

The Florida Entomologist

Official Organ of the Florida Entomological Society

Vol. XIV

WINTER NUMBER
DECEMBER, 1930

No. 4

TIBICEN DAVISI Smith and Gosbeck (CICADIDAE) A NEW PEST OF ECONOMIC IMPORTANCE*

By J. W. WILSON

In the September issue of THE FLORIDA ENTOMOLOGIST there appeared an article describing the attack of cicadas upon *Asparagus plumosus*. Since that time we have been able to collect further data on the cicada which is responsible for this damage and it seemed advisable to present this data at this time.

As early as June 27th when the first visit was made to Jupiter large numbers of a small species of cicada *Diceroprocta olympusa* Walker were present in the pine trees and bushes of that vicinity. It was an easy task to capture many males, and a few females were captured. The males are easily located by their loud continuous, monotonous, and unvarying song. A few specimens of this species have been observed and captured in the "fernery", and a few cast nymphal skins have also been collected in the "fernery". On July 10th (the second visit to Jupiter), a different type of cicada song was heard and on August 11th females of this species were observed laying eggs in dead sea oats stems about 100 feet from the beach. Mr. Wm. T. Davis identified this species as *Diceroprocta viridifacia* Walker. None of the adults of this species were observed in the "fernery" throughout the summer, although there appears to be no reason why this species should not feed on *Asparagus plumosus*. On September 15th the females of this species had disappeared but a few males were heard singing in the brush near by. On August 1st still another cicada song was heard but males of this species were not captured until August 7th. Upon examination Mr. Davis determined that these specimens belonged to the species *Tibicen davisi* Smith and Grosbeck. As

*Contribution from the Department of Entomology, Florida Agricultural Experiment Station.

the season advanced more and more individuals of this species emerged from the fernery each day.

Until September 8th very few females of *T. davisi* were observed emerging. On August 30th 100 cast nymphal cases were collected; only five of these were shed by females. After September 8, large numbers of both sexes emerged each day. The peak of the daily emergence came between September 16th and 30th, but individuals continued to emerge until October 15th.

Since the publication of the article in September cast nymphal skins, which were of a size that indicated that they were *T. davisi* have been collected in "ferneries" at Yalaha, Melbourne, and Boynton. Males of this species were captured in the woods at Pierson, and several growers from various sections of the state report that a few cicada cases have been observed in their "ferneries". But it is only at Jupiter that they have become abundant enough to do noticeable damage.

A large number of males and females were collected and placed in screen cages over *Asparagus plumosus*, but in every case all the specimens died within forty-eight hours. For this reason it has been impossible up to the present to collect data on the time of mating, the length of the preoviposition period, and the length of adult life. Dr. R. H. Beamer working with several species of cicada in Kansas found however, that the adult can be kept alive in cages for long periods of time if the proper food plant is supplied. It seems surprising that the adults of this species do not feed on *A. plumosus* for the young shoots are very tender and succulent. Thinking that my first cage was too small I built a much larger one and placed it over plants with mature nymphs on the roots, but all of the adults which emerged in this cage also died within forty-eight hours. I have not yet observed adults feeding on *A. plumosus*. It seems evident that the adults leave the fernery to feed and mate and the females return to deposit their eggs.

The full grown nymphal cicadas begin emerging from the ground very early in the evening. They crawl upon the nearest support and in many cases travel as much as twenty-five feet before stopping to shed the nymphal case. By ten o'clock many of the adults have already completed the task of shedding the last nymphal skin and may be observed clinging to the plants and supports of the sheds expanding their wings and drying themselves. At sunrise most of the individuals are ready for flight, but very few of them begin flying before about eight o'clock.

The females will deposit their eggs in almost any kind of plant material which they find available. Comparatively few of the eggs are placed in the stems of *A. plumosus*. The females distinctly prefer the dried and seasoned timbers, of which the sheds are constructed, to any other available material. It seems to make little difference whether this material is pine or cypress. The eggs are placed in holes drilled by the stout ovipositor of the female. A series of as many as twenty-five to thirty of these nests will be placed in a row if the laying female is not disturbed. From five to twelve eggs are placed in a single row in each of these nests. The nest may be sealed with a frothy secretion but in most cases it is not sealed in any way. Eggs deposited as early as September 8th have not yet hatched out (November 13th), so it is assumed that this species passes the winter in the egg stage. Beamer reports that many of the cicada belonging to the genus *Tibicen* pass the winter in the egg stage in Kansas.

