Disease and Insect Control for Homegrown Peaches and Plums

It takes a committed gardener to consistently produce high-quality peaches or plums. These fruit crops are especially demanding when it comes to pest management because peaches and plums are attacked by many insects and diseases that must be controlled to have a successful crop. This publication provides information on how to identify pests and when to treat. It also includes a recommended spray schedule for disease and insect treatments based on stage of crop development.

This publication has been developed specifically for small-scale home orchards. The insecticide and fungicide recommendations given here are based on non-restricted use products that are readily available from local lawn and garden centers and sold in container sizes appropriate for small orchards. Commercial producers and large-scale hobby orchardists who have a private pesticide applicator license should obtain a copy of the *Southeastern Peach, Nectarine, and Plum Pest Management and Culture Guide*, available at ***https://secure.caes.uga.edu/extension/publications/files/pdf/B%201171_14.PDF***, and follow the recommendations for pest management in commercial orchards.

Diseases of Peaches and Plums

Some of the diseases that attack peaches in Mississippi are very aggressive, and missing one or two key sprays can result in the loss of most of a peach crop, especially if sprays are missed when weather conditions are favorable for disease development. ***Fungicides protect the plant or fruit from infection; they do not eliminate the infection once it has occurred.*** While fungicide sprays are necessary to grow peaches in the Deep South, much of the real protection from these diseases will come from removing and destroying the inoculum (or "seed"-producing structures) of these diseases.

The following disease descriptions may seem extensive to the point of "too much," but they will help you identify these disease infections so that you can prune and remove these structures from your trees, reducing the disease pressure. Similarly, descriptions of weather conditions necessary for a disease may seem unnecessary, but knowing the conditions that encourage the disease can help you decide how important it might be to get out and spray before or between rains.

When tree parts suspected of harboring disease are removed or pruned from the tree or surrounding soil, immediately place them in a plastic bag. Tightly close the bag and destroy it. If the limbs are too large to fit in the bag, place them well away from and downwind of the trees. Burn or otherwise remove them as soon as possible. Do not allow them to accumulate.

Brown Rot

Brown rot is a serious peach disease, but it is not very common on plums in Mississippi. The disease attacks many plant parts (blossoms, twigs, shoots, and fruit) from spring through harvest. Fungicides will help suppress the disease but control it only moderately when conditions favor the disease, especially in late season near harvest. Nonetheless, fungicides are almost a necessity in our climate.

The fungus that causes brown rot (*Monilinia fruticola*) overwinters in twig cankers, fruit mummies, and peduncles (stem-like structures that attach the flower/fruit to the branch). Removing these overwintering sites after harvest will reduce disease pressure the next season.

The brown rot fungus becomes active in early spring, about the time the flower buds develop into the "pink" stage. Warm, humid, wet weather favors rapid spread and disease development. The optimal temperature for disease development is 75°F, but slower disease development can occur as cool as 39°F and as warm as 86°F. Storms are a perfect time for spore movement because the free water (rain, dew, irrigation) on the trees provides the moisture for these seeds (spores) to germinate and infect the plant. The free water will need to be present for longer periods the further the temperature is from the 75°F optimum.

As the fungus grows, it produces **spores**, or seed-like structures. They are very small (like very small pollen) and easily carried by wind and rain. The fruiting areas that produce the spores are small, ash-gray tufts that emerge from the surface of the brown-colored infected tissue. Infections in mature fruits show these spores clearly (Figure 1).

Twig cankers are dead (brownish), sunken areas. The canker may stay on one side of the twig or may girdle (encircle) it. A weak or dead twig or fruit spur will emerge from the canker. Some cankers may be small and difficult to find. Larger infected twigs or spurs may ooze sap, which looks like a bubble of dark brown viscous gum. This is called **gummosis**. The amount of gummosis varies from none to a fair amount and will only occur on larger twigs and branches.

Mummified fruit is a favored location for many diseases to overwinter. The "mummies" are fruit that have dried, leaving an unappetizing mock fruit. They might be hanging from the tree, lying on the ground, or, worse, partially buried in the soil near the tree (Figure 2). Infected fruit mummies that have been buried or partially buried in the soil may produce small, brown, cup-shaped mushrooms (apothecial stage of the fungus). The mushrooms produce a different kind of spore that infects the trees. Retrieving and destroying all mummies will be very beneficial.

