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FLIGHT BEHAVIOR AND DISPERSAL OF
*DIAPREPES ABBREVIATUS*¹

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ABSTRACT

From July to October 1975, marked adult *Diaprepes abbreviatus* (L.) (Coleoptera: Curculionidae) were released in an isolated orange grove near Apopka (Orange County), Florida. Specimens were recovered for 50-52 days following each of 2 releases. Multiple sightings were made of 42% of the released females and 34% of individually coded males. Nearly 80% of the sightings were made within 5 days of release.

An exotic curculionid, the so-called sugarcane rootstalk borer weevil, *Diaprepes abbreviatus* (L.), was first found infesting citrus near Apopka (Orange County), Florida, in 1964. The original quarantine area of ca. 2,000 ha established in 1968 has been extended 3 times to encompass ca. 13,350 ha by 1975 (Woodruff 1968, Selhime and Beavers 1972). In 1975, an infested area was found near Forest City (Seminole County), Florida, ca. 14 km from the Orange County area, and an additional 2,400 ha were placed under quarantine.

Because the 2 quarantined areas are separated by a considerable distance and infested groves within the quarantine areas are not necessarily contiguous, flight behavior and dispersal of *D. abbreviatus* were studied. This information would be helpful in establishing management and control programs for this relatively new pest.

METHODS AND MATERIALS

Two tests were conducted near Apopka, Florida, in an isolated 20-ha grove of 'Hamlin' oranges; the grove consisted of ca. 2,000 3 to 4-m tall trees in a 7.6 × 7.6 m planting. No chemical treatments had been applied there since 1969. Adult *D. abbreviatus* were field-collected and coded with enamel paints (Cross and Mitchell 1964) 1-2 days before each of the 2 releases were made on calm days (wind speed less than 1.6 km/h) in July and October 1975. Adult weevils were placed on top of a 0.3-m-high cardboard box in the center of a row (same site for each release).

On each release date we observed the flights and measured distances flown from the release site for as many weevils as possible. Visual searches of the trunks and lower canopies of at least 50-150 trees around the release site were made at various intervals during the 8 weeks following each study. The entire grove was examined weekly for the marked weevils.

Test I. Fifty males and 50 females, each individually color-coded, were released 14 July to determine distances flown by adult weevils during a period when little or no new growth (the preferred food source for the

¹Coleoptera: Curculionidae.

adults) was present. The release coincided also with the period when the weevil population generally begins to increase (Beavers and Selhime 1976). First observations were made 4 h after release. Subsequent observations were made daily during the first week, 3 times in the second week, and once per week until 3 September. Individual adults were identified by color code and then replaced on the tree.

Test II. Sixty-one males and 61 females were released 8 August to determine adult weevil flight distances during a period when considerable new foliage was present. These adults were marked with enamel paints so that sex could be determined without disturbing the adults; i.e., a single spot on males' elytra and 2 spots on the elytra for females. Observations began 5 days after the release. Data were recorded at weekly intervals for the first 5 weeks and at 2-5-day intervals for the last 3 weeks of observations.

RESULTS AND DISCUSSIONS

Test I. A total of 82 sightings was made during the 50 days following the July release (Table 1). Many individuals in the original group of 100 were recovered more than once; 21 females accounted for 43 observations (Table 1), and 17 males produced 30 observations. Data from these individuals were not extensive enough to demonstrate a sexual difference in dispersal distances through time. Some individuals (Male "8", Female "6") consistently stayed close, within 9 m to the release site, while others flew either greater distances (Female "18" at 99 m) after 30 days or changed locations more frequently (Male "11" at 3 m after 4 h, 18 m at 2 days, 236 m at 9 days and 228 m at 50 days). The numbers of adults sighted decreased markedly by 4 days after the release (Table 1).

TABLE 1. FLIGHT DISTANCES OF MARKED ADULT *Diaprepes abbreviatus* RELEASED IN AN ISOLATED CITRUS GROVE NEAR APOPKA, FLORIDA.

TEST I. Release date: 14 July 1975. Fifty male and 50 female adults, each individually color-coded.

| Days after release (dates) | No. adults observed | | Distance (m) from release site | |
|-------------------------------|---------------------|-------|--------------------------------|---------|
| | Females | Males | Minimum | Maximum |
| 0.2 (14 July) | 12 | 14 | 3 | 11 |
| 1 (15 July) | 9 | 9 | 3 | 18 |
| 2 (16 July) | 4 | 6 | 3 | 23 |
| 4 (18 July) | 6 | 4 | 3 | 26 |
| 7-16 (21-30 July) | 11 | 3 | 11 | 236 |
| 30-50 (13 Aug.-3 Sept.) | 1 | 3 | 18 | 228 |

TEST II. Release date: 8 August 1975. Sixty-one male and 61 female adults color-coded by sex only.

| | | | | |
|-----------------------|---|---|----|-----|
| 5-7 (13 Aug.-4 Sept.) | 4 | 7 | 11 | 148 |
| 31-52 (9-30 Sept.) | 8 | 4 | 18 | 208 |

Test II. The adults used in Test II were coded only for sex. Observations could be made without disturbing the adults, although use of this method meant that the movement of individual weevils could not be followed. Since observations were not begun until 5 days after release, the bulk of weevil dispersal activity may have occurred in the interim period. The numbers of individuals observed and the flight distances observed are in accord with those observed over comparable time intervals in the July release.

In dispersing from the release site, most of the adult weevils took flight immediately, although some first crawled a short distance away from the box. Before flight, the posterior of the abdomen was lowered, the elytra were elevated, and the flight wings were fully extended. Most weevils flew directly to the nearest tree from the release site or landed on weeds around the tree canopy. Those flying longer distances (38-45 m) flew to ca. twice the tree height and appeared to hover a few seconds before landing.

When disturbed, some adults feigned death by dropping to the ground and remaining motionless; others hid in the trash on the ground. Still others dropped off the leaves and took flight before hitting the ground. They usually landed on the first weeds or tree branches contacted.

From our limited field observations, *D. abbreviatus* is capable of strong flight of short duration and distance. Once they have landed, they apparently will remain in one place for long periods unless disturbed. Although the releases were made on calm days, wind could also be a potential factor affecting the distance moved.

Once they invade an area, *D. abbreviatus* populations probably tend to disperse rather slowly. Major modes of dispersal could involve a series of short flights or mechanical transport during shipment of plants, on fruit-hauling trucks, and on grove machinery. This hypothesis is supported by: (1) our observations on the locations of weevil-infested groves within a quarantine area; (2) the distance separating the 2 quarantine areas; (3) finding immatures in the soil of plants shipped to other areas; and (4) finding adults clinging to tractors used in infested groves.

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