



Diaprepes Root Weevil: What Floridians Need to Know¹

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Key Facts

- Diaprepes root weevil is a destructive pest of citrus and many other commercial crops grown in Florida including ornamental plants and root crops.
- Diaprepes root weevil is a native of the Caribbean Islands where at least 19 additional *Diaprepes* species, not currently detected in Florida, are known to occur.
- Fig. 1 shows *Diaprepes abbreviatus* and *Exothalmus vittalus* adult weevils. *Exothalmus* is not found in Florida but is a serious pest of citrus in the Caribbean.
- Diaprepes root weevil was first detected in Florida in 1964 near the town of Apopka in Orange County.
- In Florida there are five citrus root weevils of which Diaprepes is but one (Fig. 2).
- The weevil has now spread to parts of most agricultural areas outside of the original Apopka site.

- Although the adults are strong fliers, most of its widespread distribution can be attributed to man moving plants infested with larvae.



Figure 1. *Diaprepes abbreviatus* (L) and *Exothalmus vittalus* (R) adult weevils.

The Diaprepes Root Weevil is not Just a Citrus Problem

- Diaprepes root weevils attack more than citrus. See ENY-641 "Diaprepes Root Weevil Host List" for a detailed list.
- Infestation of host crops could result in a total loss of production.

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Figure 2. Adult Citrus Root Weevils (pointer is 1 1/4 inches) (Left to Right) (a) Little Leaf Notcher, (b) Fuller Rose Beetle, (c) Northern Citrus Root Weevil, (d) Citrus Root Weevil, and (e) Diaprepes root Weevil.

Economic Loss

There is no estimate of the total economic loss to Florida agriculture. However for individual growers, the loss due to Diaprepes root weevil can be total.

Damage to Citrus Trees

Adult *Diaprepes* feed on young, tender citrus foliage (Fig. 3) and occasionally on fruit. The primary economic damage is done by the larvae which feed on the fibrous roots (Fig 4) then move to and may girdle the crown area. A few large larvae can girdle and kill a mature, healthy citrus tree. This behavior apparently makes *Diaprepes* unique among the citrus root weevil species found in Florida. A combination of root-debilitating factors such as *Phytophthora* root rot, nematodes and/or moisture stress can hasten decline of an infested tree.



Figure 3. Damage to citrus leaves by root weevil.



Figure 4. Typical root damage caused by larval feeding.

Phytophthora spp. root rot organisms commonly infect the margin of larval feeding sites in the root bark. This causes girdling of large structural roots and accelerated tree decline on *Phytophthora* susceptible and moderately resistant rootstocks.

Damage to Ornamental and Root Crops

Adult and larval *Diaprepes* attack ornamental trees and root crops. However, some crops may show only adult feeding damage and others are fed on only by larvae. The presence of adult *Diaprepes* root weevils is indicated by irregular semicircular feeding areas on the leaf edges of ornamental crops such as Dahoon holly, Silver buttonwood, Green buttonwood, Pigmy palm, sea grape, tree orchid, Poinciana, etc. Adult weevil injury can also be observed on palm flowers. Adults are generally found on plants at the time of leaf flushing (Dahoon holly, Poinciana, seagrape), but can also be found on ornamental trees with permanent tender foliage, e.g. silver and green buttonwood. In south Florida, root crops such as potato and malanga, almost never have their leaves injured by adult *Diaprepes*. These crops may only serve as alternate host plants for larvae. Papaya foliage is often cut irregularly, or entire leaves may be eaten by these weevils. Injury can also be observed on ripe and overripe papaya fruit, where adult weevils may aggregate.

Many ornamental trees support advanced larval injury before external symptoms (leaf yellowing, defoliation, wilting) are observed. Other hosts, such as oaks, appear to be susceptible to root-debilitating factors such as *Phytophthora* root rot following larval feeding. Crops with a succulent root system, fleshy roots or tubers (Cassava, malanga, and potatoes) can

tolerate several larvae, before any external symptoms appear. Damage to root crops in Florida is manifested by shallow to deep larval feeding on fleshy roots or tubers.

Description

Adults vary in length from 3/8 to 3/4 inch. They are black overlaid by minute white, red, orange or yellow scales on the wing covers. Larvae are white, legless and grow to about 1 inch in length. The head has both light and dark areas.

Life Cycle

In Florida, adult weevils emerge from the soil throughout the year (Fig. 5). There appear to be two peak emergence periods in spring (May-June) and fall (August-September). Mating and egg laying occur throughout this period. Eggs are laid between leaf surfaces held together by an adhesive produced by the female. A single female may lay as many as 5,000 eggs during her life of three to four months.

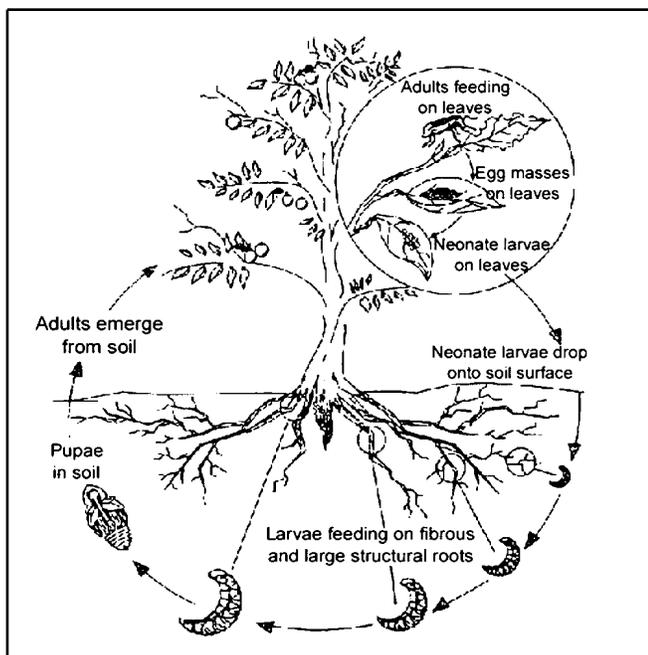


Figure 5. Life cycle of diaprepes root weevil.