The fungal spores commonly infect the flower, fruit, peduncle, and twigs. The peduncle is the stout stem that connects the flower/fruit to the tree branches. Early-season infection of the twig and blossoms creates the small

Figure 1. Peach brown rot. The "fuzzies" on the left side of the peach are the spores produced by the fungal disease. Notice the light brown discolored area between the "fuzzies" and the bright color of the peach. This is the leading edge of infection where the fungus is invading and consuming the fruit; spores will soon appear on the outside.

Figure 2. The peaches here have been infected with brown rot and have fallen to the orchard floor. They will continue to produce spores and infect other peaches. They may mummify and, especially if partially buried, produce some small mushrooms that produce a second kind of spore that will infect spring blossoms.

cankers from which the fungus produces more spores. These early-season infections can substantially influence fruit infections later in the season.

In Mississippi, attacks on the flower by brown rot disease are not common. When they do occur, it seems to foretell a very challenging season for the grower, because the disease becomes prevalent. Symptoms of flower infection are called **blossom blight**. The blossoms will brown and probably collapse. The blight appears 3–6 days after infection, which will probably have occurred during a rain, irrigation, or long, heavy dew event.

Symptoms of shoot and twig infection will occur 3–4 weeks after infection. They may or may not follow from infected blossoms, from which the fungus travels down the peduncle into the twig or branch. As these infections progress, whole clusters of blossoms or leafy branches may wilt and die. This is because the canker cuts off the flow of water to these parts of the tree. Prune these out by cutting into healthy wood below the lesion as soon as possible. Remember to place the cut parts in a plastic bag, and seal and destroy it.

Brown rot may attack fruits at any time, but older fruit are more susceptible. Infection may occur directly through the skin of the fruit, through natural openings, and through wounds, especially those made by insects.

Direct your spraying and sanitation controls toward the sources of infection. Remove old, mummified fruit, peduncles, and infected twigs/branch parts from the tree and ground before spring. If harvest weather favors the disease, regular and thorough sprays will be necessary if you want to save your fruit from destruction by brown rot. Fungicides work preventively—they cannot eradicate an infection. This means you must be proactive and keep these protective sprays on the targets the fungus most likes to infect.

Peach Scab

Scab is a fungal disease caused by *Cladosporium carpophilum*. Although the primary damage caused by this disease is visual, it can provide entry wounds for brown rot. Heavy infections may also cause the peach to split.

The disease symptoms are velvety, olive-green spots on the fruit, leaves, or twigs. The spots are about one-sixteenth of an inch and enlarge to one-eighth of an inch. You will begin seeing these spots about 3 weeks after petals fall. When the spots are on the fruit, they will usually be on the stem-end side. When infections are numerous, they may merge and may cause the fruit to split. The fruit spots are confined to the skin; they do not enter the flesh.

Like brown rot, peach scab overwinters in twig lesions. Infections of twigs occur on new growth and are difficult to see. They start as raised, oval to circular areas that are pretty much the same color as the surrounding tissue. As they age, they may turn brownish. By season's end, the lesion edges may be somewhat purple and the lesions may have grown to one-fourth to one-half of an inch. The second season of infection is when these lesions will produce most of the spores. The spores are both air- and water-borne and require 24 hours of high relative humidity to germinate.

Peach Leaf Curl

Peach leaf curl disease is caused by the fungus *Taphrina deformans.* Peach leaf curl does not occur regularly on most peach and plum trees, but it can be a serious disease. Standard fungicide sprays used to control other diseases, such as brown rot, normally control this disease.

The disease is favored by moderate temperatures (48–81°F; optimal temperature for development is 68°F) and wet weather during early bud development. The humidity needs to be above 98 percent.

Two stages of the fungus make this disease unique. One type of spore is produced from curled (infected) leaves in the spring. The fungus can infect either side of the leaf. Infected leaf symptoms include yellow to reddish areas that get thicker as the fungus grows. The infected and thickening portion of the growing leaf causes that part of the leaf to grow more slowly than the rest of the leaf, causing the leaf to curl. These thick areas produce spores that, when germinated, produce a different phase of the fungus that grows on and along with the shoot tips, keeping up with their growth.

