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## Infestation of *Xylosandrus compactus* (Eichhoff) (Coleoptera: Curculionidae) on big-leaf mahogany (*Swietenia macrophylla* King) in nursery

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### Abstract

*Swietenia macrophylla* is one of the important commercial tree species, widely being cultivated in farmlands in India due to its high market demand, attractive wood colour, and quality. The present study was conducted at Research Nursery, ICFRE-IWST, Bangalore from April 2021 to March, 2022. A hundred mahogany (1-year old) plants were heavily infested with stem borer, *Xylosandrus compactus*. Application of *Beauveria bassiana* at the concentration of  $1 \times 10^8$  spores/ml showed promising results in the management of the stem borer and caused more than 80% adult mortality in the nurseries.

**Key words:** mahogany, *Swietenia*, borer, nursery and growth

### Introduction

*Swietenia macrophylla* King (big leaf mahogany) is a tropical tree species native to Central and South America. It has a wide natural distribution, extending from Mexico to Bolivia and central Brazil (Lamb, 1966). It is one of the important premier timbers in the world. *Xylosandrus compactus* (Eichhoff) is commonly known as black twig borer and belongs to the family Curculionidae. It occurs in Southern part of India (Meshram et al. 1993), Sri Lanka, Southern Japan, Indonesia, Vietnam, Malaya, Madagascar, Mauritius, across tropical Africa, Fiji and in the United States in Florida, Georgia, Alabama and Louisiana (Le Pelley, 1968; Ngoan et al. 1976;

Venkataramaiah and Sekhar, 1964; Vasquez, Tur, & Monteagudo, 1996; Oliveira, Flechtmann and Frizzas, 2008). Delgado and Couturier (2010) reported 38.41% mortality of the seedlings due to the attack by *X. compactus* in Peruvian Amazonia. Greco & Wright (2015) reported that this pest attacks more than 200 species of plants in Hawaii. It was reported as a major pest of tea in Japan and caused extensive dieback (Kaneko et al. 1965). The physical damage to infested plants could be the tunneling action of the beetle. This pest is native to Asia and mainly distributed in subtropical and tropical areas. It is adapted to a warm environment (Hayato, 2007; Venkataramaiah and Sekhar, 1964; Vasquez et al. 1996; Oliveira, Flechtmann and Frizzas,

2008). Wood (1982) reports this pest in the United States as a first report in Fort Lauderdale. Ngoan *et al.* (1976) reports its spread throughout the southeast United States, along the coastal plain from Texas to North Carolina. Mahogany trees are often infested by this pest as stem borers and top shoot borers in the nurseries and plantations in different parts of Karnataka State with severe intensity. The larvae and the adult beetle bore into the stem and feed the pith of the stem. Severe infestation leads to the death of the plant. Heavy infestation of stem borer in one year old seedlings of *S. macrophylla* was noticed in the research nursery of IWST, Bangalore. Therefore, a study was conducted in the nursery of the ICFRE-Institute of Wood Science and Technology, Bengaluru to study the impact of this pest and its management.

### **Martials and methods**

The present study was carried out from April 2021 to March 2022 at the ICFRE-Institute of Wood Science and Technology (IWST) Nursery, Bengaluru (13.0126785<sup>0</sup>N & 77.57018464<sup>0</sup>E). The IWST nursery has hundreds of seedlings of bamboo species, sandalwood, rosewood, and mahogany. A total of 800 of *S. macrophylla* plants of one year old were selected for the present study. It was noticed that many mahogany plants were wilted suddenly in the nursery. On observing closely, it was found that 2-3 micro-holes were present in the localized lesion part (about 1cm long) of the stem at the base of all the wilted plants. From infested plants, the adults and

eggs were collected in a vial and maintained for future reference. After the dissection of the stems of infested plants, adults and eggs were collected for identification. The stem borer was identified as *Xylosandrus compactus* by Sarah M. Smith, the Curator of Scolytines, Michigan State University and the accession number of the same is UASB 019230110-UASB 019230116. Damage assessment was undertaken on alternate days until the death of the plant. The infested plants were assessed and the number of plants was recorded based on infestation level, intensity of attack, and the mode of infestation (Atuahene, 1972). A patch of fifty infested seedlings was tested with the biocontrol agent of entomopathogenic fungi *Beauveria bassiana* with a concentration of  $1 \times 10^8$  spores/ml to confirm the possibility of control measures.

### **Results and discussion**

*Xylosandrus compactus*, the black twig and stem borer is a very small beetle which is 0.508 mm in size and is shiny, black and cylindrical. It is usually found on the bottom of plant stems. It makes very minute holes in the stem. The eggs are small and oval and are white and translucent. The grubs are white and legless and are very small in size. The grubs are pointed at the rear and the matured ones have a brownish head. The pupa is about the size of the adult. The body is covered with a thick hairiness. The female gets to the seedling and builds a chamber for oviposition (Fig.1)

The study revealed that about 55.6 percent of seedlings were found attacked by the pest *X. compactus*, which is the first report on *S. macrophylla* in this region. This small size black colour beetles caused severe infestation on the seedlings and young saplings of *S. macrophylla*. By making very minute holes, it bore into the stem and fed on the pith of the seedlings and saplings thereby causing damage which finally led to the death of the seedlings or saplings (Fig 2).

