

Pecan Weevil

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Distribution:

The pecan weevil, *Curculio caryae* Horn, attacks hickory and pecan in most of the pecan growing regions of the United States. Because pecans are a recent introduction into some of the western states, pecan weevil have not become established in far West Texas, New Mexico, Arizona and California. In Louisiana, the pest has been found in most of the pecan producing parishes; however, the most severe problems occur in the northern portions of the state.

Description:

Adult pecan weevils (Figs. 1 and 2) are about 3/8 inch in length and brownish to gray in color. The adult has a prominent snout which will equal or exceed the length of the body on females. The most commonly encountered stage of the pecan weevil is the grub or larval stage found in the nuts during the harvest season. The larvae are creamy white with reddish heads and are about 3/5 inch in length.



Figure 1. Adult pecan weevil.



Figure 2. Adult male (left) and adult female (right).

Life Cycle:

The typical pecan weevil life history is illustrated in Figure 3. Starting in August of year 1, adult weevils begin to emerge from the soil. Emergence usually continues until late September, occasionally extending into October. Research in Louisiana has shown that in years of “normal rainfall patterns,” peak emergence will occur during the last week in August and/or the first week in September. Drought can delay weevil emergence, particularly in heavy soil, because the weevils cannot crawl to the surface. Frequently, late summer rains will loosen the soil and dramatic increases in weevil emergence will occur.

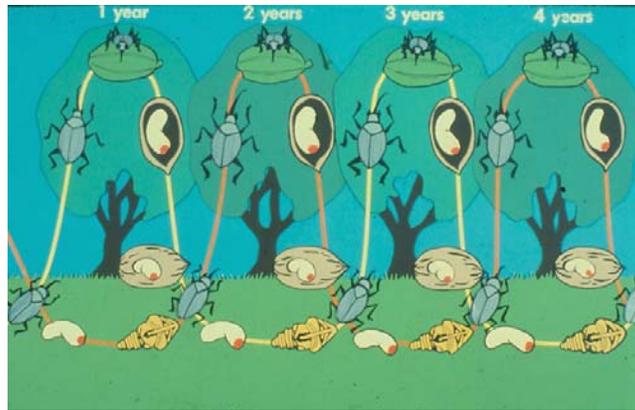


Figure 3. Pecan weevil life cycle.

After leaving the soil, the adults crawl or fly to the trees, where both sexes will begin feeding on pecans. After the shells become hardened and kernel formation begins, the female chews a hole through the shell and deposits eggs inside the nuts (Figs 4 and 5). The eggs (usually 3 to 5 per pecan) and larvae that develop from them remain in the nuts for about a month (Figures 6 and 7). Upon completion of development, larvae chew “exit” holes in the pecans and drop to the soil. This occurs primarily during October and November but can extend into December. Many times larvae will leave the nuts while the pecans are still on the trees. In these instances, the “exit” holes will be evident through the green shucks, and these weevil-damaged pecans will tend to hang on the trees longer than normal.



Figure 4. Adult female laying eggs.

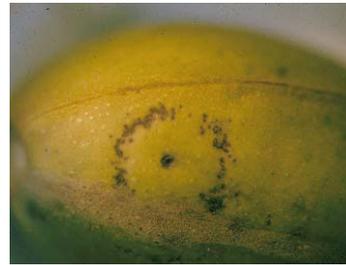


Figure 5. Pecan weevil puncture.



Figure 6. Pecan weevil egg.



Figure 7. Pecan weevil larva.

After dropping from the nuts, the larvae burrow into the soil. The depth they go will depend on the soil type and condition of the orchard floor, with deeper penetration in

cultivated soil than in uncultivated soil. Most larvae are found within six inches of the soil surface, although some have been reported to burrow as deep as nine inches. Upon reaching the desired depth, the larvae construct earthen cells. They remain in these cells in diapause (stage of dormancy—no feeding or activity) until the following September (year 2) when they change to the pupal stage (Fig. 7). The duration of the pupal stage is about three weeks, after which the pupae transform into adult weevils. The newly formed adults remain in the soil in diapause until August and September of the following season (year 3). Occasionally, a small number of pecan weevil larvae will undergo a two-year diapause which extends the life cycle an additional year.



Figure 7. Pecan weevil pupa.

