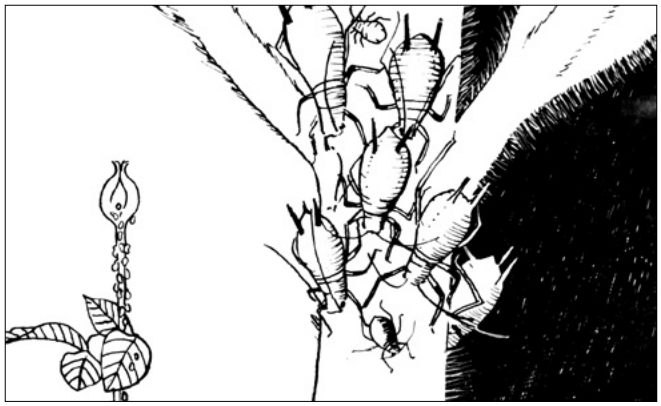
Insect Pests of Roses

We have tens of thousands of different species of insects and mites in Mississippi. Only a tiny percentage of these are pests of ornamental plants, and even fewer attack roses. Still, there are some insects and mites that cause serious problems for rose growers. Being able to identify these pests and distinguish them from non-pest species is the first step in control.

This publication discusses the identification and biology of some of the most common rose insects. It also discusses non-insecticidal methods for helping keep pests below damaging levels and lists insecticides that can be used to control these pests when outbreaks occur. There is also a section on insecticides and miticides that discusses common active ingredients, lists the pests they are most useful against, and gives some of the most commonly available brand names.

Aphids (about ⅛ inch)

Aphids are small, slow-moving, soft-bodied insects with piercing-sucking mouthparts. Several species occur on roses, but the rose aphid is one of the most common. Female aphids give birth to live aphid nymphs that can become mothers themselves within a week to 10 days. In addition, most aphids are females, and most female aphids are able to reproduce without mating. Consequently, aphids can quickly reach high populations.



Aphids

Damage

Aphids cause damage by sucking plant sap. Because they often concentrate on tender, growing tissue, like terminals and flower buds, they can cause distorted or stunted growth. These insects excrete a sticky substance called honeydew that contains large amounts of undigested sugars. Honeydew collects on leaves and supports a black fungal growth called sooty mold. Sooty mold fungi are not pathogenic, but accumulations of sooty mold are unsightly and can interfere with photosynthesis.

Management

Fortunately, there are many naturally occurring predators, parasites, and diseases that help keep aphid populations in check. Avoid unnecessary insecticide use, which can trigger aphid outbreaks by destroying these natural control agents. For heavy accumulations of aphids on terminals or buds, use a forceful spray of water to wash them from the plant. Avoid overuse of nitrogen fertilizer, as this encourages aphids. Some rose varieties are especially susceptible to aphids, while others are more tolerant. Chrysler Imperial, Midas, Tournament of Roses, and Pascali are examples of more susceptible varieties.

Control

acephate, acetamiprid, dinotefuran, imidacloprid, malathion, insecticidal soap, pyrethrins + canola oil

Soil-applied systemic insecticides like dinotefuran or imidacloprid help prevent aphids. When foliar treatments are needed, products like insecticidal soap, neem oil, or canola oil are least disruptive to biological control. For heavy infestations that require immediate control, use foliar sprays containing acephate, acetamiprid, imidacloprid, or malathion.

Whiteflies (1/16 to 1/8 inch)

Whiteflies are related to aphids. Adult whiteflies are small, moth-like insects that are covered with a white, waxy powder. There are several different species, but all carry their white, powdery wings folded tent-like over the body. They most often occur on the undersides of leaves, but clouds of adults will fly around infested plants when disturbed. Immature whiteflies are immobile, scale-like insects that feed on the undersides of leaves. They are flattened and oval-shaped. Depending on the species, they may have waxy filaments protruding from their bodies. These traits are difficult to see without a hand lens.

Whitefly

Damage

Like aphids, whiteflies suck plant sap through piercing-sucking mouthparts. They are also similar to aphids in their tendency to build to high populations and produce large amounts of honeydew, which eventually results in sooty mold.

Management

Avoid unnecessary insecticide treatments, which can disrupt natural biological control.