Sanitation and cultural controls are not effective for this disease. Some peach cultivars have been bred for resistance to this disease, so resistant cultivars and fungicides are the primary management tools. Copper sprays during tree dormancy, as well as in-season applications, are important. Once established in a group of trees, even radical pruning to remove infections will have only modest success controlling the disease.

Shot Hole

Shot hole is a fungus disease (*Wilsonomyces carpophilus*) that gets its name from the leaf symptoms—smallish brown spots that fall out, leaving a "shot" pattern in the leaf. The disease is present in Mississippi.

This fungus starts to cause problems during wet winter months when buds and twigs infected the previous season produce spores. The fungus infects and kills dormant buds. Some buds may have a varnished appearance, which results when tree gum seals the infection from the rest of the plant.

Stem lesions range from about one-tenth to three-eighths of an inch in diameter. Leaf and fruit lesions start as small, purplish areas that expand and turn brown. All may have a velvety, brownish mass of fungus in the middle during moist and humid weather. When the weather turns warm, the leaf lesions will fall from the leaf, leaving the "shot hole" appearance. Fruit lesions will be on the upper (stem) side and will become rough-textured, almost corky.

To manage this disease, you must protect the dormant buds. A single application of fixed copper or Bordeaux mixture before fall/winter rains provides winter-long protection. Growing shoots and fruits also need protection. A spray application immediately after fruit set is most common. Usually Captan is used because copper fungicides used at this time of year can cause plant injury (phytotoxicity). No resistant cultivars are available.

Bacterial Spot

As the name indicates, this disease is caused by a bacteria (*Xanthomonas arboricola* pv. *pruni)*. It can be very aggressive in the eastern United States because of generally higher humidity, wetter conditions, and longer dew periods than in the western states. Very susceptible cultivars cannot be grown here at all.

The bacteria depend upon free moisture (dew, rain, irrigation) to reproduce and for lesion growth. Rain driven by wind spreads the bacteria through the tree and among trees. Infections will be worse on the sides of the trees facing the winds that brought the infection. The optimal growth temperature is 75–84°F. The disease affects twigs, shoots, leaves, and fruits.

Leaf symptoms start as a water-soaked dark green spot that expands until it meets the veins inside the leaf. Because the leaf veins keep the lesion from spreading for a while, angular lesions (lesions with sharp corners) about one-sixteenth to one-eighth of an inch are a key that bacterial spot is the problem. If warm, wet weather continues, the lesions may enlarge and merge. As the lesions age, the insides will turn from a water-soaked dark green to a light purple color. As the weather dries, the lesions may turn brown and fall from the leaf. The lesions will be more common in areas of the tissue where water sits for any period of time, such as along the leaf midrib, on leaf tips, or along lower areas of the leaf margins. Leaves with numerous lesions may turn chlorotic (yellow) and fall from the tree.

This bacterial pathogen usually enters twigs through leaf scars, which are places where a leaf has fallen from the twig. Lesions that develop on the previous year's growth are called "spring cankers" or "black tip." They were infected by the bacteria moving through the leaf scars the previous autumn. Spring cankers appear as slightly raised blisters. They can expand to as long as an inch along the twig. Black tip is confined to the terminal bud area of the twig. The bud fails to open, and a dark canker can extend up to 1 inch down the twig from the bud.

Summer cankers form on newly growing shoots and are seen in late spring or very early summer. Favorable weather conditions may cause rapid bacterial growth, and the infection may kill the shoot.

Fruit symptoms first become apparent several weeks after petal fall. They appear as small, water-soaked, brownish lesions that might be mistaken for insect damage. As infection progresses, gum may ooze from the lesions during periods of high humidity. As the fruit and the infection age, the lesions may crack open and perhaps sink.

Bacterial infections can only be managed with proper sanitation, copper-based products, or antibiotic sprays and host plant resistance. There are cultivars with resistance to this disease. Common resistant cultivars include Redskin, Redhaven, Loring, Candor, Biscoe, Dixired, Sunhaven, Jefferson, Madison, Salem, Contender, Harrow Beauty, and Harrow Diamond. Bacterial spot is a very difficult disease to manage. If you are planting peaches or plums, please select a resistant cultivar.

Black-knot

Black-knot is caused by the fungus *Apiosporina morbosa*. The primary symptom in established infections occurs on wood and consists of outgrowths or knots on shoots, spurs, branches, and trunks. Old knots are hard, dark, almost black, raised areas. The raised areas are often invaded by insects whose damage may, in turn, be invaded by secondary pink or white fungi.

