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**R Raja Rishi**

Forest Protection Division,  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

**N Ravi**

Silviculture and Forest  
Management Division,  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

**MV Durai**

Silviculture and Forest  
Management Division,  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

**TN Manohara**

Silviculture and Forest  
Management Division,  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

**N Mohan Karnat**

Group Coordinator (Research),  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

**Correspondence****R Raja Rishi**

Forest Protection Division,  
Institute of Wood Science and  
Technology, Bengaluru,  
Karnataka, India

## An epidemic outbreak of *Sahyadrassus malabaricus* (Moore) (Lepidoptera: Hepialidae) on *Tectona grandis* in Kolisalu-Pura, Karnataka, India

**R Raja Rishi, N Ravi, MV Durai, TN Manohara and N Mohan Karnat**

### Abstract

Teak (*Tectona grandis*) has been recognised as one of the most valuable premium wood in India. Its colour, fine grain and long durability are the most fascinating features of the wood. This species is widely established through large scale plantations in most part of Karnataka State. Teak saplings are exposed to serious insect pest problem mainly by the stem borer *Sahyadrassus malabaricus* causing severe damage on stem and affect the growth as well the quality of the wood. Occurrence of this pest is prevalent and magnitude of damage caused is severe in Kerala region. For the first time, in the teak plantation raised by the Karnataka State Forest Department in Kolisalu-Pura village located in the district of Shivamogga, Karnataka, an epidemic outbreak of this pest was observed and it is causing severe damage in young saplings. The damage was characterized by a hole in the main stem of the saplings and the larvae enter in to the stem through this bore holes and excavate a long cylindrical tunnel along the pith and causing damage. Hence the present study was undertaken to assess the pest outbreak in this area. The intensity of the pest incidence was moderate to severe level and the percentage of attack on the 1 to 2 years old saplings was 35-40%. Spraying or injection of the aqueous fungal solution of *Beauveria bassiana* at a concentration of  $3.6 \times 10^{10}$  or  $3.6 \times 10^8$  at the entry hole of the pest after removal of the thick frass mat can control the pest in field condition.

**Keywords:** *Tectona grandis*, *Sahyadrassus malabaricus*, saplings, epidemic, plantation

### 1. Introduction

Teak (*Tectona grandis* L.f.) is an important commercial tree species belongs to family Verbenaceae. It is a large deciduous tree species which grow well in alluvial soils, fairly moist, warm and tropical climate with pH ranges from 6.5 to 7.5. It is widely grown both to make use of marginal lands and increasingly as a high value plantation crop by State Forest Departments, commercial companies and private investors in different parts of Karnataka. About 174 species of insects are associated with teak [1]. Many of these insects are minor or occasional pests and very few are recognized as major pests. Among the various insect-pest infesting teak plants, 136 are defoliators belonging to order: Lepidoptera, Coleoptera and Orthoptera. Teak plants are vulnerable to the attack by a number of insect pests [2]. A total of 45 insect species were recorded attacking teak plants during the survey conducted in Karnataka. Among the pests recorded 22 were defoliators, 19 sap suckers and 4 bark feeders [3]. Three species of major insects namely Cicadellid (*Tettigoniella ferruginea*), the teak defoliator (*Hyblaea puera*) and the teak skeletoniser (*Eutectona machaeralis*) have been causing severe damage to teak [2, 4]. Insect pest surveys were carried at Yellapur, Mundgod, Haliyal and Sirsi Forest Divisions during the period from 2003 to 2005 on teak plantations and different pests belongs to different orders were recorded [5]. Next to the notorious teak defoliators, *Hyblaea puera* and *Eutectona machaeralis*, *Sahyadrassus malabaricus* is considered to be the serious pest. *S. malabaricus* is a polyphagous pest reported to occur in the peninsular India [6]. This borer has long been recognized as a serious pest on several species of plants [7-10]. This pest was first time recorded on coffee during 1982 on the suckers of 4 years old *Coffea canephora* at the RCRS Chundale farm. During 1988 another incidence of this pest was noticed again [11]. This pest has assumed the major pest status in various teak growing tracks of Kerala, Tamil Nadu and Karnataka.

## 2. Material and methods

During the period from May 2017 to May 2018 periodic survey was conducted to assess the health status of the 1-2 years old young teak saplings raised in a 15 ha area of plantation in Kalisalu-Pura. Based on the incidence and intensity of insect pest attack calculation was made as per the prescribed methods of assessment of insect pest incidence plantations [12].

