

Cylas formicarius

Introduction

Cylas formicarius, the sweet potato weevil was described by Fabricius in 1798. It is originally from Indonesia where it is found on the wild plants of the genus *Ipomea* (Zimmerman, 1994). The weevil is a serious pest of sweet potato (*Ipomea batata*) causing heavy damage to the crop in the Greater Antilles. According to Lawrence (1998), losses as high as 60% of harvested sweet potato have been recorded by farmers in Jamaica. The weevil also attacks the tubers while in storage.

Identity

Authority	: Fabricius
Classification	
Kingdom	: Animalia
Phylum	: Arthropoda
Class	: Insecta
Order	: Coleoptera
Family	: Brentidae
Genus	: <i>Cylas</i>
Species	: <i>formicarius</i>
Common names:	Sweet potato weevil, Piogán de la Batata (Dominican Republic), Tetuán del Boniato (Cuba); Petit Leogane (Haiti).
Role	: Pest

Signs & Symptoms

A symptom of infestation is the yellowing of the vines. A heavy infestation necessary is before this is apparent. Larvae feed on the roots/tubers and make tunnels in them which facilitate secondary infection by fungi and bacteria.

Morphology

The **adult** (Fig. 1) is slender, about 6 - 8.5 mm long with a very conspicuous beak and prominent eyes. One-third of the body (rostrum, elytra and abdomen) is dark-blue or bluish-black. The head, thorax and legs are reddish-brown. The Prothorax is glabrous and constricted from behind; scutellum absent; body flattened laterally, femora clavate; rostrum and elytra finely punctate. The **larva** is cylindrical, curved, legless and white with the head capsule and pronotal shield pale brown. The **pupa** is about 6 mm. The cuticle is



glabrous and pale white color. In the male, the club at the apex of the antenna is 1.5 to 1.7 times longer than the basal portion, while in the female it is 0.75 times as long.

Biology & Ecology

Zimmerman (1994)

The life cycle lasts 40 - 44 days, depending on the temperature. Each female can lay about 200 - 250 eggs. The eggs are inserted singly into the tuber, and hatch within a week. Soon after the eggs hatch, the larvae begin to feed on the tuber and the stem and to make tunnel galleries. The larva undergoes 3 moults and becomes fully-grown in 3 - 4 weeks. Pupation takes place in the roots or lower stems. The adult remains in the pupal chamber for a few days before emerging. This species can produce about 5 to 8 generations within a year. The weevil is nocturnal and emerges at night to feed and copulate. This species is an inefficient flyer, but it can jump. During the dry season the sweet potato weevil causes severe damage to tubers due to the cracks in the soil, which facilitate access to the tubers.

Dispersal/vectors

The sweet potato weevil is dispersed via infested material – old roots, slips and planting material infested with eggs or young larvae. Weevils can move from old infested fields to newly -planted fields, which may be nearby.

Host Notes

The main host plant is the sweet potato (*Ipomoea batatas*). Alternative hosts are *Ipomoea aquatica* and *Convolvulus* spp (Convolvulaceae), including the morning glory (Schmutterer, 1990). Santoro (1960) reported that *Cylas formicarius* attacks other root crops e.g. potato (*Solanum tuberosum*), sweet cassava (*Manihot* sp.), black or bitter cassava (*Manihot utilissima*), taro (*Xanthosoma sagittifolium*), yam (*Dioscorea* sp.), leren (*Calathes allouya*), and celery (*Apium gravealens*). The larvae feed in the tubers and the adults feed on the stem and leaves

Distribution

The genus *Cylas* occurs naturally in Africa, Madagascar, India, S.E Asia and the East Indies, but *Cylas formicarius* (Fabricius) has been introduced into Australia, Japan, North America and the West Indies. The sweet potato weevil can be found throughout the coastal plain of the southeastern USA from North Carolina to Texas and Hawaii. In the Caribbean it is found Cuba, Puerto Rico, Jamaica, Dominican Republic, Haiti, Guyana, St. Kitts-Nevis and in Central America -- Mexico and Panama.

