

Crop Profile for Peaches in Alabama

Prepared September 2009

General Production Information

The state of Alabama ranks 9th among the peach producing States in the United States of America (U.S.). The state produces about 1.2% of the total U.S. peach crop with about 4,000 acres (15-30 million pounds) and a market value of about \$10 million (1). All peaches grown in the state are sold as fresh eating peaches. Approximately seventy percent of these are sold to wholesalers, with the remaining thirty percent sold by roadside stands.

Production Regions

Peaches are grown almost statewide in Alabama, but the major production counties are Blount, Limestone, and Chilton, with Chilton being the largest producing county (1). Other key peach producing counties include Mobile and Houston counties (Table 1).

County	Peach production (lb)*
Chilton	15,330,000
Limestone	1,360,000
Blount	1,340,000
State Total	20,300,000

Table 1. Key peach producing counties in Alabama.

* 2002 production data (1).

Cultural Practices

For optimal growth and fruit production peach orchards should be grown on deep, well drained medium textured soils having moderate fertility. Soils which are shallow and heavy should not be used because root growth may be restricted and hence the impact of drought, excess water and low temperatures will be serious (2). Herbicides should be sprayed at a distance of about four feet on both sides of each tree row to reduce weeds. In order to combat erosion, grass or sod should be established in areas between tree rows and mowed three to four times per year.

Alabama peach orchards typically contain up to 25 different varieties of trees. Some of the common varieties grown in the state include: Springprince, Rubyprince, and Juneprince (early season varieties); Harvester, Fireprince, Redhaven, and Loring (mid-season varieties); and O'Henry and Flameprince (late season varieties). The varieties produce different harvesting times from the first harvest in mid May until the last harvest in mid August. Growers can expect a small harvest three years after planting. Major bloom occurs in early to mid March, and

thinning of fruit should follow within 45 days post bloom. Peaches are thinned by hand by removing damaged, small, and excess fruits. The amount of thinning is correlated to tree size and amount of fruiting wood, and harvest period. Early maturing varieties are thinned more heavily than mid and late season varieties. Orchards should be thinned only once per season. Although thinning is normally done about 45 days post bloom, thinning closer to bloom has an increased effect on fruit size. However, Alabama growers are encouraged to wait until at least April to thin to combat detrimental effects of frost or freeze damage. Late frosts have wiped out 90% of peach production in Alabama in the last decade (1996, 2002 and 2007). The major way of minimizing frost damage in Alabama is to choose the right variety and orchard site for your area. Growers in Northern Alabama should grow varieties with a chilling requirement of at least 850 hours. In Central Alabama varieties with at least 750 chilling requirements are acceptable. Several other methods are also employed by Alabama peach growers to combat frost, such as wind machines placed in the orchards or helicopters hovering above orchards in order to invert warmer air.

Although Alabama typically receives adequate yearly rainfall for peach orchards, irrigation systems are recommended due to possible dry periods. This is especially recommended for younger trees. Drip irrigation is recommended for sandy loam and clay loam soils; whereas spray irrigation is recommended for sandier soils. Most orchards in the southeastern U.S., however, use micro-irrigation, which is only used during long periods without precipitation (2). For an orchard in Alabama 3600 gallons of water per acre per day is sufficient, yet sandier soils should use 4800 gallons per acre per day. A small percentage of Alabama peach growers score the trees. This practice can increase fruit size and yield. However this process may also make easy entry sites for pests. All of the peaches grown in the state are handpicked during harvesting. Individual fruits should be picked when all green color around the stem has vanished.

Worker Activities

The worker activities relate to the level of labor input required for a successful commercial orchard operation in Alabama. The activities may be different depending on the stage of the plant, and are discussed under two headings: non fruit bearing stage and fruit bearing stage.

