

# Peach and Plum Insects

## AND THEIR CONTROL



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# Key to Insects Attacking Peaches and Plums

## INSECTS FEEDING EXTERNALLY ON THE FRUIT

- Green or brown stink bugs, or plant bugs,  $\frac{1}{8}$  to  $\frac{1}{2}$  inch long, sucking the sap from the fruits .....page 3      Catfacing Insects
- Black beetles, about  $\frac{1}{8}$  inch long, with tan spots on the wing-tips, feeding in damaged areas on the surface and inside the fruit .....page 5      Dried-fruit Beetle

## LARVAE (CATERPILLARS OR GRUBS) TUNNELING AND FEEDING INSIDE THE FRUIT

- White, legless larvae with brown heads, feeding in the fruit.....page 5      Plum Curculio
- Grubs, similar to those above, feeding in the pit .....page 7      Plum Gouger
- Pink-white, active caterpillars with abdominal legs, burrowing in the fruit .....page 7      Oriental Fruit Moth
- Brown caterpillars with yellowish bands, burrowing in the fruit .....page 8      Peach Twig Borer

## INSECTS ATTACKING THE TRUNK AND LARGER LIMBS

- White caterpillars, with the hooks on their abdominal legs arranged in two transverse rows, feeding in the upper trunk and large branches .....page 8      Lesser Peach Tree Borer
- Caterpillars, similar to those above, tunneling in the lower trunk .....page 10      Peach Tree Borer
- Dingy-white to brown-gray caterpillars, with the hooks on their abdominal legs arranged in circles, burrowing in the trunk .....page 11      American Plum Borer
- Tiny, black beetles with dull-red markings, usually feeding in the wood of unhealthy trees. Numerous small round holes made in the bark .....page 12      Shot-hole Borer

## STATIONARY INSECTS ON THE TRUNK AND BRANCHES

- Light-gray, waxy scales up to  $\frac{1}{16}$  inch in diameter with raised nipples in the center .....page 12      San Jose Scale
- Bark covered with a white, cottony mass of scales interspersed with grayish ones with yellow-to-orange centers .....page 13      White Peach Scale
- Large, brown, soft-bodied scales, usually on the underside of the twigs .....page 13      Soft Scales

## LARVAE FEEDING INSIDE THE TWIGS

- Pink-white, active caterpillars with abdominal legs, burrowing in the terminals causing them to wilt .....page 7      Oriental Fruit Moth
- Brown caterpillars with yellowish bands, habits same as those above .....page 8      Peach Twig Borer
- White, legless grubs with constrictions between their body segments, tunneling down the twigs from a point 2 to 4 inches from the ends .....page 13      Dogwood Twig Borer

## INSECTS FEEDING EXTERNALLY ON THE FOLIAGE AND TWIGS

- Soft-bodied, green or brown insects in colonies, sucking the sap from buds and foliage .....page 14      Aphids
- Insects feeding on the leaves and tender bark of small trees, frequently girdling branches .....page 14      Grasshoppers
- Hairy caterpillars, which construct unsightly webs, defoliating the twigs and branches in early spring .....page 14      Eastern Tent Caterpillar

# Peach and Plum Insects and Their Control

D. R. KING and H. F. MORRIS\*

**I**NJURIOUS INSECTS set up serious limitations in stone fruit production. Before an effective control program can be initiated, recognition is essential of the individual insect pests and their damage. Similarly, a knowledge of seasonal life histories and specific control measures is necessary to determine when treatments should be applied.

The insect control calendar on the back cover is designed primarily for use in East Texas. It does not include control measures for the peach twig borer and certain other insect pests in the West Cross Timbers and Hill Country. Information available at this time is insufficient for a recommended spray schedule in areas where the peach twig borer is a major problem.

The control measures that are recommended in this publication for specific insects should result in satisfactory control in any part of Texas. Thorough spray coverage at each spraying is essential for control of peach and plum pests. For home orchards, substitute 1 tablespoon of 50 percent methoxychlor wettable powder per gallon of water wherever dieldrin or parathion is recommended. Dieldrin and parathion are recommended for commercial orchards, but are highly toxic to humans.

## Insects Attacking the Fruit

### Catfacing Insects

The feeding of several species of insects on peaches early in the growing season causes a gnarling and distortion of the fruits which is called catfacing. Plant bugs and stink bugs, which are largely responsible for this type of injury, suck the sap from the fruits. If the peaches do not fall as a result of this attack, fruit development is inhibited in the area of the insect feeding punctures while the surrounding healthy tissue continues to grow.

Although catfacing insects invade plum trees early in the season, injury similar to that which occurs on peaches does not appear. The damaged plums probably fall before maturing.

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Plant bugs and stink bugs overwinter in the adult stage under dead leaves, in debris on the ground and in cover crops. In the spring, the adults emerge and begin feeding on the buds of peach, plum and other plants. Egg-laying, which begins shortly after adult emergence, occurs principally on vegetables, weeds and legumes. Occasionally, eggs are deposited in peach trees and a few individuals develop.

**PLANT BUGS**, *Lygus* sp., principally *lineolaris* P. de B.

These insects appear in peach trees in the pink bud stage. The adults are about 1/5 inch long and range through shades of brown from tan to nearly black. Following their feeding activities, damaged buds, blossoms and very small fruits usually fall. Large peaches develop sunken, corky areas. Populations decline shortly after petal fall, as the bugs are attracted to other hosts. Occasionally they are in peach trees after shucksplit.

**SMALL GREEN STINK BUGS**, *Thyanta* sp., principally *custator* (F.)

These stink bugs are the first species of economic importance to attack peaches in the spring. The adults are about 3/8 inch long and usually are light to dark green. They emerge from hibernation and fly to peach trees in increasing numbers from the late-bloom stage until about the week after shucksplit. They migrate to other plant hosts during the following 3 weeks (Figure 1).

Damage caused by these stink bugs is particularly severe, because they attack early in the season when the fruit is small. By harvest time, the injured peaches become folded and distorted. Usually, corky areas do not appear on the fruit (Figure 2).

**BROWN STINK BUGS**, *Euschistus* sp., principally *servus* (Say)

Brown stink bugs are in the orchard about a week after petal fall. They are 3/8 to 1/2 inch long and light to dark brown in general color because of closely spaced indentations which are brown on a yellow or light-gray background.

PETAL FALL SHUCKSPLIT 2 WKS. 4 WKS. 6 WKS.

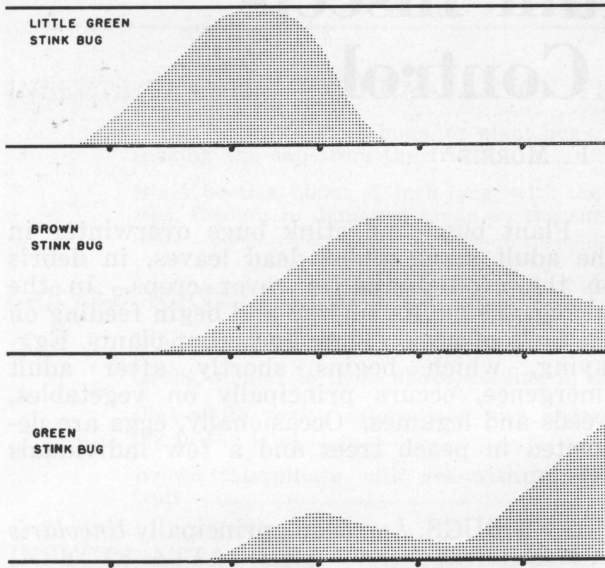


Figure 1. Seasonal abundance on peaches of three species of stink bugs which cause catfacing.