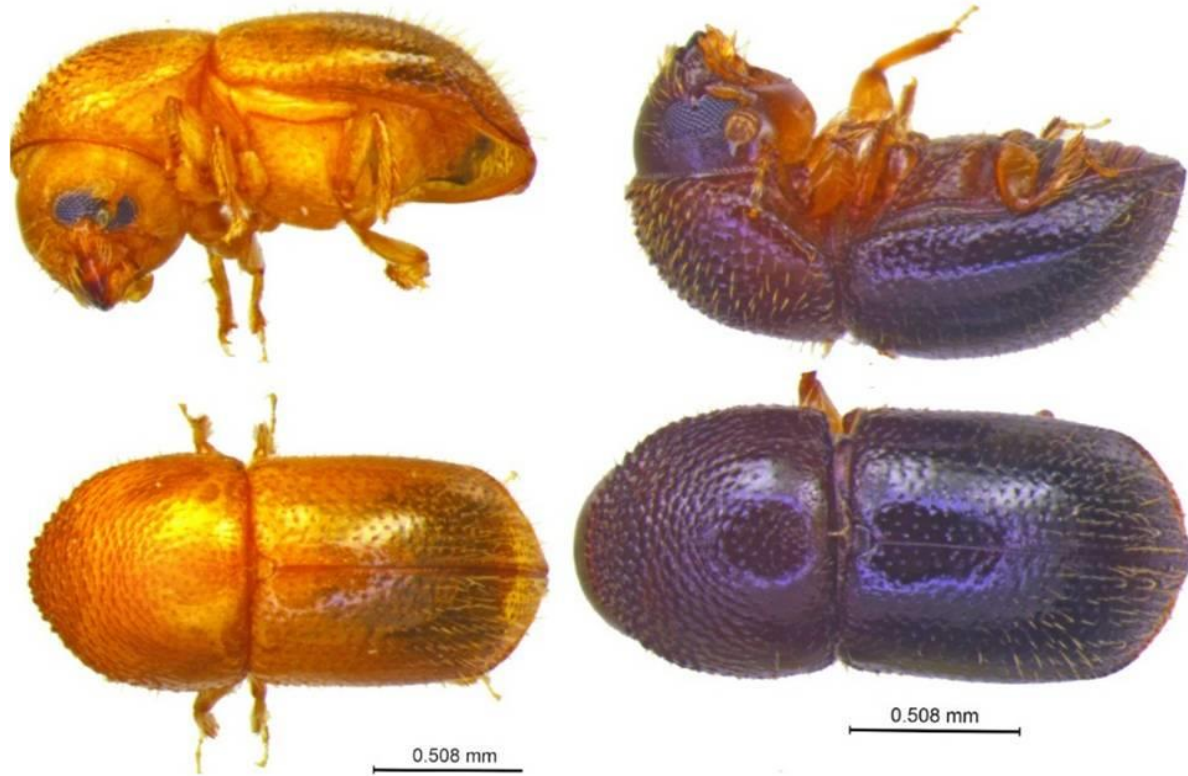
Ngoan *et al.* (1976), Mannakkara and Alawathugoda (2005), Chong *et al.* (2009) reported that this pest has a wide range of infestation on about 224 plant species belonging to 62 families including agricultural crops and trees. Among these, more commonly attacked non-native host species such as mango (*Mangifera indica* L.), cinnamon (*Cinnamomum camphora* (L.) Nees and Eberm.), cherimoya (*Annona cherimola* Mill.), burutha (*Chloroxylon swietenia* DC.), khaya (*Khaya senegalensis* (Desr.) A.Juss.), kolon (*Adina cordifolia* Roxb. Ridsdale), kumbuk (*Terminalia arjuna* (Roxb.) Wight and Arn), neem (*Azadirachta indica* A. Juss), tamarind (*Tamarindus indica* L.) and mahogany (*Swietenia macrophylla* King). Delgado and Couturier (2010) report in Peruvian Amazon region *Swietenia* species were severely attacked by this pest in nursery seedlings. *X. compactus* originating in Asia is now established in the tropical areas of Africa as well (CABI/EPPO, 1997). As a control measure, Meshram *et al.* (1993) tried spraying

the nursery seedlings with the insecticide Monocrotophos 0.05 percent (Nuvacron EC) in October- November and found it to be effective against this pest. Only a few biological control measures are available to check the pest (Sreedharan *et al.* 1992). Application of several parasitoids has been reported in India. *Eupelmus* sp. (Hymenoptera: Eupelmidae) was found inside black twig borer tunnel in coffee plants in Kerala, India (Balakrishnan *et al.* 1989). *Tetrastichus xylebororum* (Eulophidae) was reported to be associated with *X. compactus* on the island of Java in Indonesia (Balakrishnan *et al.* 1989). The entomopathogenic fungus, *B. bassiana* was shown to infect all the life stages of *X. compactus* in India. It resulted in 21% infection of the beetles present in colonies of robusta coffee branches (Balakrishnan *et al.* 1994). *B. bassiana* is now registered in Hawaii, for the coffee berry borer *Hypothenemus hampei* Ferrari (Coleoptera: Curculionidae). In our studies, it is also concluded that the application of *Beauveria bassiana* at the concentration  $1 \times 10^8$  Spores/ml showed promising results and caused more than 80% adult mortality in the nurseries.

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**Fig. 1** Adult beetles of *Xylosandrus compactus*



**One-year old seedlings of mahogany**



**Lesion and wilting symptoms of infected plants**



**Wilting and lesion symptoms**



**Micro-hole on stem made by borer**

**Fig. 2 Symptoms of stem borer infestation in mahogany nursery, IWST, Bangalore**

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