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THE CITRUS ROOT WEEVILS IN FLORIDA: AN EXTENSION SERVICE PERSPECTIVE

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ABSTRACT

There are 5 species of root weevils that infest citrus in Florida. A ban on the use of existing effective persistent insecticides in the soil limits recommended Cooperative Extension Service control practices to: 1) maintenance of sound agronomic programs for vigorous growth of trees; 2) concentration of efforts on resets; 3) elimination of alternate hosts in or near groves; 4) use of 0.5 to 1.0% FC-435-66 spray oil in normal spray applications; and 5) use of Carzol SP as the miticide of choice when needed.

RESUMEN

En la Florida hay 5 especies de gorgojos de raíces que infestan los cítricos. Debido a que se ha prohibido el uso en los suelos de insecticidas persistentes efectivos, las recomendaciones de control del Cooperative Extension Service se han limitado a: 1) mantenimiento de sólidos programas agronómicos para el vigoroso crecimiento de los árboles; 2) concentrar los esfuerzos hacia los replantes; 3) eliminar hospederos alternos dentro o cerca de las arboledas; 4) usar rocíos de aceite de 0.5 a 1.0% FC-435-6 en aplicaciones normales de rocío; 5) cuando es necesario usar Carzol SP como el acaricida preferido.

Presently, five species of root weevil are known to infest citrus in Florida (Table 1). These are *Diaprepes abbreviatus* (L.), the West Indian sugarcane root stalk borer weevil; *Pantomorus cervinus* (Boheman), Fullers rose beetle; *Pachnaeus litus* (Germ.), the citrus root weevil; *Pachnaeus opalus* (Oliv.), blue-green weevil; and *Artipus floridanus* Horn., the little leaf notcher.

Pachnaeus and *Artipus* were observed feeding on citrus foliage by Hubbard (1885). It was recommended that adults be hand picked from the trees. Watson (1926) noted that larvae of *Pachnaeus* fed on citrus roots and recommended adults be controlled by lead or calcium arsenate. *Pachnaeus litus* was first mentioned by Watson and Berger (1937) as being a pest of Florida citrus. Adults were controlled by spraying trees with fluosilicate. In 1957, the list of root weevils was expanded to include *P. cervinus*, *A. floridanus*, and *P. opalus*. (Griffiths and Thompson 1957.) No recommendations were given for control of these species. Brogdon and Lawrence (1960) mentioned *P. cervinus* as only a minor pest of citrus which could be controlled chemically by mixing 5 pounds a.i. per acre of aldrin, chlordane, dieldrin or heptachlor with fertilizer. Two applications of 2.5 pounds a.i. mixed with fertilizer applied in the spring and fall appeared better than a single application of 5 pounds per acre. In addition, cultural weed

TABLE 1. GENERALIZED DISTRIBUTION OF CITRUS ROOT WEEVIL COMPLEX SPECIES IN FLORIDA.

Species	Distribution
<i>Diaprepes abbreviatus</i>	Concentrated in the Lake to Orange County areas with smaller population pockets in St. Lucie and Palm Beach counties.
<i>Pantomorus cervinus</i>	Northern half of citrus belt from Lake Okechobee north including both coastal areas and the ridge. Also collected in Homestead area.
<i>Pachnaeus litus</i>	Southern half of citrus belt from Highlands county south.
<i>Pachnaeus opalus</i>	Northern half of citrus belt roughly from Highlands county north.
<i>Artipus floridanus</i>	Primarily along the east coast from Daytona Beach to Key West. Specimens also collected in Glades, Hendry, Polk, Lake and Orange counties.

control by frequent mowing, chopping or cultivation, or a combination were suggested to reduce weevil damage. Brogdon and Lawrence (1974) mentioned *P. cervinus* and *P. litus* as pests of citrus but no control recommendations were mentioned.

Prior to 1974, aldrin 5G was applied with fertilizer about every five years for weevil control (Brooks personal communication). In 1974, the U.S. Environmental Protection Agency (EPA) cancelled all agricultural uses of aldrin/dieldrin in the U.S. leaving heptachlor as the only registered treatment for root weevil. In 1978, EPA and USDA approved phasing out the use of heptachlor over a two year period and limited the amount sold in Florida for root weevil control to 20,000 pounds a.i. in 1978 and 1979. From 1979 to 1981, two attempts were made by the Cooperative Extension Service to get EPA to reopen the aldrin cancellation hearings. Both requests were denied, citing "lack of substantial new evidence which materially affected the cancellation order of this chemical". EPA requested distribution and economic analysis information, which was not available. In 1980, an application was submitted for an Experimental Use Permit to evaluate Vydate® 2L, FMC-35,001 5G, and aldrin 5G for citrus root weevil control. EPA requested additional data on Vydate and FMC 35,001 relating to ecological effects, environmental chemistry and residue chemistry. These data were not available and industry terminated further development of FMC 35,001 as a soil insecticide. A Section 18 request was filed through the Florida Department of Agriculture and Consumer Services (FDA&CS) in 1982 for the use of 500,000 pounds a.i. of chlorpyrifos (=Lorsban® 5G) to treat 50,000 acres at 10 pounds a.i./acre. EPA approved the request but little material was purchased. The request was approved again in 1983. Usage was greater than in 1982, mostly on the east coast. Dow Chemical Company requested full EPA registration for Lorsban 5G and 4E for use on the citrus root weevil complex in 1983. In addition, Dow Chemical filed for a 24(c) with FDA&CS which was denied. FDA&CS requested a protocol for environmental fate studies before it would act on the 24(c) request. No chemical was approved for use in 1984.

According to general observations, it would appear that: (1) the citrus root weevil problem is more common in bedded groves on the east coast and/or in the flatwoods where groves have limited root systems and are grown under permanent sod culture; and (2) many of the groves showing heavy feeding by adult weevils are adjacent to woods, swamps, or pastures.

Since no registered pesticides are available at this time for larval control of root weevils, the Cooperative Extension Service is limiting their recommendations to the grower with a problem to: (1) maintaining sound fertilizer and water management practices, (2) paying more attention to resets than mature trees as the potential for economic loss is greater, (3) eliminating alternate hosts in and around the grove through sound weed management practices, (4) using 0.5 to 1.0 percent FC-435-66 spray oil in normal spray applications to slough off root weevil egg masses making them more susceptible to desiccation and predation, (5) using Carzol SP® according to the supplemental label for concentrate application when a miticide is required. Carzol will kill adult *D. abbreviatus*.

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CITRUS WEEVILS IN FLORIDA AND THE WEST INDIES: PRELIMINARY REPORT ON SYSTEMATICS, BIOLOGY, AND DISTRIBUTION (COLEOPTERA: CURCULIONIDAE)

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ABSTRACT

The following 11 genera of weevils are associated with citrus in Florida and the West Indies: *Artipus*, *Cleistolophus*, *Compsus*, *Diaprepes*, *Epicaerus*, *Exophthalmus*, *Lachnopus*, *Litostylus*, *Pachmaeus*, *Pantomorus*, and *Tanymecus*. This paper is a compilation, listing the known species on citrus, their biology, distribution, taxonomic status, economic importance, and selected references.