Non-fruit bearing stage (orchard establishment and tree maintenance): Availability of labor is extremely important for most of the operations in the orchard. Some of the activities requiring high input of labor are discussed below:

Tree planting: Properly planted trees are important to orchard health and longevity. Trees are planted by hand. Sufficient labor is needed to plant 136-145 trees per acre in a time frame that reduces planting time, root desiccation, and provides proper graft union placement. Two workers per tree being planted are needed.

Tree training: The goal of tree training is to develop and select permanent limb structure and to position lateral branches to optimize tree structure and maximize the production of high quality fruit. Training begins at planting and scaffold selection during the first winter. Training is used to bring trees into production earlier and also to develop a strong structural framework to support heavy crop loads without breaking. Workers need to have sufficient knowledge of horticultural pruning and training techniques.

Mowing: Grass middles in an orchard reduce soil erosion and provide support for year round equipment travel. Mowing aids summer pruning and harvest operation efficiency, and reduces

certain insects, voles and other pests. Mowing should be done three to four times per growing season depending on need.

Fertilization: For young trees fertilization is important to provide the tree with initial vigor that usually translates to proper growth. Application of lime, phosphorus and potassium based fertilizers is done by ground applications prior to planting. Nitrogen applications during establishment years are made by hand to individual trees three to four times per year. Foliar spray applications of micronutrients such as boron and magnesium may also be used to provide peach trees with nutrients as needed. Ground applied fertilizers should be timed and applied to coincide with early rains to ensure effective plant uptake and utilization. Foliar application on the other hand should be applied on days without rainfall since rain can cause run off and eventually reduce the efficacy of the fertilizer. Some ground applied fertilizers such as nitrogen should be placed one to two feet from the trunk to reduce avoid root tissue damage (2, 3).

Fruit bearing stage: Most of the worker activities are done at this stage. Fruit bearing activities include pruning, thinning, pest control, and harvesting.

Pruning: Pruning is used by growers to remove dead and damaged wood, develop and maintain tree structure and to maintain a balance between vegetative growth and fruit production. The goal of pruning is to open up the canopy to allow adequate penetration of sunlight for fruit initiation and development, to maximize air flow to reduce insect and disease pressure and to allow optimal spray penetration and distribution within the canopy. Most orchards are pruned once during each winter dormant season and may be also pruned during the growing season.

Fruit thinning: The goal of thinning is to provide the optimum crop load for production of large, high quality more profitable peaches. Thinning can be accomplished from bloom up to 45 days post bloom. Hand thinning is the most common form of thinning, often utilized when fruitlets are approximately three-fourths inches in diameter. A single tree may require one-half man hour to properly thin. Unfortunately, thinning is concurrent with the timing for important pesticide applications for peach scab, plum curculio, and piercing-sucking pests. Re-entry intervals (REIs) on insecticides, or fungicides needed at this time have to be followed and scheduled with fruit thinning to reduce the pesticide exposure risk factor to workers.

Harvesting: This is the major activity which requires the greatest worker exposure to the foliage and fruit. Depending on the cultivars there may be up to three to four harvests of the tree over a period of one to two weeks allowing the fruit on the tree to mature, improve in size and color before harvest. Strict adherence to pre-harvest intervals (PHI's) should be maintained to minimize worker exposure to pesticides. By following the required PHI's growers reduce the risk of pesticide exposure to their workers. It is necessary that workers are provided personal protective equipment and wear proper clothing as required by the pesticide label.