The eggs hatch in 7-10 days after they are laid. Larvae drop to the ground, burrow into the soil and begin to feed on fibrous roots of host plants, moving to larger roots as they mature. After a period of

feeding, they pupate in the soil, emerging later as adults.

The length of time spent in the larval (Fig 6) and pupal stages varies from several months to more than a year. Thus, the total life cycle of any single weevil may last from six months to more than two years, based on laboratory data. Field data are not available on this point.



Figure 6. Larval stages of diaprepes root weevil.

In southern Florida, Diaprepes root weevils are observed in deep, marl type soils and are seldom observed in limestone soils, and consequently crops planted in marl soil may appear to have a heavier infestation than crops in limestone soils. In southern Florida, adults are found throughout the year. However, adults appear to be most abundant during spring, early summer and early fall. Egg laying has also been observed throughout the year. There are multiple generations occurring per year, generations overlap progressively through the year.

Eggs are deposited between leaves of ornamental trees in any part of the tree canopy. Younger leaves appear to be the preferred oviposition site on silver and green button wood trees. In citrus, young leaves are consumed by adults and mature leaves are preferred for oviposition. Females deposit their egg masses between two leaves and then cement the egg mass with a sticky secretion. Eggs can also be laid on a single leaf, by folding parts of the leaf.

Management Program

Surveys -- Surveys should be conducted in nurseries and commercial groves surrounding known infestations to detect and monitor weevil spread.

Regulations -- The Florida Department of Agriculture and Consumer Services, Division of Plant Industry, regulates the movement of all nursery stock originating from nurseries known to be infested with Diaprepes root weevil.

Infested nurseries are required to be under a compliance agreement that enables the nursery stock to move from the nursery once all the conditions in the agreement are met. These conditions may include removal of plants from growing media, shipping plants bare-root, or the application of approved chemical treatment.

Anyone needing more specific information concerning these regulations should contact their nearest Florida Department of Agriculture and Consumer Services Division of Plant Industry office.

Sanitation -- Movement of equipment and materials that might spread the pest from infested to noninfested areas should be restricted. Diaprepes may harbor in all soils, plants, leaves, grass, sod and stump wood.

Production:

- Eliminate soil and leaf litter before equipment enters and exits groves.
- Access to blocks with known infestations should be limited.

Harvesting:

- Eliminate soil and leaf litter as equipment enters and exits groves.
- Clean all picking sacks and personal items.
- Prevent leaf litter from being loaded onto semi trailers.
- Install slatted sides on loaders instead of solid walls.

- Use plastic instead of wooden bins in infested areas.
- Contain fruit-processing within a known infested area if possible.

Packinghouses - Processing Plants:

- Remove all leaf debris from pallets coming from areas of known infestation.
- Clean semi trailers to eliminate leaf debris.
- Burn or compost leaf debris at plant site or haul to an approved sanitary landfill using covered transport.

Natural Enemies

No native egg parasitoids have been observed attacking Diaprepes root weevils, but eggs appear to be preyed upon by ants, mites and spiders. A predatory bug has been observed attacking adults of the root weevil. Larvae are attacked by fire ants and native ant species. Classical biological control on the introduction of parasitoids from the geographical origin of Diaprepes root weevil, is being studied by researchers.

Chemical Control

For the use of chemical pesticides in an integrated program to manage *Diaprepes*, see discussion and recommendations for Citrus Root Weevils in the current Florida Citrus Pest Management Guide.

Phytophthora root rot - See discussion and recommendations for Phytophthora Foot Rot and Root Rot in the current Florida Citrus Pest Management Guide.

Flatwoods - Begin two annual applications of an approved fungicide as soon as Diaprepes root weevil infestation is detected.

Ridge - Do not initiate a Phytophthora root rot management program in infested groves until trees are in advanced stages of decline, i.e. loss of leaves and twig dieback.

New Technology

New management techniques are being tested against this pest. They include different insecticides for both larval and adult control, the use of biopesticides such as nematodes and fungi, and synthetic lures for detection and monitoring.

How you can Help

Commercial citrus growers, nurserymen, and others can help by:

- Complying with the suggested sanitary measures.
- Looking for the pest or signs of leaf notching and root feeding in grove or nursery.

Any previously unreported finds should be reported to The Division of Plant Industry - (352) 372-3505.

Additional Information

- For general information, see Citrus Root Weevils, SP-157, University of Florida, or Entomology Circular 77, DPI.
- For identification, life history and damage, see the Root Weevil chapter in SP-14, Florida Citrus Integrated Pest and Crop Management Handbook.
- For suggested pesticides, rates and restrictions, see current Florida Citrus Pest Management Guide.

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