

ORGANIC STRATEGIES FOR THE GARDEN AND HOME LANDSCAPE

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What is Organic Gardening? Generally accepted organic practices comprise soil management, fertilization, and pest management.

The USDA National Organic Program has established rules for commercial organic production. These rules do not apply to home gardeners, but they are a useful guide for choosing organic pest-management alternatives. The chemicals listed in this section are recognized as organic insecticide, fungicide, and bactericide alternatives by the National Organic Program.

Organic pest management is not simply replacing a conventional pesticide with another chemical that is labeled “organic.” Knowledge and planning are the keys to successful organic gardening. Consider a Master Gardener class offered through your local Extension office. Additionally, your local library offers books on organic gardening. Be careful of books from other parts of the country; they may not reflect pest problems in the Southeast. Additionally, many web sites offer information about organic gardening. The best sources of information are university sites (i.e., Florida, California, UGA, etc.) and established organic research institutes. Beware of home remedies and apparently outlandish ideas; often there is no research to support these claims. Web sites from other countries may offer remedies that are not appropriate for the Southeast United States.

PRINCIPLES FOR ORGANIC GARDENING

- Planning is essential for successful organic gardening.
 - Before you purchase seeds or buy plants, consult UGA Extension information to find out if the things you wish to plant will be suitable for Georgia.
 - Your local UGA Extension agent is an excellent source of information for choosing plants and creating healthy growing conditions.
- Healthy plants are less susceptible to pests and disease. Stressed plants attract pests.
 - Choose plants that are adapted for your local climate.
 - When you buy plants, inspect them carefully for signs of pest infestation.
 - Test the soil to make sure the plants are receiving the nutrients they need to stay healthy. UGA Extension offers soil testing with organic alternatives.
 - Plant at the right date and under the proper light/water conditions.
- Anticipate problems.
 - Find out what pests and pathogens are common in your area.
 - Look for plant varieties resistant to regular pests and pathogens. Look for information on line or consult your local Extension office.
 - Learn the life cycles of the insect pests and pathogens you expect.
 - When/how do they arrive?
 - Are any stages of the life cycle vulnerable (or protected)? Some insects (e.g., squash vine borer) overwinter in soil; you can kill many of them with tillage during the off season.
 - UGA Extension is your best source.
- Scout for pest and disease problems regularly.
 - It is much easier to manage young insects, early infections, and small populations.
 - Scout at least three times per week in warm weather.
 - Look at the whole plant, under leaves, and along stems.
- Practice good sanitation.
 - Dispose of diseased or spent plant materials promptly.
 - Many pests and pathogens will persist over the winter in crop debris.
- Use crop rotation.
 - Do not plant the same type of plants in the same place each year.
 - Your Extension agent can advise you about crop rotations. Some plants that look different may be closely related.
- Encourage natural controls.
 - An assortment of flowers and herbs will attract beneficial insects.
 - Beneficials need a source of water. During dry periods, spray your garden with water every day or two to give beneficial insects a drink.
 - Even insecticides labeled as organic may be broad spectrum and kill beneficials. Use them sparingly.
- Use mechanical controls.
 - Row covers and hand-picking are practical on a small scale.
 - Water spray is effective against many insects if the plants are hardy enough to withstand a vigorous spray.
 - Remove infested or infected plants and leaves/limbs before problems spread to other plants.

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- Use cultural controls.
 - An appropriate planting date may avoid peak pest populations. Most pest populations increase as the season progresses. Planting as early as possible is usually a good idea. You may also want to plant vegetables more than once in the season to maintain a steady supply. Take out the older plants as they develop pest problems.
 - Mulch helps keep plants healthy and controls some pests and pathogens.
 - Avoid plants or particular varieties that have a lot of pest problems. Some crops, such as peaches will rarely produce a satisfactory harvest in Georgia without regular applications of synthetic pesticides. Your Extension agent can give you advice.
 - Plant extra to allow for losses to pests and mechanical removal. For example, several apple trees will likely yield enough acceptable apples for several pies even though the fruit is not perfect.
- Use chemical controls sparingly. An “organic” listing does not eliminate all risks.
 - Spot treat instead of spraying a large area.
 - Use pesticides only when other options are not practical.

