

to fall prematurely, while terminal leaves wilt, droop and dry up. Young branches may wither faster compared to older twigs. Severe infestation can lead to the loss of a significant number of productive branches, potentially delaying the establishment of young coffee plantations.



Infested twigs

### Management

The incidence of SHB can be effectively managed by implementing the following measures:

- Maintain recommended shade and ensure good drainage in the coffee estate
- The pest prefers to breed in the suckers during unfavourable dry conditions. Hence, remove and destroy all the unwanted/infested suckers during the dry period (February and March)
- Prune the SHB infested twigs 2.5 to 7 cm below the entry hole of the infestation and destroy (burn) them immediately. Start this operation

from September, as soon as you observe the first signs of an attack (drooping of leaves), and continue as a routine practice at regular intervals

- Install 12 XYCOM traps which are used for berry borer management (Broca) with 10 ml of XYCOM lure, from September month onwards. This trap can be used as an early monitoring system to identify the presence of SHB, as well as to prevent the spread of infestation by mass trapping. The traps can be employed from September month onwards till a severe infestation is noticed in the field. The traps and lure are available in coffee research stations at Karnataka and Kerala
- Spray *Beauveria bassiana* with 10<sup>7</sup> spores/ml, i.e. 1kg of rice culture (approximately 40 g of spore) in 200L water with 100ml APSA can be sprayed on the infested branches
- In young plants (less than three years old), Carbosulfan 25EC @ 400 ml in 200L water can be sprayed after the cessation of monsoon to prevent the infestation of SHB. Due to the concealed nature of the pest, insecticide application is not economically feasible in grown-up plants.

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## MANAGEMENT OF SHOT HOLE BORER



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Published by Dr. M. Senthilkumar, Director of Research  
Printed at M/s. Omkar Offset Printers, Bengaluru

The shot hole borer (SHB) is a major pest of robusta coffee. It is otherwise known as the black twig borer or Ambrosia beetle.

### Distribution and host plants

The shot hole borer is a polyphagous pest that affects over 225 plant species, including coffee. The SHB is native to Asia and is mostly found in subtropical and tropical regions. In coffee, robusta is the most preferred host, and the SHB occasionally infests arabica. The other common host plants are Annatto, Avocado, Clerodendrum, Cocoa, Crotalaria, Croton, Dadap, Dendrobium, Mahogany, Mango, Neem, and Pomegranate.

### Morphology and life cycle

The adult SHB is a brown to black beetle with a short and sub-cylindrical body. Females are larger and darker, measuring about 1.5 to 1.8 mm, while males are smaller and dull in appearance, ranging from 0.8 to 1.0 mm. The body of the beetle is covered with fine hair. This beetle typically infests young and tender branches of coffee plants. In some cases, it may even attack the main stem of very young plants. The female enters the twig through a hole, usually located on the underside and between the nodes. The adult female beetles bore the coffee branches and make a tunnel inside the branch for inoculating the

symbiotic fungus, Ambrosia. Once the fungus develops inside the tunnel, the adult beetle starts to lay eggs and the emerging larvae grow inside, by feeding on the fungus.



SHB boring on sucker

Adult beetles and larvae do not feed on the tissues of the coffee plant; however, they survive by feeding on the fungus inoculated by the female adult beetle. After cultivating the fungus, the female lays up to 50 eggs, in groups of 5 to 8. These eggs hatch within 2 to 3 days. The milky white larvae feed on the ambrosia fungus. The larval stage lasts for 13 to 21 days, followed by an 11-days pupal stage. The life cycle, from egg laying to adult emergence, takes approximately 4 to 5 weeks. During the peak incidence period, all life stages of the pest can be found within the same tunnel.

Shot hole borers exhibit a form of parental care. The female remains inside the shot hole, protecting the brood for most of the time. After full development, the beetles stay in the tunnel for a few days before emerging, typically in the afternoon, to infest fresh branches. Females have limited flight capabilities,



Damage inside twig

while males have underdeveloped wings and cannot fly. The male-to-female ratio is approximately 1:10, and mating occurs within the gallery.

Due to its short life cycle, the SHB can complete multiple generations rapidly under favorable conditions. The incidence of this pest is generally low before the onset of the Southwest monsoon, reaches a peak between September and January, and gradually decreases during the dry period. Infestation can be more severe under heavy shade, as higher humidity promotes better establishment of the ambrosia fungus.

### Symptoms of attack and nature of the damage

The presence of the SHB is indicated by withered or dried branches with small shot holes. Infested branches dry up quickly due to the tunnelling activity that restricts the flow of sap. Leaves above the affected area tend

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