

# PEST SUSCEPTIBILITY OF *TECTONA GRANDIS* UNDER INTENSIVE MANAGEMENT PRACTICES IN INDIA

R. V. Varma\*, T. V. Sajeev & V. V. Sudheendrakumar

Forest Protection Division, Kerala Forest Research Institute, Peechi 680653, Kerala, India

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**VARMA, R. V., SAJEEV, T. V. & SUDHEENDRAKUMAR, V. V. 2007. Pest susceptibility of *Tectona grandis* under intensive management practices in India.** The pest complex associated with intensively managed teak plantations was studied in the states of Tamil Nadu and Andhra Pradesh in India. Pests encountered in teak plantations in forest areas such as *Hyblaea puera*, *Eutectona machaeralis* and *Sahyadrassus malabaricus* were found in intensively managed teak plantations. Less known pests such as *Zeuzera coffeae*, *Dihammus* sp., *Aleurodicus* sp. and mealy bugs can be potential problems. The bollworm, *Helicoverpa armigera*, a notorious pest in agriculture, was noted for the first time attacking terminal shoots of young teak.

**Keywords:** Pest damage intensity, *Helicoverpa armigera*, *Hyblaea puera*, *Eutectona machaeralis*, teak in private sector

**VARMA, R. V., SAJEEV, T. V. & SUDHEENDRAKUMAR, V. V. 2007. Kerentanan *Tectona grandis* yang diuruskan secara intensif di India terhadap serangan perosak.** Serangga perosak yang berkaitan dengan ladang jati yang diuruskan secara intensif dikaji di negeri-negeri Tamil Nadu dan Andhra Pradesh di India. Serangga perosak seperti *Hyblaea puera*, *Eutectona machaeralis* dan *Sahyadrassus malabaricus* yang dijumpai di ladang jati di kawasan hutan kini dijumpai di ladang jati yang diuruskan secara intensif. Serangga perosak yang kurang dikenali seperti *Zeuzera coffeae*, *Dihammus* sp., *Aleurodicus* sp. dan koya-koya berupaya menjadi perosak utama. Ulat bol, *Helicoverpa armigera*, perosak yang terkenal dalam pertanian didapati menyerang pucuk hujung pokok jati muda buat pertama kalinya.

## INTRODUCTION

Teak (*Tectona grandis*) has a long history of cultivation under low input management in India. Apart from weeding during the initial years after planting and thinning at different intervals, no management strategies are practised in these plantations. The pest scenario in these 'left to nature' plantations has been well documented (Beeson 1941, Nair *et al.* 1985, Mathew 1990, Sudheendrakumar 1994). Practices such as fertilizer application, irrigation and other tending operations will have consequences on the nature and intensity of pest infestations in plantations. It is also reported that increased nitrogen content makes many crops more susceptible to pest attack.

With the private sector coming in a big way into teak cultivation in the 1990s, many intensively managed teak plantations came into existence. This has provided us with a chance to look into the pest complex associated with such plantations. In order to reduce the rotation period from 50–60 years in the conventional

public sector teak plantations, the high input managed plantations in the private sector aimed at a rotation of 20 years. The management inputs include regular mechanized weeding, wider espacement, fertilizer application based on quarterly soil testing, drip irrigation during non-rainy days, and pest and disease surveillance.

## MATERIALS AND METHODS

Field data were collected from intensively managed teak plantations raised by Sterling Tree Magnum India Ltd. (STM) in Tamil Nadu and Andhra Pradesh. Phenological observations were confined to the Andipetti and Panagudi teak plantations in Tamil Nadu. The other plantations: Rasungapuram, Veeravanallur and Gandharakotta from Tamil Nadu and two plantations from Andhra Pradesh were also covered.