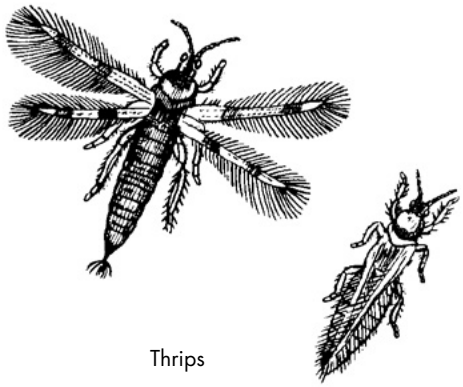
Control

acetamiprid, imidacloprid, dinotefuran, acephate, insecticidal soap, neem oil, horticultural oil

Dinotefuran and imidacloprid are useful for control of whiteflies when applied as soil drenches. When attempting to control whiteflies with foliar sprays, be sure to apply at least two successive treatments 5 to 7 days apart.

Thrips (about 1/16 inch)

Thrips are some of the most important insect pests of roses. There are several species, but flower thrips and western flower thrips are two of the most common. Thrips are tiny, elongate insects that are no more than one-sixteenth of an inch long when fully mature. Most adults have fringed wings that they carry folded lengthwise over the body, but these are only visible through magnification. Immature thrips are usually light yellow to lemon colored and are spindle-shaped.



Thrips

Damage

In roses, thrips cause damage mainly by feeding on flowers. Their injury reduces the beauty of the blooms, and heavy infestations can prevent buds from opening. Thrips feed by punching plant cells with their needle-like mandibles and sucking up the resulting plant juices. This results in silvery or bleached damaged areas on flower petals that eventually turn brown. Because feeding is often concentrated on young, actively growing tissue, petals and leaves are often crinkled or distorted as they continue to expand after being damaged. Low levels of thrips injury tend to be more obvious on white or light-colored blooms than on darker blooms, but severe injury will distort blooms regardless of color.

Management

Thrips are carried by prevailing winds. Well-placed windbreaks, either artificial or natural, can help protect rose plantings from the heavy populations of migrating thrips that often occur in late spring. These won't intercept all of the wind-blown thrips but can help reduce heavy thrips pressure. Consider bloom color when choosing varieties. Dark-colored blooms are less attractive to thrips than are white or light-colored blooms.

Control

acephate, acetamiprid, dinotefuran, malathion, imidacloprid, cyfluthrin, cyhalothrin, permethrin, spinosad, insecticidal soap

Soil-drench treatments such as dinotefuran or imidacloprid will help control foliage-feeding thrips. Thrips feeding in flowers are more difficult to control. During late spring to early summer, large numbers of thrips migrate from maturing weeds and other hosts. Weekly sprays may be necessary to minimize damage during such periods of heavy migration. Thrips also breed directly on roses, and these "local" populations can require control throughout the year. Spinosad is one of the more effective foliar treatments, especially for western flower thrips.

Chilli Thrips

Chilli thrips, *Scirtothrips dorsalis*, is a nonnative thrips species that is not yet widely established in Mississippi. Rose growers need to be aware of this new invasive species. Chilli thrips attack a wide range of host plants, including roses, even the Knock Out roses. Unlike most species of thrips that occur on roses, chilli thrips feed mainly on foliage, but they will feed in blooms. Heavy infestations can cause discoloration and distortion of rose leaves, resulting in severe damage and even complete defoliation. These symptoms are sometimes mistaken for herbicide or disease injury. If you notice these types of symptoms in your roses, use a hand lens to check for thrips on the undersides of leaves. Report suspected infestations of chilli thrips to your local county Extension office and/or the Mississippi Department of Agriculture. Spinosad, applied as a foliar spray, is one of the most effective treatments for chilli thrips. It will take several treatments to obtain control.

Leafhoppers (⅛ to ½ inch)

Leafhoppers are active, elongate, somewhat wedge-shaped insects. They have piercing-sucking mouthparts and readily run, hop, or fly when disturbed. There are many different species. Most are green to yellow, but some species are brightly marked with yellow, red, or blue.

Damage

Both adults and nymphs suck sap from the undersides of leaves and tender stems, causing leaves to become spotted or turn yellow. A white or yellow stippling of the leaves is one of the most common symptoms in roses. The stippling caused by leafhoppers is usually larger and more widely spaced than that caused by spider mites. In most cases, leafhoppers are minor pests that seldom cause serious injury.

Control

acetamiprid, cyfluthrin, cyhalothrin, malathion, dinotefuran, imidacloprid, permethrin, insecticidal soap, pyrethrins + canola oil

Apply foliar sprays as needed. Foliar sprays containing cyfluthrin, cyhalothrin, or permethrin will provide good contact control of nymphs or adults. Soil drenches of imidacloprid or dinotefuran will provide some control but are rarely applied specifically to control leafhoppers.

