The Pecan Nut Casebearer And Its Control

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How to Control The Pecan Nut Casebearer . . .

The recommended control for the pecan nut casebearer in Oklahoma is a spray made of four pounds 50 percent DDT wettable powder (2 2/3 pounds 75 percent) in 100 gallons of water. One application at the right time is usually enough. Dust applications have been unsuccessful.

Time of spraying is extremely important. **See page 6.**

DDT spray may be combined with Zerlate or Bordeaux as a combination spray for casebearer and pecan scab.

Parathion may be substituted for DDT to avoid development of aphids and mites, but two applications will be needed.

CAUTION: Observe manufacturer's safety recommendations when using parathion.

Effective control can usually be obtained with two applications of nicotine sulphate and summer oil. See page 8 for mixtures.

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THE PECAN NUT CASEBEARER

And Its Control

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The pecan nut casebearer* is one of the principal insects attacking pecans in Oklahoma and presents one of the major problems facing pecan growers. It has caused heavy losses during the past decade, at times destroying the entire crop in some areas. The infestation varies from year to year, but it usually is high enough to require control measures every year.

Research aimed at finding methods of controlling the pecan casebearer was started at the Oklahoma Station in 1942. The tests involved eight different insecticides singly and in combination, various methods of application, and several different times of application. Experimental applications were made in commercial orchards at Stillwater, Okemah, Muskogee and Catoosa as well as in the native and variety pecan orchards of the Experiment Station.

This bulletin summarizes the results of this research** and describes recommended control methods based on those results.

HOW CASEBEARER CAUSES DAMAGE

The most severe damage from the pecan nut casebearer is caused by the larval worms of the first generation. In Oklahoma, this generation appears in early June and attacks the small nuts. The worm bores into the nut, usually near the stem end. An infested nut shows a mass of borings cast off by the larva and held together by fine silken threads. This web helps hold the injured nut to the cluster and frequently prevents it from dropping to the ground before the larva has matured. During the course of feeding and development, a single larva may hollow out and destroy from two to five small nuts. Often one larva destroys an entire nut cluster.

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* *Acrobasis caryae* (Grote)

** Results are given in more detail as progress reports in the *Proceedings* of the American Society for Horticulture Science, Vol. 44; pp. 123-128 (1944) and in the mimeographed *Proceedings* of the Oklahoma Pecan Growers' Association for the years 1944 through 1947.

There are usually three generations in Oklahoma. The second and third generations are not as destructive because the nuts are larger and an individual worm usually destroys only one or at most two nuts.

THE CASEBEARER'S LIFE HISTORY

The pecan nut casebearer passes the winter as a small larva in a tightly woven case or hibernaculum. This case is usually attached to, or near, dormant buds or leaf scars. (See Fig. 1). Early in the spring when the buds begin to swell, the larvae become active and begin feeding on the buds. Later they bore into the new shoots near the axil of a leaf. The typical injury observed is the wilting and dying of the shoot.

Two weeks after the larva has entered the shoot, it reaches maturity and transforms into the pupal stage. Pupation takes place either within the tunnelled shoot, among the catkins, or under rough bark on the tree. The average duration of the pupal period is about fifteen days.

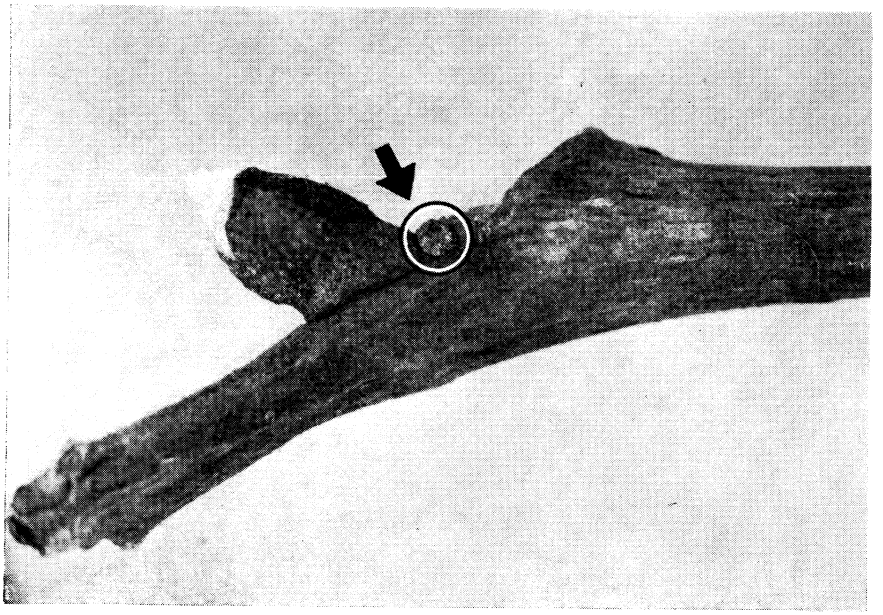

Fig. 1.—Encircled is the small, round overwintering case (hibernaculum) of the pecan nut casebearer larva. Like the one shown above, the case is usually attached to or near buds or leaf scars. Such larvae become active in the spring and feed on the swelling buds. Later they bore into the new shoots near the axil of a leaf.