The adults appear in largest numbers about a month after shucksplit (Figure 1). Unlike the small green stink bugs, many of them remain in the trees throughout the season.

Fruits attacked at an early stage develop depressed, corky areas similar to those produced by the feeding of plant bugs. Those damaged later in the season become only slightly deformed (Figure 3).

Frequently, the adults of these species are confused with large stink bugs belonging to the genus *Brochymena* (Figure 4). The latter are dark-gray, stout-bodied insects,  $\frac{1}{2}$  to  $\frac{5}{8}$  inch in length. They lack the yellow or light-gray background that is characteristic of the brown stink bugs. They appear early in the season, but do not injure the fruit.

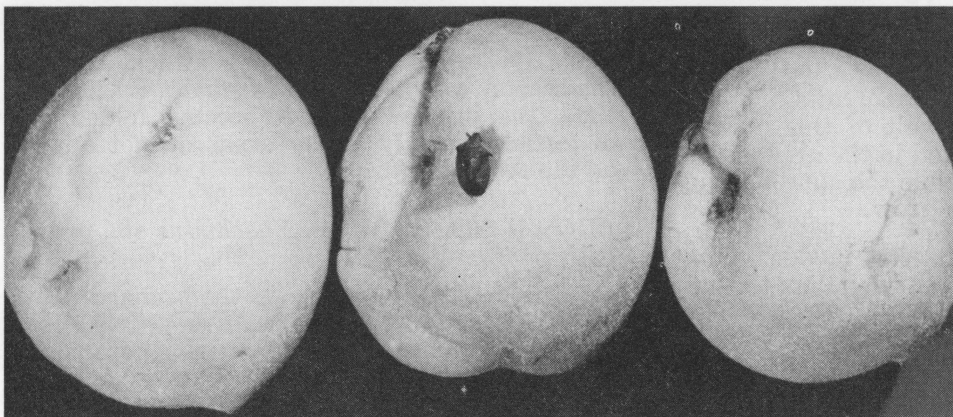


Figure 2. Typical damage and appearance of small green stink bugs.

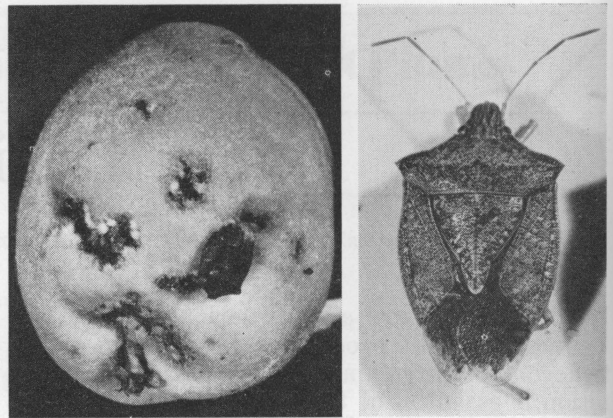
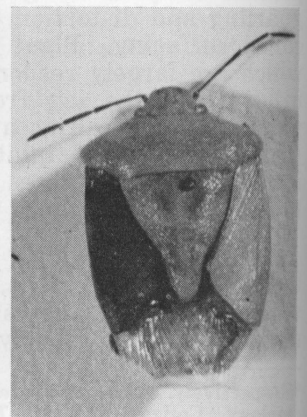


Figure 3. Typical damage and appearance of brown stink bugs.

### SOUTHERN GREEN AND GREEN STINK BUGS *Nezara viridula* (L.) and *Acrosternum hilare* (Say)

These stink bugs are the last to appear in damaging numbers in peach orchards each season. They are about  $\frac{1}{2}$  inch long and are bright green. They appear when the fruits are in the shucksplit stage and increase in number until harvest (Figure 1). Peaches on trees along the margins of orchards bordering fields and woodlands are damaged most severely. The bugs feed in groups, usually attacking some of the fruits and not injuring others on the same tree. Damage resulting from their feeding is different from that caused by the brown stink bugs. Corky areas and gnarled, misshapen fruits do not develop. Instead, damaged peaches appear watersoaked and dimpled. Frequently, strings of gum exude from the feeding punctures (Figure 5).

*Control of Catfacing Insects.*—The prevention of injury by catfacing insects depends largely on early season spray applications. Control of these insects as they emerge from hibernation reduces the damage to young fruits. An application of 1 pound of 25 percent



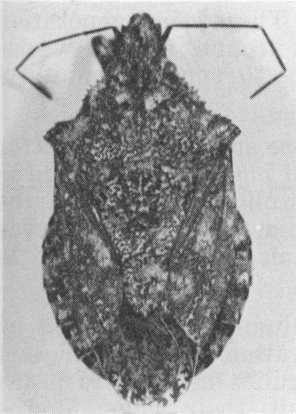


Figure 4. Noninjurious stink bugs, *Brochymena* sp., which occur on peach trees.

parathion or 1/2 pound of 50 percent dieldrin wettable powder at petal fall, followed by another application at shucksplit, usually provides satisfactory initial control of plant bugs, brown stink bugs and small green stink bugs. Succeeding sprays applied for curculio control also prevent the development of destructive populations of green and brown stink bugs.

Fruits which do not escape injury early in the season may be removed during the thinning operation.

#### Other Fruit-infesting Insects

##### DRIED-FRUIT BEETLE

Dried-fruit beetles, *Carpophilus hemipterus* (L.), are found frequently in ripe or decaying fruit. They are secondary invaders, attacking where the skin of the fruit has been broken by other insects, hail or physiological factors. Bacteria, yeasts and fungus spores, which cause fermentation of the fruit, are transported on their bodies.

The adults, which measure about 1/8 inch in length, are black beetles with reddish legs. Their wing covers are short so that the rear portion of the abdomen is visible. There is a

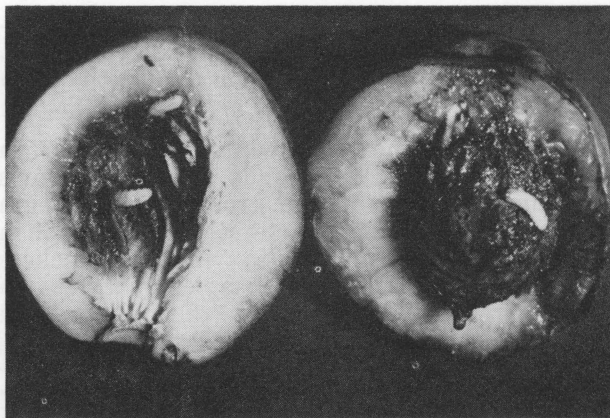


Figure 6. Plum curculio larvae feeding in peaches.

tan spot near the tip of each wing, and a similar, smaller spot near the base. The larvae, which are white with brown heads, bear two tiny, brown, horn-like projections near the tip of the abdomen. They are slender, very active larvae which are about 1/4 inch long when full-grown.