Infection starts in the spring when the tree enters the green tip stage, with most infection occurring between very early bloom and the end of petal fall. Spores released from 2-year-old infected tissue are moved by wind and splashing rain to new shoot growth. For the spores to be made, at least 6 hours of rain are needed at 70°F, which is close to the optimal growth temperature for the fungus.

Symptoms of new shoot infection are difficult to detect. Perhaps the most obvious symptoms are the branches growing at right angles. Less obvious are the small, olive-green knots that might be firm to somewhat corky. The knots later turn hard and will probably break off easily.

Black-knot can be a problem in Mississippi plum trees, usually when those trees are within about 600 feet of wild plums and cherries or when the trees have not received care for a substantial length of time. Fungicides apparently suppress the disease, but pruning out black-knot cankers anywhere on the tree is a necessity. Wild

plums and cherries within 600 feet should be removed if possible. Prune infections in wood about 4 inches below the lowest symptom of infection. Midsummer pruning is the most effective since the outer swelling is the closest to the infection on the inside of the wood. Fungicides should be applied during the time of active shoot growth if the disease is a problem in your area.

Plum Pockets

The fungus *Taphrina* causes plum pockets disease, but, while present in Mississippi, it has not been a serious problem. It is included here because it occurs frequently enough for many people who raise plums to see it. Although the fungus infects leaves, shoots, and fruit, symptoms are most obvious on fruits. Symptoms become obvious on all plant parts 6–8 weeks after bud break.

Fruit become enlarged (up to 10 times their normal size), wrinkled, and distorted. The centers of the fruit are spongy or hollow and may or may not contain a pit. When the fruits dry, they turn brown to black and are called "bladder plums," "mock plums," or, most often, "plum pockets."

Twisting and curling are the most common signs of leaf and fruit infections, but these symptoms may not be present.

If planting new trees, select resistant cultivars. The most effective fungicide practice is a single fungicide spray in late autumn or before spring budbreak. Bordeaux mix, chlorothalonil, and liquid lime sulfur are effective treatments.

Fungicides for Homegrown Peaches and Plums

Captan

Captan-containing fungicides with labels for use on residential orchard trees include the following products:

Bonide Captan
Hi-Yield 50 W Captan Fungicide
Southern Ag Lawn and Garden Captan Fungicide

Chlorothalonil

Chlorothalonil-containing fungicides with labels for use on residential orchard trees include these:

Fertilome Broad Spectrum Landscape and Garden Fungicide
Hi-Yield Vegetable, Flower, Fruit, and Ornamental Fungicide
Monterey Fruit Tree, Vegetable, and Ornamental Fungicide
Southern Ag Lawn and Garden Liquid Ornamental & Vegetable Fungicide Contains Daconil

Coppers

Copper fungicides come in different formulations and brands. Formulations include basic copper sulfate, cuprous oxide, copper hydroxide, and copper octanate. The labels differ depending on the percent of metallic copper in the product. The rates of use should decrease the later in the season the product is to be used to avoid damage to the trees. Check your water pH before using coppers because spraying coppers in water with pH less than 6.5 can result in tree injury. Adjust the water pH using an appropriate spray buffer. Do not apply copper-based fungicides at temperatures greater than 90°F to avoid tree injury. Do not use copper fungicides in conditions that may be overcast with high humidity for 3 or more days.

Copper fungicides with labels for use on residential orchard trees include these:

Bonide Liquid Copper Fungicide Concentrate
Monterey Liqui-Cop
Natural Guard Copper Soap Liquid Fungicide
Southern Ag Lawn and Garden Liquid Copper Fungicide

Myclobutanil

The myclobutanil-containing fungicide labeled for use on residential orchard trees is

Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate for Gardens

Propiconazole

Propiconazole-containing fungicides with labels for use on residential orchard trees include these:

Bonide Infuse Concentrate
Monterey Fungi-Fighter

Sulfur

Sulfur-containing fungicides with labels for use on residential orchard trees include these:

Fertilome Dusting Sulfur
Hi-Yield Dusting Wettable Sulfur
Southern Ag Lawn and Garden Wettable or Dusting Sulfur

