

Bug-Wise



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Insect Control Issues in the Vegetable Garden: Summer time is garden time and controlling insect pests is one of many tasks that must be done to have a successful vegetable garden. Here we briefly discuss some key questions and issues that affect Mississippi vegetable gardens. For more complete information on garden insect control see Extension Publication 2347, *Insect Pests of the Home Vegetable Garden* (with control recommendations for traditional and organic gardeners) <http://msucares.com/pubs/publications/p2347.pdf> .

Pre-harvest Interval or PHI: When using any pesticide on any edible crop one of the most important things to know, and you need to know this before you start spraying, is the pre-harvest interval or PHI. How long do you have to wait after you spray the crop before you can harvest the crop? This information is clearly stated on the product label. For some products on some crops the wait is very short—“do not harvest until spray has dried.” For other products on other crops the wait can be as long as 21 days. Note that the PHIs for a particular product will not be the same for all vegetables. For example, Sevin Concentrate Bug Killer (carbaryl) has a 1 day PHI on asparagus, a 3 day PHI on tomatoes and peppers, a 7 day PHI on Irish potatoes, and a 14 day PHI on turnip and mustard greens. If the label does not specify a PHI for the crop you plan to spray the product is not labeled for application on that crop!

Sevin and Malathion: For many decades these were the standard insecticides for home vegetable gardens and hundreds of thousands of successful vegetable gardens have been grown using only these two insecticides. If these are your favorite garden insecticides and you have had consistent success using them, you may want to keep on doing what has worked for you in the past. However, we do have better options for many garden insect pests—better because they give better control and/or have shorter pre-harvest intervals. Pyrethroid insecticides, like permethrin, bifenthrin, and cyhalothrin, are much more effective against bugs (stink bugs, squash bugs, and leaf-footed bugs) and spinosad is far better against caterpillar pests. Even with these new insecticide options, malathion is still the best treatment for aphid control, and Sevin is one of the better options for cowpea curculios.

Is there one insecticide I can keep on hand to use for all my garden insect problems?: Not really, but if I had to choose only one insecticide to use in my personal vegetable garden it would be permethrin. The reason is that permethrin is labeled for use on most summer vegetable crops, it will control most insect pests in the vegetable garden, and it has a shorter PHI profile than most of the alternatives. The following table shows PHIs for the active ingredients in some of the most readily available garden insecticides. One significant limitation for permethrin is that it is not labeled for use on peas and beans, and this means that we need some other product, like carbaryl or bifenthrin, to control cowpea curculio and stink bugs in the purple hull peas. Also, there are pests that permethrin will not control, and many of these pests, can actually be “flared” (or made worse) by spraying with permethrin, but this is also true of the other insecticides listed in this table. Spider mites, whiteflies, and aphids are three pests that are often “flared” by insecticide sprays.

Insecticide	Pre-Harvest Interval (days)				
	Tomatoes	Peppers	Squash	Peas/Beans	Broccoli
permethrin	1	3	1	Not labeled	1
bifenthrin	1	7	3	3	7
cyfluthrin	0	7	0	3	1
carbaryl	3	0	3	3	3
malathion	1	3	1	3	3
spinosad	1	1	3	3	1

Spinosad: Serious vegetable gardeners and especially organic vegetable gardeners need to know about spinosad. This is a relatively new, and very useful, addition to the home garden insecticide arsenal. Spinosad is sold under a variety of brand names; Fertilome, Bonide, Monterey, and Green Light all offer a spinosad product packaged for home use, and some of these products are even approved for use by organic gardeners. Spinosad is especially useful for caterpillar control; it works great on all caterpillar pests. In fact, spinosad is much more effective than the Bt products organic gardeners have traditionally used to control caterpillar pests. It also has an acceptable PHI profile (see table above), and it is less likely to “flare” outbreaks of spider mites, whiteflies, or aphids than most other available treatment options. Spinosad also controls thrips and works well on some beetle pests, like Colorado potato beetle and yellow margined leaf beetles on winter greens. However, spinosad is not effective on “bugs” and does not control beetle pests like cucumber beetles and cowpea curculios.