Insect Pests

Peach orchards in the southeast have numerous insect pests, many of which cause direct damage to the fruit. Since most of the peaches in Alabama are harvested for the fresh market fruit are usually expected to show no sign of damage therefore making organically grown peaches not a viable option at this time. Pesticides are needed for control of the pests that attack peach in Alabama. Peach orchards in Alabama are not routinely scouted for pests and pesticide spraying is done on a calendar basis. Some of the most common insect pests of peaches are plum curculio, stink bugs, leaffooted bugs, tarnished plant bugs, peachtree borer, lesser peachtree

borer, white peach scale, San Jose scale, Japanese beetle and the Green June beetle, Oriental fruit moth, peach twig borers, shothole borer and ambrosia beetles. They cause damage to the peach flowers, fruit, twigs, limbs and trunk. The need to control these serious insect pests as well as disease organisms is very critical for successful peach production. Pesticide rate, spray volume and timing of application are critical factors that may affect effectiveness of pesticide sprays. Aside from pesticides, growers can follow such cultural practices as weed control, and orchard sanitation to reduce insect pests. Sanitation includes quickly removing and destroying dead, diseased and damaged wood and fruit. The leaves, wood and fruit often provide pests with places to complete their development or to survive the winter. Although adequate insect control on peaches usually requires spraying trees, these sprays need to be timed accurately to be effective. Knowledge of the insect pests and their life cycles aids in identification as well as the early diagnosis of a developing pest problem.

Plum Curculio (*Conotrachelus nenuphar* Herbst)

The adult plum curculio is a small, rough snout beetle, about 1.57-2.36 inch (4-6 mm) long and mottled with black, gray and brown. There are four pairs of ridges that occur on the wing covers, but the middle humps on each wing cover are larger, which makes it appear to have only two humps. The sharp, biting jaws are located on the tip of a long curved snout. The larva is whitish and legless. It measures about 0.24-0.35 inch (6-9 mm) long when fully grown. It is slightly curved or bow-shaped and tapers slightly at each end. It has a brown head and a light brown shield behind the head. There are 4 larval instars. Each stage of the larvae can be determined based on the head capsule width. Fully grown larvae leave the fruit 14-16 days after egg hatch and enter the soil at a depth of 1.18-3.15 inch (30-80 mm) where they form a pupation chamber for an additional 10-12 days before transforming into pupae. The pupa, which is found in the upper 1.18-3.15 inch (30-80 mm) below the soil surface, is whitish or cream-colored and measures 0.16-0.28 inch (5-7 mm). All of the adult structures (such as eyes, mouthparts, etc.) are visible just before transformation into the adults. The length of time between oviposition and larval entrance into the soil varies from 17-39 days depending on the type of fruit infested and also on environmental conditions. The time taken for pupae to emerge from the soil depends on soil conditions, but normally takes about 20-25 days. Plum curculio adults overwinter (survive the winter) under leaves, brush and in other protected places near the orchard. Wild plum thickets and wooded areas within 1 mile radius of orchard vicinity provide a source of adult infestation. The adults become active when mean temperatures reach 50-60 °F (10-15.8°C) for three to four days, or when the maximum temperature reaches 75 °F (24°C) for two or more days. This is usually about the time peach trees bloom. The first activity will be noticed on outside rows. They feed on developing fruit and leaves and lay their eggs in the young fruit. Carefully inspect fruit on these outside rows for egg-laying and feeding scars. Fruit infested shortly after bloom by the first generation typically drop to the ground. The larvae hatch and feed in the fruit. They leave the fruit, burrow into the ground and pupate (transform into the nonfeeding stage where the larva changes into an adult). From late May through early July the first generation adults emerge, move into the trees, and begin laying eggs. Fruit infested by the second generation remain on the tree until harvest. Again the larvae feed for a while, drop to the ground and pupate. The second generation adults emerge in the fall, move to the protected areas and overwinter. When disturbed, the adult plum curculio tends to fold its legs against its body and fall to the ground where it remains motionless for several minutes, a behavior known as thanatose (death-feigning). To detect the presence of plum curculio adults, place a light colored

drop cloth on the ground under the tree and shake some branches. If present, the plum curculio will drop to the ground and be readily visible.