Insect Pests of Peaches and Plums

Plum Curculio

The plum curculio, *Conotrachelus nenuphar*, is one of the most damaging insect pests of homegrown peaches and plums. The white, legless grubs are the "worms" so often encountered in fruit that has not been adequately protected. Adults are small weevils that overwinter in leaf litter and ground trash in or near the orchard. The adults become active about the time peaches begin to bloom. They fly to trees to feed on buds and newly set fruit; females chew crescent-shaped punctures through the skin of developing fruit to insert their eggs. Grubs hatch and feed inside the fruit until mature. Fruit that are attacked when small usually abort, but larger fruit remain on the tree with developing larvae inside. Picking up and destroying fallen fruit can help reduce future infestations. Mature larvae drop to the ground when they are ready to pupate. There are two to three generations per year.

Successful control of plum curculios depends on killing the adults before they are able to lay their eggs in the fruit. Begin including malathion in cover sprays as soon as petals fall and apply on a 10- to 14-day schedule (tighten the spray schedule during rainy periods). Extending the spray intervals will result in reduced control. Tightening spray intervals to 7–10 days, especially for the first few cover sprays, will improve control. The first few sprays after petal drop are the most important because they target the overwintered adults that will lay the eggs for the first generation.

Stink Bugs and Plant Bugs

Several species of stink bugs, as well as tarnished plant bugs, will feed on developing peaches and plums, causing catfacing injury. It is usually adult insects that cause this damage. Their feeding kills developing cells at the feeding site and causes the fruit to be distorted as it grows. Cover sprays containing malathion will usually control catfacing insects. Permethrin is also effective against stink bugs and will control plant bugs in non-Delta areas of the state.

Oriental Fruit Moth

The caterpillar stage of the oriental fruit moth, *Grapholita molesta*, bores into the terminals, or tips, of peach tree branches, causing them to die back 4–6 inches. This damage is not serious unless populations are high, but once the terminals harden and become unattractive, the caterpillars begin boring into fruit.

The oriental fruit moth is relatively uncommon but can cause significant fruit damage. Watch for early signs of dying terminals and tighten the cover spray interval if necessary to protect fruit. Infested fruit may have masses of gummy sap containing frass at the point of entry. Permethrin can be substituted for malathion if necessary to control heavy infestations.

Peachtree Borers

Two species of peachtree borers attack peaches and plums: peachtree borer (PTB), *Synanthedon exitiosa,* and lesser peachtree borer, *Synanthedon pictipes*. Both are wasp-like, day-flying moths whose larvae bore under the bark and tunnel in the cambium. Peach tree borers usually focus their attack on the lower 10–12 inches of the trunk down to the root flare and extending a few inches belowground. Lesser peach tree borers attack higher on the trunk and on lower scaffold limbs. Peach tree borers are the more damaging of these two species.

Moths are especially attracted to trees that have injured areas on the trunk or have previous bore infestations. Keeping trees healthy and protecting trunks and root flares from mechanical injury helps reduce attacks. The eggs are deposited on the surface of the bark, and newly hatched larvae promptly bore into the tree. If PTB are not controlled, trees may die as the result of the cumulative damage caused by larvae tunneling through the cambium. Young, small-diameter trees are especially vulnerable. Balls of gummy sap that contain frass and sawdust indicate bore infestation. Note that some disease infections also cause peach and plum trees to exude gummy balls of sap through the bark. Sap balls that contain frass and/or sawdust indicate a bore problem; sap balls that are clear/free of frass and sawdust indicate disease problems.

The key to controlling peach tree borers is to kill the newly hatched larvae before they bore through the bark. This means applying a trunk spray at the proper time of year so the newly hatched larvae have to crawl through the insecticide residue as they bore into the bark. Low numbers of moths may be active in June and July, but cover sprays for other insect pests usually control these. Heavy PTB moth flight does not occur until August and September, usually peaking around early September, and this is the time to apply trunk sprays for peachtree borer control.

Permethrin is currently the best treatment available for peachtree borers in small home orchards. Mix at the highest rate labeled for trunk sprays, and thoroughly spray the lower scaffold limbs, the trunk, and the root flare. Apply a second spray in 2–3 weeks; a single application of permethrin will not provide adequate residual control. Treatment dates around mid-August and the first week of September are appropriate for most of the state. To protect trees that are heavily infested or especially vulnerable, make three applications at 2-week intervals, beginning in mid-August.

