DEVELOPMENT OF *DIAPREPES ABBREVIATUS* ON POTTED CITRUS SEEDLINGS

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Abstract

Adult *Diaprepes abbreviatus* (L.) were recovered from citrus seedlings 132 through 168 days after infestation of the plants with 0- to 24-hour old larvae. Pupae were recovered 98 through 238 days after infestation. The number of larval instars could not be determined from the frequency distribution curves of head capsule measurements.

The so-called sugarcane rootstalk borer weevil, *Diaprepes abbreviatus* (L.), a serious pest of sugarcane and citrus in the West Indies, was first found infesting citrus in the vicinity of Apopka, Fla., in 1964. Later a quarantine area of ca. 6500 acres that included an uninfested border zone was established (Woodruff 1964, 1968). In a recent review of the status of this pest in Florida, Selhime and Beavers (1972) found that the known area of infestation entailed ca. 7200 acres of citrus within an area of ca. 15,000 acres.

Little is known about the development of *D. abbreviatus*, especially in Florida. In the Barbados, Watson (1903) reported the egg stage as 10 days, the larval stage as 312, the pupal stage as 15, and the adult lifespan as 20, a total of 357 days. Ballow (1912) and Jones (1915) also indicated a life cycle of ca. 1 year. Nowell (1913) reported larval periods of 261, 326, and 334 days before pupation.

In more detailed studies in Puerto Rico, Wolcott (1933) successfully reared 3 larvae to the pupal stage on corn and bean seed. Larval periods were 202, 238, and 268 days, and pupation occurred after the 10th, 6th, and 9th instars, respectively. He indicated that the larval period was extended to ca. 1 year by a resting period before pupation. Later, Wolcott (1934) arbitrarily chose the 8th instar as the transitional period from active growth to the period before pupation, an interval he called active diapause. This active diapause lasted less than 2 and more than 13 months (Wolcott 1936). Adults remained in the ground from 11 to 126 days before emergence, but some completed their life cycle in 8 to 18 months.

The earlier studies thus indicated a high degree of variability in the development of *D. abbreviatus*. Also, we have little information about the development of the weevil in Florida. A study was therefore made of the larval development of *D. abbreviatus* at the USDA Citrus Root Weevil Research Unit at Apopka, Fla. The information may be helpful in determining the age of new larval infestations, in predicting the number of generations occurring in Florida, in timing the application of control measures, and in determining the feasibility of rearing this weevil on artificial diets.

Methods and Materials

Two tests were made. In the first test, each of 150 sweet orange seedlings (0.5 m tall) planted in 4-liter plastic pots was infested with 5 neonatal

D. abbreviatus (0-24 hr old) by placing the larvae in a small hole adjacent to the tree trunk and covering them with soil. Then, at least 3 seedlings were uprooted each week, and the larvae were recovered by sifting the soil through various sized screens. Head capsule widths of the recovered larvae were measured with an ocular micrometer, and were placed in K.A.A.D. solution (Peterson 1962) for 24 hr; then they were preserved in 70% alcohol until the test was completed. The larvae were so small during the first 4 weeks of this test that additional seedlings grown in 0.35-liter cans were infested. Weevils could then be recovered from the soil by placing the soil in small dishes and flooding them with water so the small larvae were floated off. All trees were held in a building under artificial lighting at ca. 25°C and 60-65% RH.

In the second test, 93 plants in 4-liter plastic pots were each infested with 10 neonatal larvae as before. These plants were held outdoors in an 8 X 8 X 7-ft screen cage (16 mesh/in.) covered with a corrugated fiberglass roof. Plants were uprooted only after they had been killed by larval feeding. The head capsules of the recovered larvae were not measured to avoid undue stress on the larvae. Larvae were transferred onto fresh plants.

Results and Discussion

The first test was run from 5 May to 8 November 1971. Six adults (0.8%), 6 pupae (0.8%), and 107 larvae (14.3%) were recovered, a total of 15.7% of the larvae originally infested. Most larvae were recovered from 35 to 70 days after infestation. Head capsule measurements ranged from 0.33 mm for neonatal larvae to 2.58 mm for 175-day-old larvae. We were unable to determine the number of larval instars from the frequency distribution of head capsule widths because individual variation in growth prevented definite separation of instars. Pupae were recovered at 98, 126, 140, 154, 161, and 175 days after infestation. Adults were recovered at 154(2), 161(2), and 168(2) days. Larvae were recovered each week through 175 days. The test was discontinued at 182 days because all plants had been uprooted.

In the second test, 5 May 1971, to 9 March 1972, four adults were recovered at 132, 133(3), and 144 days after infestation, and 8 pupae were recovered (while larvae were being transferred onto fresh plants) at 102, 129(2), 132, 221, 234, 236, and 238 days after infestation. During the test, 64 larvae were transferred to fresh plants.

In all other attempts to establish a colony of *D. abbreviatus* on citrus (seedlings), larval mortality was high. Although over 1,100 potted seedlings, cultivars of pineapple orange, Carrizo citrange, rough lemon, Murcott orange, sweet lime, Cleopatra mandarin, Succory orange, and sweet orange were infested with about 16,000 larvae, only 90 adults were recovered from 140 to 297 days after the infestation.

Results of these tests indicate that the developmental period of *D. abbreviatus* in Florida is highly variable, as reported for the West Indies, and that natural mortality of the immature forms due to unknown factors is also high. An extended diapause (Wolcott 1936) is not a prerequisite for the development of all these weevils because adults were first obtained at 154 and 132 days in the first and second test, respectively. This occasional absence of diapause may make it possible to rear the weevil in the laboratory on artificial media by selecting eggs from those weevils that mature in the shortest period.

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