ORGANIC INSECTICIDE/MITICIDE OPTIONS

Except for spinosad products, nearly all organic insecticides have little or no residual activity. Repeated applications may be necessary before you see results. Note: *spinosad* products come in both “organic” products and conventional products; both have nearly the same activity and risks.

Nearly all organic pesticides have a very broad range of use sites, which means you can use them nearly anywhere in the garden or landscape. Check the label to be sure it is labeled for the site you need to treat.

USE ALL PESTICIDES ACCORDING TO THE LABEL INSTRUCTIONS!

If used improperly, even natural products may injure your family or pets.

To use this guide, locate your pest problem and identify the chemical options. Review the chemical options for additional information and potential risks. If you need help choosing among several options, consult your local Cooperative Extension agent.

Caterpillars	<i>Bacillus thuringiensis kerstaki</i> , <i>pyrethrins</i> , <i>spinosad</i> , <i>neem</i>
Fire ants	<i>spinosad</i> (fire ant bait formulation)
Thrips	<i>spinosad</i>
Aphids, whiteflies, other soft bodied pests	oils, insecticidal soap, <i>pyrethrins</i> , <i>neem</i>
Stink bugs	<i>pyrethrins</i> , <i>spinosad</i> , <i>neem</i>
Beetles	<i>pyrethrins</i> , <i>spinosad</i> , <i>neem</i>
Scale insects	oils
Mites	oils, <i>sulfur</i> , insecticidal soap
Mosquito larvae	<i>Bacillus thuringiensis israelensis</i>
Yellow jackets	traps, <i>pyrethrins</i>
Slugs/snails	<i>iron phosphate</i>

Pyrethrins (*pyrethrum*) are produced by some varieties of chrysanthemum. Pyrethrins are often combined with piperonyl butoxide (PBO), which significantly increases the effectiveness of pyrethrins. The PBO is a synthetic chemical; some people do not consider PBO combinations an organic alternative. Pyrethrins are also available in product combinations with oil or sulfur to give the products greater activity against mites and diseases.

Risks: May kill bees and other beneficials. Extremely toxic to aquatic species. Pyrethrins can be toxic to cats.

NOTE: Very short (hours) residual activity. Insects may recover from pyrethrin exposure unless PBO is added to the product.

Pyrethrin products: Garden Safe, Ortho Ecosense, Bonide, others.

Horticultural oils and dormant oils are highly refined petroleum products or oils derived from plants. Petroleum oils are not on the list of approved organic products, but they do not have the human/environmental risks associated with most conventional insecticides.

Risks: May kill non-target arthropods if they are covered with oil.

NOTE: Be sure you are using the right oil and the right concentrations to minimize the risk of plant injury.

Petroleum oil products: Bonide All Seasons and many others.

Other oils include sesame oil, soybean oil, orange oils, cedar oils, canola oil, and other plant-based oils. We have limited information about their efficacy, but their activity is likely to be similar to petroleum oils. They may also cause phytotoxicity.

Oil products: There are dozens of products. Look at the list of active ingredients.

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Neem (azadirachtin) is derived from the Neem tree. Leaf extracts and oils pressed from nuts are available. Neem is an insecticide, an insect growth regulator, and a repellent. An insect growth regulator prevents juvenile insects from maturing properly.

Risks: High concentrations can harm fish. Relatively low risk to bees and other beneficial insects.

Neem products: Green Light, others.

Spinosad comes in two forms. The organic form is derived from a soil bacterium, *Saccharopolyspora spinosa*. The non-organic form includes some petroleum products as inert ingredients; it is not considered to be organic.

Risks: Quite toxic to bees until dry. Low risks for other non-target species.

Spinosad products: Fertlome, Bulls Eye.

Iron phosphate is the only organic slug bait in the U.S. Used for many years in Europe.

Risks: Low risks to non-target species.

Iron phosphate products: Ortho Ecosense, Worryfree.

Insecticidal soap may also be called Potassium Salts of Fatty Acids. They must be applied directly to the insects. They have no residual activity.

Risks: May cause plant injury, particularly when weather is hot or plant is water stressed.

