FRUIT PIERCING MOTH, *GONODONTA NUTRIX* (CRAMER), ATTACKS ORANGES IN FLORIDA [1]

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In July, 1956, several Valencia oranges were received from the Fort Pierce, Florida, area with holes of unknown origin through the peel. The injury was somewhat similar, but not typical, of oviposition holes made by fruit flies or other insects known to pierce citrus rind in Florida. Investigations made in citrus groves in daylight hours did not reveal activity of any uncommon insect, but at night adult moths were found piercing holes in mature oranges and feeding on the juice. These were identified by E. L. Todd of the Entomology Research Branch, U.S. Dept. of Agriculture, as *Gonodonta nutrix* (Cramer).

As far as is known, this is the first record of *G. nutrix* attacking oranges in Florida. However, according to Crumb (1956), the larvae were collected at Miami, Florida, in 1908 on *Annona* sp. In 1941, W. W. Yothers found that this moth caused considerable loss of oranges in Cuba [2]. In 1957, R. W. Swanson (1957) collected the larva in Dade County, Florida. Also in 1957, King (1957) observed injury in an orange grove at Torrente, Cuba.

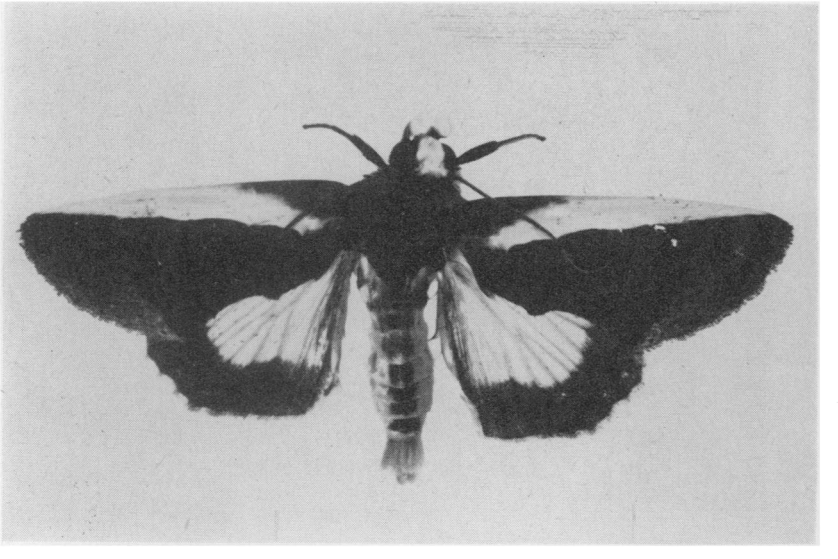

Fig. 1.—Adult fruit piecing moth, *Gonodonta nutrix* (Cramer).

The adult moth is quite distinctive (fig. 1). The head is white; the meso and metathorax are brown, and the abdomen is orange. The fore-wings are brown with a broad white band along the anterior edge. The wing span

[1] Florida Agricultural Experiment Stations Journal Series No. 645.
[2] Personal communication.

is about two inches. The hind wings are orange with a broad brown band along the edges. The under side of the body and wings are orange.

The adult pierces the fruit by pressing the distal end of the straw-like proboscis against the fruit and oscillating the curved center portion of the proboscis to the right and left. The distal end of the mouth part has several triangular shaped protrusions which serve to cut holes through the orange rind. The hole is about one-half millimeter in diameter and in appearance is much like one which has been drilled.

Several other species of moths were observed in large numbers feeding in the holes made by *G. nutrix*. The most common of the non-piercing species were *Mocis latipes* (Guen.), *Hymenia recurvalis* (F.), and *Caenurgia chloropha* (Hbw.). These species often out-numbered *G. nutrix* as many as twenty to one.

The injury has been observed during June, July, and August, 1956 and 1957, on mature Valencia and Pope Summer oranges. No adult feeding injury has been discovered on other citrus varieties or on other fruits. The injury has been seen in four groves, three in the vicinity of Header Canal in Saint Lucie County, and one near Vero Beach in Indian River County.