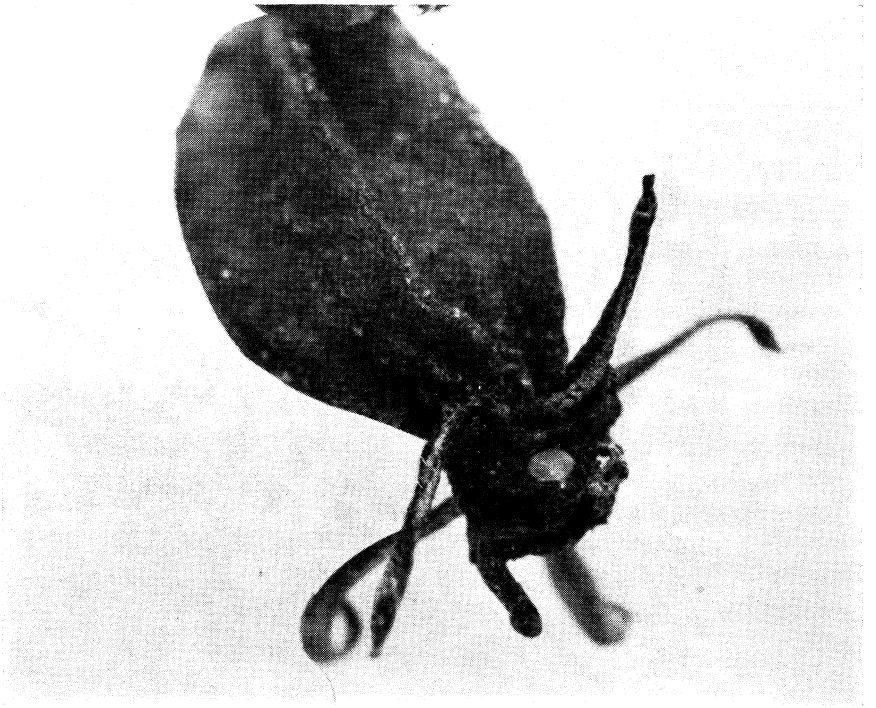

Fig. 2.—The light gray spot on the pecan is an egg of the pecan nut casebearer. Such eggs are greenish white when first laid in the spring, turning a pinkish color after two or three days. The eggs hatch in five to seven days, and the tiny larvae begin feeding and boring into the base of the small nuts.

The adults are small, inconspicious, dark-gray moths which emerge from the pupae in Oklahoma during late May and early June. They soon begin laying their tiny, greenish white eggs singly on the small nuts, usually at or near the caylx lobes or stigma. These are the eggs for the first generation. (See Fig. 2).

Two or three days after eggs are laid, a pinkish color develops in the shell. Usually the eggs hatch in five to seven days. The tiny larvae, which are whitish to pinkish in color, begin feeding and boring into the base of the small nuts. (See Fig. 3). When the larva is full grown, it is olive gray in color, and just before pupating it turns to a jade green. The average length of the mature larva is about one-half inch. Pupation usually takes place within the injured nut.