Insecticidal soap products: Ortho Ecosense, Safer, others.

Sulfur is commonly found in combination with other organic products to provide control of fungal diseases.

Risks: Low risks to non-targets. May cause irritation of skin, eyes, and throat tissue.

Sulfur products: Many products are widely available.

Bacillus thuringiensis kerstaki is a strain of *Bacillus* bacteria that only infects caterpillars. The caterpillars must consume the bacteria. Birds, pets, fish, people, etc., cannot catch this strain of bacteria.

Risks: Very low risks to non-target species (except other caterpillars).

Bacillus thuringiensis kerstaki products: Dipel, Thuricide, others.

Bacillus thuringiensis israelensis is a similar strain of bacteria that controls mosquito larvae. Use it in water containers or ponds where mosquitoes are a problem. It is very effective for controlling mosquito larvae.

Risks: Very low risks to non-target species (except fly larvae).

Bacillus thuringiensis israelensis products: Mosquito Bits, Mosquito Dunks, others.

Bacillus popilliae is a bacterial strain that infects Japanese beetle larvae. It will not affect adult insects. There is no clear evidence that using *Bacillus popilliae* will reduce Japanese beetle damage in your yard.

Risks: Very low risks to non-target species (except beetle larvae).

Bacillus popilliae products: Milky Spore granules, Milky Spore powder, others.

Japanese beetle traps catch large numbers of Japanese beetle adults attracted from a large area. There is no clear evidence that using Japanese beetle traps will reduce Japanese beetle damage in your yard. On a large property, it may be possible to attract Japanese beetles away from desirable plants; however, this strategy is unproven.

Yellow jacket traps can help reduce the number of yellow jackets in a local area. May seem ineffective if other foods are nearby that are also attractive to yellow jackets. Yellow jacket holes can be sealed with a glass bowl to eliminate the colony. The bowl must fit tightly to the ground or the yellow jackets will escape under the edge. Only approach yellow jacket nests in the evening or early morning to reduce the risk of stings.

Diatomaceous earth is not recommended. It loses most of its effectiveness in damp/humid conditions, and it is difficult to avoid inhaling the dust.

Home brews are commonly used and widely touted on the Internet. Common brews include garlic, hot pepper, ground insects, etc. Because there is no consistency among brews, there are no reliable data to gauge their effectiveness. Garlic and hot pepper are known to repel some insects. Thorough coverage of the plant is required, or you will simply chase the insects from one part of the plant to another.

ADDITIONAL RESOURCES

Contact your local Extension agent!

omri.org — Organic Materials Review Institute and the National Organic Standard. Includes a list of all of the pest management chemicals accepted as organic.

attra.ncat.org/organic — National Sustainable Ag Information Service. This site has a great deal of information about organic production, including pest management.

ams.usda.gov/about-ams/programs-offices/national-organic-program — USDA National Organic Program.

ORGANIC FUNGICIDE/BACTERIACIDE OPTIONS

The products listed in this section are registered by the EPA and are approved by the National Organic Program for use in organic production. However, not all formulations are NOP approved and a current list of approved formulations can be found on the Organic Materials Review Institute's website, omri.org/omri-lists/download. The effectiveness of most of these products is generally limited when compared to conventional pesticides. Organic pesticides should not be considered as substitutes for or used as conventional fungicides in a pest control program, and should only be used judiciously and as a last resort in an integrated pest management program. Most plant diseases in the home garden can be managed without chemical intervention.

