

Hypothenemus hampei

Introduction

The coffee berry borer, (CBB), *Hypothenemus hampei* (Ferrari) is one of the most serious pests of coffee. This pest is of quarantine significance to the Caribbean and it is believed that it was introduced into this region from Africa with planting material .It originated in Angola from where it spread to all South American coffee producing countries – Brazil in 1923, Guatemala in 1971, Mexico and Jamaica in 1978 (Guadalupe Rojas 1998).

Identity

Authority	: Ferrari, 1867
Classification	
Kingdom	: Animalia
Phylum	: Arthropoda
Class	: Insecta
Order	: Coleoptera
Family	: Scolytidae
Genus	: <i>Hypothenemus</i>
Species	: <i>hampei</i>
Synonyms	: <i>Stephanoderes hampei</i> (Ferrari, 1871); <i>Stephanoderes coffeae</i> (Hagedorn, 1910); <i>Xyleborus coffeivorus</i> (Van der Weele, 1910); <i>Xyleborus coffeicola</i> (Campos Novaes, 1922); <i>Xylosandrus morigerus</i> (Blandford), <i>Xyleborus coffeae</i> (Wurth, 1908), [Le Pelley, 1973]) possible synonyms.
Common names	: Coffee berry borer, Berry borer; Broca del cafeto, Broca del fruto del cafeto, Barrenador del cafe, Brocal del cafe brasil, Taladro de las cerezas del cafeto, Scolyte du grain de cafe, Scolyte des grains de cafe, Kaffeebeerekafer, kaffebohnekafer, Kaffeekirschenkafer, Koffie bessen boeboek, Kofiebessen-boeboek, Broca do cafe.
Role	: Pest

Morphology

The female of the coffee berry borer are very small about 1.4 - 1.7 mm length, but some of them may reach 2 mm. The coloration goes from blackish to brown or completely black (Fig. 1). Prothorax is humped, and the head is concealed under the prothorax making it invisible from above. The antennae are short, elbowed and clubbed. Tibiae strongly spined. Larvae are legless and white, head capsule sclerotised and brown. Elytra are striate and punctate



Fig. 1: *Hypothenemus hampei* (adult)

usually covered with short bristles. The emerging adults are brown, and they turn completely black within 4 or 5 days. The eggs are bean-like, translucent and turn whitish on maturing (FAO Record; Le Pelley (1973); Schmutterer, 1990).

The male is smaller than the female.

Host Notes

The main host plant for this pest is coffee (*Coffea arabica*). There are several alternative host plants namely the families Rubiaceae, Leguminosae, and Malvaceae (*Hibiscus*) (Schmutterer, 1990). In addition, it can attack other species belonging to the genera *Camphor*, *Dendrobium*, *Bombax*, *Swietenia*, *Crotalaria*, *Leucaena*, *Tectona*, and *Tephrosia* (Le Pelle, 1973). The FAO-CARINET recorded the following host plants: *Centrosema*, *Phaseolus*, *Tephrosia* (Fabaceae) and *Ligustrum* (Oleaceae), *Dialium lacoutianum* (Caesalpiniaceae), *Leucaena leucocephala* (Mimosaceae; *Gliricidia sepium* (Fabaceae) *Psychotria* (Rubiaceae) and *Dioscorea* (Dioscoreaceae). This wide range of host plants should be of concern, as the pest could be introduced not only by the main host plants but also by any of the alternative hosts.

Distribution

This pest is established in tropical Africa, Asia, Mexico, South America (Colombia, Argentina, and Brasil) in Central America (Guatemala, El Salvador, Honduras and Costa Rica). In the Caribbean CBB is found in the Dominican Republic and Jamaica, (FAO Record, Schmutterer, 1990). According to Vega *et al* (2002) CBB is not established in Puerto Rico on Arabica coffee.

Biology & Ecology

The adult females bore into the coffee berry making a gallery to lay their eggs. When the eggs hatch the larvae begin eating and consequently destroy the coffee beans (Schmutterer, 1990). The female lays an average of 30 to 70 eggs (FAO Record; Le Pelley (1973). The ovoposition period last up to 3 or 7 weeks. Eggs hatch from 3 to 9 days; male larvae undergo 2 stages in 15 days, and the female undergoes 3 instars for 19 days. The pupal stage may last from 4 to 9 days. The entire cycle from egg to adult takes about 25 to 35 days in warm temperature (FAO Record).

Males emerge from the pupa first then begin to mate with the females as soon as they emerge. The males can fertilize two females in a day and up to 30 in a lifetime. Fertilized females stay on the berries for 3 or 4 days then leave the coffee bean for another. The female can live up to 282 days. Also, this species can survive without feeding for a long time and in extreme, whether conditions can go into facultative diapause (FAO Record).

Management

Chemical Control

The coffee berry borer is difficult to control by spraying because most of its life cycle occurs deep inside the berry. The most common chemical compound used to control this pest is Endosulfan due to the great efficiency and low environmental hazard (Pest

CabWeb (2002). However, the coffee berry borer has developed resistance to the high doses of Endosulfan in New Caledonia (Brun and Suckling, 2001). Other fumigants used are Hydrocyanic acid (HCN), methyl bromide, and phosphine (FAO Record).

Cultural Control

Some cultural methods have been applied and though expensive have given good results e.g. hand collection of the ripe berries after harvest to break the cycle of the pest is recommended. This practice has been adopted in South America (Colombia, and Brazil). This method can reduce from 60 to 90% of the pest damage. In addition, the eradication of any alternative host plants near the crop field will help (FAO Record).

Biological Control

Pest Cab Web pointed out that the use of the entomopathogenic fungus *Beauveria bassiana* was responsible for 80% of adult mortality especially in Colombia. There are four main parasitoids of the CBB: *Cephalonomia stephanoderis* & *Prorops nasuta* (bethylids), *Phymastichus coffea* (Eulophid), and the braconid *Heterospilus coffeicola*. All are of African origin. The bethylids are widely spread throughout the coffee growing regions of Latin America and have given promising results as biocontrol agents of the pest.

Natural Enemies

Pest CabWeb (2002) recognized four major parasitoids on CBB namely *Cephalonomia stephanoderes* & *Prorops nasuta* (bethylids), *Phymastichus coffea* (Eulophid), and the braconid, *Heterospilus coffeicola*. According to Smith *et al* (1996) the Bethylids are easier to rear than the hymenopteran parasitoids.

In addition, *Beauveria bassiana* has been reported as an important natural enemy. This fungus infects the females and kills them before they bore into the coffee bean. (Schmutterer, 1990). The pathogen seems to be very effective causing 80% adult mortality (Pest CabWeb 2002).

PEST SIGNIFICANCE

The CBB is responsible for severe yield losses of the coffee bean, which is a very important product in the economy of many tropical countries. It also damages the stored coffee bean.

INSPECTION PROCEDURES FOR THE PEST

Careful examination of berries of coffee and alternate host, imported into non-infested countries must be undertaken to ensure that the pest is not introduced. Roasted berries should be imported.

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Web Resources -

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