The second generation larvae begin to appear in the nuts during

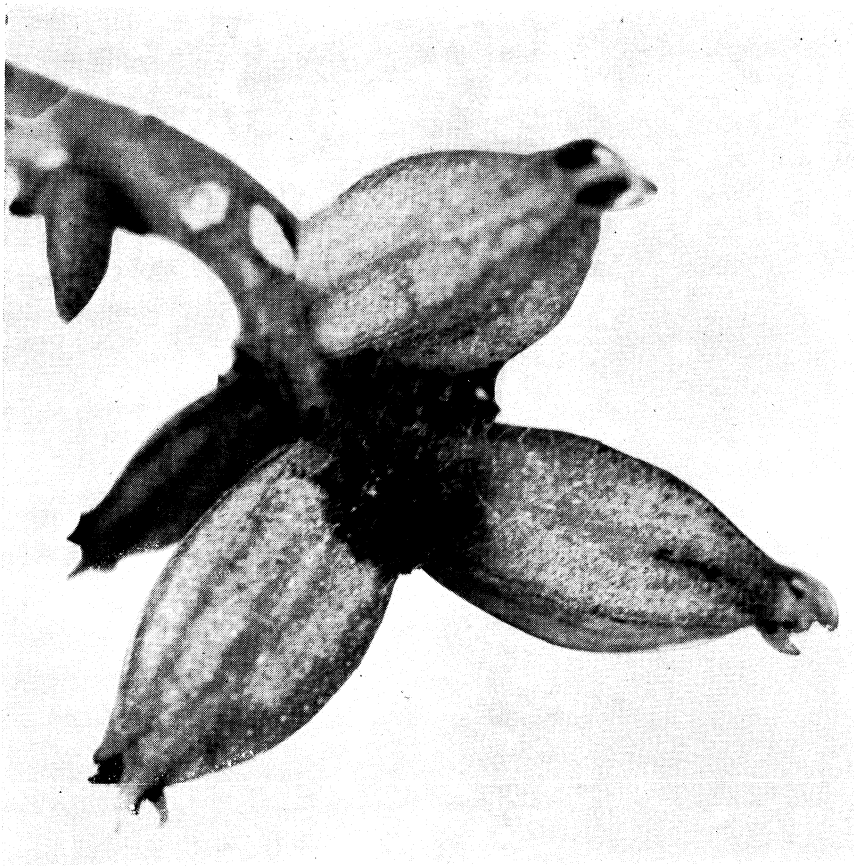

Fig. 3.—This cluster of green nuts has been infested by first generation larvae of the pecan nut casebearer. Note how the middle area of the cluster is damaged and covered with webs. The dark nut in the back of the cluster has been completely destroyed by the worm.

the latter part of July, feeding primarily in the shucks. The third generation appears in September, feeding for a short time and then forming the hibernation cases in which the winter is passed.

HOW TO TIME SPRAY APPLICATIONS

The most accurate way of timing spray applications is by watching for appearance of the first-generation eggs (see page 5). Begin examining the nut clusters by May 15 in southern Oklahoma (Ardmore area) and by May 22 in the Stillwater vicinity. If the season happens to be unusually early, a few days earlier might be better.

Examine the trees every three days, and begin spraying four or five days after the first eggs are found.

A magnifying glass may be needed to find the eggs, because they are small.

If the nut clusters cannot be examined for appearance of the eggs, start spraying soon after the tips of the newly formed nuts have turned brown. This will vary from May 25 in southeast Oklahoma to as late as June 15 further northwest in the State. The average time in central Oklahoma has been June 4. The time for the first application will vary somewhat from year to year, but has never varied more than four days either way from the average date in a given locality.

A delayed application is better than omitting the spray entirely.

Spraying for casebearer can be omitted in years when no nuts are set on the tree.

SUMMARY OF CONTROL STUDIES

Experimental tests aimed at finding ways of controlling the pecan nut casebearer were started at the Oklahoma Agricultural Experiment Station in 1942. Eight materials were used singly and in various conbinations: Lead arsenate, summer oil (Superla), nicotine sulphate, fixed nicotines, DDT, parathion, benzene hexachloride, and dinitro-o-cyclohexylphenol.

One and two applications were made, timed with appearance of eggs on the nuts. The first application was made five to seven days after the eggs were found. The second application followed the first in about seven to ten days.

Tests were conducted in the Station's native and varietal pecan orchards at Stillwater, and also in commercial orchards owned by W. A. Adams, Stillwater; Tom P. Camp, Okemah; Clyde W. Fish, Muskogee; and T. J. Hartman, Catoosa.

Ground spraying, hand dusting, and aerial dusting were investigated as methods of application.

Infestation, and effectiveness of the various treatments, were determined by tagging representative clusters of nuts in each treatment. In some cases, records of production on treated and untreated trees were also obtained.

Effectiveness of Various Insecticides

Lead Arsenate.—Lead arsenate used alone at the rate of six

pounds to 100 gallons of water was one of the least effective materials tested. Aphid infestations developed following all lead arsnate applications. The residual effect was very good for all leaf eating insects. Excellent control was obtained of walnut datana and fall webworm. To prevent foliage injury from lead arsenate, equal amounts of hydrated lime and lead arsenate were added to the spray mixture.

Lead Arsenate and Summer Oil.—The addition of summer oil (Superla) to the lead arsenate spray at the rate of three quarts to 100 gallons improved the control. Two applications were more effective than one, but the increased yield was not sufficient to pay for the second application.