Avoid Unnecessary Sprays: Paradoxically, spraying plants with an insecticide often increases the potential for future pest outbreaks, by killing the beneficial insects that help keep the pest insects in check. This is especially true for pests with high reproductive rates like spider mites, whiteflies, and aphids, and many of these are pests for which we do not have good treatment options, especially spider mites and whiteflies. For this reason, it is important to avoid applying an insecticide to a plant unless you have a good reason to do so. Don’t spray the peppers and eggplants with permethrin just because you happen to be spraying the tomatoes for fruitworms, and don’t do things like spraying everything in the garden once a week as an “insurance spray.” You may be insuring a spider mite outbreak that you just can’t control. There are no good miticides for use in home vegetable gardens.

Proper Spray Timing is Critical: Gardeners must balance the need to avoid unnecessary sprays with the need to apply sprays at the proper time to kill pests before they cause significant damage. Don’t wait until you have large tomato fruitworms boring into half of the tomatoes in the garden before starting to treat for tomato fruitworms. With some pests it is best to wait until you actually see low numbers of the critters on the plants before initiating treatment; aphids and spider mites are good examples. With other pests, it is best to time treatments based on the stage of plant development, because we know from past experience that these pests are very likely to show up in certain crops once the plants reach a particular stage of development. Here are a few examples of proper spray timing for specific pest/crop situations.

- squash bugs on squash and pumpkins: Check carefully around bases of plants twice weekly. Begin spraying as soon as you find the first adult squash bugs, or if you find nymphs.
- stink bugs on any vegetable crop: Be alert for stink bugs when you are weeding, picking, or checking the garden for other pests. Use your eyes, your ears, and your nose. Apply sprays as soon as you detect stink bugs or stink bug damage in a crop that has susceptible fruit. Be aware that stink bugs are hard to detect. If you find two or three stink bugs there are probably a lot more.
- aphids on any vegetable crop: Wait until you notice significant numbers of aphids and light accumulation of honeydew, or early signs of leaf or terminal distortion, before treating. Aphid infestations are often controlled by naturally occurring parasites and diseases.
- tomato fruitworms on tomatoes: Begin weekly sprays as soon as plants begin to bloom. The moths lay their eggs on the bloom clusters and you need to kill the newly hatched caterpillars before they bore into the fruit.
- squash vine borers on squash and pumpkins: begin weekly sprays as soon as plants begin to bloom or run. The day-flying moths lay their eggs on leaves and stems. You have to have the insecticide residue on the plant so that newly hatched larvae are killed when they crawl through it and before they can bore into the plant where insecticides can’t reach them.
- cowpea curculio on southern peas: Spray as soon as you see the first ½ inch long peas. Spray again 5 days later, and apply a 3rd spray in 5 more days. You want to kill the adult curculios that have accumulated in the pea patch before they can lay eggs in developing pea seed.

Insecticide Application Methods: Methods of applying insecticides vary depending on the target pest, size of garden, and personal preference. Here are some of the most common methods of applying insecticides in home vegetable gardens and some specific considerations for each method.

Ready-to-Use Sprays: RTU sprays are sold as pre-diluted liquids, usually in “trigger-pump” sprayers. These are best for gardeners who only have a few plants to treat. RTU sprays are the most expensive way to buy insecticides, but they are convenient. If you only have three or four tomato plants, this is the way to go. RTU sprays are also handy for making spot treatments in larger gardens.

Spray Concentrates: These insecticides are usually sold as liquid concentrates. Dry formulations, like wettable powders or water soluble granules are less common in products for home use than for commercial applications. Insecticide concentrates need to be diluted in water before application. Label directions will indicate to “add _____ tsp, tbsp, or fl. oz. per gallon of water.” Be sure to shake the insecticide container well before measuring out the product. This is the most effective method of applying insecticides in mid-sized to large home vegetable gardens. Most home gardeners use 1 or 2-gallon hand pump sprayers for this purpose. When spraying, be sure to direct spray to the undersides of the leaves as well as the tops.

Avoid mixing and applying insecticides and fungicides in sprayers that have been used to apply herbicides! Tomatoes and other vegetables are especially sensitive to herbicides such as 2-4-D and glyphosate (Round-Up). Keep one sprayer for herbicides and another dedicated solely for insecticides and fungicides.