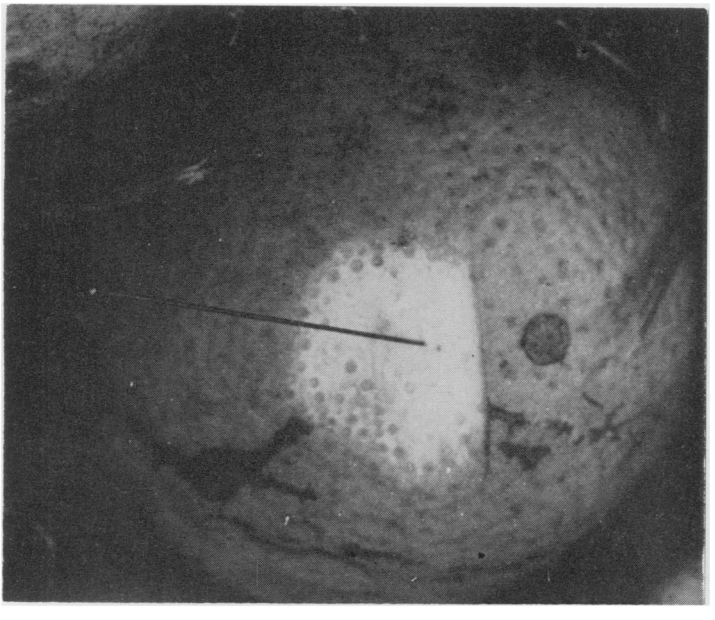

Fig. 2.—Injury to mature Valencia orange by adult moth *G. nutrix* (Cramer).

To determine the amount of pierced fruit, twenty-five oranges from each of several trees were examined for holes through the rind. The percentage of injured fruit was determined by hand squeezing which caused the juice to squirt through the small holes of pierced fruit much like a toy squirt gun. About 20 percent of the fruit in two of the Saint Lucie County groves had been pierced. The crop in the third grove had been picked except

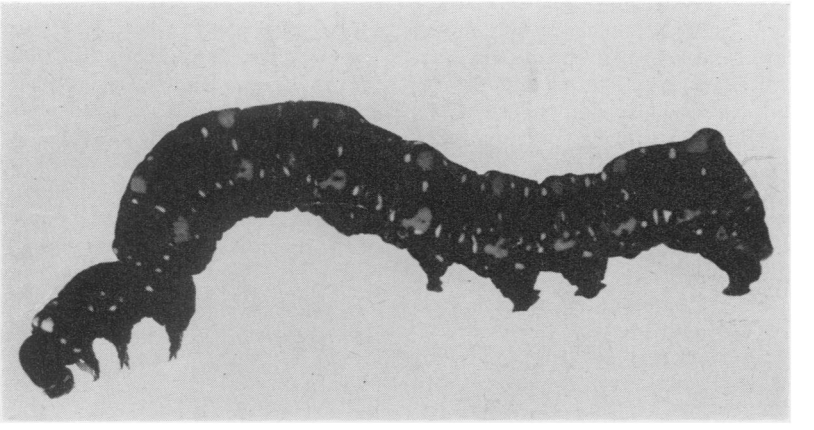

Fig. 3.—Mature larva of fruit piercing moth, *Gonodonta nutrix* (Cramer), collected at Fort Pierce, Florida, from its food plant, *Annona glabra* (L.).

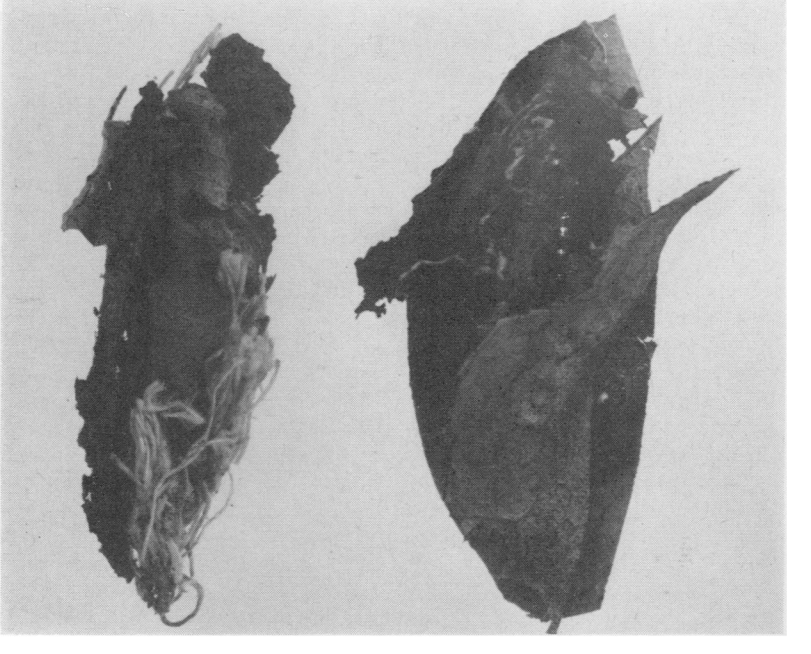

Fig. 4.—Pupa of *Gonodonta nutrix* surrounded by pieces of *Annona glabra* leaves cut and webbed to the pupa case by the last larval instar.

for one row near the center of the 260 acres, and fruit on these trees was a total loss. No estimate was made of injury in the grove near Vero Beach. Most of the pierced fruit did not drop as a direct result of the moth injury. However, a small brown, sunken spot about one centimeter in diameter often developed around the holes (fig. 2). The skin breakdown around the pierced hole was possibly caused by secondary fungus infection. This fruit eventually dropped from the tree.