Lead Arsenate, Summer Oil, and Nicotine Sulphate.—In this mixture, the materials were used at the rate of four pounds of lead arsenate, three quarts of summer oil and a pint of 40 percent nicotine sulphate to 100 gallons of water. Satisfactory control was obtained with a single application, but two applications were more effective. The addition of nicotine sulphate to the lead arsenate and summer oil did not seem to improve the control in the single application.

Summer Oil and Nicotine Sulphate.—Two spray applications consisting of three quarts of summer oil and a pint of 40 percent nicotine sulphate (Black Leaf 40) in 100 gallons of water was an effective control for the casebearer. A single application was not satisfactory with severe infestations. These materials remain effective for only a short time, and they must come into contact with either the eggs or the larvae while they are still toxic. This calls for accurate timing. The first application should be made just before the eggs begin to hatch and the second follows in about seven days. Aphids were effectively controlled with summer oil and nicotine.

Summer Oil.—Summer oil (Superla) used alone was not effective. It is one of the best stickers and spreaders and should be combined with other materials.

Nicotine Sulphate.—Forty percent nicotine sulphate (one pint to 100 gallons of water) gave some control but it was much better when summer oil was added. (The period of effectiveness of nicotine sulphate is much shorter when it is applied when temperatures are above 70 degrees F., or in combination with alkaline materials such as hydrated lime, because the nicotine volatilizes more rapidly. This probably explains why nicotine added to lead arsenate and summer oil did not improve the control.)

Fixed Nicotines.—Fixed nicotines consist of nicotine sulphate combined with materials such as bentonite clay to prevent immediate volatization. In most cases, fixed nicotines gave good control. A single application of three pounds of Black Leaf 155 used with summer oil was very effective.

Nico-Sol summer oil, a fixed nicotine preparation in summer oil, was used at the rate of three quarts Nico-Sol summer oil and one pound Nico-Sol powder to 100 gallons of water. In 1942, when infestation was severe, this material was not effective in either one-or two-spray applications; but in 1943 a single application of Nico-Sol proved to be just as effective as Black Leaf 155.

Aphid population did not develop following application of fixed nicotines.

DDT.—A single application of four pounds of 50 percent DDT or 2 2/3 pounds of 75 percent DDT wettable powder to 100 gallons of water was one of the most effective materials used. Two applications were necessary only where heavy infestations occurred. DDT remains effective for two to three weeks, depending upon the temperature and rainfall.

Mite populations usually increase following DDT applications, but that did not occur in these tests. However, aphid infestations did develop.

Benzene Hexachloride.—This material was found ineffective for casebearer control.

Parathion.—Parathion used at the rate of three pounds of 15 percent wettable powder to 100 gallons of water was one of the most effective materials used. Two applications were necessary to give control.

EPN 300*** used in a first application at the rate of 1½ pounds per 100 gallons, followed by DDT at the rate of 2 2/3 pounds in the second application, gave excellent control of casebearer.

Mites and aphids were effectively controlled by parathion sprays.

Black Leaf 155 and DDT.—Two formulations of Black Leaf 155 and DDT were used, with each material containing the same amount of nicotine and DDT (12 percent nicotine, 7 percent DDT). Each was used at the rate of three pounds per 100 gallons of water. There

*** Trade name for an organic phosphate similar to parathion.

was no significant difference between the two formulations and they were equal to Black Leaf 155 in effectiveness.

DN 111.—Three pounds of DN 111 (40 percent dinitro-o-cyclohexyphenol) used with three gallons of dormant oil to 100 gallons of water applied as a delayed dormant spray was very effective on the over-wintering stage of the casebearer. Infestation counts made during the first generation, however, revealed that a summer spray was necessary to maintain control. Moths had migrated into the sprayed area from unsprayed trees.

Methods of Application

Three methods of applying DDT were tested:

Sprays were applied with an orchard power sprayer operating at 600 pounds pressure, using a tree spray gun.

Both rotary hand dusters and power dusters were used to apply dust to trees early in the morning while the foliage was damp and the wind velocity low.

An airplane equipped with a venturi tube duster was used to apply 40 pounds of five percent DDT dust per acre. Application began at daybreak and was discontinued at 8:00 a. m.

The results indicate that spraying was the only effective method of application. Dust failed to adhere to the pecan leaves, regardless of the method of application used. Dust applied while leaves were damp with dew apparently went into suspension in the dew droplets, but sifted off the leaves as soon as the dew dried.