Granulate Ambrosia Beetle

This tiny beetle occasionally attacks and kills peach and plum trees, as well as many other trees in the home landscape. Actually, it is not the beetle that kills the tree, but the disease it carries and inoculates into the tree. Because they are less than one-eighth of an inch long, the beetles themselves are rarely seen. The sign to look for is the compacted columns of sawdust these beetles create as they bore into the tree. Except for the fact that they are often curved, these sawdust columns are similar to toothpicks in size and color. Be aware, however, that this sign is short-lived, as these sawdust columns are easily broken off by wind and rain.

Even a half-dozen attacks is enough to kill a small tree, and there is no effective rescue treatment. This pest has several generations per year, but most fatal attacks to fruit trees occur in early spring, just as trees are leafing out. These beetles attack many species of trees and shrubs, but peaches and plums seem to be favorite targets, possibly because of pruning activities. Newly planted trees, less than 3 or 4 years old, are most susceptible, but older trees are also attacked.

Fortunately, granulate ambrosia beetle attacks are sporadic; they may kill two or three of your seven trees one year and not return for several years. In most situations, there is no practical treatment or response other than to recognize what killed the tree and to cut it down and burn the wood to prevent further spread. To treat preventively, mix permethrin according to label directions for a trunk spray and apply at 2-week intervals, beginning just before buds begin to swell and continuing until just before bloom. Spray to cover the trunk, scaffold limbs, and larger branches. Trees less than 4 years old are most likely to benefit from such treatments. Note that sprays for ambrosia beetles must be applied much higher on the tree than for peachtree borers.

Scale Insects

Heavy infestations of San Jose scale or white peach scale can severely damage peach and plum trees. Scale infestations are difficult to detect because the insects are small and immobile. Watch for irregular, crusty, brown or white patches on limbs and twigs, and then use a hand lens to see individual insects (Figure 3). Scales will also occur on fruit when infestations are heavy. Insecticides used in spring and summer cover sprays help control newly hatched scale crawlers, but dormant horticultural oil sprays are the most effective treatment for scales. Apply a single delayed-dormant treatment in late winter to early spring as a preventive treatment or to control light infestations. Trees that are heavily infested with scales should be treated in late fall, after 95 percent leaf drop and before onset of freezing temperatures, and again in late winter to early spring (delayed-dormant period). Apply spring oil sprays before buds break and new leaf growth is evident. Do not apply oil sprays within 30 days of (before or after) making a spray that contains sulfur.

Figure 3. Irregular, crusty, brown or white patches on limbs and twigs indicate scale infestation. Use a hand lens to see individual insects.

Mites

Several species of mites attack peaches and plums. Two-spotted spider mites are the most common, but European red mites and silver mites may also occur. Heavy infestations of spider mites can be damaging and difficult to control because there are no effective miticides labeled for home use. Minimize foliar sprays containing pyrethroid insecticides, such as permethrin, and avoid treatments that contain carbaryl (Sevin) because these treatments tend to encourage spider mite outbreaks. Some mites overwinter as eggs on the bark, and these overwintering eggs can be controlled with a delayed/dormant application of horticultural oil. If heavy mite populations occurred in the previous season, make an application of horticultural oil just before bud break to help reduce the potential for further mite outbreaks.

Protect bees and other pollinators. Avoid spraying insecticides while fruit trees are in bloom. There are no major insect pest problems to be concerned about during this period anyway. Begin your insecticide spray program promptly after petal drop to control overwintered curculios and catfacing insects.

Insecticides for Homegrown Peaches and Plums

Horticultural Oils

Horticultural oils are usually applied in winter to early spring, after leaves drop in the fall and before buds break, to control San Jose scale and white peach scale, as well as overwintering mites. Read and follow the label carefully to avoid injuring plants. Avoid applying horticultural oil sprays when temperatures are below freezing or are likely to drop below freezing for the next 2–3 days. Bonide All Seasons Horticultural Spray Oil and Ortho Volck Oil are two examples.