Spider Mites (about 1/32 inch)

Although they are not insects, spider mites belong to a closely related group. Adult spider mites are so small that they are barely visible to the naked eye, but you can see them easily through a 10X hand lens. Adults of most species are somewhat globular in shape and have eight legs. There are many different species. Color may vary from red to green or yellow. One of the more common species, the two-spotted spider mite, has a dark spot on either side of its body.

Spider mite

Damage

Spider mites are some of the most common arthropod pests of roses and some of the most difficult to control. They feed by sucking the fluid from plant cells. Adults and nymphs cause similar injury. Feeding by low numbers of mites is inconsequential, but these pests have a very high reproductive potential and can complete a generation in as little as 7 days. Heavy infestations can cause severe injury or even kill plants. Feeding by individual mites causes localized cell death, resulting in light-colored "stippling." When mite populations are heavy, these individual feeding sites merge, giving leaves a "bleached" or bronzed

appearance. Severely injured leaves may curl and drop from the plant. At first, mite infestations are only on the undersides of leaves. Under heavy infestations, the mites produce webbing and occur on the tops of leaves and other plant parts.

Management

Populations of plant-feeding mites are often kept in check by naturally occurring predatory mites and other predators. Outbreaks of spider mites often occur following insecticide treatments targeted against other pests because these treatments destroy the predatory mites. Avoid unnecessary insecticide treatments. Foliar applications of carbaryl, acephate, or pyrethroid insecticides have a tendency to trigger mite outbreaks. Outbreaks are also more likely to occur on plants that have been treated with imidacloprid. Outbreaks of some species of mites are favored by hot, dry weather, especially if acompanied by dusty conditions. Keeping plants well watered during periods of drought helps reduce the potential for mite outbreaks. Washing foliage with a water spray can also help control or prevent mites, especially if you spray the undersides of the leaves. Do this early in the day to reduce the risk of triggering plant diseases.

Control

insecticidal soap, neem oil, horticultural oil, pyrethrins + canola oil

Few specific miticides are available for use by homeowners. Horticultural oils provide effective mite control when thorough spray coverage is achieved. When using products that only control adults or kill by contact activity, apply two or more successive treatments 4 to 5 days apart in order to break the life cycle. Choose products carefully. Using ineffective products or inadequate treatment intervals can worsen mite problems. Remember, most of the mites are on the bottoms of the leaves; direct your spray there.

Serious rose growers often resort to using commercial miticides. There are several effective commercial miticides that are not classified as "restricted use" and can be purchased and applied by serious hobbyists/commercial producers. Be aware that these miticides can be very expensive but are highly effective when not overused. Many of these products exhibit translaminar activity (move from top to bottom of the leaf), which greatly improves effective coverage. Many control eggs and immature mites.

If you use these products, be sure to read and follow the label and wear all required personal protective equipment (PPE). Don't fall into the trap of relying too heavily on a particular miticide just because it works well initially. Overuse of a miticide can quickly create populations of mites that are resistant to that miticide. Take advantage of other methods of mite control, and switch to a different miticide after one or two successive sprays, as indicated on the label.

Eriophyid mites (about 0.25 mm)

Eriophyid mites are considerably smaller than spider mites (they are just visible with a 10X hand lens), and they only have four legs. There are many species of eriophyids. Most cause some type of growth distortion such as witches' broom, rosette, bud-proliferation, or rust on the plants they infest. The species of eriophyid that occurs on roses is *Phyllocoptes fructiphylus*.

Damage

The eriophyid mite carries a virus that causes a serious rose disease called rose rosette. Although this disease is uncommon, rose growers need to be aware of it and able to recognize the symptoms. Early symptoms may be mistaken for herbicide injury. Watch for a dense stem growth at the ends of canes that creates a rosette or "witches' broom." This growth is usually dark red but in some varieties is an unusual light green. The leaves in the rosette area will usually be smaller than normal. Stems tend to be brittle and may have more thorns than usual.

This disease is not only unsightly; it will eventually kill the plant. This disease is so deadly to roses that it has been investigated for use as a biological control for multiflora rose, which is a weedy invasive species. Multiflora rose is an especially good host for the eriophyid mite and the virus disease it carries.

Management

The best defense against rose rosette is to watch for symptoms and destroy diseased plants as soon as you diagnose them—before the disease spreads to your other roses. Once a plant shows symptoms, it is already infected with the virus. Controlling the eriophyid mites won't help. Get rid of the entire plant in a way that minimizes chances for the mites to be blown or transferred to other roses in your landscape. Put the plant in a plastic bag or burn it.