Damage:

The pecan weevil causes two types of direct damage to pecans. Prior to shell hardening, feeding punctures by adults cause immature pecans to fall from the trees. The second type of damage occurs later in the season. After the shell hardens and the kernel begins to form, females lay eggs in the pecan. The grubs that hatch from these eggs destroy the kernel by their feeding. This damage shows up at harvest either as wormy pecans or hollowed out nuts with larval emergence holes present (Fig. 9).



Figure 9. Pecan weevil damage.

Pecan weevil damage not only affects pecan growers but also presents problems for pecan buyers and processors. Often, infested pecans are harvested along with good pecans. Processors then incur additional costs in sorting the weevil infested nuts and removing pecan weevil parts from the pecan nutmeats. Occasionally this results in lower prices from pecans that come from areas known to have a history of severe pecan weevil damage.

Control:

At the present time, the most effective control measure for the pecan weevil is the use of insecticides directed at the adult weevils in the trees to prevent feeding and, more importantly, egg laying by the females. Because the adults emerge over a period of approximately two months (August and September), multiple applications are usually required (generally 3) and timing of the insecticide applications is extremely important.

Research in Louisiana and other states across the “Pecan Belt” has demonstrated that a sampling technique to monitor the emergence of adult weevils from the soil can be useful in timing applications. The wire cone emergence trap (Fig. 10) has been shown to be effective for detecting the onset of weevil emergence, fluctuations in weevil emergence, and peak emergence. The traps should be placed under pecan trees in late July and checked periodically, preferably daily, until October. There are certain trees in an orchard that will be more heavily infested year after year while other trees will escape weevil damage. Therefore, it is recommended that the emergence traps be placed under trees with histories of pecan weevil infestation. These trees will then serve as “indicator” or “scout” trees for the entire orchard. Other types of traps that can be used to monitor adult pecan weevil activity include the pyramid trap (Fig. 11) and the circle trap (Fig. 12).



Figure 10. Wire cone traps



Figure 11. Pyramid trap



Figure 12. Circle trap

After emergence from the soil, the female weevils will usually take four to six days before they begin laying eggs. Knowledge of this habit means that pecan growers

do not have to begin spray applications immediately upon catching the first weevils but will have a few days to determine whether the early catches represent a population of any magnitude. Therefore, the traps are useful not only in determining when to spray but also whether a need to spray actually exists. In recent years, growers who have monitored weevil emergence with cone traps have eliminated one of the late season applications because the traps indicated that weevil emergence had ceased in their orchards. They suffered no decrease in control efficiency but did profit from reduced production costs.

Alternate Method of Timing:

For commercial growers and homeowners who do not use a sampling technique for pecan weevils, there is another way to time the first insecticide application each season. Because the female weevil does not lay eggs inside the pecans until shell hardening and kernel development has begun, the first insecticide spray should be made when shell hardening begins. This can be determined by periodically checking trees starting about August 10. In orchards containing several varieties, applications should begin when shell hardening occurs on the earliest maturing varieties. Continue applications (usually at 7 to 10 day intervals, depending on the insecticide used) until mid to late September. Generally, three applications will be sufficient to obtain successful control. Remember that no insecticides should be applied after shuck-split.

The control approach just described will protect the pecans on the trees during the time they are susceptible to egg laying. This will reduce damage in the current season (year 1) and will also reduce the population (larvae) which will enter the soil and presumably appear as adults in year 3. Because of overlapping weevil populations, control measures should not be ignored in year 2 because effective control in that season will reduce the population in year 4. After two or three years of concentrating the spray program during the period when the nuts are susceptible to egg laying, the pecan weevil population in an orchard should be reduced.

Although this approach has considerable merit, it has some disadvantages. It does not take into consideration the populations present and may result in unnecessary treatments. Indiscriminate applications against the weevil may cause secondary pest outbreaks and may contribute to the development of insecticide resistance in other pests which appear simultaneously such as aphids and mites. Thus, a strictly preventive approach may not be prudent from an economic or environmental standpoint.

In orchards with histories of severe infestations, a two-year program of insecticide sprays timed on nut development could be supplemented by a management program utilizing emergence traps. Then after severe populations have been reduced, reduction in the number of applications may be possible.

Several insecticides are recommended for pecan weevil control. A listing of the insecticides that can be used for controlling the pecan weevil can be found in the Louisiana Recommendations for Control of Pecan Insects. This guide can be found at www.lsuagcenter.com. When using insecticides be sure to check the pH of the water being used for spraying. The pH needs to be between 5.5 and 6.5 for optimum insecticide efficacy. Use of a buffering agent will help maintain the desired pH once pesticides have been added to a solution.