Control: Cultural practices such as removing or cleaning up overwintering sites should be combined with chemical control for plum curculio. Chemical controls are applied immediately after the flower petals fall and continue at intervals up to harvest. Targeted sprays beginning at first plum curculio peak followed by one spray three weeks after petal fall, and two more sprays targeted to coincide with second generation emergence have provided effective control in some recent trials (4). Growers may use Imidan 70WP (Phosmet) alternated with Actara (Thiamethoxam) or a pyrethroid such as Arctic (Permethrin). Preharvest intervals range from 7 to 14 days while re-entry intervals are 12 to 24 hours for most products. Insecticides should be alternated to avoid resistance development. As with all pesticides, read and follow all label directions and precautions.

Oriental Fruit Moth (*Grapholita molesta* (Busck))

The Oriental fruit moth is grayish-brown and has a wingspan of about 0.5 inch (12.7 mm). It is active at night. When first hatched, its caterpillar (larva) is about 0.06 inch (1.6 mm) long and white with a black head. The mature caterpillar is about 0.5 inch (12.7 mm) long, has six distinct legs and is pinkish with a brown head. The caterpillar is a pest of peaches and other stone fruits as well as apples, pears, and some ornamentals in the rose family. In Alabama, there could be six or more generations of Oriental fruit moth per year. This pest overwinters as mature larvae inside cocoons, which are located in protected areas on the tree or in debris near the base of the tree. In early spring, the larvae pupate and adults begin to emerge at about the time of bloom. The adults lay eggs from which larvae hatch. These first-generation caterpillars bore into new growth at the tips of peach tree branches. This activity causes the branch tips to wilt (also known as “flagging”) and die back. Later in the season, after the branch tips harden, caterpillars enter and feed on the fruit instead. While in the fruit and twigs, caterpillars are protected from insecticides. Good early season control of adult moths using insecticides will often provide control for the entire season.

Control: The presence of moths can be detected with the use of traps containing pheromones (synthetic insect attractants), which are commercially available. Calendar based sprays for plum curculios reduce incidence and injury from this pest. As more targeted sprays are utilized traps will become more important. Several products are effective against Oriental fruit moths and should be applied if an average of more than 10 moths per trap is recorded.

Peachtree Borers

The peachtree borer (*Synanthedon exitiosa* (Say)), the lesser peachtree borer (*Synanthedon pictipes* (Grote & Robinson), and the shothole borer (*Scolytus rugulosus* Ratz.) are pests of peaches in southeastern U.S. (2). The peachtree borer and lesser peachtree borer are usually the more serious pests of peaches in Alabama. They are found on most cultivated and wild stone fruits, including some ornamental shrubs such as flowering peach and cherry. It is the larvae of these insects that damage peach trees.

Peachtree Borer: The peachtree borer adults are clearwing moths, and are often mistaken for wasps due to their appearance and behavior. The adult female peachtree borer is a metallic blue-black color except for a red-orange band on the abdomen. The male is black with yellow stripes along the back at the base of each wing and narrow yellow stripes on the abdomen. The larva (immature stage) is about 1-1.25 inch (25.4-31.6 mm) long when fully

grown. It is creamy white with a brown head. The larva attacks the tree at the base and may be found feeding from the main roots to about 10 inch (254 mm) up onto the trunk. Masses of gum mixed with frass (a sawdust-like insect waste) are the primary symptoms of attack. Young trees can be killed by a very small number of larvae. Older trees can tolerate more larvae. The peachtree borer overwinters (survives the winter) as larvae. It has one generation per year. Some adults begin emerging in late May although peak emergence is in mid- to late August. Wounds and rough bark are favorite sites for egg laying. About two weeks after the eggs are laid at the base of the tree, the small larvae hatch, and burrow into the bark and begin feeding. They stop feeding during winter and resume feeding the following spring.