Since dried-fruit beetles feed on peaches only after they are soft ripe, these insects are not considered pests in East Texas orchards where firm ripe fruit is harvested.

##### PLUM CURCULIO

Extensive damage to peaches and plums is caused by the plum curculio, *Conotrachelus nenuphar* (Hbst.). The adults eat holes in the fruit as they feed and deposit eggs, which provide entry for the brown rot fungus and produce catfacing on peaches similar to that caused by stink bugs. The larvae, or worms, tunnel in the developing fruits (Figure 6).

The adults are snout beetles, about 1/4 inch long. They are dark gray to black with lighter gray and brown mottlings (Figure 7). Their wing covers are roughened and bear two prominent humps and two smaller ones.



Figure 5. Typical damage and appearance of green stink bugs.

The larvae are slightly curved, white to yellow-white, legless grubs with brown heads. They measure about  $\frac{3}{8}$  inch in length when full-grown.

Plum curculios overwinter as adults in protected places in woodlands, along fence rows and under debris on the ground. They begin to leave hibernating quarters before wild bush plums bloom, and migrate to wild plum thickets and plum orchards, and to a lesser extent to peach trees. They feed on the foliage and flowers until the small fruits form.

Shortly after the shucksplit stage on plums, plum curculios begin to lay eggs, but the peak of egg-laying is not reached until a month later (Figure 8).

Plums and nectarines are chosen more frequently as egg-laying sites by the overwintering generation than are peach varieties, such as Elberta, which mature during or after midseason. However, peach varieties which mature in late May and during June also are attacked.

The females eat holes in the fruits in which they deposit their eggs. After having placed the eggs, they cut a crescent-shaped slit under each egg cavity.

The larvae complete their development in the fruit in 2 to 4 weeks. When full-grown, they crawl out and drop to the soil, where they construct an earthen cell, usually 1 to 3 inches below the surface, in which they pupate and

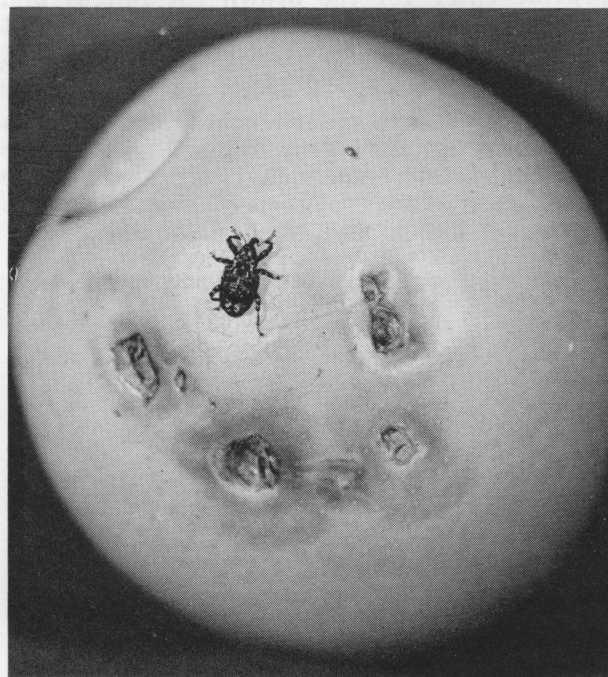


Figure 7. Plum curculio with feeding and egg-laying scars on plum.

transform to adults. These first-generation beetles emerge from the ground in 3 to 4 weeks. The life cycle from egg to emerged adult requires 5 to 8 weeks.

Bruce plum is a more satisfactory host for the larvae than are wild bush plums. Twice as many curculios successfully transform in the pupal stage and emerge as adults if the larvae developed in Bruce plums than if they fed in wild bush plums.

Most varieties of plums are harvested by the time the first generation is completed, and many of the adult curculios migrate to peach orchards. They deposit their eggs in the developing fruit of varieties like Elberta, which mature during mid-or-late season. The larvae of this second generation may be found in the peaches at harvest time.

After the second-generation larvae have completed development, they pupate in the soil and appear as adults in July and August. They join the first-generation adults in feeding on foliage until the advent of cold weather, at which time individuals from both generations seek hibernating quarters.

Annual variations in this life cycle depend on climatic conditions. During hot, dry seasons, fewer individuals of the first generation reach maturity, and the second generation rarely becomes large enough to inflict economic injury to peaches. The overwintering population following a hot, dry season is composed almost entirely of first-generation adults.

*Control.*—Satisfactory control of the plum curculio depends on the careful application of effective insecticides. Sprays containing  $\frac{1}{2}$  pound of 50 percent dieldrin wettable powder or 1 pound of 25 percent parathion wettable powder, or their equivalents, per 100 gallons of water will protect the fruit from curculio attack.

Application of these materials should begin in the spring when adult curculios leave their hibernating quarters. Since the time of emergence varies from year to year, the trees should be jarred or shaken to determine the exact date of the beetles' appearance in the orchard. A sheet should be placed under a tree, and the limbs jarred or bumped sharply with a pole, padded with rubber or burlap to prevent injury to the bark. The curculios in the tree feign death when they are disturbed and drop on the sheet, where they may be counted and the advisability of treatment determined.

Usually, the beetles appear and a spray should be applied when plums are in the petal fall stage (Figure 8). Succeeding applications of insecticides should be made at shucksplit,

# PLUMS

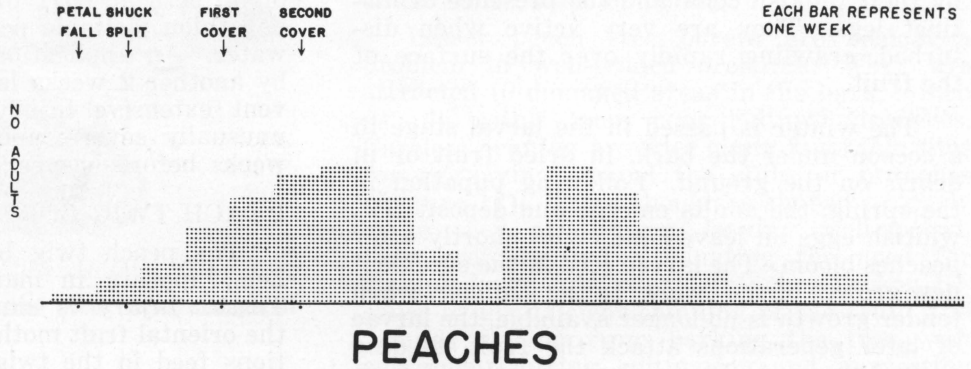


Figure 8. Seasonal life history of plum curculio on peaches and plums.

and twice at 2-week intervals thereafter. If dieldrin is used, 30 days should elapse between the final application and fruit harvest. If parathion is used, a 21-day interval is required before harvest to eliminate any insecticidal residue hazard.

