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## Incidence of bark feeding borer, *Indarbela quadrinotata* Walker (*Lepidoptera: Cossidae*) on *Sonneratia apetala* in the Mangroves of Maharashtra, India

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### Abstract

The bark feeding caterpillar *Indarbela quadrinotata* is a polyphagous insect, which attack different tree species of forestry importance, horticultural plants and occasionally the mangroves. Though this pest is considered as minor pest, it occasionally causes outbreak if the conditions are favourable. This was observed causing damage to the mangrove plant species particularly on *Sonneratia apetala* in the mangroves of Airoli and Vashi creek of Thane district of Maharashtra in the year 2018. This is the first incidence of its infestation on *S. apetala* in this region. The intensity of the pest incidence was spodic to moderate level and the percentage of attack was 20-35%. The entomopathogenic fungus *Beauveria bassiana* spore solution at the concentration of  $2.4 \times 10^8$  Spores/ml can control the pest.

**Keywords:** *Sonneratia apetala*, *Indarbela quadrinotata*, mangrove, polyphagous, infestation

### 1. Introduction

Indian mangroves which comprise of 3.3 percent in the global cover and distributed along the maritime states, except Lakshadweep, covering an area of about 4921 sq. km along the 7,500 km long Indian coastline<sup>[1]</sup>. Mangroves are an important component ecologically in the coastal ecosystem, and are under severe threat globally because of different causes<sup>[2]</sup>. The contribution towards ecological services by the mangroves is vital<sup>[3]</sup>. Indian mangrove ecosystems are having the biological diversity of 4,011 species which includes 23% plants and remaining are different species of animals<sup>[4]</sup>. There are about 55 mangrove species belongs to 22 genera under 18 families have been recorded in the Indian Ocean region<sup>[5]</sup>. Among the 52 creeks present across the 720 km coastline of Maharashtra State 18 are considered as major ones and have developed mangrove habitats<sup>[6]</sup>. In Greater Mumbai, the density of mangrove trees is the highest in Thane Creek (30 trees/25 m<sup>2</sup>) followed by other creeks (9.5 to 28.5 trees/25 m<sup>2</sup>)<sup>[7]</sup>. Among the mangrove species available in Maharashtra, *Avicennia marina*, *A. officinalis*, *Sonneratia alba* and *S. apetala* are the dominant species grown in Airoli and Vashi creek of Thane district. Mangrove species are often infested by several insect pests. During the surveys conducted to assess the insect pest problems of mangrove species in Airoli and Vashi creek revealed the infestation of the bark feeding borer *Indarbela quadrinotata* Walker on *S. apetala*. It is a primitive lepidopteran pest belonging to the family Cossidae. It is a serious pest of a large number of plant types throughout Asia<sup>[8]</sup>. About 422 insects belongs to 41 families which includes 212 belongs to the order Lepidoptera and 69 Hemipterans, in addition to the checklist of insects of Indian mangrove ecosystem reported earlier during 2008 by different authors<sup>[9]</sup>. Few insects species were reported infesting the mangroves in Pitchavaram mangroves, South coast of India, and the predominant insect species are the leaf mining moth (*Phyllocnistis* sp.), leaf gall species (*Stephaniella falcaria*, *Monolepta* sp.), caterpillars (*Dasychira* sp., *Capua endocypha* and *Odites* spp.) and scale insects (*Aspidiotus destructor*)<sup>[10]</sup>.

### 2. Material and Methods

During the year 2018 periodic surveys were conducted to assess the insect pest problems on the mangroves species of Airoli and Vashi creek of Thane district of Maharashtra (Airoli Natural mangroves -N 19° 14'76.5" E 72° 98'43.9", Ghansoli Plantation- N 19° 11'50.9" E 72°