In the case of the Panagudi plantation, the whole area was divided into eight blocks and each

\*E-mail: rvvarma@kfri.org

block was subdivided into compartments. Five randomly selected trees from each compartment were marked for regular observations on the occurrence of major pests of teak such as the teak defoliator (*Hyblaea puera*) and the teak skeletonizer (*Eutectona machaeralis*). In the Andipetty plantation, trees were marked as described above and the incidence of the above two pests in 10 blocks was recorded. In addition to the recording of major pests, observations were also taken at fortnightly intervals on the foliage level, percentage of tender foliage and defoliation due to insect feeding. Apart from this, during monthly visits to the plantations, the investigators also made detailed observations on the incidence of various insect pests and their damage intensity.

## RESULTS

A total of nine species were found to cause damage (Table 1). Some of the insects which visited the plantations such as grasshoppers and beetles, which did not make any impact by feeding on the teak crop, were excluded. The two well-known leaf feeding caterpillars of teak viz., *H. puera* and *E. machaeralis* were prevalent in almost all the plantations. The sapling borer, *Sahyadrassus malabaricus*, was observed in 10–15 trees in the Andipetty plantations. Minor

infestations of an unidentified species of mealy bug were observed in a few trees at the Panagudi plantation. The mealy bug, *Planococcus* sp., was observed on many trees in the Andipetty plantations during the months of February till June and also in September. The sapling borer, *S. malabaricus*, was observed in over 20 trees in the Andipetty plantation. In the same plantation, a few trees showed occurrence of the whitefly, *Aleurodicus* sp., as a minor pest. Many trees in all the plantations showed the presence of termites belonging to the genus *Odontotermes*. In the Andipetty plantations, many trees (over 37) showed attack by the coffee borer, *Zeuzera coffeae*. *Zeuzera coffeae* was also found in other intensively managed teak plantations from Tamil Nadu. From one of the plantations in Andhra Pradesh, a borer that attacked a branch of teak was collected and identified as the cerambycid, *Dihammus* sp. When the plantations were visited later, a few more trees showed symptoms of this borer damage.

One unique pest problem noted was in the Rasingapuram plantations in Tamil Nadu, where there was a serious attack on the terminal shoots of young teak by *Helicoverpa armigera*. Attack by *H. armigera* was noticed for the first time. Further investigations showed that *H. armigera* was breeding on the groundnut crop which was raised along with teak as an intercrop. The

**Table 1** Pest insects recorded from intensively managed teak plantations

Pest species (Order/Family)	Nature of damage	Pest status	Location
<i>Hyblaea puera</i> (Lepidoptera: Hyblaeidae)	Defoliator	Major, already known	Panagudi, Andipetty, Veeravanallur, Rasingapuram
<i>Eutectona machaeralis</i> (Lepidoptera: Pyralidae)	Leaf feeding	Major, already known	Panagudi, Andipetty, Veeravanallur, Rasingapuram
<i>Sahyadrassus malabaricus</i> (Lepidoptera: Hepialidae)	Stem boring	Major, already known	Andipetty
Mealy bugs (Hemiptera)	Leaf feeding	Minor	Panagudi
<i>Planococcus</i> sp. (Hemiptera: Pseudococcidae)	Leaf feeding	Minor	Andipetty
<i>Zeuzera coffeae</i> (Lepidoptera: Cossidae)	Stem boring	Minor, but emerging problem	Andipetty
<i>Helicoverpa armigera</i> (Lepidoptera: Noctuidae)	Leaf feeding / terminal shoot damage	First record, major	Rasingapuram
<i>Dihammus</i> sp. (Coleoptera: Cerambycidae)	Stem boring	Minor, but emerging problem	Andhra Pradesh
<i>Aleurodicus</i> sp. (Homoptera: Aleurodidae)	Leaf feeding	Minor	Andipetty

status of *H. armigera* may be rated as a major pest and the spread of damage on teak was checked by removing the groundnut crop from the teak plantation. Since the damage by *H. armigera* was mostly on terminal buds, it is of great economic importance.