On peaches, sprays for curculio control should begin at shucksplit (Figure 8). This spray should be followed by two applications at 2-week intervals. A final spray should be applied 30 days before harvest to prevent egg-laying by first-generation adults (Figure 8).

## PLUM GOUGER

The plum gouger, *Anthonomus scutellaris* Lec., is primarily a pest of native plums. A few may be found feeding on the buds and blossoms in plum and peach orchards in March and early April. Fruits attacked by this insect become gnarled and distorted as a result of adult feeding and egg-laying punctures. The kernels of the pits are eaten out by the larvae.

The adult plum gouger is a snout beetle which resembles the plum curculio. The two species may be separated by the appearance of the wing covers; the plum gouger's are smooth and dark brown in contrast with those of the curculio, which are mottled gray, roughened and humpy. The head, forepart of the thorax and legs of the plum gouger are yellow-brown. The larva is a legless, white grub with a brown head.

This insect overwinters in the adult stage, emerging in the spring to lay eggs in small holes eaten in the young plum fruits. The larvae feed on the kernel, pupating in the excavated cavities. There is only one generation each year.

*Control.*—Special control measures are not required for the plum gouger in commercial orchards. In small plum plantings, the materials recommended for the plum curculio probably would prove effective against this pest.

## ORIENTAL FRUIT MOTH

The oriental fruit moth, *Grapholitha molesta* (Busck), is a pest of importance on peach varieties which mature fruit later than Hiley and Burbank July Elberta. Some damage to twigs on plum trees may occur, but the fruit is not attacked.

In the spring, injury is confined largely to the growing tips of twigs, into which the larvae burrow (Figure 9). As a result, the terminals die and heavily infested trees appear bushy and stunted. Larvae of succeeding generations attack peach fruits, frequently entering through the stem, so that no external evidence of injury is apparent. Infested peaches break down rapidly in shipping and are unfit for consumption because of extensive internal damage.

Adults of the oriental fruit moth are gray with dark-brown bands on their wings. The

mature larvae are about  $\frac{1}{2}$  inch in length. They may be distinguished from curculio grubs by their pinkish color and the presence of distinct legs. They are very active when disturbed, crawling rapidly over the surface of the fruit.

The winter is passed in the larval stage in a cocoon under the bark, in dried fruit or in debris on the ground. Following pupation in the spring, the adults emerge and deposit flat, whitish eggs on leaves and twigs shortly after peaches bloom. The larvae feed in the succulent new growth of the twigs. In the summer, when tender growth is no longer available, the larvae of later generations attack the fruit, feeding around the seed. If succulent growth and fruit are absent late in the summer, a "suicide" generation probably occurs, since the larvae cannot find food satisfactory for their development. Consequently, only a few survive, and damaging infestations rarely occur the following year.

Injury may be severe in orchards where apples, pears or late-maturing peaches, such as Frank, are available since egg-laying of later broods is concentrated on these fruits. In seasons of abundant summer rainfall, succulent twigs may be attacked in the fall.

In recent years, the practice of planting varieties of peaches that ripen before Elberta decreases the probability of severe damage by this pest.

*Control.*—Since the larvae feed in protected situations, sprays must be timed to control the



Figure 9. Peach terminals wilted by feeding of oriental fruit moth larvae.

moths when they are depositing eggs. Satisfactory control has been obtained with 2 pounds of 50 percent DDT or 1 pound of 25 percent parathion wettable powder per 100 gallons of water. An application at shucksplit, followed by another 2 weeks later, is sufficient to prevent extensive injury. If the infestation is unusually severe, another application 3 to 4 weeks before harvest may be required.

#### PEACH TWIG BORER

The peach twig borer, *Anarsia lineatella* Zell., appears in many orchards in Central Texas. Injury is similar to that produced by the oriental fruit moth. Larvae of early generations feed in the twigs of peaches and plums and later generations attack peach fruits.

The adults have a wingspread of about  $\frac{5}{8}$  inch and are steel gray with lighter markings. The mature larvae average  $\frac{3}{8}$  inch in length and are brown with yellow-white bands around the body.

The peach twig borer has not been sufficiently injurious to fruit trees in East Texas to warrant the use of specific control measures.

### Insects Attacking the Trunk and Branches

#### LESSER PEACH TREE BORER

Trunks and limbs of peach and plum trees may be injured severely by the lesser peach tree borer, *Synanthedon pictipes* (G. & R.). The feeding of the larvae, or borers, in the wood weakens or kills the tree or limb, and provides entry for rot-producing organisms and shot-hole borers. Masses of gum mixed with frass and sawdust exude from the feeding areas under the bark.

Lesser peach tree borer adults are metallic blue-black moths which resemble wasps. Usually, there are yellow bands on the second and fourth abdominal segments, but the latter band is indistinct on some individuals.

The larvae, or borers, have white bodies and dark-brown heads and are about an inch long when full-grown. The hooks on each abdominal leg are arranged in two transverse rows (Figure 10). The larvae feed under the bark around wounds, usually in the upper trunk and large branches, although they may attack near the base of the tree.

When the larval stage is completed, flimsy cocoons covered with frass are constructed under the bark near the edge of the wounds in which the insects pupate. Shortly before transforming into moths, the pupae work their way partly out of their hiding places.



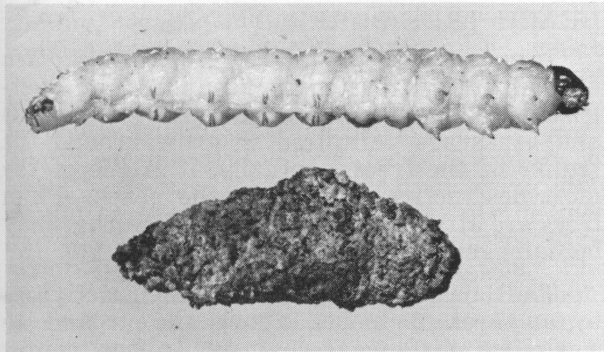


Figure 10. Lesser peach tree borer larva and pupal case.

When the adults emerge, they leave the empty pupal skins protruding from the surface of the bark. The moths are active during the day. The female deposits eggs on rough bark at the margins of wounded areas.

Figure 11 shows that there is one complete generation and a partial second generation annually. Larvae in each instar, except the first, may be found during the winter feeding periodically until pupation begins in January. The first adults appear in March, but the peak of emergence is not reached until early May. Eggs deposited by these adults hatch into larvae which feed throughout the summer. Many of the larvae pupate and appear as second-generation adults in late summer and early fall, with most individuals emerging in September. The remainder of the larvae cease development in

the sixth instar, pass the winter in their feeding areas under the bark, pupate and emerge as adults the following spring.

Lesser peach tree borers are seldom a problem in well-tended orchards. They are attracted to damaged areas in the bark, which usually result from poor cultural practices. Careless pruning provides many favorable sites for egg-laying around the stubs of branches (Figure 12). Trees should be shaped properly while they are young, leaving well-spaced, open crotches and eliminating the need for making large cuts later. Branches broken because of insufficient thinning of the fruit, and wounds arising from barking the tree with equipment during cultivation and harvesting also are attractive to the lesser peach tree borer. Sun-scalded areas, which sometimes afford entry for the larvae, often may be prevented by leaving small branches to shade larger limbs. Winter injury of trunk and scaffold branches, and cracked limbs resulting from scale infestation, also provide sites for larval feeding.