Infestations in cultured roses are often associated with nearby infestations of multiflora roses. Eliminating any nearby infestations of multiflora roses helps reduce the

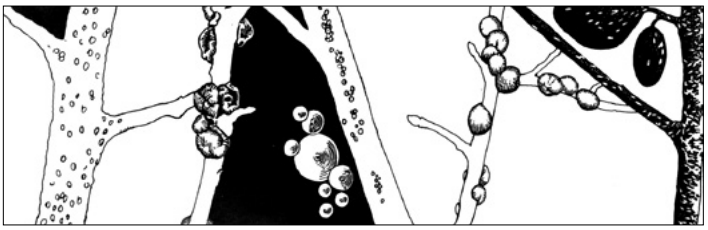
potential for infection in cultured roses. Eriophyid mites are wingless so can't fly, but they are easily windborne because of their small size. They can also hitch rides on insects—even insects as small as thrips.

Control

Controlling the mites on a plant that is already infected with the virus won't help that plant, but sometimes it is helpful to control the mites. For example, if you discover an infected plant in your landscape, you'll want to minimize the potential for spread to other roses when you remove it. Spray the infected plant and surrounding plants with an effective miticide a few days before you remove the diseased plant to help reduce the risk of mites moving to other plants. Not all miticides are effective on eriophyid mites, and no miticides are specifically labeled for the eriophyid that carries rose rosette. Abamectin or spiromesifen are the best options. These miticides are labeled for some species of eriophyids.

Scale Insects (about ⅛ inch)

Several species of armored scales occur on roses, with rose scales being one of the more common. Scale insects do not look like insects at all. Their bodies are covered with a hard, scale-like covering that may be round, elliptical, tear-shaped, or oyster shell-shaped, depending on the species. These scale covers often blend in with the bark of the plant, making the scales difficult to see. Females deposit eggs underneath their scale covers. The eggs hatch into tiny crawlers that move a short distance from their mothers and insert their mouthparts into the plant. There, they begin to feed and form their scale covers. From this point on, they remain in this location. If they are females, they do not move at all for the rest of their lives.



Scale insects

Damage

Scales damage plants by sucking sap from the plant with their thread-like sucking mouthparts. Heavy infestations also cause tissue damage as they probe and feed on plant cells. Scale infestations can reduce plant vigor and growth. Heavy infestations can cause the death of whole canes or even whole plants.

Management

Avoid purchasing scale-infested plants. Keep plants healthy and vigorous so they can better resist or tolerate infestation. Prune and discard heavily infested canes.

Control

horticultural oil, dinotefuran, acetamiprid

Horticultural oil is one of the best treatments for control of armored scales, but thorough coverage is critical. Only insects that are directly covered by the spray will be controlled. Soil applications of one of the systemic insecticides, such as dinotefuran, will also help control armored scales. Read and follow label directions.

Japanese Beetles (about ½ inch)

Although they are present in portions of Mississippi, Japanese beetles are not yet well established in the state. These damaging beetles are common in southern Tennessee and northwestern Alabama and are most likely to be seen in neighboring areas of northern Mississippi. Adult Japanese beetles are robust, shiny, metallic green and copper insects. They also have a row of white tufts of hair around the edge of the abdomen on each side. Look for these tufts to help distinguish them from other metallic-colored beetles, such as the green june beetle. The larvae are white grubs that feed on the roots of grasses.

Damage

Where they occur, Japanese beetles are one of the most important insect pests of roses. Adult beetles are strong fliers and migrate from nearby turfgrass, where the grubs develop, to feed on blooms of roses and other plants. Japanese beetles damage roses mostly by feeding on and disfiguring blooms, although they will feed on foliage, also. They are especially attracted to light-colored blooms.

Management

Handpicking and destroying adult beetles is a noninsecticidal method of control that can be reasonably effective on small-scale plantings with light infestations. Some gardeners use protective mesh cages to protect the buds and blooms of especially prized plants. Foliar sprays containing azadirachtin have been shown to repel Japanese beetles. You can buy traps that use synthetic pheromones to attract and capture Japanese beetles, but traps may attract more beetles to the area than they capture. If you use traps, place them well away from rose plantings.

Organic gardeners plagued by Japanese beetles may want to try a "push-pull" approach. Spray roses with

azadirachtin to help repel beetles. Place traps well away from rose plantings to attract them away from the roses and to catch and eliminate as many adults as possible. Supplement with hand-picking or other organic controls.

