

White Grubs in Florida Sugarcane ¹

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White grubs commonly found in Florida sugarcane fields are larvae (i.e., immatures) of beetles. These beetles are in the family Scarabaeidae also called "June beetles." The most common grubs in Florida sugarcane fields are in the genera *Anomala*, *Cyclocephala*, *Euphoria*, *Ligyris*, and *Phyllophaga*. Of these grub pests, the species *Ligyris subtropicus* is by far the most important pest. It is the largest of the grubs and causes the most damage. One study showed that *L. subtropicus* caused a 39% reduction in sugarcane yield in areas of high infestation. Because *L. subtropicus* is the white grub of primary economic importance, it is the species that is discussed in this document.

Biology

Ligyris subtropicus completes its life cycle in one year. The life cycle consists of 4 stages - egg, 3 larval instars, pupa and adult. The adults are hard-shell, black beetles that are most active in late May and June. The final instar (large grub) may last for 8 to 9 months and is the most damaging to sugarcane. Mature larvae are 1.5 to 2" long with a head about 1/3" wide. Grubs have a characteristic "C"

shape, 6 legs, and a white to cream colored body with a dark posterior (Figure 1 and Figure 2).

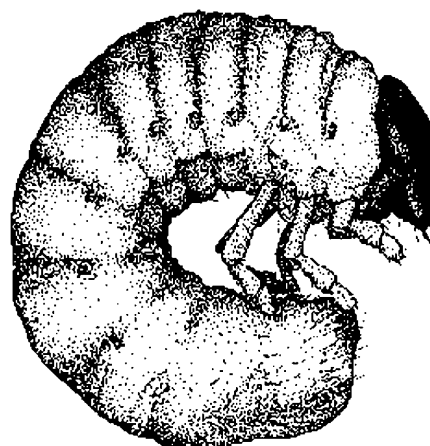


Figure 1. Characteristic "C" shape of white grubs.

Damage

White grubs damage sugarcane by feeding on roots and underground stems. The first symptom is a

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Figure 2. Larval, pupal, and adult stages of white grubs.

yellowing (chlorosis) of the leaves. This is usually followed by stunted growth, dense browning, lodging, plant uprooting and death in heavily infested areas. Symptoms may be seen as early as September. Damage is usually more severe in ratoon crops and is most evident around the edges of a field. Grub damage is also worse on muck soils than sandier soils.

Ligyris subtropicus infestation usually starts at the edge of a field and slowly spreads, in an irregular pattern, throughout the field. Infested fields may need to be replanted because ratoon regrowth and productivity can be severely reduced. Heavily infested areas may not be worth harvesting.

In recent years, grub populations have decreased in Florida sugarcane for reasons not fully understood. Hence, damage has been less than previous years.

Control

Biological

Bacterial milky disease, fungal *Metarhizium* disease and parasitic nematodes occur naturally in sugarcane grubs in Florida.

The bacterium *Bacillus popilliae* causes "milky disease" in the larvae of *Ligyris subtropicus* and *Cyclocephala parallela* (Figure 3). It is called milky disease because of the white milky appearance of the grubs when infected with the bacteria. The bacterium is the most prevalent pathogen found in these grubs. The contribution of natural infection by milky disease in controlling grub populations is not known.

Laboratory studies have shown *C. parallela* is more prone to infection than *L. subtropicus*.



Figure 3. White grub infected with milky disease (left; note whitish tip of abdomen) and healthy grub (right).

Metarhizium anisopliae is a fungus that can infest white grub larvae and kill them. The fungus is naturally present at very low levels in the soil in Florida sugarcane fields. Although the fungus has been shown to be highly pathogenic to the white grub larvae in laboratory studies, it is not a major mortality factor in the field. Additional research is needed to determine what factors are presently limiting *Metarhizium* disease in the field.

The use of nematodes as biological control agents for grubs has had mixed results. In a laboratory study, it was reported that *L. subtropicus* appeared to be an excellent host for the nematode, *Steinernema feltiae*, yielding 139,576 nematodes per grub. However, field studies on the control of *L. subtropicus* showed that field releases of *S. feltiae* did not cause a significant reduction in the number of *L. subtropicus* grubs in sugarcane. Field releases of *Steinernema glaseri* also failed to significantly reduce the number of grubs. It is yet to be demonstrated that nematodes may be used for grub control in Florida sugarcane.

Cultural Practices

Disking infested fields, reducing the number of ratoon crops, and flooding are methods of grub control in Florida. Disking kills many grubs and allows birds to kill many more. Freshly planted fields usually have little or no grub infestation

Although it is not always practical to flood, this control method can significantly reduce grub populations. The following points are to be considered if flooding is to be used to control *L. subtropicus* in sugarcane grown on muck soil.

1. Positive identification of *Ligyris subtropicus* should be made and the stage found (i.e, adult, egg, larvae) should be noted.
2. Adults are essentially impossible to kill by flooding. Eggs are also very difficult to kill by flooding. These stages occur from approximately May through July.
3. Larvae (grubs) and pupae, which occur mostly from August through April, are the easiest stages to kill by flooding.
4. The warmer the weather, the better the flood will kill larvae and pupae. If the water temperature in the flooded field is 77 °F or higher, a continuous flood for 5 days will be sufficient for grub control.
5. The flood water level should be about 2" above the soil surface. Many grubs will come to the soil surface and survive if there is less than 2" of standing water. Water depth greater than 2" will increase grub mortality very little, if at all.
6. Given the option, the best time to kill grubs by flooding is in August. At this time, water temperatures are warm, rainfall abundant, and feeding damage by the grubs is just starting.

Chemical

Chemical control of white grubs has not been effective in Florida. Hence, there are no chemicals labeled for white grub control in Florida.