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A STUDY OF INSECT INFESTATIONS IN A NEGLECTED PEACH ORCHARD

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During the seasons of 1953 and 1954 a study of insect populations was conducted in a southern Illinois peach orchard which had been neglected and unsprayed since the conclusion of the 1951 harvest. It was hoped that it would yield information of immediate and practical value and also some data of a more basic nature. The orchard is near Mounds, Pulaski County, Illinois, almost at the southernmost tip of the state. It is located in a rugged terrain with enough wood and brush land at its edges to provide good hibernating quarters for insects. As a result of these surroundings, the poor spraying the orchard had received prior to its abandonment, and its location in the southern end of the state where all insects thrive better than farther north, there was a high insect population in the orchard at the time it was abandoned. The study was of practical value in that on the basis of conditions observed in this orchard, insect and disease development could be predicted for areas farther north. This information was incorporated in our weekly spray service report sent to fruit growers. The conditions in this orchard presented an excellent opportunity for the study of insects and insect development in relation to the development of the peach tree under conditions unaffected by poisoning or other activities of man. With a little additional effort it was possible to obtain valuable information on the extent of insect and disease injuries to the fruit and the extent of crop losses when no sprays were used.

Information on insect populations was obtained by jarring five previously marked trees at approximately weekly intervals from the blooming period until harvest and recording the number of insects dislodged onto sheets placed under the branches. Jarring is done with a pole, at one end of which is a padded block of wood. Quick blows with the end of the pole on the main branches of the trees will dislodge many insects, especially in the cool of the morning.

In peach orchards the important insects which may be dislodged by jarring are the plum curculio, *Conotrachelus nenuphar,* and certain sucking insects, notably the tarnished plant bug, *Lygus lineolarius,* and a number of stink bugs, the most common of which belong to the genus *Euschistus.* Of the insects whose immature stages enter the fruit of peaches, the plum curculio is by far the most important. Most of the spray operations conducted by the growers are designed to control this insect and the disease for which it makes ready access, brown rot, caused by the fungus *Monilinia fructicola.* The plum curculio is also responsible for some of the injury

known as "catfacing." Tarnished plant bugs and stink bugs are the most important catfacing insects. Catfacing may be defined as an early injury to the fruit that checks the growth at that point and results in a distorted and frequently lopsided peach with a lack of pubescence in the area affected.

The number of sucking insects obtained by this jarring method was surprisingly small. Only two tarnished plant bugs were caught in the entire season of 1953 and four in 1954. Only 37 stink bugs were caught in 1953 and, of these, 25 were jarred late in the season (July) and represented a second brood. These late stink bugs do not produce the typical injury. In 1954 only seven stink bugs were obtained during the season. It is possible that the heat and drought which were severe in both years were responsible, or that the insects may have been held in check by natural enemies, or both factors might have been acting to reduce the numbers. Such small numbers make the seasonal distribution of data of little value and these data are not recorded here.

The total number of plum curculio adults obtained by 19 jarrings in 1953 reached the astonishing total of 495. The distribution over the season and in relation to stages of fruit development is shown in Figure 1. Quite large numbers were jarred in 1954 as compared with those in most sprayed orchards, but many less than in the preceding year in this orchard. The distribution in 1954 is shown in Figure 2.

A study of these two graphs will show that the plum curculio first appeared in relatively small numbers when peach trees were in the late bloom stage, and that the population began to increase rapidly about two weeks later, about the shuck-crack period. In 1953 the peak of abundance occurred 21 days after the shucks were all off the fruit, which was 56 days after the first appearance of the beetles in the orchard. In 1954 the peak was reached 13 days after the shucks were off or 43 days after the first appearance of beetles. These differences may be correlated with weather conditions, especially temperatures. In both years, however, the data indicate a rather prolonged period during which the adults emerged from winter quarters. These beetles usually hibernate at the edges of peach orchards and in woodlands and thickets which, as already noted, are abundant in the vicinity of this orchard, and in spring the insects fly to nearby orchards. The five trees which were used for jarring were close to this type of vegetation. Knowledge of this extended period of adult activity has practical significance because it indicates the need for continued protection of the fruit by insecticides with good residual qualities.