Control

imidacloprid, cyfluthrin, cyhalothrin, permethrin

Soil-applied systemic insecticide treatments will not prevent adult Japanese beetles from damaging rose blooms. Where Japanese beetles are common, repeated foliar insecticide treatments are necessary to prevent excessive bloom damage. Be aware that frequent spraying increases the potential for spider mite outbreaks.

12-Spotted Cucumber Beetles (about ⅜ inch)

These beetles are a shiny greenish-yellow and have 12 black spots on their backs. They are one of the more common beetle pests of roses. The larvae feed on the roots of various plants but are not serious pests of roses. Adults migrate to roses from larval hosts. There are several other species of beetles that occasionally attack rose blooms in a similar manner, and earwigs will also feed on rose blooms.

Damage

Adult cucumber beetles damage roses by feeding on the petals. A single beetle often does not cause enough damage to be aesthetically damaging unless blooms are to be cut for sale or exhibition. Blooms can be disfigured when several beetles feed in the same bloom.

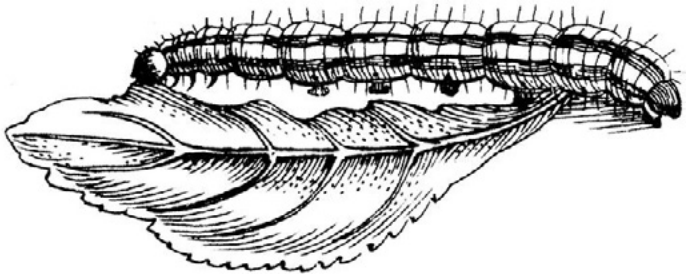
Control

acephate, acetamiprid, imidacloprid, cyfluthrin, cyhalothrin, permethrin

Foliar sprays of pyrethroid insecticides (bifenthrin, cyfluthrin, cyhalothrin, or permethrin) are effective against cucumber beetles, but these products can flare spider mites.

Caterpillars and Sawflies (length varies)

Several species of caterpillars and sawflies occasionally attack roses. Caterpillars are the larvae of moths or butterflies. Sawflies are the caterpillar-like larvae of a special group of wasps that feed on plant leaves. Rose slugs are some of the most common sawflies that attack roses. There are actually several species of rose slugs.



Caterpillar

Damage

Caterpillars and sawflies cause damage by feeding on the leaves, resulting in leaf skeletonization or defoliation. Severe defoliation is unsightly and can interfere with plant growth. Sawflies are especially likely to skeletonize leaves. Some species of caterpillars feed as leaf rollers. A few caterpillars, like tobacco budworms and some of the armyworms, will feed on buds or blooms, but this is uncommon.

Management

Handpicking can be an effective way to control isolated infestations of caterpillars or rose slugs, especially on small plantings. You can also use a forceful spray of water to wash rose slugs from the plants.

Control

acephate, Bacillus thuringiensis*, cyfluthrin, cyhalothrin, permethrin, spinosad*

Foliar sprays of spinosad are probably the best treatment for caterpillars and sawflies because they are less disruptive of the beneficial insects and mites that help control other pests, like mites and aphids. Broad spectrum treatments, like pyrethroids or carbaryl, will also work. *Bacillus thuringiensis* products are effective against leaf-feeding caterpillars but not rose slugs. Because they are slow-acting, Bts work best when applied when caterpillars are small.

Rose Midge (1/20 inch)

This insect is not common in Mississippi, but Mississippi rose growers need to be aware of this pest and able to recognize symptoms. It is a serious pest of roses across the northern regions of the country. The adults are tiny mosquito-like flies. The larvae are legless maggots, only about one-twelfth of an inch long, that feed inside the tissue of growing plant tips. Because of its size, this insect is easy to overlook. It is hard to overlook the damage heavy infestations can cause, but this damage is often not recognized as insect injury.

Damage

It is the larvae, or maggots, that cause the damage. They feed in the tips of developing shoots, causing them to be blackened and distorted and to fail to produce blooms. Heavy infestations can result in greatly reduced bloom production.

Management

Prune and destroy infested tips as soon as you detect them. Using plastic mulches can help reduce survival of pupating larvae.

Control

imidacloprid, cyfluthrin, cyhalothrin, permethrin, bifenthrin

Rose midges overwinter as pupae in leaf litter at the base of the plant. Soil drench treatments containing imidacloprid applied as a single application in early spring, before new leaf-out, can provide effective control.