*Treatment.*—Established infestations may be eliminated by painting the entire damaged area with a preparation of 2 pounds of paradichlorobenzene dissolved in 1 gallon of miscible dormant oil and mixed with 2 gallons of water. The wound should be covered thoroughly, without completely circling the limb or trunk. It is not necessary to remove the frass, gum or loose bark when this formula is used. The mixture should be applied during

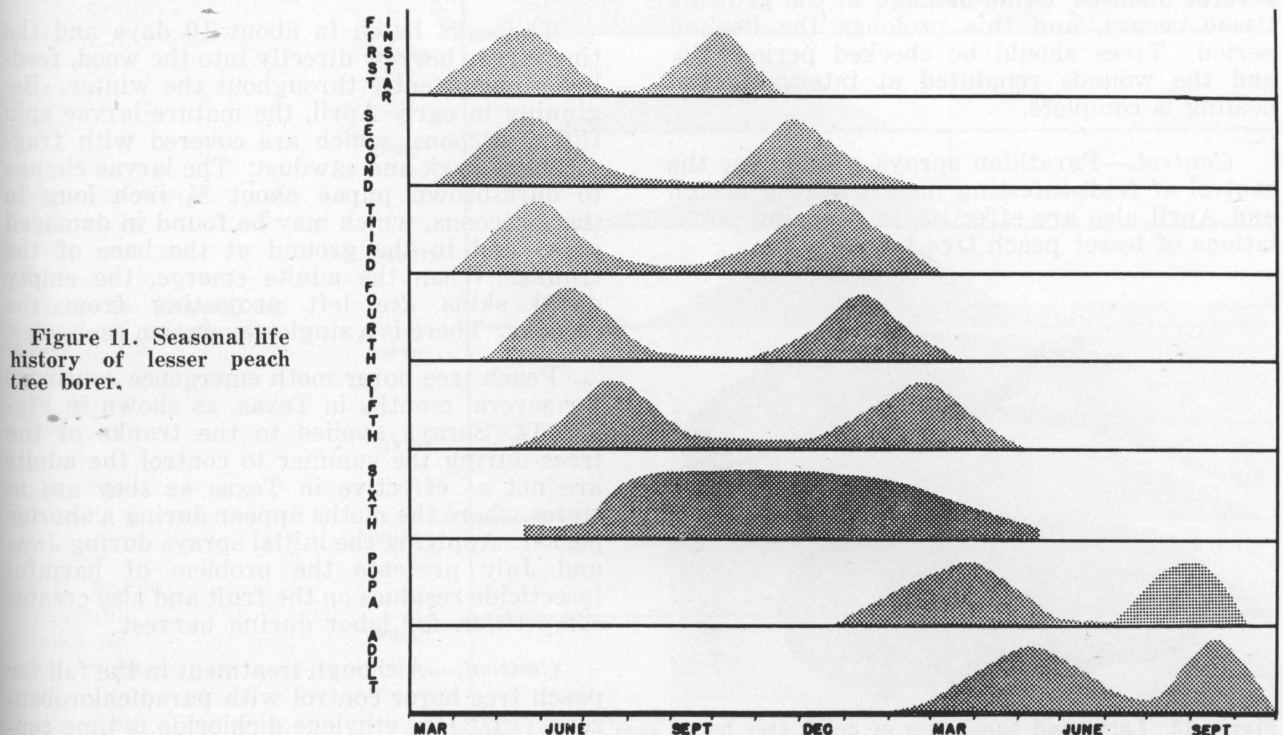


Figure 11. Seasonal life history of lesser peach tree borer.



Figure 12. Lesser peach tree borer injury around a carelessly pruned stub.

## PEACH TREE BORER

Injury by the peach tree borer, *Sanninoidea exitiosa* (Say), often is minimized or overlooked, particularly in orchards in which weeds and grass are permitted to grow around the trunks of the trees. Actually, it is one of the most destructive enemies of the peach. Plum trees are attacked less frequently, but they may be damaged by this pest.

The larvae usually confine their activities to an area 6 inches above the ground to a similar distance below it. In the course of their feeding activities, the trunk may be girdled, resulting in the death of the tree. Masses of frass and gum exude from the wounds.

Yellow-white larvae of varying sizes, up to  $1\frac{1}{4}$  inches in length, may be found under the bark of infested trees, tunneling in the wood. Their abdominal legs are short, and bear hooks arranged in two transverse rows (Figure 13).

The adults are clear-winged moths which resemble wasps in general appearance. The females are dark blue with one or two orange bands around the abdomen. The males are lighter in color, slightly smaller and have several yellow bands encircling the abdomen.

The moths are active during the day. Females usually deposit eggs on the lower trunk, but occasionally on leaves, soil or weeds near the tree. Adult emergence and egg-laying extend from the middle of May to early October.

The eggs hatch in about 10 days and the tiny larvae burrow directly into the wood, feeding intermittently throughout the winter. Beginning in early April, the mature larvae spin flimsy cocoons, which are covered with fragments of bark and sawdust. The larvae change to dark-brown pupae about  $\frac{3}{4}$  inch long in these cocoons, which may be found in damaged areas and in the ground at the base of the trunks. When the adults emerge, the empty pupal skins are left projecting from the cocoons. There is a single generation each year.

Peach tree borer moth emergence continues for several months in Texas, as shown in Figure 14. Sprays applied to the trunks of the trees during the summer to control the adults are not as effective in Texas as they are in states where the moths appear during a shorter period. Applying the initial sprays during June and July presents the problem of harmful insecticide residues on the fruit and also creates competition for labor during harvest.

*Control.*—Although treatment in the fall for peach tree borer control with paradichlorobenzene (PDB) or ethylene dichloride is time con-

warm days in November or December, when all the lesser borers are in the larval stage. Unfortunately, this treatment does not prevent reinfestation before the wounds are healed.

An alternative method of preventing lesser borer infestations consists of cleaning out the damaged areas thoroughly and then painting with a mixture of 1 part asphalt and 1 part carbolineum. This material is available as a commercial tree paint. Treatment with it is time-consuming because the debris and rotten wood must be removed, but the wound is less likely to be reinfested since the paint lasts several months. Some damage to the growing tissue occurs, and this prolongs the healing period. Trees should be checked periodically and the wounds repainted at intervals until healing is complete.

*Control.*—Parathion sprays applied for the control of fruit-infesting insects during March and April also are effective in reducing populations of lesser peach tree borer moths.