PEST SIGNIFICANCE

The Sweet Potato Weevil is the most severe pest of the sweet potato (*Ipomoea batatas*) in the countries where it occurs. Weevil damage to tubers causes heavy losses. The sweet potato is

one of the basic food sources in the Dominican Republic, Haiti, and Cuba as well as other tropical areas. This crop is harvested by the low-income farmer.

The weevil bores small, rounded holes into the tubers. Consequently, bacteria and fungi infest these galleries. Larvae tunnelling do the major damage. Damage is more severe if the tubers are left for a longer time in the ground or if harvest is delayed. Significant losses can occur as a result of weevil damage.

There is no precise data, but it has been estimated that about 40,000 ha. of this crop are planted in Dominican Republic and about 60,000 ha. in Cuba. The pest can cause damage to 45% to 50% (Santoro, 1960; Lagnaoui, 2000).

Management

Control of the sweet potato weevil is difficult because adults lay their eggs in the tissue of the tubers. The larvae penetrate deep in the stems and tubers, where they pupate. Therefore, controlling the weevil by the application of pesticides is not very successful. Janet Lawrence (1998) has reported that weevil damage can be lowered by using IPM – a combination of chemical, biological and cultural strategies.

CHEMICAL CONTROL: The sweet potato weevil can be managed using biological and cultural practices only. However, if pesticides are to be used then they should be applied only when pests are present or when there are symptoms of damage. Pesticides that are least harmful to natural enemies of the weevil and the environment, for example, soaps and oils, may be applied. Planting time applications made to the soil can be undertaken. Chemicals can also be applied to tubers in storage

CULTURAL CONTROL: One should avoid using infested plant material. Keep the soil moist so that it does not crack thereby it making it easy for the weevils to access the tubers. Crop rotation and prompt harvesting are also recommended. After harvest, all damaged roots and vines should be collected and burned or buried.

BIOLOGICAL CONTROL: The use of ants (*Solenopsis geminata*) was suggested by Santoro (1960) to control the weevil larvae. Other species of ants suggested are: *Tetramorium guineense*, and *Pheidole megacephala*. The fungus *Beauveria bassiana* has also been used to control the pest (Yasuda, 2000). Jansson *et al* recommends the use of entomopathogenic nematodes – *Steinernema* and *Heterorhabditis* sp

NATURAL ENEMIES

Several natural enemies are known including parasitoids –*Bracon mellitor*. Predators such as ants. Santoro (1960), has suggested that the fire ants (*Solenopsis geminata*) may help to control the larvae of the weevil. The fungus *Beauveria bassiana* has been used as biological control for the weevil. The use of this pathogen can be very promising to apply in IPM control of this important and severe pest (Yasuda, 2000). A number of parasitoids, predators and other microorganisms are natural enemies of *C. formicarius*.

Yasuda (2000), conducted an Integrated Pest Management (IPM) study for the sweet potato weevil (*Cylas formicarius*) in Okinawa, Japan. The study was based on the determination of threshold levels before action is taken to control the pest. The use of sex pheromone for trapping the weevil, and the pathogenic fungus (*Beauveria bassiana*) for infecting the weevil

already in the trap has been successful. The males were infected with the fungus and on maturing the female will also be infected.

The advantages of this IPM method seem to be very promising for controlling the weevil. The IPM program will be very successful for the low-income sweet potato farmers. This system requires integrating different strategies, which included biological, cultural methods, pesticides, and pheromones.

The IPM system requires that both farmers and extensionists be trained in the techniques required. This is a time-consuming process but could prove to be the most cost effective method of control in the long term.

INSPECTION PROCEDURES FOR THE PEST

Some procedures advocated for avoiding the spread of the pest are as follows: Not transporting infected tubers within the country and among countries; thereby preventing the spread of the pest from infected areas to non-infected areas.

Quarantine precaution should be taken in the countries and areas where the sweet potato weevil is not present. Programmes to monitor the occurrence, distribution and population of the sweet potato weevil must be created and implemented. Sweet potato tubers, slips (planting material) must be thoroughly examined by plant quarantine personnel for the presence of adult weevil and larvae.

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