Repeated sprays of pyrethroid insecticides (cyfluthrin, cyhalothrin, bifenthrin) can also be effective. Hose-end sprayers are the easiest way to apply these sprays. Do not target the foliage with these sprays; the objective is to thoroughly spray the soil, mulch, and leaf litter surrounding the plants, with the goal of controlling mature maggots when they drop to the soil to pupate, as well as emerging adults before they can lay eggs. Begin treating when roses begin to leaf out, and repeat treatments at 14-day intervals. Rose midges have multiple generations per year and can continue to damage new growth summer-long. Effective control of spring generations, when populations are lowest, will result in lower late-season populations. However, in areas with heavy infestations, gardeners may also have to apply sprays several times during the growing season to maintain control. Be aware that repeated applications of pyrethroids to plant foliage can trigger spider mite outbreaks, as can soil-applied applications of imidacloprid. If you must treat rose midges aggressively, be prepared for spider mite outbreaks.

Leafcutting Bees (⅝ inch)

These solitary bees build their nests in hollow stems, reeds, or pipes. They stuff the nests with pieces of leaves cut from various plants and feed them to developing larvae. Roses are one of the preferred plants for cutting leaves.

Damage

Adult bees cut semicircular holes in rose leaves, usually affecting only a few leaves on any one plant. These bees sometimes build their nests in the ends of garden hoses. Gardeners sometimes discover the tightly packed columns of leaf material, which look like small cigars, when they turn on the water.

Control

There's little that can be done to control this bee. Fortunately, damage is usually minor.

Fire Ants

See Extension Publication 2429 *Control Fire Ants in Your Yard* for information on fire ant control.

Fire ant

Insecticide General Information

Although there are hundreds of different insecticide products labeled for use in the home landscape, there are only a few dozen different active ingredients. When purchasing insecticides for use in the home landscape, it is important to think in terms of active ingredient rather than brand name. Brand names can be confusing and even misleading. This section provides general information about insecticides and miticides most commonly used on roses.

Use insecticides safely! Before using any insecticide or miticide, always be sure to read the label carefully and follow all label directions regarding personal protection equipment and instructions for mixing and applying the product. The label is the law, and its directions are designed for the safety of the applicator, the environment, and those using the area. Handle insecticides with the respect they deserve. They are poisons, and excessive exposure can result in acute or chronic health problems.

Be sure the insecticide is labeled for use on the plant(s) being treated. Some insecticides may actually cause injury, or phytotoxicity, to certain landscape plants. Before applying an insecticide to a particular species of plant, be sure to read the label and check that the product is labeled for use on that particular species or variety.

Insecticides and Miticides Used on Roses

{} *the primary rose pests controlled by each product*
** *insecticides suitable for use by organic gardeners*

Acetamiprid

{aphids, whiteflies, thrips, scales, caterpillars}

Acetamiprid is a broad spectrum, systemic insecticide that is applied as a foliar spray. Ortho Bug B Gon Systemic Insect Killer concentrate (0.5% acetamiprid) and Ortho Flower, Fruit, and Vegetable Insect Killer Ready-to-Use are brand names of two products available for homeowner use on roses. Acetamiprid is especially useful against sucking insects such as aphids, whiteflies, and scales, but it will also control many caterpillar and beetle pests.

Acephate

{thrips, aphids, caterpillars, rose slugs, cucumber beetles, Japanese beetles}

Acephate is currently sold under the brand names Bonide Systemic Insect Control (9.4% acephate) and Orthene Turf, Tree, and Ornamental 97 Spray (97% soluble powder). Acephate is a systemic insecticide that is effective against sucking insects like aphids, whiteflies, and scales, as well as thrips and many caterpillars and beetles. This is a useful broad-spectrum insecticide for rose growers, but it does have a strong, disagreeable odor that can persist for several days after an application.

*** Azadirachtin*

{aphids, whiteflies, thrips, Japanese beetles}

Azadirachtin is a botanical insecticide that acts as a contact insecticide and insect-growth disruptor. It is also somewhat repellent to Japanese beetles and other insects. Azadirachtin is sold to homeowners under the brand names AzaMax and Azatrol, which are approved organic insecticides.

*** Bacillus thuringiensis kurstaki*

{caterpillars}

Bacillus thuringiensis (Bt) is a bacteria that produces compounds that are toxic to certain insect species. Different species and strains of this bacteria 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. *Bt kurstaki* is effective against leaf-feeding caterpillars but is not effective against sawfly larvae, which are easily mistaken for caterpillars. Bt is most effective against small larvae. Attempts to control large caterpillars with Bt products may give disappointing results.