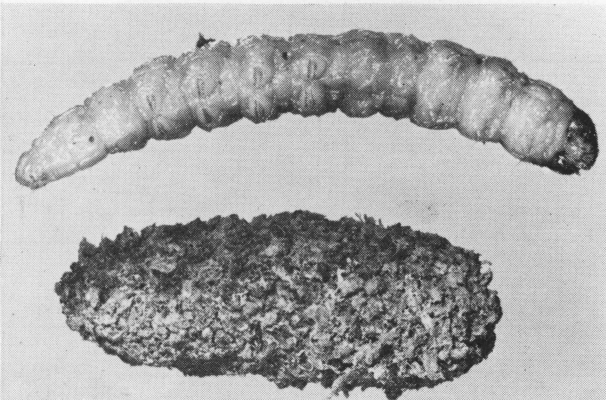


Figure 13. Larva and pupal case of peach tree borer.

suming, satisfactory results can be obtained. Both of these chemicals form gases which penetrate the tunnels in the trees and kill the larvae. Applications should be made after egg-laying is completed in late October or early November on days when the temperature is above 55 degrees F. If PDB is used, the ground should be leveled around the base of the tree and the crystals applied in a continuous band about 1½ to 2 inches from the trunk. For trees 2 to 3 years old, ½ ounce of PDB should be used; 4 and 5-year-old trees require ¾ ounce, while 1 ounce is necessary to control borers attacking trees 6 or more years old.

Several shovelfuls of loose soil should be placed over the band of crystals around the trunk and compacted into a cone-shaped mound. The crystals should not be pushed against the tree trunk since direct contact will cause injury. The mounds should be pulled away from the tree in the spring to prevent the moths from laying eggs at the higher soil level the following summer.

If ethylene dichloride is used, it should be applied according to the manufacturer's directions.

#### AMERICAN PLUM BORER

Although the American plum borer, *Euzophera semifuneralis* (Wlk.), is widely distributed, it has never been known to be destruc-

tive enough to warrant extensive control measures. It attacks peach and plum trees in a manner similar to that of the peach tree and lesser peach tree borers. Damaged or diseased areas in the trunk, from 1 or 2 inches below ground level to the scaffold branches, are favorable sites for larval development.

The larvae construct broad, shallow burrows just beneath the surface of the bark and may girdle the trunk completely.

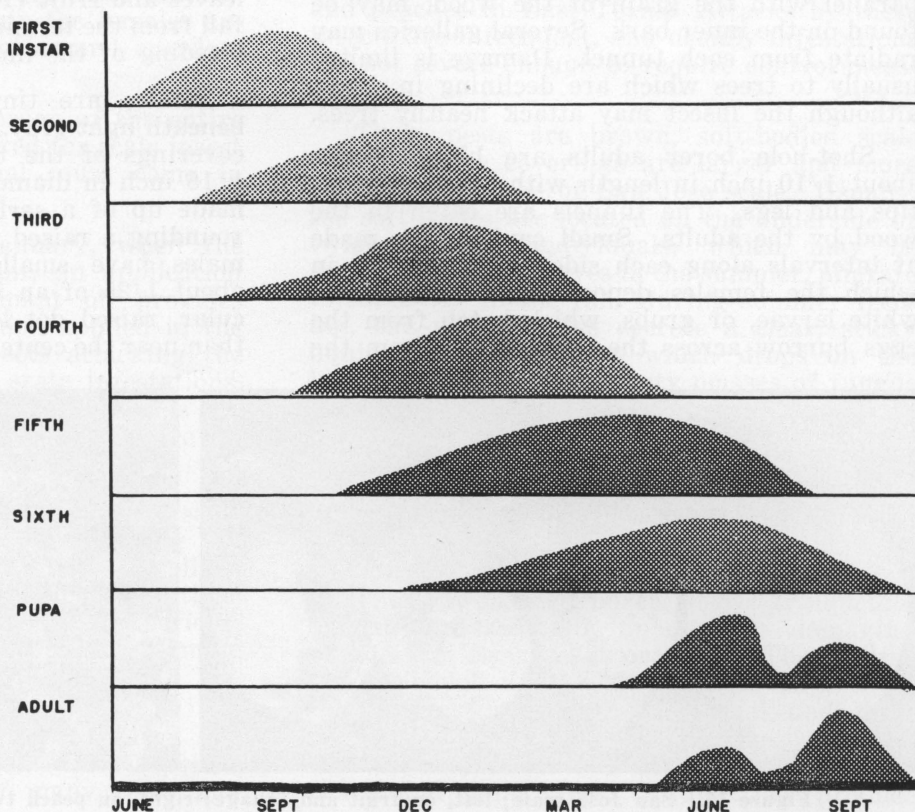
The adults are gray-brown moths with a wingspread of about 1 inch. They are active chiefly at night, resting during the day on the bark, which their coloration closely resembles.

The full-grown larvae are about 1 inch in length and vary in color from dingy white to brownish gray. They may be differentiated from the larvae of the two species of peach tree borers by their color, by the presence of longer hairs on the body and by the arrangement of the hooks on each abdominal leg in circles rather than in transverse rows.

The pupal stage is passed in a tough, loosely woven cocoon under the bark.

Since attacks by this insect are limited largely to trees which are in a declining state of vigor, healthy trees are relatively free from damage.

Figure 14. Seasonal life history of peach tree borer.



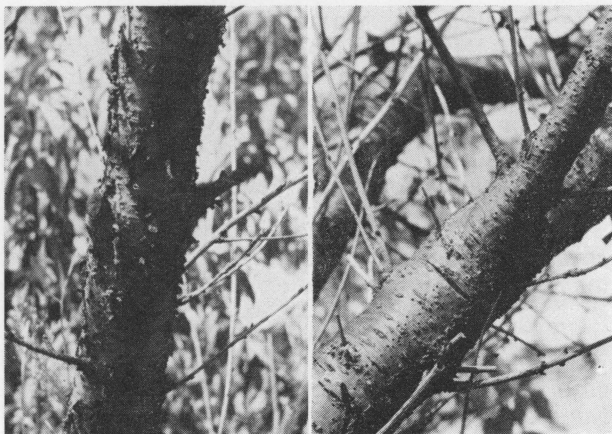


Figure 15. Exit holes of shot-hole borers; left, in living limb (note gum exuding from holes); right, in dead limb.

*Control.*—Control measures discussed for the lesser peach tree borer also may be used for this insect. Paradichlorobenzene crystals applied to kill the peach tree borer likewise will control American plum borer larvae feeding at the base of the trunk.

#### SHOT-HOLE BORER

The attack of this borer, *Scolytus rugulosus* (Ratz.), is shown by clusters of small holes in the bark of peach and plum trees. Gum frequently exudes from the holes in newly infested trees (Figure 15, Left). A series of small tunnels 1 to 2 inches in length, usually running parallel with the grain of the wood, may be found on the inner bark. Several galleries may radiate from each tunnel. Damage is limited usually to trees which are declining in vigor, although the insect may attack healthy trees.

Shot-hole borer adults are black beetles about 1/10 inch in length with dull-red wing-tips and legs. The tunnels are eaten in the wood by the adults. Small cavities are made at intervals along each side of the tunnels in which the females deposit eggs. The small, white larvae, or grubs, which hatch from the eggs burrow across the grain away from the

parent tunnels. Pupation takes place when the larvae have completed development, and the adult beetles tunnel directly out of the galleries, emerging from small exit holes in the bark (Figure 15, Right).