Control: Since peachtree borer causes its most severe damage to young trees, special care must be taken during planting to avoid damaging the bark. A pre-plant dip in an insecticide solution is strongly recommended. In light soils the wind may make the tree move enough to make a gap between the trunk and the soil or abrade the bark. This is an excellent entry site for the larvae. An annual trunk spray during mid August to early September will generally keep the peachtree borer under control. Be sure to apply sufficient spray from the scaffold limbs to ground level so the bark is saturated and a small puddle forms at the base of each tree. Growers should make a post-harvest application of Lorsban (Chlorpyrifos) or other products such as Arctic (Permethrin) for peachtree borer control.

Lesser Peachtree Borer: The adults of the lesser peachtree borer are also clearwing moths. Both the male and female adult lesser peachtree borers resemble the male peachtree borer except that they are somewhat smaller. The larva of the lesser peachtree borer is very similar to the larva of the peachtree borer but smaller. Lesser peachtree borer attacks the trunk and main limbs. The symptoms are oozing gum that contains frass. Heavy infestations can kill individual limbs or an entire tree. Like peachtree borer, lesser peachtree borer overwinters as larvae. However, it has two generations per season and occasionally, a third. Emergence of adults peaks in late April to mid-May and late July to mid-August in Alabama. *Cytospora* canker (a fungal disease), wounds, and previously infested areas are favorite sites for egg laying.

Control: The best control for the lesser peachtree borer is to keep the trees in a vigorous, healthy growing condition and to prevent mechanical injury. Prune out split or broken limbs and limbs with signs of borer damage where feasible. Destroy pruned wood before adults emerge in April by shredding or burning. As with peachtree borer, annual post-harvest trunk spray in mid August to early September will help control lesser peachtree borer. Lesser peachtree borers have become more difficult to control with preharvest cover sprays.

Shothole Borers (Bark Beetles): Shothole borers (e.g., *Scolytus rugulosus* Ratz) are small, cylindrical beetles. They attack many fruit trees and ornamental trees and shrubs. Plants under stress are highly susceptible to shothole borer attack. Shothole borers attack the trunk and limbs. The entry holes look like the tree has been hit with fine bird shot. The adult beetle bores into the bark and then carves out chambers below the bark in which to lay eggs. The larvae feed on the bark. Occasionally, shothole borers may attempt to enter the twigs at the base of flower buds. This activity can destroy the buds. The shothole borer overwinters as larvae. It has several generations per year. The adults emerge from infested trees in April and May and move to new trees, especially those under stress from drought, disease or other reasons.

Control: The best control for shothole borer is to keep the trees in a vigorous, healthy growing condition and to prevent mechanical injury. Prune out split or broken limbs and limbs with signs of borer damage where feasible. Destroy pruned wood before adults emerge in April by shredding or burning. Avoid spreading bacterial canker while pruning by dipping the pruning

tool after each cut into a solution of one part household bleach to nine parts water. Normal sprays that are necessary for other insects usually provide adequate control of adults (see insecticides for peach tree and lesser peach tree borer control). With more than one generation per year it is difficult to get good control with insecticides since the first generation emerges while there is fruit on the tree. There is no effective control for insects already in the tree.

Plant Bugs and Stink Bugs

Catfacing insects include the tarnished plant bug (*Lygus lineolaris* Palisot de Beauvois), various stink bugs and leaffooted bugs. The tarnished plant bug is oval and has a white triangle on its back in the “shoulder” area. It is brown and about 0.25 inch (6.4 mm) long. Stinkbugs are shaped like a shield. They vary in color from green to brown and in size from 0.5-0.75 inch (12.7-19.1 mm) in length. Leaffooted bugs are about 0.79 inch (20 mm) long. They have dark brown bodies, a narrow cream colored stripe across the back, and flattened leaf-like hind legs. All of these bugs have needlelike mouthparts that they use to pierce and suck fruit. They distort developing fruit by their feeding. The damage that they cause appears as deep dimples in the fruit. The damage is cosmetic and the fruit is still edible but not marketable. Mid and late summer feeding on fruit by stink bugs and leaffooted bugs can increase disease infections when disease pressure is high. These insects overwinter as adults in protected areas in or near the orchard. Winter annual weeds that begin to bloom in late winter are a major attractant for these insects. Seasonal dry down of small grains and cool season weeds increases populations in orchards.