Malathion

Malathion is the most effective treatment available to homeowners for controlling plum curculios and is the key insecticide recommended for early cover sprays (beginning at petal fall). Malathion is also effective against immature scale insects (crawler stage) and catfacing insects (stink bugs and plant bugs) and will help control oriental fruit moths and lesser peach tree borers. Examples of brand name formulations include Bonide Malathion Concentrate and Ortho Malathion Insect Spray. The pre-harvest interval for malathion is 7 days on peaches. Avoid applying malathion during periods of overcast or highly humid weather because the spray will dry slowly and increase the potential for plant injury.

Permethrin

Permethrin is a pyrethroid insecticide that controls a wide range of insects. It is the most effective treatment currently available to homeowners for control of peach tree borers. Because overuse of permethrin can trigger outbreaks of spider mites, scales, and aphids, it is not recommended for early cover sprays. Permethrin is effective against oriental fruit moths and catfacing insects, as well as plum curculios, and can be substituted for malathion in one or two of the summer cover sprays. There are many commercial formulations of permethrin that are not labeled for use on peaches and plums. Check labels carefully before you buy. Hi-Yield Lawn, Garden, Pet, and Livestock Spray (10%) and Bonide Total Pest Control Outdoor Concentrate (13.3%) are examples of two products that are labeled for use on peaches. The pre-harvest interval for permethrin is 7 days on peaches.

Pre-Mixed Fruit Tree Sprays

Several companies sell pre-mixed fruit tree sprays. These usually contain a fungicide and one or more insecticides. Malathion should be one of the insecticides. Bonide Complete Fruit Tree Spray Concentrate and Gordon's Liquid Fruit Tree Spray are two examples (both contain 11.76% Captan, 6% malathion, and 0.3% carbaryl). Such products can be an effective and convenient way to buy and apply pesticides, but read the label carefully before purchasing to be sure the product contains the active ingredients you need. Some "fruit tree sprays" contain active ingredients that are only marginally effective against important insect and disease pests.

Sanitation

A good sanitation program can greatly improve control of diseases and insects. The following sanitation and management practices are simple, inexpensive, and effective:

- Remove all dead branches and rotted and mummified fruit from trees and the orchard floor.
- Remove leaves, bark, sticks, and plant debris near trees.
- Remove any swollen branches from plums.
- Prune trees properly to allow good air circulation and light penetration.
- Protect the trunk and root flare area from mechanical injury.

Spray Suggestions

Controlling tree size makes them easier to spray. Pruning reduces tree height and number of limbs. This allows better air circulation and greatly improves spray coverage. Use adequate spray volume for the size of the trees you are treating and take care to get good spray coverage. Apply sprays as a mist of fine droplets with enough pressure to completely cover the tree. Be sure your spray pattern reaches the highest leaves.

Disease spray intervals may need to be tightened during periods of warm, wet weather. Sprays also need to be reapplied, or spray intervals tightened, following rainfall of a half-inch or more. Never use a sprayer for peach and plum trees that has been used to apply 2,4,D weed killers.

Number of Gallons of Spray Required, Based on Tree Size

Gallons	Tree Size – Height (ft)	Tree Size – Spread (ft)
½–1	5–8	3–6
1–2	8–10	4–8
4–5	10–15	8–15
8–10	15–20	15–25

Be careful when applying pesticides. Always follow all label recommendations and restrictions.

Home orchardists are sometimes discouraged by the number of disease and insect treatments it takes to make a good crop of unblemished fruit. "I just want to be able to make a few peach cobblers every year. Can I get by with spraying less if I am willing to accept lower yields and some damaged fruit? If so, which sprays are most important?"

For insect control, the most important sprays are the three to four curculio sprays beginning at petal fall. The goal is to control the overwintered adults before they can establish an infestation. These sprays will also control catfacing insects. It's also important to spray for peachtree borers in August and September to protect your trees from these pests. Treat for scale and other insects as needed.

Cutting back on disease control sprays is risky. If a disease gets established during the season, the consequences can be severe and long lasting. The most important treatments are the dormant sprays and sprays through flowering. You can reduce fungicide sprays by applying fewer cover sprays during periods of dry weather.

The information given here is for educational purposes only. References to commercial products, trade names, or suppliers are made with the understanding that no endorsement is implied and that no discrimination against other products or suppliers is intended.

Before purchasing and using any pesticide, always carefully read the label to make sure the product is labeled for the intended use.

Carefully follow all instructions and restrictions specified on the product label.

Spray Schedule to Control Diseases and Insects

Read pesticide labels carefully and observe all directions and restrictions.

