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The Control of the Apple Curculio by Hogs

By B. B. Fulton

The apple curculio is causing severe losses in a number of Iowa apple orchards and is not being controlled by spraying. The injury is caused by the feeding of the adult curculios on the fruit. The insect has a long beak with small jaws at the tip with which it chews a hole thru the skin of the apple and hollows out a large cavity below without increasing the size of the opening.

This insect shows a peculiar preference for certain varieties, notably the Ben Davis and Delicious, while some varieties such as the Northwestern Greening are practically free from attack.

How to Recognize Injury by Apple Curculio

Apple growers who find a large number of pitted and misshapen fruits at picking time may suspect the presence of this insect in the orchard but should try to distinguish the injury from that of the plum curculio which is a much more widespread insect. The latter would probably be controlled also by the measures herein described, but in most orchards adherence to the recommended spraying schedule year after year will sufficiently check this insect.

Since the curculios themselves will seldom be seen by fruit growers it is necessary to determine which species are present by the types of injuries found on the fruit. The most characteristic thing about the apple curculio injury is a deep funnel shaped pit with a small brown scar at the bottom (Fig. 1, o). When these pits are cut thru the center, a dark line will be found reaching part way to the core and often slightly forked or bent to one side at the inner end. These pits result from the deep cavities which the adult apple curculios excavate in the green fruit (Fig. 1, h). Similar cavities made by the newly matured beetles in late summer will be found on apples at that time (Fig. 1, b, d). Many such cavities are made on a rather limited area while the beetle is hiding under a leaf or in the hollow about the stem. The underlying tissue dries out and collapses leaving the perforated skin sunken and browned.

The best clue to the presence of plum curculio on the ripe fruit is a brownish scar shaped like a half moon or letter "D"
Comparison of fruit injuries by Plum Curculio (A) and Apple Curculio (B). Upper figures are of recent work on young fruit, enlarged 3 diameters. Lower figures show recent work on mature fruit and scars resulting from early injury. a. Crescent cut or egg puncture, surface view. b. Feeding puncture. c, d. Sections of egg and feeding punctures respectively. e. Egg puncture plugged with excrement. f. Same, plug removed. g. Section of feeding puncture. h. Section of egg puncture. i, j. Unusual types of punctures. k. Late summer feeding punctures, enlarged by drying or rotting. l. Scars resulting from crescent cuts. m, n. Protruding and sunken scars from early feeding punctures. o. Pits resulting from egg punctures. p, q. Late summer feeding punctures. r. Patch of late feeding punctures resulting in collapse of underlying tissue. s, t. Crater-like and protruding scars resulting from early punctures.

(Fig. 1, l). These scars result from the crescent shaped cuts made by the female plum curculios in spring (Fig. 1, a, c). The apples will also have round scars resulting from the spring feeding cavities of the curculios (Fig. 1, b, d, m, n). Late summer feeding cavities in plums may also be found, but they tend to be more scattered than those made by the apple curculio and are not so large, for the plum curculio has a much shorter beak and cannot reach so far (Fig. 1, k).

Life History

The apple curculio has but one generation a year and passes most of that time in the adult or beetle stage. It comes out of hibernation in spring and begins to feed on the young apples just after they set (Fig. 2). Egg laying begins while the apples are still quite small. Most of the eggs are deposited before the June drop is complete, but a few beetles continue laying eggs until the apples are nearly half grown. The egg laying period covers a month or more. Each female deposits a few eggs a day and an average of 60 to 70 eggs during the season.

Normally the apple must drop if the life history of the insect is to be completed. The entire larval and pupal stages are spent within the dropped apple which may become dried and mummi-
fied before the beetle emerges. No large larvae have been found in growing apples. Evidently the insect is not completely adapted to the cultivated apple and is dependent on the "June drop" for survival. The beetle or adult stage cuts a hole thru the side of the dried apple and crawls out. It feeds on the fruit for about a month and then goes into hibernation until spring.

Recommendations for Control

If apples have a pitted and scarred appearance, the grower should first make sure of the cause. If unable to decide from the description and figures in this circular, send about a dozen typical samples of either ripe or green fruit to the entomology section of the Agricultural Experiment Station, Ames, Iowa, for identification.

If it is determined that the apple curculio is responsible for a large part of the injury, prepare to pasture about five pigs per acre from the middle of June until about the middle of July. Pigs weighing about 100 pounds are the best size, for they do not tramp down the low branches. The pigs do not feed from the trees much if the apples are more than nose high. If the weight of the apples brings the branches down to the ground, the pigs can be removed.

The pigs prefer green apples to grass and can find the apples more readily if the orchard is cultivated before the middle of

Fig. 2. Adult apple curculio.
June. No cultivating should be done after the apples start dropping, else many apples may escape destruction.

Pigs should be encouraged to frequent parts of the orchard containing the varieties most injured by the apple curculio. This can be done by throwing there whatever extra feed is necessary or by providing a wallow in that part of the orchard. The best results will be obtained if the pigs are kept on slightly short rations. Wherever apple varieties are segregated, good results could be obtained with fewer pigs by fencing them in the severely injured parts of the orchard.

The greatest drawbacks to keeping pigs in the orchard are the severe rubbing of the tree trunks and the rooting to expose the roots. When small pigs are used for only a month, such injury is negligible. Pigs should not be oiled while they are in the orchard.

It is sometimes difficult to obtain pigs at the time when the pasturing should be done. Under ordinary circumstances, the fruit grower should anticipate this need and buy pigs during the winter and spring whenever they can be obtained economically.

This method of control has been practiced by R. M. Clark, manager of the Apple Grove Orchards, south of Mitchellville, and has been found to be both effective and economical. A cost account kept by Mr. Clark for two years showed that during 1925 each pig returned a net profit of $10.00 above cost and feed, and in 1926 a net profit of $7.65. These figures include the cost of vaccination but not the cost of labor in handling and feeding the pigs, nor the cost of fencing, which in this case was small.

In considering the results of these control measures one should bear in mind that they are directed against the new generation of curculios and will have no effect on the early injury caused that year. If successful, the treatment should reduce the number of late summer feeding punctures and should result in a clean crop of fruit the following year. To get good results, the practice should be continued for at least two years and as often thereafter as necessary, judging by the condition of the fruit each fall.