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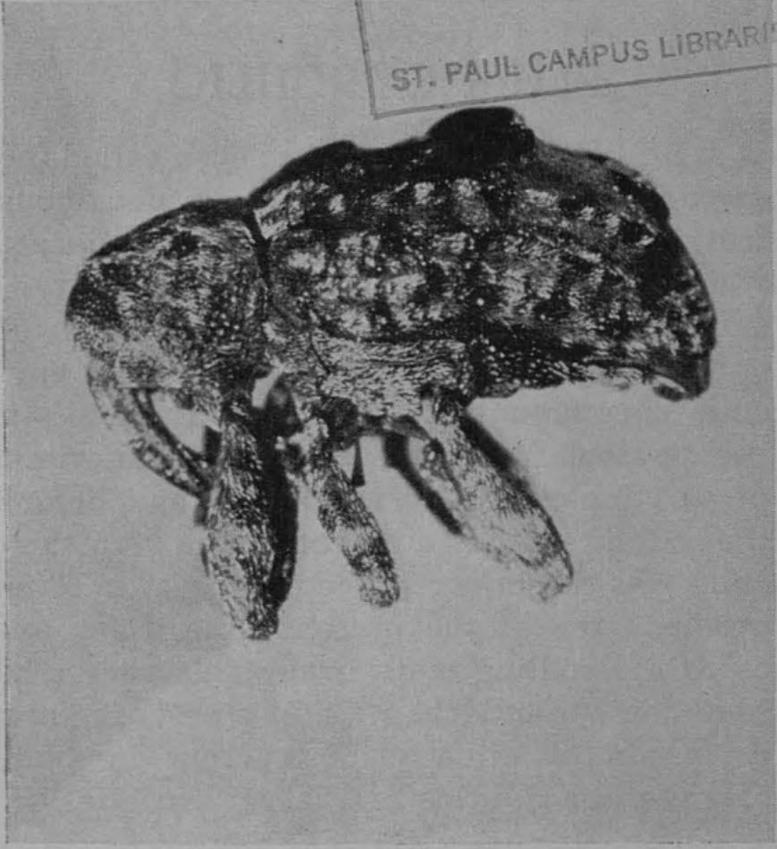
MN 2000 EF 121

Control of the PLUM CURCULIO

Plum Gouger, Apple Curculio

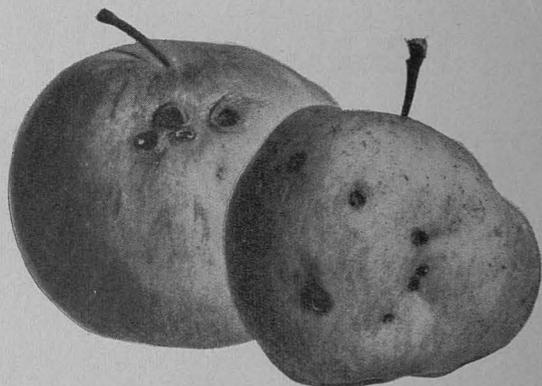
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Plum curculio—Actual size |—|

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Surface scars and fruit distortion from plum curculio

PLUM CURCULIO

THE PLUM CURCULIO has been called the second most important pest of deciduous fruits in this country. It is a native insect which formerly bred in wild plums and possibly other fruits before the introduction of cultivated varieties. Although the plum curculio is commonly considered as primarily a pest of stone fruits, it is also a very important pest of apples. Thirty or 40 years ago, before the codling moth had moved in, the plum curculio was *the* important apple insect in Minnesota. Even at the present time it far exceeds the codling moth in destructiveness in some seasons and localities. As a pest of plums it is almost equally destructive in both cherry-plum hybrids and larger varieties.