Dormant (before buds swell in spring)	
Time of Application	Material to Use per Gallon of Water
Peach leaf curl and bacterial spot	2 cups liquid lime sulfur Apply copper fungicide at the bacterial spot rates.
Scale insects (especially if they were a problem last year) or mites, especially European red mites.	Horticultural oil—Follow label directions for mixing. Do not apply when temperatures are below freezing. Do not apply when freezing weather is anticipated within the next 2–3 days.
Delayed dormant (1–5% bud swell)	
Time of Application	Material to Use per Gallon of Water
If leaf curl or plum pockets are a problem	Copper fungicide spray[1]
Beginning of bloom (pink to 5% bloom)	
Time of Application	Material to Use per Gallon of Water
If bacterial spot is present	2 tbsp Captan[2] 50% WP (fungicide)
If black-knot of plum is present in the area (such as in wild plums)	Chlorothalonil[3] **Do not apply insecticides during bloom.**
Bloom	
Time of Application	Material to Use per Gallon of Water
If brown rot was a problem the previous year	Captan[2] or Chlorothalonil[3]
If black-knot was a problem the previous season	Chlorothalonil[3] **Do not apply insecticides during bloom.**
Petal fall to start of shuck split (after ¾ or more of the petals have fallen)	
Time of Application	Material to Use per Gallon of Water
For disease control:	
If scab was a problem the previous season	6 tbsp sulfur 80% WP (fungicide) or
If scab or black-knot was a problem the previous season	2 tbsp Captan[2] 50% WP (fungicide) + Spectracide Immunox[5] ½ fl oz (fungicide)[5] or Captan 50% WP (fungicide) or Immunox ½ fl oz (fungicide) OR propiconazole[5] or
Bacterial spot	Copper-based fungicide
For insect control:	**AND**
Cover sprays for plum curculio and catfacing insects The first few sprays after petal fall are especially important for plum curculio control.	2 tsp malathion 50% EC (insecticide)[3]
Summer cover sprays (beginning at shuck fall[4] and at 10- to 14-day intervals until harvest; shorten spray intervals if there are frequent rains)	
Time of Application	Material to Use per Gallon of Water
For disease and insect control:	2 tbsp Captan[2] 50% WP + Spectracide Immunox[5] ½ fl oz or propiconazole[5] (fungicide)[5]
	AND
For plum curculio and catfacing insects	2 tsp malathion 50% EC (insecticide)[3]
Two weeks before harvest and up to harvest	We especially recommend you use Captan + (Spectracide Immunox ½ fl oz or Bonide Infuse 1 fl oz) for brown rot control[5]

Post-harvest (mid-August and early September)	
Time of Application	Material to Use per Gallon of Water
	Permethrin trunk sprays for peach tree borers; mix per label directions. Apply two to three sprays at 2- to 3-week intervals.
Early dormant (late fall after leaf drop and before freezing temperatures)	
Time of Application	Material to Use per Gallon of Water
For disease control:	Chlorothalonil[3] or lime sulfur; especially needed if peach leaf curl or plum pockets have been a problem.
For scale insects or overwintering European red mites	Apply horticultural oil after 95% leaf drop and when weather is favorable.

WP – wettable powder
tbsp – tablespoon
EC – emulsifiable concentrate
tsp – teaspoon

[1]The rate of copper must be reduced as the season progresses; otherwise, tree injury (phytotoxicity) may result. Carefully follow label directions. Copper antibacterial activity and phytotoxicity are related to the pH of the water used to dilute the fungicide. Water pH less than 6.5 may increase the risk of phytotoxicity. If necessary, adjust the pH of the water before mixing.
[2]Do not apply Captan within 14 days of an oil spray (as in horticultural oil). Captan may cause leaf spotting if leaves are drenched (excess solution applied to leaves) or if leaves do not dry for a long period.
[3]Do not tank mix chlorothalonil with an EC formulation of any product, such as malathion EC. Tree injury will result.
[4]Shuck fall is the stage when all flower parts have fallen from the newly formed fruit. It occurs 5–7 days after petal fall.
[5]Do not apply myclobutanil (Spectracide Immunox) OR propiconazole (Bonide Infuse or Monterey Fungi-Fighter) in any combination more than seven times per season for brown rot control.

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