Dinotefuran

{scales, aphids, whiteflies, thrips}

Dinotefuran is a new systemic insecticide recently labeled for use by homeowners. It is sold under the brand name Zylam Liquid Systemic Insecticide or Safari 20 SG. This product is applied as a soil drench. The rate depends on the height of the shrub being treated. It provides slow-acting, long-term control of sucking insect pests such as aphids and whiteflies. Dinotefuran is especially effective against armored scales.

Horticultural Oils

{scales, spider mites}

Horticultural oils are highly refined paraffinic oils that are used to control scale insects, spider mites, and other small insects. Because oils work by contact activity, spider mites are not likely to develop resistance. Horticultural oils may be applied as dormant sprays or during the growing

season. Read and follow the label carefully to avoid plant injury. Horticultural oils can be especially useful against infestations of hard-to-control armored scales, like rose scales. Commonly available brand names include Sun Spray Ultra-Fine Year Round Pesticidal Oil, Volck Oil Spray, and Bonide All Seasons Horticultural Spray Oil.

Imidacloprid

{aphids, whiteflies, thrips}

Imidacloprid is a systemic insecticide. It is sold under many brand names. Bioadvanced Tree and Shrub Insect Control and Bonide Tree and Shrub Insecticide are two examples. These products are applied as a soil drench around the roots of ornamental plants, rather than as a foliar spray. There are several other formulations sold for homeowner use. One is a combination of imidacloprid and a fungicide. In the commercial horticulture pesticide market, imidacloprid is sold as Merit, which is available as either a granular product or a liquid concentrate. Imidacloprid is especially effective against sucking pests such as aphids, leafhoppers, and whiteflies when applied as a soil drench. It is relatively slow-acting but provides long-term control.

** *Insecticidal Soap*

{aphids, whiteflies, spider mites, thrips}

Insecticidal soaps are potassium salts of fatty acids. They control insects by disrupting cell membranes. They are most effective against soft-bodied pests such as aphids, mites, and thrips. Direct contact with the pest is necessary in order to achieve control. Safer Insecticidal Soap is an example of one brand name. Many plants can be injured by insecticidal soaps, especially if applied at excessive rates. Be sure to read the label carefully before treating.

Malathion

{aphids, cucumber beetles}

Malathion is another long-time standard insecticide. It is useful for control of aphids and certain beetles, but there are probably better options for roses.

** *Neem Oil*

{aphids, whiteflies, thrips, spider mites}

Neem oil is a botanical product that is useful primarily against aphids, mites, whiteflies, and scale crawlers. It also helps control certain plant diseases. It is labeled for use on most landscape plants and is sold under several brand names. Monterey 70% Neem Oil and Green Light Rose Defense are two examples. Thorough coverage of the pest is necessary to gain control.

** *Pyrethrin*

{aphids, whiteflies, thrips, spider mites, rose slugs, cucumber beetles, Japanese beetles}

Pyrethrin or pyrethrum is a botanical insecticide that is used mainly by organic gardeners. Monterey Bug Buster O is one common brand name. This insecticide provides rapid knockdown 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. Pyrethrin or pyrethrin + PBO is active against a wide range of insects, but its efficacy is limited by its very short residual activity. Although overall effectiveness is low to mediocre, pyrethrin remains useful for organic gardeners.

** *Spinosad*

{thrips, caterpillars, rose slugs}

Spinosad is a relatively new microbial insecticide that is very effective against most caterpillar pests and sawfly larvae. It is also one of the better treatments for thrips, especially western flower thrips, but is not effective against most other types of insect pests. Two commonly available brand names that are labeled for use in the home landscape are Monterey Garden Insect Spray and Fertilome Bore, Bagworm, Leafminer, and Tent Caterpillar Spray. Spinosad is sold as Conserve SC in the commercial horticulture market. Some formulations of spinosad are approved for use by organic gardeners. Green Light Lawn and Garden Spray is one example.

Pyrethroids

The term “pyrethroids” refers to a group of synthetic insecticides that are modeled after the botanical pyrethrum molecule but are much more effective and longer-lasting. These products are effective against a wide range of insect pests and are used at very low rates. Pyrethroids control most species of thrips but are only moderately effective against western flower thrips. Pyrethroids have a tendency to flare spider mite populations. The following pyrethroid insecticides are currently labeled for use in the home landscape.