Since the adults are attracted to unhealthy trees to lay their eggs, vigorous trees should be maintained by cultivation and fertilization. Prunings and weakened or dead limbs should be removed from the orchard and burned to reduce the number of sites for egg-laying.

#### SAN JOSE SCALE

The San Jose scale, *Aspidiotus perniciosus* Comst., is one of the most destructive pests of stone fruits in the United States. Damaging infestations develop before growers are aware of the insect's presence, because of the small size and obscure coloration of the scales. The reproductive rate of this insect is exceedingly high and injurious infestations frequently develop in the few months between harvest and the advent of winter. Dry summers usually check the rapid development of this pest.

An initial symptom of scale infestations is a decline in the vigor of the trees which is characterized by sparse, yellow foliage. Reddish spots may be found on the underside of infested bark around the areas where the insects have inserted their mouthparts. If control measures are not used, reddish spots caused by the feeding of immature scale insects appear on the leaves and fruit (Figure 16, Left). The leaves fall from the terminals and limbs; cracking and bleeding of the limbs occur and the trees die.

Scales are tiny, orange, sac-like insects beneath light-gray, waxy coverings. The round coverings of the full-grown females measure 1/16 inch in diameter. Each scale covering is made up of a series of concentric rings surrounding a raised nipple near the center. The males have smaller, elongate-oval coverings about 1/25 of an inch in length with the circular, raised dot located near one end rather than near the center (Figure 16, Right).

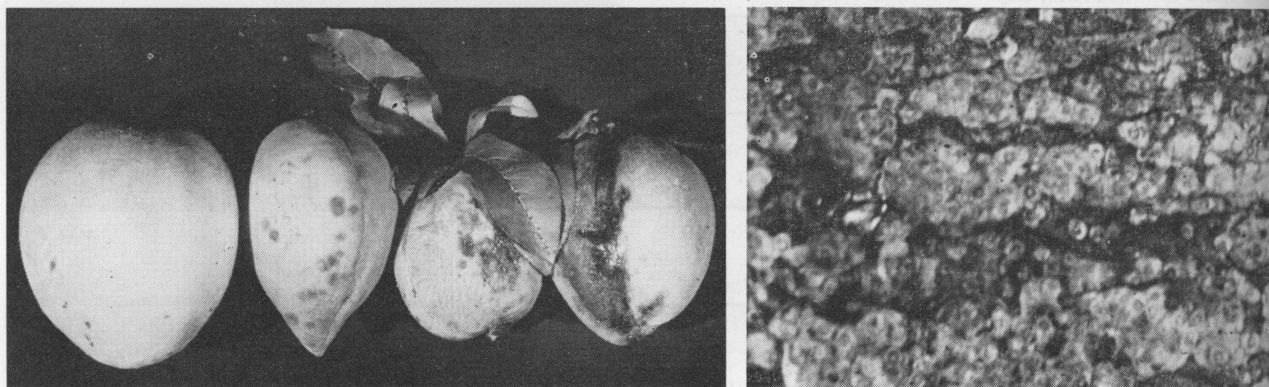


Figure 16. San Jose scale; left, on fruit and foliage; right, on peach twig (greatly enlarged).

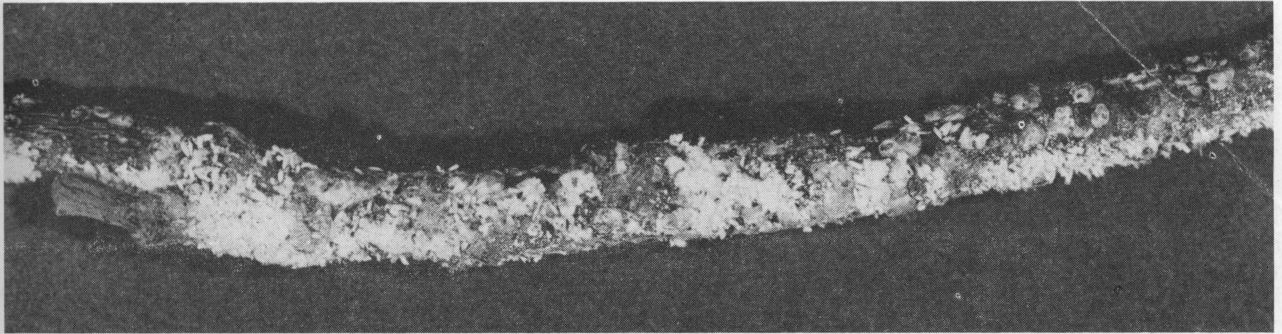


Figure 17. Severe white peach scale infestation.

The females give birth to living young, which are called crawlers. These tiny, yellow insects crawl from beneath the parent scale, find suitable places on the bark, leaves or fruit, and insert their threadlike sucking mouthparts. The females never move from the spot selected at this time. After feeding on the sap for 2 or 3 days, the young, or nymphs, secrete their initial scale coverings, which are later enlarged. The males develop into delicate two-winged insects in 3 or 4 weeks, which emerge from their scales and die soon after mating with the sac-like stationary females.

Scale insects, in all stages of development, exist throughout the year, except during periods of extremely cold weather. Mature females and nymphs survive the few days of cold weather in Texas which normally occur in December and January. During these periods, embryonic development within the females apparently ceases and adult males and crawlers do not appear.

*Control.*—Thorough coverage of the entire tree with insecticide is required for scale insect control. The spray material must come in direct contact with the scales.

During December or January, when the trees are completely dormant, an application of 4 percent miscible dormant oil provides satisfactory control. Parathion applied in the spring to control other insects attacking the fruit also aids in reducing scale infestations. A combination of these two treatments is the most effective means of controlling severe infestations.

In years of abundant summer rainfall, scale populations frequently increase following the harvest of fruit. The growth of heavy foliage and succulent twigs provides ideal conditions for scale development. During these periods, growers should make inspections to determine the need for additional parathion sprays.

#### WHITE PEACH SCALE

White peach scale, *Pseudaulacaspis pentagona* (Targ.), is a pest of many trees and

shrubs. The damage resulting from the feeding activities of this species is similar to that caused by San Jose scale.

Female scales are circular and grayish, with a yellow-to-orange raised center. The male scales are smaller and more elongate than the females. In cases of severe infestations, they appear as white, cottony masses encrusting the bark of the tree (Figure 17).

*Control.*—Ordinarily, no control measures are required for this insect, because of the activity of natural enemies. If the infestation should attain damaging proportions, the use of dormant oil, as discussed for San Jose scale, will result in satisfactory control.

#### SOFT SCALES

Several species of soft scales attack plums and peaches in East Texas. Attacks by these insects are infrequent, and usually infestations are not severe enough to require control measures.

These pests are brown, soft-bodied scale insects whose coverings are larger and more convex than those of San Jose scale. Usually, the soft scales are located on the underside of twigs. Young individuals, which may be motionless on the leaves in the summer, migrate to the twigs in the fall. During summer feeding, the young scales secrete a clear, sticky liquid called honeydew, which drops on the leaves and fruit. Dark, sooty masses of fungus grow on the honeydew and discolor the foliage and fruit.

*Control.*—Dormant oil, as recommended for San Jose scale, will control these pests.