Major NOP Approved Products for Disease Management

TYPE OF DISEASES CONTROLLED	COMPOUND	NOTES
COPPER		
Many fungal and bacterial diseases, including powdery and downy mildew, fungal leaf spots, anthracnose, bacterial leaf spot and/or blight, fire blight, and rust on a wide variety of fruits, vegetables, and ornamentals. Labeled for many plants.	<i>copper sulfate</i> and <i>fixed coppers</i> (<i>copper hydroxide</i> , <i>copper oxide</i> , <i>copper oxychloride</i>)	Copper is toxic to fish, aquatic invertebrates and humans. Label directions and harvest intervals should be followed carefully. Copper is a heavy metal and must be used in a manner that minimizes accumulation in the soil. Coppers have the potential to burn the foliage and flowers of many plants. To avoid this problem, do not spray prior to or during the flowering period, or during prolonged cold, wet weather. Refer to individual product label for plants that may be treated.
Various diseases of fruits, vegetables and ornamentals including leaf curl on peaches and bitter rot, black rot, and scab on apples. Labeled for many plants but may no longer be readily available.	<i>bordeaux</i> mixture (hydrated <i>lime/copper sulfate</i>)	Lime added to copper sulfate increases the effectiveness of the copper. Phytotoxicity (burning of foliage and flowers) can occur on many plants including the young, tender leaves of peach, plum, rose and apple. Some sensitive plants require diluting the product to one-half strength (depending on the product used – see label) to avoid phytotoxicity. Should not be used during cool, wet weather since this can increase damage to plant foliage.
SULFUR		
Used in the dormant season to kill overwintering fungal spores of black spot, powdery mildew and rust of rose, leaf curl and shot-hole of peach, cane blight, and leaf spot of brambles. Some brands labeled for delayed dormant and/or growing season applications for scab and powdery mildew of apple, anthracnose, rust, and powdery mildew of blackberry, and powdery mildew and scab on pear.	liquid <i>lime sulfur</i> (<i>calcium polysulfides</i>) Many <i>lime sulfur</i> products labeled for residential use have been discontinued due to safety concerns.	Labeled for roses, peaches, pears, brambles, deciduous hedge plants, delphinium, lilacs, euonymus, columbine, crape myrtle, sweet peas, zinnias, ornamentals, and tuberous begonias. Do not spray when temperature is expected to exceed 80°F within 24 hours. Spray early in the morning or late in the evening to avoid burning of foliage. <i>Lime sulfur</i> is very caustic. Wear protective equipment and follow label for dilutions, etc. Also controls mites and scale.
Controls fungal diseases including powdery mildew, scab, and cedar apple rust of apples, brown rot, and scab of peach, plum, and nectarine, powdery mildew on brambles and strawberry. Also labeled for powdery mildew, leaf spots, rust, and botrytis on many vegetables and ornamentals (includes black spot of rose).	elemental <i>sulfur</i> (dry wettable <i>sulfurs</i> of flowable <i>sulfurs</i>)	Should not be used when the temperature is above 90°F or within four weeks of an oil spray as injury to the foliage may occur. Refer to individual product label for plants that may be treated. Do not use on apricots, cucumbers, d'Anjou pears, melons, spinach, squash or viburnum as <i>sulfur</i> causes injury and defoliation to these plants. <i>Sulfur</i> is lethal to beneficial insects, spiders, and mites leading to increased problems with certain pests including mites. Residue may be a problem.

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TYPE OF DISEASES CONTROLLED	COMPOUND	NOTES
OTHER COMPOUNDS		
Some control of insect vectors of viruses and a few fungal diseases such as powdery mildews and black spot.	Oils, horticultural, narrow range oils as dormant, suffocating and summer oils	Do not apply when <i>sulfur</i> compounds have or will be used. This combination is toxic to the plant. Repeated use can cause build-up in the soil.
Has some efficacy against foliar fungal diseases, in particular powdery mildew on various hosts.	<i>potassium bicarbonate</i>	Diluted in water and often mixed with insecticidal soap (surfactant) and horticultural oil to increase effectiveness.
Biological product made from the fermentation of the bacterium <i>Bacillus subtilis</i> . Some control of foliar diseases, mummy berry of blueberry and fire blight.	<i>Bacillus subtilis</i> Serenade MAX	Limited effectiveness against most diseases. Best used in a rotation with other NOP-approved products
Strain of a naturally occurring soil bacterium. Effective against soil pathogens such as <i>Pythium</i> , <i>Rhizoctonia</i> , and <i>Fusarium</i> . Also some foliar diseases such as downy and powdery mildew and <i>Alternaria</i> . May be more effective against soil pathogens.	<i>Streptomyces lydicus</i> Actinovate AG Actinovate Lawn and Garden	Limited effectiveness and must be used together with cultural methods of disease suppression. Used as a pre-plant soil drench or a foliar spray.