Permethrin {thrips, rose slugs, cucumber beetles, Japanese beetles}

Permethrin is the oldest and most common of the pyrethroid insecticides. It is widely available and is sold under many different brand names. Martin's Vegetables Plus; Bonide Eight Vegetable, Fruit, and Flower Concentrate; and Hi-Yield 38 Plus Turf, Termite, and Ornamental Spray are three examples. Permethrin is labeled for use on many different ornamental plants and is effective against a wide range of pests. Permethrin is often confused with pyrethrin, but there are considerable differences in the overall effectiveness and residual control provided by these two insecticides.

Bifenthrin {thrips, rose slugs, cucumber beetles, Japanese beetles}

Bifenthrin is one of the more effective pyrethroid insecticides. One of the more commonly available brand names is Hi-Yield Bug Blaster. Bifenthrin is a broad-spectrum insecticide that is less likely to flare spider mites than most other pyrethroids.

Cyhalothrin {thrips, rose slugs, cucumber beetles, Japanese beetles}

Gamma cyhalothrin is another pyrethroid insecticide. Triazicide Insect Killer for Lawns and Landscapes Concentrate is the most common brand name. It is effective against a number of different insect pests and is labeled for use on most ornamental plants.

Cyfluthrin {thrips, rose slugs, caterpillars, cucumber beetles, Japanese beetles}

Cyfluthrin is an effective and broadly useful pyrethroid insecticide. It is sold as Bioadvanced Rose and Flower Insect Killer Concentrate, and it is sold under this same brand name as a ready-to-use spray. It is effective against a wide range of insect pests and is labeled for use on many ornamental plants. Like other pyrethroids, it is not effective against spider mites or whiteflies and has limited efficacy against aphids.

Commercial Miticides

Spider mites are challenging and difficult to control and will quickly develop resistance if repeatedly treated with the same product. This means you must rotate the use of different miticides to prevent resistance. The following miticides are available through suppliers of commercial horticulture products and specialty rose suppliers. These products are not classified as "restricted-use pesticides" and can be purchased and used by serious hobbyists with large numbers of roses. However, these products are not intended for small-scale use, and because they are only sold in commercial quantities, these products are often costly. These are some of the most effective miticides for commercial producers and serious hobbyists who grow large enough numbers of plants. Observe good resistance management practices when treating spider mites. Alternate products belonging to different classes of chemistry and do not exceed the recommended number of applications per season for a product.

Abamectin {spider mites, whiteflies, leafminers}

Avid 0.15 EC is an excellent miticide that also controls leafminers. For heavy infestations, apply a second application after 7 days. Rotate to a different miticide for subsequent applications. Avid controls adult and immature mites and exhibits good translaminar movement (moves from top of leaf to bottom) but has no activity on mite eggs.

Bifenzate {spider mites}

Bifenzate is sold as Floramite 2 SC in the commercial ornamentals pesticide market. It is an excellent general miticide that provides quick knockdown and long-term residual control. It also kills eggs. Bifenzate only works through contact activity, so good coverage is key to effective control. Apply only once before rotating to a different miticide.

Etoxazole {spider mites}

Etoxazole is sold as TetraSan 5 WDG. It has good contact activity against immature mites and eggs. It has good translaminar activity, which means that it will move from the top side of the leaf to the bottom, a useful feature for a miticide. Apply only once before rotating to a different miticide. Do not exceed two applications per year.

Spiromesifen {spider mites, whiteflies}

Spiromesifen is a relatively new miticide that is sold commercially as a liquid concentrate under the brand name Forbid 4F. This product exhibits translaminar movement. It provides good control of eggs and immature spider mites and will also control whiteflies. Apply only once before rotating to a different miticide. Do not exceed three applications per year.

This work is partially supported by Crop Protection and Pest Management, Extension Implementation Program grant no. 2017-70006-27200/project accession no. 1014037 from the USDA National Institute of Food and Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.

The information given here is for educational purposes only. References to commercial products or trade names are made with the understanding that no discrimination is intended against other products that may also be suitable.

Publication 2472 (POD-04-21)

By **Blake Layton**, PhD, Extension Professor, Entomology.

Copyright 2021 by Mississippi State University. All rights reserved. This publication may be copied and distributed without alteration for nonprofit educational purposes provided that credit is given to the Mississippi State University Extension Service.

Produced by Agricultural Communications.

Mississippi State University is an equal opportunity institution. Discrimination in university employment, programs, or activities based on race, color, ethnicity, sex, pregnancy, religion, national origin, disability, age, sexual orientation, gender identity, genetic information, status as a U.S. veteran, or any other status protected by applicable law is prohibited.

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director