Description—The adult plum curculio is one of the snout beetles, averaging about one-fifth of an inch in length. It has a somewhat tweedy appearance because of the patches and bands of grayish-white and rust-colored hairs over a dark brown, almost black, ground color. The wing covers are very rough with conspicuous humps near the middle. These beetles have a curious habit of feigning death if disturbed. They may rest on a leaf or drop to the ground in what appears to be a lifeless

state, in which condition they could easily be confused with a bud scale or a shuck.

Habits and Life History—The adult beetles pass the winter under leaves, trash, stones, and other debris on the ground. When they seek hibernation quarters in the fall they may find suitable shelter in sod orchards and remain near the trees for the winter. However, they seem to prefer to move out into bordering fence rows, woodlots, or waste areas. Orchards and small home plantings surrounded by such favorable hibernation quarters are always attacked most frequently and heavily. In the spring the beetles begin to fly to apple and plum trees about the time of full bloom. Usually they are present in large numbers about two weeks after petal-fall and some may continue to move into the orchard for two or three weeks longer. Migration from the winter quarters is controlled largely by temperature. Studies made in Minnesota and in other states have shown that the greatest damage occurs after the temperature has reached 75° F. or has averaged 60° F. for a few days during the period of migration.

When the first beetles arrive in the trees they feed on expanding leaves and blossoms, but turn to the fruit as soon as it develops. Round feeding punctures on the newly formed fruit may be seen in apples soon after petal-fall and in plums when the shucks have been shed. Egg laying starts when the fruit is about one-fourth inch in diameter and most of it will be over by the time the fruit is one-half inch in diameter, although some fresh stings may be found up until apples have reached an inch or more in size.

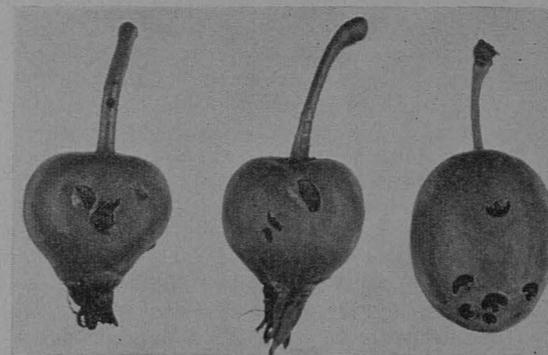
Egg-laying injury—egg scars or stings—are easily recognized by the crescent-shaped cuts which the female beetle makes when she lays her eggs. A small cavity in which the egg is laid is formed first, after which the typical crescent-shaped cut is made half way around the site of the egg. Supposedly, this cut is made to prevent rapid fruit growth which might cause pressure on the egg.

After an egg is laid, a tiny grub hatches in about one week. If the infested fruit drops to the ground the grub finishes its feeding in about two weeks, leaves the fruit, and burrows down into the soil to a depth of about one inch. A small earthen cell is formed in the soil in which the insect goes

through the pupa stage, the new adults emerging from the cells during August. After feeding for a while on maturing fruit the beetles leave the trees and seek their hibernation quarters.

Damage—The damage caused by the plum curculio is principally of three kinds—surface scars and fruit distortion, premature fruit drop, and late-summer feeding punctures. Surface injury caused by the early-season egg-laying crescents and feeding punctures is the most common type. Stung apples which do not fall develop russeted scars where the early-season stings were formed in the young fruits. These scars usually lie in depressions, but in a few varieties they may be on elevated knobs. The plum curculio grubs are unable to complete their development in fruit which grows normally except possibly in some of the early varieties of apples and plums. However, they often feed long enough to form tunnels into the flesh, and when this happens the mature fruit is always misshapen. Early varieties of apples such as the Duchess are commonly distorted by the grubs. Drops of sticky discharge material around egg scars on plums indicate some grub development. Plums infested in this way often develop brown rot much earlier than normal fruits.

Early dropping of fruit attacked by the plum curculio is common in both plums and apples, particularly plums. These dropped fruits, which fall about the time of the normal June drop of imperfectly fertilized or crowded apples, are the fruits in which normal grub development is com-



Egg-laying injury on apples and plum

pleted. In a heavy infestation of the plum curculio, the large number of prematurely dropped apples or plums may cause a significant loss of crop. Losses from this source, however, never equal the damage resulting from scars and distortion.

