been displaced by more effective products on many pests, but it is still one of the best treatments for control of aphids.

***Bt kurstaki*\***: *Bacillus thuringiensis* is a bacteria that produces compounds that are toxic to certain insect species. There are different species and strains of this bacteria that produce different toxins. *Bt kurstaki* produces a compound that is toxic to certain caterpillars but has no effect on other insect species. Thuricide and Dipel are two of the more common brand names under which this product is sold. Bt is most effective against leaf-feeding caterpillars, such as loopers and diamondback moths. In recent years, Bts have been largely displaced by products containing spinosad, which is also available in organic formulations and provides much better control of caterpillar pests.

***Spinosad*\***: Spinosad is a relatively new microbial insecticide that is very effective against a number of different caterpillar pests. Some commonly available brand names that are labeled for use on many different vegetable crops and herbs are: Monterey Garden Insect Spray; Fertlome Bore, Bagworm, Tent Caterpillar and Leafminer Spray; and Green Light Spinosad Lawn and Garden Spray. Spinosad is very effective against most caterpillar pests, and is also effective against thrips, leaf miners, and Colorado potato beetles, but it does not control most other insect pests. Certain formulations of spinosad are acceptable for use by organic gardeners.

***Insecticidal Soap*\***: Insecticidal soaps are potassium salts of fatty acids that are specially formulated for insect control. They control insects that they contact by disrupting cell membranes and are most effective against soft-bodied pests, such as aphids, mites and thrips. Thorough coverage of the pest is necessary in order to achieve control. Insecticidal soaps have a short pre-harvest interval and are labeled for use on most vegetables. Safer Insecticidal Soap is an example of one brand name.

Note: Do not try to substitute household soaps or detergents for insecticidal soaps. These are not the same products. Insecticidal soaps are developed specifically to control insects and are tested for plant safety. Household soaps are not labeled for use on plants and may cause plant injury. The key point here is that not all “soaps” are the same. There are commercially available herbicidal soaps. Carbon chain length and a variety of other chemical factors determine whether a “soap” is used to kill insects, to kill plants, or to wash hands.

**Neem Oil\*:** Neem oil is oil extracted from the seed of the neem tree and is a botanical product that is primarily useful against aphids, mites, and whiteflies. It is labeled for use on most vegetables and is sold under several brand names (Monterey 70% Neem Oil is one example). Thorough coverage of the pest is necessary in order to obtain control.

**Azadirachtin\*:** Azadirachtin is also extracted from the seed of the neem tree, but it is a different product from neem oil; neem oil contains some azadirachtin, but the azadirachtin products do not contain neem oil. Azadirachtin works as a natural insect growth disruptor and is also repellent/feeding inhibitor to many insects. It is labeled for use on most vegetable crops, as well as herbs, and is especially useful for control of pests such as whiteflies and aphids. It also provides some control of small caterpillars and a variety of other insect pests. Azatrol, by PBI Gordon, is one formulation that is packaged and sold for use in the home vegetable garden.

**Acetamiprid:** Acetamiprid has only recently been labeled for use in home vegetable gardens. It is sold as a “ready-to-use spray” containing 0.006% acetamiprid, under the brand name Ortho Max Flower, Fruit, and Vegetable Insect killer. It is labeled for control of a variety of insect pests, but is only labeled for use on certain vegetable crops. This is one of the best treatments available to home vegetable gardeners for control of whiteflies.

**Pyrethrin\*:** Pyrethrin or pyrethrum is a botanical insecticide that is primarily used by organic gardeners. This insecticide provides rapid knock down of most insects, but insects often recover. Piperonyl butoxide (PBO) is often mixed with pyrethrin to act as a synergist. This increases the overall effectiveness, and helps prevent pests from recovering, but piperonyl butoxide is not acceptable for organic gardening. Pyrethrin or pyrethrin + PBO is active against a wide range of insects, is labeled for use on most vegetables, and has a very short pre-harvest interval. However, its efficacy is limited by its very short residual activity.

**Pyrethroids:** The term ‘pyrethroids’ refers to a group of synthetic insecticides that are modeled after the botanical pyrethrum molecules. These products are effective against a wide range of insect pests, and are used at very low rates. The following five pyrethroid insecticides are currently labeled for use in the home vegetable garden.

**Permethrin:** Permethrin is the oldest, and most common, of the pyrethroid insecticides. It is widely available and is sold under a large number of different brand names. Bonide Eight Vegetable, Fruit & Flower Spray and Hi-Yield Garden, Pet & Livestock Insect Control are two examples. Permethrin is labeled for use on many different vegetable crops and is effective against many beetle, bug, and caterpillar pests. Because permethrin controls so many different insect pests and is labeled on most vegetables, this is one of the most useful insecticides for home vegetable gardeners to keep on hand. Permethrin is one of the best treatments for control of stink bugs and leafhoppers, and it also works well against tomato fruitworms and hornworms. But be aware that permethrin often flares (causes population explosions) populations of those pests that it does not control. These include spider mites, aphids, whiteflies, loopers, and diamond back moth. Also, there are some vegetables on which permethrin may not be used.

**Cyhalothrin:** Lambda cyhalothrin is one of the newer pyrethroid insecticides (Spectracide's Triazicide Insect Killer Once & Done Concentrate is the most common brand name). It is very effective against a number of different insect pests, including stink bugs, but is labeled for use on only a few vegetable crops.

**Cyfluthrin:** Cyfluthrin is another relatively new pyrethroid insecticide. It is sold under the brand name Bayer Advanced Garden Power Force Multi-Insect Killer Concentrate. Like cyhalothrin, it is very effective against a number of different insect pests, including stink bugs, but is only labeled for use on a few vegetable crops.

**Esfenvalerate:** Esfenvalerate is one of the older pyrethroid insecticides. It is labeled for use on a number of different vegetable crops and controls a wide range of insect pests. Monterey Bug Buster is one example.

**Bifenthrin:** Bifenthrin is an effective pyrethroid for control of stink bugs, leaffooted bugs, tomato fruitworms, and a variety of other insect pests. However, it is labeled for use on only a few vegetable crops, including tomatoes and many cucurbits. Ortho Bug-B-Gon Max Lawn and Garden Insect Killer is one example of a bifenthrin product.

**Miticides for Home Vegetables?:** Currently, there are no effective miticides labeled for use in home vegetable gardens. For many years Kelthane was the standard miticide for home vegetable gardens, but Kelthane is no longer being produced. This makes it even more important to avoid unnecessary insect sprays, which can flare spider mite problems. When it is necessary to treat for spider mites, home vegetable gardeners will have to rely on contact products, such as insecticidal soaps, neem oil, or summer weight horticultural oils. Spraying undersides of infested leaves with a fine mist of water can also help reduce mite numbers.

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This information is for educational and preliminary planning purposes only. Brand names mentioned in this publication are used as examples only. No endorsement of these products is intended. Other appropriately labeled products containing similar active ingredients should provide similar levels of control. Always read and follow the insecticide label.

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