Control: Maintaining clean orchards with mowing and herbicide strips will greatly reduce the populations of these insects. Chemicals used for plum curculio control do a fair job of controlling these pests. Stink bugs and leaffooted bugs have become major pests of peaches in the last six to eight years.

Scale Insects

Several species of scale insects attack peaches in Alabama. Two of the most commonly seen scales are white peach scale (*Pseudaulacaspis pentagona* Targioni-Tosswtt) and San Jose scale (*Quadraspidiotus perniciosus* Comstock). Scales are unusual insects in appearance. They are small and immobile, with no visible legs. Scales vary in appearance depending on age, sex and species. The adult females typically produce a waxy covering that protects them from many insecticides. They feed on sap by piercing the leaf or stem with their mouthparts and sucking.

White peach scale: The adult female white peach scale is 0.06-0.13 inch (1.6-3.3 mm) in diameter. It is circular in shape and yellowish to grayish white with a yellow or reddish spot. It will infest the bark, fruit and leaves of peach trees. An infestation by white peach scale can result in stunting, leaf drop, death of branches and even entire trees. The white peach scale survives the winter as an adult female. The adult male is mobile and lives about one day. After mating, the female starts laying eggs in early April. The eggs hatch into nymphs (immature stage that looks similar to adult only smaller). Nymphs, or crawlers, as they are also called, crawl around for a few days before settling and beginning to feed. There are three generations per year.

San Jose scale: This species was introduced into the U.S. through the San Jose valley in California and has established in most parts of the country. It is an extremely important indirect pest of peaches, and other pome fruits (3). It injects a toxin into the plant as it feeds causing localized discolorations. The adult male and female looks different. The female is yellow and circular, sac-like in shape with no legs. The males are tiny, golden-brown, with two wings.

Because the female is wingless it lives under a protective covering which is about 0.06 inch (1.6 mm). The mobile stage is the young nymphs which measure about 0.25 mm long and can be mistaken for mites. The nymphs overwinter under the protective covering. During early spring the males begin to mate with the females, who remain under their scale covering. After about two months the females begin giving birth to live young. The young crawlers move around to locate a suitable site to stay. Because the crawler stage is very mobile it is easy to detect it by using a double-sided sticky or black electrical tape coated with petroleum jelly wrapped around randomly selected branches.

Control: Most scale insects, particularly, females are difficult to control with insecticides because of their hard, waxy covering. Treatment with dormant oils will control most scale species. Dormant oil works by smothering the overwintering adult females. Dormant oil can be applied before bud break when the temperature is above 40°F (4.4°C). In addition, applications of summer/horticultural oils for in-season control of scale may be needed for heavy populations. Treatment should be timed to synchronize with crawler emergence. In cases of heavy scale infestations, chemical control of the crawlers can be achieved with insecticides such as Lorsban (Chlorpyrifos), Spectracide (Diazinon), and Esteem (Pyriproxifen).

Green June Beetle (*Cotinus nitida* L.)

Green June beetle feeds on ripening fruits. In Alabama, the C-shaped grub (larva) overwinter in the soil, and adults emerge in mid-summer. There is only one generation per year in most parts of the U.S. (5). Adults feed mainly on fruits and seldom on leaves and are usually found in aggregations. The adult is an active flier which makes them easily detected after initial emergence. Observation of their flight activity can be used to set monitoring traps in the orchard. Placing trays of fermenting fruit or watermelon on the perimeter of the orchard can be very useful in detecting the insect. June beetle traps are available and can be purchased by growers. Also shaking and visual techniques can be used for early detection of the insect. Control is recommended if fruit feeding injury exceeds one percent (5).