## 3. Result and Discussion

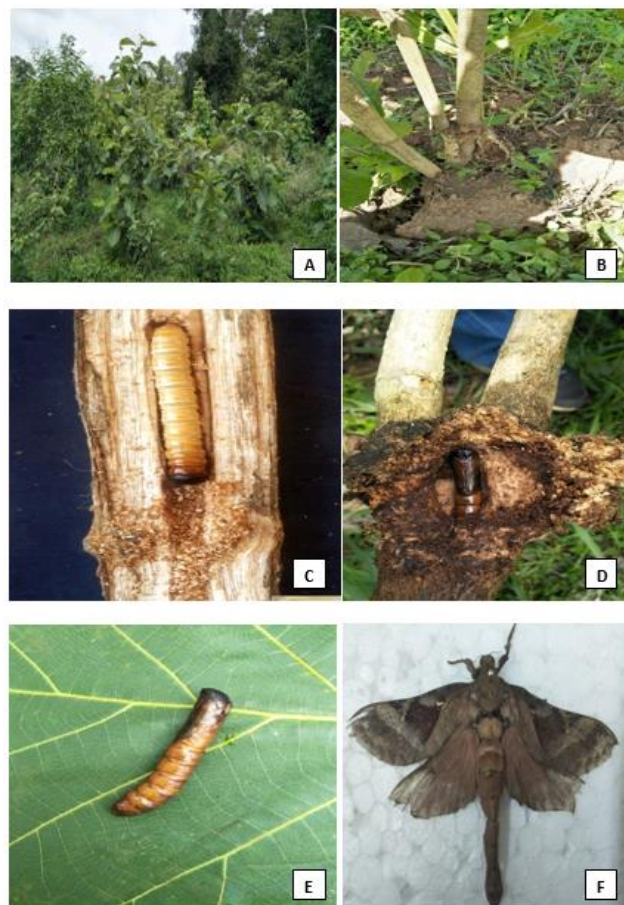
The regular surveys to observe the health status of Teak plants planted by the Karnataka State Forest Department during the period from May 2017 to May 2018 revealed that an epidemic outbreak of *S. malabaricus* was recorded in the Kolisalu-Pura (Latitude 14° 18' 35.1" N and Longitude 75° 07' 31.2" E) teak plantation located in the Sagar Forest division of Shivamogga Circle of Karnataka State. The teak saplings of 1-2 years old were heavily infested by the stem borer (Fig.1 a, b). This is the first time observation that nearly 35 to 40 percent of plants planted in these areas were affected by this pest with moderate to severe intensity of attack. The larvae enter into the stem of young saplings by making bore holes and excavate a long cylindrical tunnel along the pith, sometimes extending to the tap root resulting in the death of the saplings or breaking of the stem at the point of attack [13]. The top end of the tunnel is curved and opens to outside. The mouth of the tunnel is covered by a mat work consisting of coarse saw dust like particles of wood and bark, spun together with silk secreted by the larva. The large mat covering made by the larva is an indication of the pest attack. The larva feeds on the callus tissue which develop around the tunnel mouth due to constant feeding. The larva feeds during the night under the mat cover (Fig 1 c). The saplings break at the point of attack of the pest. The young larvae appear to develop on ground vegetation, before they migrate to the saplings. Full grown larvae are large, conspicuous measuring 8 to 10 cm in length. They are yellowish white in colour with deep black head capsule. The pupation takes place in the tunnel and the moths start emerging during the month of May- June (Fig 1d, e). The moths are large and greyish brown with a wing span of about 11 to 12 cm. and body length of 5 to 6 cm (Fig 1 f). The eggs are produced in large numbers and are believed to be broadcast by the female moth during flight. The pest has an annual life cycle. Infestation was severe in plantations with dense growth. As the larvae are reported to survive on undergrowth initially, removal of undergrowth in the plantations will help to check the establishment of the pest population considerably. The method of management through injection of chemical pesticides into the bore holes is not found feasible and economically viable as a the practice is cumbersome and laborious. Spraying or injection of the aqueous fungal solution of *Beauveria bassiana* at a concentration of  $3.6 \times 10^{10}$  or  $3.6 \times 10^8$  at the entry hole of the pest after removal of the thick frass mat can control the pest effectively [14].

Different control measures was tried on *S. malabaricus* by applying contact insecticide at the tunnel mouth region after removal off the frass mat [6]. Bio-efficacy of microbial bio-pesticides has been studied by many workers against important insect pests. *B. bassiana* plays an important role in the regulation of pest population [15]. The virulence of nine strains of the fungus *B. bassiana* tested against the coffee berry borer *Hypothenemus hampei* under laboratory conditions showed that the fungus *B. bassiana* is a potential

microbial agent suitable for incorporation into a program of integrated control directed against *H. hampei* [16]. A preliminary attempt was made to test the pathogenicity of the fungus *B. bassiana* against the hepalid larvae *S. malabaricus*, a pest of forest trees in India, as a biocontrol agent in laboratory condition [17]. The fungus *B. bassiana* was found infecting larvae of *Indarbela quadrinotata* a insect pest of *Casuarina* [18].

## 4. Conclusion

The present study finds and confirms that *S. malabaricus* is a potential and harmful insect pest of Teak during sapling stage. The intensity of the pest incidence was moderate to severe level and the percentage of attack on the 1 to 2 years old saplings was 35-40% in the study area. Preventive and curative interventions are fundamental for the control of this pest. Mechanical control measures may be adapted to control this pest when the pest infestation is in a low level of intensity. Eco-friendly approaches such as biological control are considered the best alternatives to chemical pesticides. There is growing interest in the use of entomopathogens for biological control, since they are naturally occurring and environmentally safe. Spraying or injection of the aqueous fungal solution of *Beauveria bassiana* at a concentration of  $3.6 \times 10^{10}$  or  $3.6 \times 10^8$  at the entry hole of the pest after removal of the thick frass mat can control the pest. Therefore the information provided here could be used to locate this significant pest and help tackle it in young plantations in the initial stage of pest incidence.



**Fig 1:** *Sahyadrassus malabaricus* attack on Teak saplings in the study area (A) Teak plantation at Kolisalu-Pura (B) Stem borer attack on Teak sapling (C) Grown up *S. malabaricus* larva (D) Pupa inside the bore hole with frass mat (E) Full grown pupa (F) Adult moth of *S. malabaricus*.

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