Dusts: Dusts are dry powders containing a low concentration of insecticide. Dusts are declining in popularity and for good cause; dust are just not as effective as sprays, especially when it comes to treating the undersides of leaves, and they are unsightly. Still, it must be acknowledged that a lot of successful vegetable gardens have been produced here in the state using dusts as the primary method of insecticide treatment. Dusts are applied with “trombone dusters,” hand crank dusters, or sometimes, using a jar with a few holes punched in the lid. Insecticides available as dust formulations include: 5% Sevin dust (carbaryl) and 0.25% permethrin dust.

Granules: Insecticide impregnated granules are only used for control of soil-inhabiting insects like wireworms and mole crickets. The two products most commonly available products labeled for use in vegetable gardens both contain bifenthrin (Monterey and Ortho products). Depending on the rate required per 1000 sq. ft., granules can be applied with small hand-held seeders, bag-style seed spreaders (aka “belly-grinders), or with lawn-sized fertilizer spreaders. Labels indicate to spread granules over the treated area at the specified rate and till into the top 4 to 6 inches of soil. These products are not labeled for use on all vegetable crops; read labels carefully before treating.

Soil-applied Drenches: One systemic insecticide, imidacloprid (Bayer product), is sold for use on certain vegetable crops as a soil-applied drench. This is actually a liquid concentrate, but the label indicates to dilute in water and apply to the soil around transplants or newly emerged seedlings (see label for details). This particular product is not especially useful in the home vegetable garden, but it is effective for early control of aphids, whiteflies, and cucumber beetles. Imidacloprid does not control “bug” or caterpillar pests, and plants treated with imidacloprid are more likely to experience spider mite outbreaks.

Tank-Mixing: I need to control insects and diseases on my tomatoes. Can I mix these two pesticides together in my hand-pump sprayer and apply them at the same time? It will be a lot faster and easier if I can. The answer depends on which products you want to tank-mix. Some products will interact, resulting in pesticide failure, settling in the spray tank, or plant injury. Read the labels of both products carefully. Unless one of the labels specifically says not to mix with the other product, active ingredient, or type of formulation, then it is usually safe to make the tank mix. But try it on a small scale first and be alert for any problems such as: failure to mix properly, settling in the tank, poor control, or plant injury. One tank mix commonly used on homegrown tomatoes includes permethrin (for control of fruitworms, hornworms, and stink bugs) and chlorthalalonil (for fungal diseases). Some home gardeners will even make a three-way tank-mix, by including a copper-based fungicide to control bacterial diseases. Once you become familiar with a particular tank-mix and are confident that it works, try to stick with the same brand name products for future uses. Changing formulations or brand names can affect pesticide compatibility.

Non-insecticidal Insect Control: Insecticides are not the only tools we have for controlling insect pests. There are a lot of other practices home gardeners can use to help reduce the likelihood of insect outbreaks. Here are a few examples:

- plant early to avoid heavy late-season insect populations
- plant into weed free areas and maintain good weed control
- choose varieties that are resistant to key insects and diseases
- grow healthy vigorous plants
- fertilize adequately, but avoid excessive fertilizer use
- destroy old crop residue as soon as possible after final harvest
- use physical control methods, like hand-picking and foot-stomping
- use metalized reflective plastic mulches where appropriate
- use physical exclusion tools like floating row covers and cutworm collars
- use trap crops when feasible

See Extension Publication 2036, Organic Vegetable IPM Guide

<http://msucare.com/pubs/publications/p2036.pdf> for more detailed information on these and other non-insecticidal pest control practices. Although this publication is written for commercial organic vegetable producers, this information is equally useful to both organic and conventional home vegetable gardeners.

Protect Bees and Other Pollinators: Recently there has been an increase in grassroots concern over pollinator protection. How can I avoid harming bees and still control insect pests that attack my vegetables? The first step is to read the product label and follow the precautions given for pollinator protection. Most labels will say to avoid spraying when pollinators are present. The best way to accomplish this is to only spray very late in the day after pollinators have stopped foraging, when you have just enough daylight left to allow you to finish the job and rinse out the sprayer before it is too dark to see what you are doing.

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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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