When the young nymphs hatch out they will be about the same length as the egg which is 2.3 mm. in length. These small nymphs will make their way to the opening of the nest and after casting what Beamer designates as the postnatal skin, they will cast themselves bodily into space. They will immediately make their way to the roots of the plant, form a cell and begin feeding. In June only a few third stage nymphs were found in spite of the fact that most of the soil dug was run through a small meshed screen. Large numbers of fourth stage nymphs and early fifth stage nymphs were collected at this time. The nymphs are usually found about six inches below the surface of the soil directly beneath the crown of the plant. They are never found on *A. plumosus* deeper than eight inches for this is the maximum depth at which this plant produces numbers of roots or crowns. In August, and September, many full grown fifth stage nymphs and some fourth stage nymphs were collected. The full grown fifth stage nymph is recognized by its increased size and the prominent, red eyes. It is assumed that these fourth stage nymphs either pass the winter as such or transform to fifth stage nymphs and pass the winter in this stage.

We have not been working on this problem long enough to assign any definite length of time for the development of any of the immature stages. Any statement as to the length of time required for the development is mere conjecture but evi-

dence seems to indicate that this species does not require longer than three or four years.

During the summer nearly every available insecticide was used in an attempt to control the nymphs in the soil. These included various strengths of calcium cyanide, Black Leaf 40, carbolic acid emulsion, a number of pyrethrum compounds, chloride of lime, kerosene emulsion, Mowrah Meal (a fertilizer somewhat like castor pumme), steam, hot water, carbon disulphide, and carbon disulphide emulsion. Of these carbon disulphide emulsion alone was effective to any extent. The emulsion was made up by a 1-3-10 formula, 1 part fish oil soap, 3 parts water, 10 parts carbon disulphide. This emulsion was then diluted at the rate of one pint to twelve gallons of water. Three pints of this dilute solution was applied to each square foot of soil. This treatment gave a good control for the fourth stage nymphs, but did not have any noticeable effect upon the fifth stage nymphs. If this material is made stronger either by adding more of the concentrated emulsion to the water or by applying more of the solution to each square foot of soil, the plants will die. This treatment will cost about \$160.00 per acre for each application.

A very ingenious method of control was used very effectively by Mr. Wilkinson, the grower whose "ferns" were most severely damaged this summer. This control should properly be called the *Hydraulic Pressure Method*. It consists merely of attaching a garden hose at convenient points to the irrigation system and stopping all other openings of the system. A one-quarter inch pipe about three feet long is attached to the end of the hose. By this means he obtained about eighty pounds pressure at the nozzle end. The stream of water is directed into the soil holding the end of the nozzle about two inches from the soil. This stream of water thoroughly cultivates every inch of the soil and penetrates to a depth of about twelve inches or deeper, depending on how long the nozzle is held in one place. Large numbers of the nymphs are rolled out upon the surface and left to dry out and die. Many are hit directly by the stream and torn to pieces. A few of the larger nymphs escape unharmed but all of these emerged as adults in September. Thus in October when we went over a plot of about seventy-five square feet for the second time, it was found that his "fernery" was practically free of the nymphs and will remain free until the next brood of eggs hatches out. Mr. Wilkinson estimates that this treatment will cost about \$40 per acre, or

about one-fourth as much as the carbon disulphate emulsion treatment. This treatment has other advantages. By this means the grower is enabled to cultivate the soil which has been impossible heretofore because of the nature of growing *A. plumosus*. Fertilizers can be applied to the top of the soil as has been the practice and washed into the soil. Most of the smaller weeds are destroyed by this means. Mr. Wilkinson also thinks that the treatment noticeably reduced the numbers of the developing brood of noctuidae by destroying many of the pupae in the soil.

In September a number of materials were applied to the shed in an attempt to prevent the females depositing their eggs in the timbers of the "fernery". Bordeaux mixture, various strengths of oil emulsion, lime-sulphur solution, and whitewash were used. Of these the plot upon which whitewash was used was the only one avoided by the females. This was only a small plot and might not prove effective if the whole shed were treated. The whitewash also vastly increases the amount of light in the "fernery", and if used on a large scale lamp black should be mixed with it.

A little later on various strengths of oil emulsions, carbon disulphide and carbon disulphide emulsion, lime-sulphur, and paridichlorobenzene were applied to egg nests. Since none of the eggs have yet hatched it is not possible to determine how effective these treatments will be.

I have not yet collected any egg parasites or nymphal parasites but Beamer reports that there is a large number of both egg and nymphal parasites which attack the Kansas Cicadidae. No doubt some of these also attack *Tibicen davisii* and other Cicadidae found in Florida. A large species of Robber Fly has been observed feeding upon the adult cicadas, but the Robber Fly escaped before I could capture it for identification. A large species of Spider which builds its web in the "fernery" has also been observed feeding upon the adults. A great many of the adults are destroyed by mocking birds, blue jays, and mourning doves. Large flocks of these birds congregate around the ferneries during the period when the adults are emerging. One grower attributed the excessive numbers of cicadas in 1930 to a direct affect of the 1928 hurricane which killed many birds in that region. Skunks, field rats and moles dig up and eat some of the nymphal cicadas but we have no way of determining how many these predators destroy.