#### DOGWOOD TWIG BORER

The dogwood twig borer, *Oberea tripunctata* (Swed.), occasionally appears in damaging numbers in East Texas orchards. The whitish larvae, which are about 5/8 inch long when full-grown, are nearly cylindrical and their bodies are strongly constricted between segments. They burrow in the growing twigs of peach and plum trees. Injury they produce

may be detected by the appearance of dead leaves at the growing terminals during the late spring and summer. The adults, which are about  $\frac{1}{2}$  inch in length, are long-horned, red-to-yellow beetles with black spots on the thorax and black-margined wing covers.

*Control.*—No satisfactory chemical control for the dogwood twig borer has been developed, but removing and burning the infested twigs will reduce the damage by succeeding generations.

## Insects Attacking the Twigs and Foliage

### APHIDS

Several species of aphids, or plant lice, often appear in large numbers early in the season on the buds and young foliage of plum trees. Peach trees are attacked less frequently. These insects suck the juices from the leaves, which causes them to curl and stunts the terminal growth. The leaves become covered with a clear, sticky fluid called honeydew, which is secreted by the aphids.

Aphids are green or brown, soft-bodied insects which feed in clusters. Immature aphids resemble the adults but are smaller. Winged and wingless adults may be present.

*Control.*—As a rule, aphids are of economic importance in orchards only when other pests are not controlled. Sprays should be applied as soon as infestations appear. The application of one of the following materials will result in satisfactory control: 1 pound of 25 percent parathion; 2 pounds of 10 percent gamma BHC wettable powder or 1 pint of nicotine sulfate plus 3 or 4 pounds of soap.

### GRASSHOPPERS

Young peach and plum trees are attacked frequently by several species of grasshoppers during the summer. Orchards often are invaded when nearby pastures dry up. The insects prefer the tender bark to the foliage and usually girdle twigs and small branches. As a result, the leaves beyond the point of injury wilt and die. Frequently, small branches which would be suitable for scaffold limbs must be removed in the pruning operation because of this type of injury.

Grasshoppers overwinter in the egg stage in the ground along fence rows and in pastures. So long as field crops and weeds are succulent and green, grasshoppers continue to feed on them. They attack trees only when other crops mature in the summer. There is one generation annually.

*Control.*—Weeds around the edges of young orchards should be inspected at frequent intervals during the spring for small grasshoppers. When large numbers of young nymphs are observed, sprays or dusts should be applied to these margins. Usually, treatment of the orchard is unnecessary if the grasshoppers are controlled around the edges of the orchard with one of the following materials:  $\frac{1}{2}$  pound of 50 percent dieldrin; 1 pound of 25 percent aldrin; 2 pounds of 25 percent heptachlor or 5 pounds of 40 percent toxaphene wettable powder per 100 gallons of water. The equivalent amount of each of these insecticides in emulsion sprays or dusts will provide satisfactory control.

### EASTERN TENT CATERPILLAR

The webs constructed by the eastern tent caterpillar, *Malacosoma americanum* (F.), are familiar sights in neglected orchards in early spring. Branches and twigs in the area around the webs may be defoliated.

The adults are stout, red-brown moths with two whitish lines crossing the front pair of wings.

The larvae are black, hairy caterpillars with a white stripe along the back. There are brown and yellow stripes and a row of blue spots along each side of their bodies.

The winter is passed by this insect in the egg stage. The larvae feed for 4 to 6 weeks in the spring, and pupate in loose, white cocoons, usually on the trunk or branches. The adults emerge in about 3 weeks and deposit eggs in collar-like masses around twigs. There is only one generation annually.

*Control.*—Control of the larvae may be obtained by spraying with one of the following compounds: 1 pound of 25 percent parathion; 2 pounds of 50 percent DDT or 5 pounds of 40 percent toxaphene wettable powder per 100 gallons of water. An application of 3 pounds of lead arsenate per 100 gallons of water also will provide effective control.

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# Peach and Plum Insect Control Calendar

The program outlined in this calendar is designed to control the most common pests attacking peaches and plums in East Texas. Since it does not cover minor pests and those that occur irregularly, fruit-growers also should consult the discussions of specific pests, pages 3 to 14 of this publication. The control measures listed for individual pests apply to any part of the State.

NOTE: Insecticides should be handled carefully.

Parathion and dieldrin are recommended for commercial growers to use in controlling fruit pests. These materials provide efficient control at low cost, but they should not be used for treating home orchards because they are highly toxic to humans.

For home orchards, substitute 50 percent methoxy-chlor wettable powder at the rate of 1 tablespoon per gallon of water wherever the control calendar calls for dieldrin or parathion.

<b>January</b>	Prune and remove weakened and dead limbs from the orchard to reduce shot-hole borer infestations. Spray with 4 percent miscible dormant oil to control scale if an application was not made in December.
<b>February</b>	Check for aphids. (See page 14 for control.) If growing season is early, apply petal fall spray on plums when 75 percent of the petals have fallen. Use 1 pound of 25 percent parathion or $\frac{1}{2}$ pound of 50 percent dieldrin wettable powder.
<b>March</b>	On plums, apply petal fall and shucksplit sprays. If growing season is early, apply first cover spray on plums 2 weeks after shucksplit. On peaches, spray when 75 percent of the petals have fallen. If growing season is early, shucksplit spray on peaches may be required. Use $\frac{1}{2}$ pound of 50 percent dieldrin or 1 pound of 25 percent parathion wettable powder per 100 gallons of water on both peaches and plums.
<b>April</b>	On plums, apply first cover spray 2 weeks after shucksplit and another spray 2 weeks later. Spray peaches at shucksplit, followed by two additional sprays at 2-week intervals. Use $\frac{1}{2}$ pound of 50 percent dieldrin or 1 pound of 25 percent parathion wettable powder per 100 gallons of water. To avoid harmful insecticide residues on the fruit, do not spray plums or early-maturing peach varieties within 30 days of harvest with dieldrin, or within 21 days with parathion.
<b>May</b>	Second cover spray on peaches should be applied early this month if it was not put on in late April.
<b>June</b>	Apply third cover spray on peaches early this month. Use $\frac{1}{2}$ pound of 50 percent dieldrin or 1 pound of 25 percent parathion wettable powder per 100 gallons of water. This is the final application for mid-season varieties which ripen in July. Do not apply this spray on earlier ripening varieties.
<b>July</b>	Late-maturing peach varieties should be sprayed 30 days before harvest with 1 pound of 25 percent parathion or $\frac{1}{2}$ pound of 50 percent dieldrin wettable powder per 100 gallons of water.
<b>Aug. - Sept.</b>	Check for development of scale infestations. If damage is severe, spray with 1 pound of 25 percent parathion wettable powder per 100 gallons of water.
<b>October</b>	On peaches, apply PDB or ethylene dichloride for peach tree borer control late in the month. Check plum orchards to determine need for control. (See peach tree borer discussion, page 10.)
<b>November</b>	Finish peach tree borer control applications and treat for lesser peach tree borer. (See lesser peach tree borer discussion, page 8.)
<b>December</b>	Same as January

*Thorough spray coverage at each spraying is essential for control of pests.*