Moths were observed to be active only during the night from about 8:30 p.m. to 3:30 a.m. Apparently the moth spends the daylight hours in the weeds and bushes along the canals, and migrates into the groves at night.

During the summers of 1956 and 1957, field observations were made on the seasonal history of *G. nutrix*. In addition, it has been reared in cages at the laboratory. There are many details yet to be worked out, but a fairly complete life history has been obtained.

The food plant for the larva was found to be the pond apple, *Annona glabra* (L.). This plant was found growing wild along canal banks in the vicinity of the moth infested groves, and along the north fork of the Saint Lucie and Sebastian Rivers. Practically all of the pond apple plants observed in Saint Lucie and Indian River Counties during the summer of 1957 were infested with eggs and larvae of *G. nutrix*.

SEASONAL HISTORY: Since an infestation of the larva was not located until the summer of 1957, the over-wintering stage or stages are not known; however, it seems probable that both the pupa and adult could survive the very mild winters. The mean temperature for January and February at Fort Pierce is 56.9° F.

Eggs are laid singly on the undersides of pond apple leaves and there are usually three to seven eggs per leaf. The eggs are round, translucent, and measure about one millimeter in diameter. Most of the eggs are laid on new leaves, although they are occasionally found on those that are fully mature. The eggs hatch in about two weeks and the young larvae begin feeding within 24 hours. The first and second instars feed on the leaf epidermis. After this superficial feeding, pond apple leaves are skeletonized until the last three instars, when larvae usually eat the entire leaf and succulent shoots. Large populations characteristically defoliate trees from the branch terminals inward.

Observations in the laboratory indicate that the larvae pass through five instars during a four week period. The smooth skinned mature larva (fig. 3) measures about two inches when fully extended. When not in motion the larva maintains a pronounced hump in the first three abdominal segments as well as in the eighth and ninth. Each abdominal segment has four large orange spots and several small white dots. The head and background color of the body is black. The larva has three pairs of thoracic legs ending in a single claw, and a pair of prolegs on the fifth, sixth, seventh, and tenth abdominal segments.

Larvae form the pupal case by webbing pieces of leaves together much like a bag worm and usually attach the case to the branches or tree trunk (fig. 4). Some of the larvae in plastic screen cages formed pupal cases by webbing particles of soil together. Larvae in cheese cloth sleeve cages cut and used the cheese cloth to form pupal cases. The pupal stage re-

quires about two weeks during the summer months; there are three generations from mid-July to September 1.

No control measure has been worked out. Under existing conditions, eradication of the host plant, *A. glabra,* would possibly be the most effective and economical method. According to Quayle (1938) poison baits have been used in other countries to suppress adult population of related species.

SUMMARY: Samples of pierced oranges were received from a grove near Fort Pierce, Florida in 1956. The insect involved was found to be an adult moth, *Gonodonta nutrix* (Cramer). Considerable damage was done to mature oranges as a result of the adult moths drilling holes in them.

From field observations made during two seasons, it was found that the moth pierced the oranges during the night hours, and that other non-piercing moth species used the holes to obtain food. The host plant for the egg, larva, and pupa is the pond apple, *Annona glabra* (L.), which grows along canals adjacent to citrus groves.

No control measure has been worked out, but with the limited population of the host plant, *A. glabra,* it is possible that its eradication would provide effective control of this pest.

ACKNOWLEDGMENT: Acknowledgment is made to Messers. C. C. Woolard, Jr. and R. L. Reese, of Fort Pierce, Florida for their help in life history studies.

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ANNOUNCEMENT OF THE 41st ANNUAL MEETING

The Florida Entomological Society will hold its annual meeting September 11-12, 1958, at the Tampa Terrace Hotel in Tampa. In addition to the usual reading of papers (deadline for titles is August 1st), there will be invitational speakers and two symposia. One panel will discuss nemas, the other will talk about virus-vector relationships of plant diseases in Florida. Dr. John S. Allen, President, University of South Florida, will be the guest speaker at the banquet.

Members who have failed to receive the April communication calling for titles can contact the Program Chairman, Frank W. Mead, State Plant Board of Florida, Gainesville, if they so desire.