Control: The adult June beetle can be controlled by using Sevin (Carbaryl) or pheromone-baited traps. Use of insecticide treated fermented fruit trays can also control the beetle. When using pheromone traps do not place traps near peach trees. Removal of over-ripe or damaged fruit during harvesting is beneficial.

Japanese Beetle (*Popillia japonica* Newman)

The Japanese beetle is an important peach pest in Alabama. The adult beetle is polyphagous and eats the leaves and flowers of over 300 plants. The adult feed by eating the tissue between the veins, a type of feeding called skeletonizing. The larvae, called white grubs, feed on plant roots and organic matter in the soil. Most of the damage occur late in the season when fruits are about to mature. The adults are a brilliant metallic green, generally oval in outline, about 0.31-0.43 inch (8-11 mm) long and 0.2 inch (5 mm) wide. The wing covers are a coppery color and the abdomen has a row of five tufts of white hairs on each side that are diagnostic. The larvae are typical white grubs that are C-shaped when disturbed. First instar larvae are about 0.06 inch (1.5 mm) long while the mature third instars are about 1-1.25 inch (24-32 mm) long. In Alabama, adult Japanese beetles normally emerge during the last week of June through July. The first beetles out of the ground seek out suitable food plants and begin to feed. These early arrivals begin to release an aggregation pheromone (odor) that attracts additional adults. Newly-emerged females also release a sex pheromone that attracts males. After

feeding and mating for a day or two, the females burrow into the soil to lay eggs at a depth of 2-4 inch (50-100 mm). Females lay 1 to 5 eggs before returning to plants to feed and mate. This cycle of feeding, mating and egg laying continues until the female has laid 40 to 60 eggs. Most of the eggs are laid by mid-August though adults may be found until the first frost. The eggs hatch in 8 to 14 days and the first instar larvae dig to the soil surface to feed on roots and organic material. The first instars shed their skin (molt) in 17 to 25 days. The second instars take 18 to 45 days to mature and molt again. Most of the grubs are in the third instar by late September and by October they dig deeper into the soil to overwinter. The grubs return to the surface in the spring as the soil temperature warms, usually in mid-April. The grubs continue their development and form a pupa in an earthen cell 1-3 inch (25-75 mm) in the soil.

Control: The control of this insect is mainly targeted on the adult even though the larvae can also be controlled successfully. Where population is low hand picking and the use of other host plants to attract them can be an effective cultural control strategy. Several traps using a plant lures and sex attractants are available even though they are not recommended for large scale control. The adults can also be controlled by spraying peach plants with insecticides. Over-the-counter pesticides available for this include: Sevin (Carbaryl) and several pyrethroids such as Brigade (Bifenthrin), Baythroid (Cyfluthrin), Decis (Deltamethrin), Warrior (Lambda-cyhalothrin), and Arctic (Permethrin). Applications of Provado (Imidacloprid) generally need to be made 20 days before anticipated Japanese beetle adult activity. During the heavy adult activity periods, sprays may be needed every 5 to 10 days.

Parasitic Nematodes

Nematodes are soil dwelling, microscopic roundworms that feed on plants by piercing them and feeding on the inner juices (6, 7). There are several species that affect peach trees; however, they are controlled with the same techniques. These pests are found in lighter textured sandy soils more often than in clay soils. Newly planted trees are at a higher risk of root damage caused by nematodes. Some nematodes such as the root knot nematode form galls and knots on the roots. At high densities nematodes can reduce normal plant growth and root development.

Control: Chemical control using soil fumigants is usually effective against soil nematodes (7). Also cultural control involving the use of cover crops can be used to disrupt nematode populations.