When the overwintering generation of beetles emerge in the late summer, usually after the first week in August, they cause some damage by feeding on maturing fruit. The fall-feeding punctures appear as small pits, often with a reddish or light-colored margin around them. They are seldom an important cause of damage except in unsprayed orchards or where control has been unsuccessful.

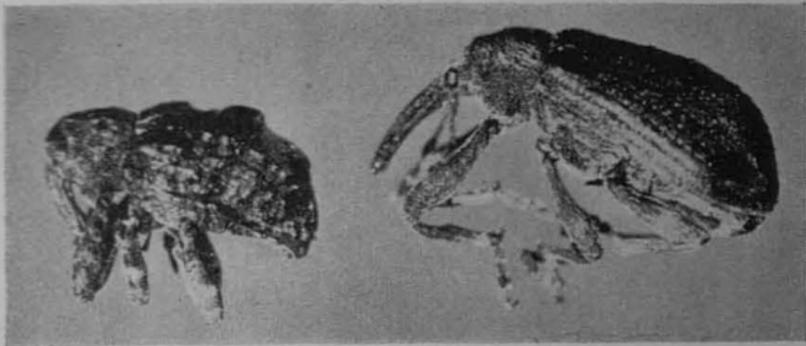
Control of Plum Curculio

Spraying—Spraying with lead arsenate at the rate of 3 pounds of lead arsenate and 3 pounds of spray lime to 100 gallons of water (1½ table-spoons of each to 1 gallon), with the addition of a sticker and fungicide, is the standard method of control of the plum curculio. Use soybean flour, casco glue, or a commercial sticker and wettable sulfur as a fungicide to control brown rot. Timing of the three recommended spray applications is very important. At least part of the difficulty in combating the curculio in plums and cherry hybrids is due to improper timing of sprays. Sometimes an apple spray program will suffice for control in plums, but often it will not.

THE FIRST SPRAY should be put on when about three-fourths of the petals have fallen, the so-called calyx or petal-fall spray. For apples this spray is also essential in the control of both scab and the codling moth.

THE SECOND SPRAY, called the curculio spray, is usually the most important for the control of the plum curculio. Most years it should be applied about 7 to 10 days after petal-fall. Temperature during this period should determine whether to delay the curculio spray a short or longer time. If there are several days with an average temperature of 60° F. or with a top temperature of 75° F. or higher, it should not be delayed longer than a week after petal-fall. In cool weather, the grower may wait 10 to 14 days with safety. At the proper time for the curculio spray, apples have usually reached a size of about one-fourth inch in diameter with the calyx only partly closed.

★ Prevent damaged plums and apples—spray trees, pick up drops, remove brush and trash, destroy beetles ★



Plum curculio
Actual size |——|

Plum gouger
Actual size |——|

Spray should be applied to plums right after shuck-fall when the fruit is first exposed and about the size of a small pea.

THE THIRD SPRAY of importance for curculio control is commonly designated as the second-cover spray or first-codling-moth spray and should be put on 10 to 14 days after the curculio spray. All but early varieties of apples and most of the large varieties of plums will average about $\frac{1}{2}$ inch in diameter at the proper time.

Because some plums are susceptible to arsenical injury, cryolite may be substituted for lead arsenate as a spray material. It should be used at the rate of 4 pounds to 100 gallons of water with a sticker and wettable sulfur added. Spray lime or lime sulfur should not be used with cryolite because they reduce its effectiveness. However, 3 pounds of spray lime should be added to lead arsenate and wettable sulfur mixtures to prevent arsenical burning on both apples and plums.