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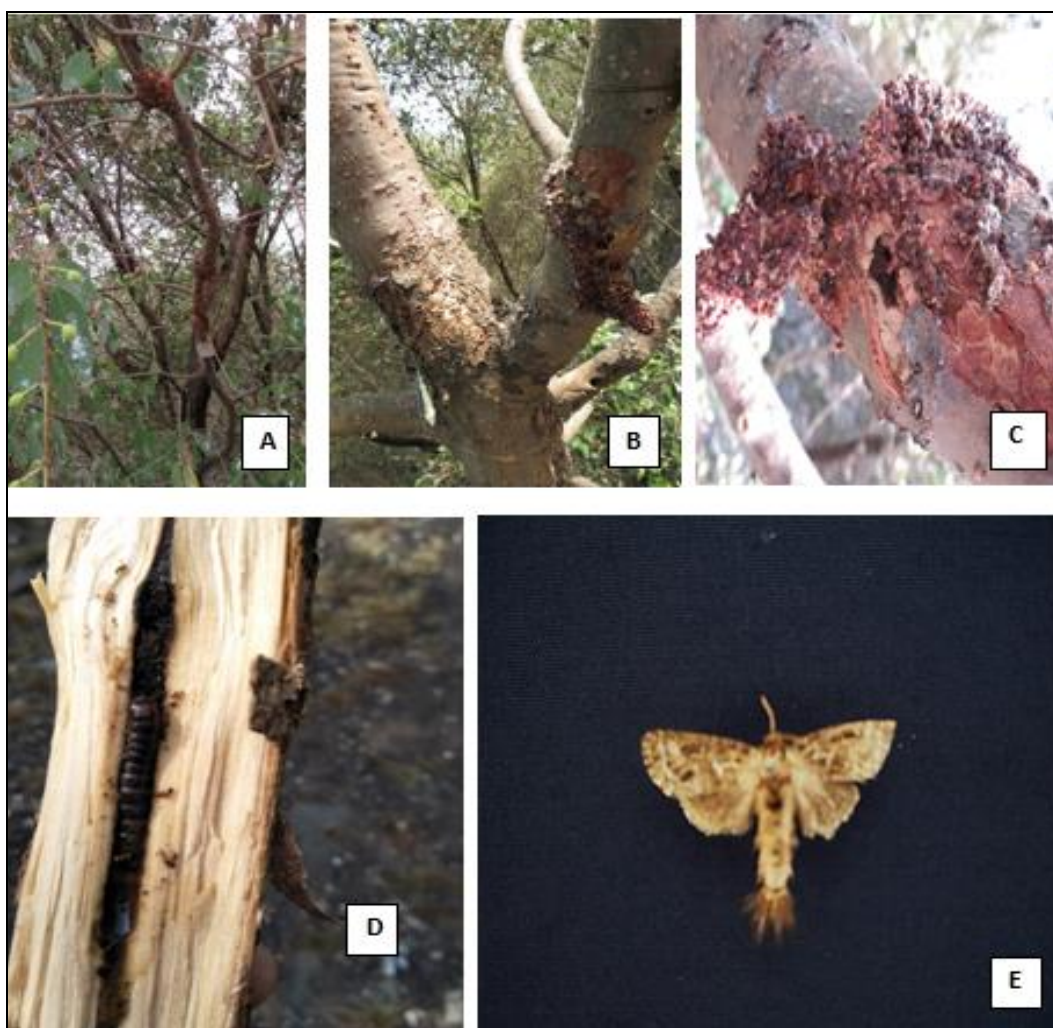
99°17.3”). The intensity of attack was also assessed by the level of incidence of the insect pests and percentage of the damage/extent of damage caused. Based on the incidence and intensity of insect pest attack calculation was made as per the prescribed methods of assessment of insect pest incidence <sup>[11]</sup>.

### 3. Result and Discussion

The regular insect pest surveys conducted to observe the pest problems in the mangroves of Airoli and Vashi creek of Thane district of Maharashtra during the year 2018 revealed that the first time incidence of infestation of the bark feeding borer *I. quadrinotata* on *S. apetala* in this region. The young plants of *S. apetala* were heavily infested by the bark feeding borer (Fig 1 A & B). With the range of 20 to 35 percent of plants were affected by this pest with moderate intensity of attack. The pale to dark brownish colour larvae feed on the bark surrounding the tunnel mouth under a sleeve, which made of frass and excreta of the larva webbed together, which extend from the tunnel opening (Fig. 1 C). This pest is the most common and widely distributed in different tree species of horticultural and forestry importance. The life cycle of this insect has been worked out on various hosts by the researchers. Life cycle is annual with one generation per year. Adults start emerging during May to July. Adult moth is yellowish brown with brown markings on the forewings (Fig 1 E). Females oviposit under loose bark in clusters in early June to July. Eggs hatch in 15-25 days. Larvae that hatch out initially feed on the bark and subsequently bore into the trunk

(Fig 1 D). The larval period lasts for 9 -10 months. Pupation occurs within the larval tunnel, with the cephalic end of the pupa slightly protruding outside. The pupal period lasts for about 15-25 days. The tunneling caused by the larvae which causes weak points on the trees and subsequently the breakages occur which leads to the reduction in growth rate of the plants. In some incidence this breaking also providing entry points for secondary infestations like fungal pathogens and shelter for other pests.

The biology and management of *I. quadrinotata* was studied on different horticultural species by the researchers <sup>[12]</sup>. The method of management by spraying of the aqueous fungal solution of *Beauveria bassiana* at a concentration of  $2.4 \times 10^8$  Spores/ml on the thick frass mat can control the pest effectively. Using of microbial biopesticides for the control of different insect pests has been studied by many workers. *B. bassiana* is one of the important entomopathogenic fungus which plays an important role in the regulation of pest population <sup>[13]</sup>. It was effective on the Casuarina bark feeding borer *I. quadrinotata* <sup>[14]</sup>. Different fungal pathogens including *B. bassiana* were tested against the coffee berry borer *Hypothenemus hampei* and reported *B. bassiana* is a potential microbial agent suitable for controlling the pest *H. hampei* <sup>[15]</sup>. Pathogenicity of the fungus *B. bassiana* was tested on *S. malabaricus*, a pest of Teak in laboratory condition and reported effective <sup>[16]</sup>. *B. bassiana* was found effective in controlling *I. quadrinotata* on *Paraserianthes falcataria* <sup>[17]</sup>.



**Fig 1:** *Indarbela quadrinotata* attack on *Sonneratia apetala* (A) & (B) Stem borer attack on the young plants of *S. apetala* (C) Frass mat near the tunnel opening (D) Grown up *I. quadrinotata* larva inside the young stem (E) Adult moth of *I. quadrinotata*

#### 4. Conclusion

The present study confirms that *I. quadrinotata* is a potential and harmful insect pest of *S. apetala*. The intensity of the pest incidence was sporadic to moderate level and the percentage of attack was 20-35% in the study area. Eco-friendly approaches such as using entomopathogenic fungi as biological control is considered as the best alternatives. There is a growing interest in the use of entomopathogens for biological control, since they are naturally occurring and environmentally safe. Identification and controlling the pest in the initial stage is the best way to tackle this pest in the mangroves. Further indepth research is required study the pest in the mangroves, their host range and the effectiveness through ecofriendly management in field condition.

#### 5. Acknowledgement

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