Diseases

Peaches are attacked by several diseases among which are classified as those that attack the fruits, foliar and tree bark (6, 7). The most important diseases are caused mainly by bacteria and fungi. Brown rot is caused by the fungus *Monilinia fructicola* Winter, and can cause severe fruit losses and can also infect flower blossoms and shoots. Peach scab caused by a fungus *Cladosporium carpophilum* Thiim, and gummosis (caused by the fungus *Botryosphaeria dothidea* (Moug.:Fr.) are also important diseases of peach which can kill branches or tree. These diseases have the potential of decreasing productivity and fruit marketability over time. Other fungal diseases such as anthracnose (*Colletotrichum* spp.) and constriction canker (*Phomopsis amygdali*

Delacr.) occur occasionally. Rhizopus (*Rhizopus stolonifer* (Ehrenb.) Vuill.) and Gilbertella rot (*Gilbertella persicaria* (Eddy) (Hesselt) of fruit can be a problem when fruit are allowed to over-ripen and sanitation practices are poor. Bacterial spot (*Xanthomonas campestris* Pammel pv. *pruni*) can cause serious economic fruit loss on highly susceptible cultivars and on other cultivars when weather conditions are wet especially during the 3-4 week period following bloom. Bacterial canker caused by (*Pseudomonas syringae* pv. *syringae*) is associated with the peach tree short life (PTSL) complex. Root-knot nematodes (*Meloidogyne* spp.) can severely effect tree establishment and the ring nematode *Criconebella xenoplax* Raski is associated with premature tree death in the PTSL complex.

Brown Rot (*Monilinia fructicola*)

This is the major fruit rot organism in the southeast. The fungus can infect shoots and flowers. Over wintering takes place in infested plants. The fungus is spread mainly by wind and rain, particularly heavy rain which result in splashing. Symptoms of infected fruit are brown spots on the skin. These can spread rapidly to other fruit. Although fungicide resistance has been found in other Southeastern states, it has not a significant problem in Alabama.

Control: Refer to the 2009 Southeastern Peach Pest Management and Culture Guide.

Peach Scab (*Cladosporium carpophilum*)

Peach scab is a common fungal disease in Alabama. Over wintering occurs in twigs, and is spread by rain and wind. Scab infections typically occur between petal fall and pit hardening, and fungicides are needed during this time to prevent disease. Symptoms develop about 5-7 weeks after infection. Fungicide applications when symptoms are first observed are of little value.

Control: Peach scab is typically controlled using fungicides such as Abound, Bravo Ultrex WDG, Bravo Weather Stik, Captan 50WP, Captec 4L, Equus, Flint, Lime sulfur, Microthiol disperss, Pristine, Roval 4F, Roval 50WP, and Wettable Sulfur 80%. Fungicide control is typically good, although scattered losses do occur in some years (7).

Bacterial Spot (*Xanthomonas campestris* pv. *pruni*)

Bacterial spot is damaging, and occasionally devastating disease on susceptible varieties. Over wintering occurs in lesions on twigs and buds. During spring rains the bacteria is spread to the fruit and leaves. Injury is seen as lesions on the fruit and leaves. Leaves will also turn yellow then drop. Highly infected fruit will have cracks.

Control: Spays containing copper compounds antibiotic such as Mycoshield (Oxytetracycline) are used as protective sprays on susceptible varieties. Current copper products include Cuprofix Disperss, Kocide 101, Kocide 2000, and Kocide DF. Note that these products must be sprayed before symptoms are noticed. Cultural Control using resistant varieties of peaches has proven to provide some control (7).

Weeds

Weeds compete with peach for water, nutrients and provide habitats for pests and diseases. Therefore weed control is an important orchard management practice. The area under each tree should be sprayed with herbicides and kept with bare soil. Bare soil also traps and releases more heat during frost/freeze events. However, evidence from recent studies in Alabama shows that bare soil can provide optimal conditions for plum curculio pupae development and adult emergence. The areas between peach tree rows should contain grass (6).

Control: Weeds can be controlled with 2, 4-D, glyphosate, Devrinol 50DF, Goal 1.6E, Karmex DF Direx 4L, Sinbar 80W, Pincep 90DF, Simazine 90DF, Princep 4L, Simazine 4L, Prowl 3.3EC.

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