Following these peaks there is a rapid drop in numbers of curculios present on the trees (Figs. 1 and 2), indicating the period when feeding and ovipositing have ceased and the overwintering adults are dying off. It is during this period that the larvae leave the fruit, enter the soil, and pupate. Studies have shown that the adults emerge from the pupal cells in the ground, but they require some moisture before they are able to work their way to the surface. The three seasons of 1952, 1953 and 1954 were very unfavorable for

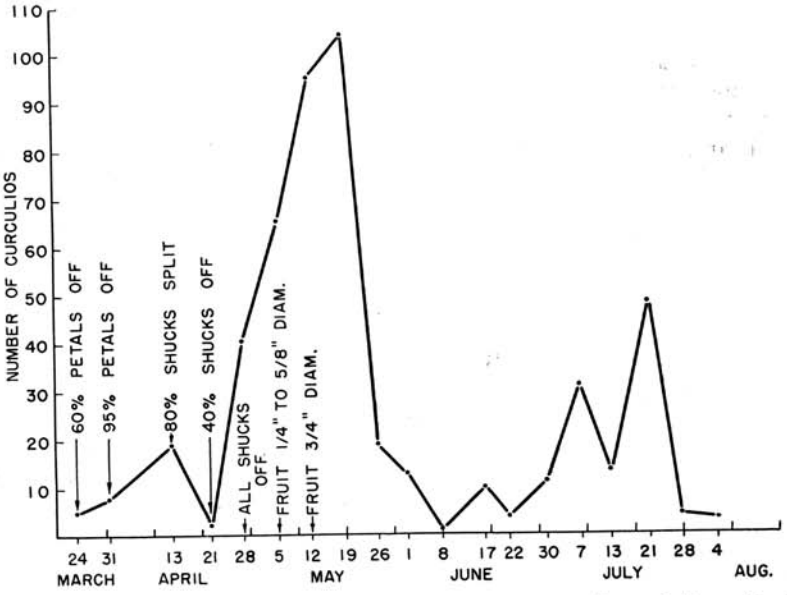

FIG. 1.—Numbers of plum curculios jarred from 5 unsprayed peach trees in 1953.

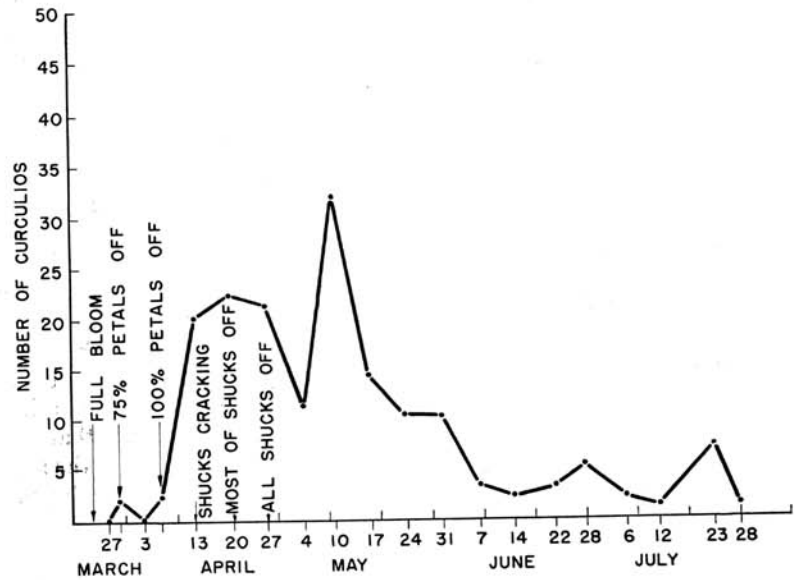

FIG. 2.—Numbers plum curculios jarred from 5 unsprayed peach trees in 1954.