Other Control Helps—Although thorough and timely spraying is the most reliable method of combating the plum curculio, some supplementary measures may be needed. Among the most important sanitary control measures are the elimination of favorable hibernation quarters near the orchard, destruction of prematurely dropped fruits, and the removal of unsprayed apple or plum trees. Weedy fence rows, brush piles, and abandoned plum thickets should be cleaned up if spraying is to be entirely satisfactory. Stung plums and apples which drop during June and July should be picked up and destroyed or placed in the sun where they can dry rapidly. This should be a routine procedure in the home or small farm planting. Burning of the entire orchard is not advised because it is likely to do more harm than good. Careful burning of pruning brush, trash, and weeds will help to eliminate plum curculio hibernation quarters.

OTHER SNOOT BEETLES

Two other snout beetles cause considerable damage to apples and plums. These species are the plum gouger and the apple curculio. Because neither of these insects is controlled successfully by spraying they present a problem of control different from that described for the plum curculio.

Plum Gouger

The plum gouger is a smooth, brown snout beetle with a long, curved, slender beak. It hibernates as an adult in leaves and debris under plum trees, emerging from these quarters during the blossoming period. Some early damage is done at this time as the beetles feed at the base of plum blossoms.

The injury to the fruit commences soon after shuck-fall and is quite different from that caused by the plum curculio. Eggs are deposited in the plum skin in tiny punctures, and when the grubs hatch they bore directly through the flesh to the pit. Most of the feeding is done in the pit, not in the flesh, and pupation takes place there. The adults, upon emerging, cause the principal damage when they bore their way to the outside. Their exit is marked by round holes about one-eighth inch in diameter which appear first as the fruit is beginning to ripen. It is uncommon to find more than one beetle maturing in a single fruit. Unlike the plum curculio, the gouger develops in fruit which remains on the tree instead of in the early drops. Damage caused by this insect seldom occurs in the small cherry-plum hybrids.

Tree-jarring every four or five days from full bloom until the plums are about one-fourth inch in diameter is the most successful means of control. When the trees are shaken or jarred by being struck with a well-padded mallet, the beetles fall to the ground where they may be collected on a blanket, sheet, or canvas spread on the ground. Jarring should be done early in the morning before the beetles warm up and become active. Jarring can be suspended during cool weather but should not be neglected after two or three days when the temperature rises to 70° F. or above. Spraying the ground with a 25 per cent kerosene emulsion, as described for control of the apple curculio, may be desirable to clean up heavy infestations of the beetles.

Apple Curculio

The apple curculio is a dark brown snout beetle with a long snout and four conspicuous knobs on the wing covers. It passes the winter in the orchard on the ground under infested trees, although some migration to nearby woodlots is indicated by the greater amount of damage near such places. Most commercial damage is done in the spring by the beetles which have hibernated under leaves and trash in the orchard. Both feeding and egg-laying punctures cause pitted and gnarled fruit at harvest time. The pits are shallow, funnel-shaped depressions, quite unlike damage caused by the plum curculio. Most of the young fruits infested tend to drop during June, but these weevils can complete their development on growing apples. There is one generation a year, the adults emerging directly from infested fruit.

The plantings most severely attacked are closely planted, poorly pruned, sod orchards in protected sites. Parts of an orchard near a woodlot tend to be more heavily infested. The weevils seem to develop about equally well in all varieties when infested fruits drop, but they seem to show some preference for Wealthy and Delicious.

Spraying trees has not been successful in controlling the apple curculio in Minnesota or elsewhere. However, experiments conducted in other states indicate that the use of a ground treatment is worthwhile. As soon as the leaves and grass dry in the spring, the ground may be sprayed with a 25 per cent kerosene emulsion. One pound of finely divided clay, such as Fuller's earth or bentonite, per gallon of oil can be used to make the emulsion. Up to 20 gallons of the emulsion may be applied per tree with no permanent injury to the sod. Care should be taken to prevent the mixture from hitting low branches and the tender bark of young trees. In small plantings, this pest can be controlled by destroying all fallen apples after the June drop, but this method is not practical in commercial orchards grown in sod.

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