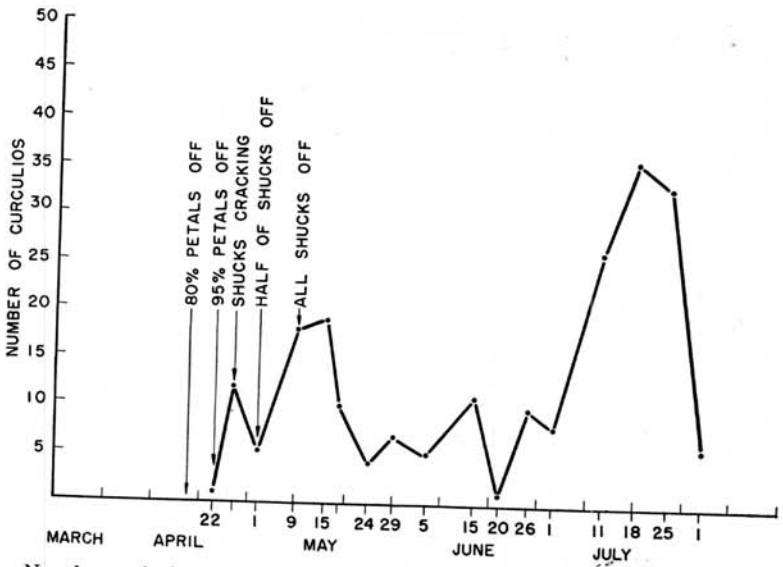

FIG. 3.—Numbers of plum curculios jarred from 5 peach trees in a normal season.

emergence of curculios from the ground, and consequently Figures 1 and 2 show very small midsummer peaks. The beetles represented by this second peak are first generation adults. These produce the second brood of larvae from which come the adults that will later hibernate. If this second brood is small, the carryover into the following year is also light. A more normal season is indicated by Figure 3, in which the second peak is higher than the first. To obtain information on the extent to which insects and diseases would injure fruit left entirely unsprayed, 500 peaches were examined at harvest in each of the two years 1953 and 1954. These records are given in Table 1.

With the extremely heavy infestation in 1953 it was impossible to make accurate distinctions between wormy and stung peaches, especially when the injuries were masked or obscured by brown rot infection. Therefore, they were grouped together in Table 1. The correlation between the injury by plum curculio and that by brown rot is quite apparent. In 1953 there was just one peach which was found to be absolutely free from insect and disease injury. The important part played by peach scab, which is caused by the fungus *Cladosporium carpo-*

TABLE 1.—Records of Insect Infestation of 500 Peaches Examined at Harvest in a Neglected Orchard, 1953 and 1954.

Injuries to fruit from	Number of peaches infested	
	1953	1954
Plum curculio, wormy	....	49
stung	....	60
Total curculio	444	109
Oriental fruit moth	4	11
Catfaced	82	70
Leaf roller	0	0
Brown rot of peach	276	10
Peach scab	343	500

philum, is self-evident. There were no perfect peaches in 1954, very largely because of this disease. The greatest injury from peach scab is to the appearance and market value of the fruit, reducing it to the grade of a cull, because the disease does not cause any appreciable injury to the quality of the flesh of the fruit.

In addition to the fact that the peaches remaining on the trees at harvest time were unmarketable, the crop was materially reduced by the dropping of insect- and disease-infested peaches between the time of the normal June drop and harvest. In 1953 following the June drop the crop was estimated at two bushels per tree, but at harvest time the number of peaches remaining on the trees averaged only 59 fruits, or approximately one-third bushel of peaches per tree. This indicated that approximately 83 per cent of the crop was lost in the preharvest period. On June 14, 1954, following the June drop the trees were carrying an average of 308 peaches per tree, but at harvest time the crop averaged only 176 fruits, or approximately three-fourths bushel of peaches per tree. This showed a 42% reduction in the crop between June 14 and harvest time.

These data on yields and losses should convince even the most critical that a commercial peach crop can not be produced in southern Illinois without the use of good insecticides and fungicides to control insects and diseases.