The plantation at Panagudi in Tamil Nadu, where detailed phenological observations were made, showed the presence of tender foliage throughout the year (Figure 1). However, the incidence of *H. puera* was limited from August till November. *Eutectona machaeralis* was practically present throughout the year.

## DISCUSSION

Both *H. puera* and *E. machaeralis* were the major pests in intensively managed teak plantations. This is similar to the case of natural teak plantations. In the southern most state of India, Kerala (Nair 1988), it is reported that *E. machaeralis* is of less significance in terms of growth loss compared with *H. puera*. However, in Tamil Nadu and other states in India, reliable data are not available and often *E. machaeralis* is considered as a major problem. In the present study, at Panagudi plantations in Tamil Nadu, *E. machaeralis* incidence was on the increase.

In the intensively managed teak plantations, the presence of tender foliage was throughout the year due to drip irrigation facilities. However,

despite this, *H. puera* was limited to the months of August till November, coinciding more or less with the north-east monsoon. This is the usual period of *H. puera* infestation in Tamil Nadu in naturally grown teak plantations. The availability of tender foliage should sustain a population of *H. puera* throughout the year because the young larvae can survive only on tender leaves. However, it was seen that availability of desirable quality of food in terms of tender foliage was not the only criterion for the survival of *H. puera* in the Panagudi plantations. Unlike in the naturally grown teak in the STM plantations, whenever pest and disease problems were noted, control measures were adopted. Thus, the impact, nature of spread and intensity of attack of different insect pests could not be studied in detail on a long-term basis. In spite of the control measures adopted, incidence of *H. puera* was noted in many plantations which indicates the possibility of an immigrant population from elsewhere.

Besides the above two pests, the potential of borer pests emerging as major pests in intensively managed teak plantations cannot be ruled out. *Sahyadrassus malabaricus*, *Dihammus* sp. and *Z. coffeae* are examples and they are polyphagous with several other forest trees recorded as host trees (Beeson 1941, Varma 1986, Nair 1987). *Zeuzera coffeae* has been reported to be more prevalent in intensively managed teak

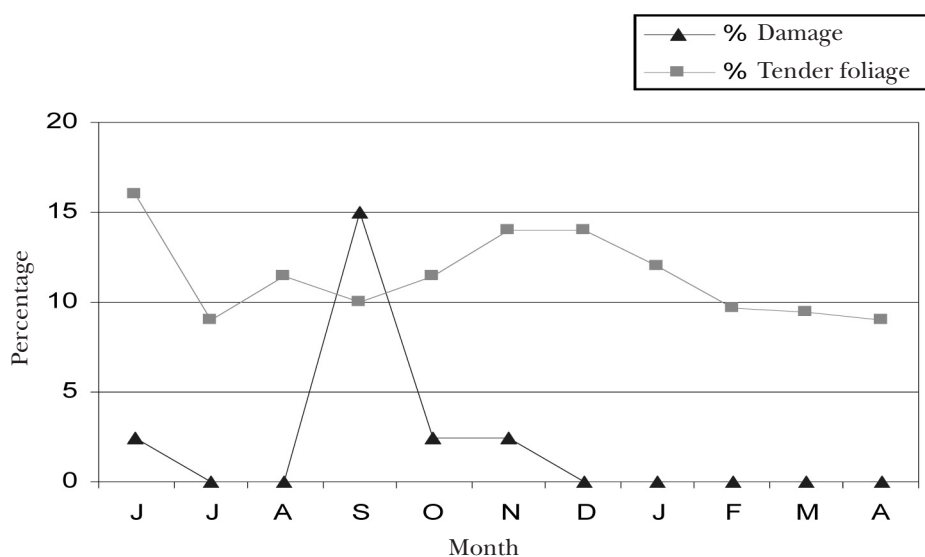


Figure 1 Percentage of tender foliage and insect damage in Panagudi teak plantation

plantations in central Java than in natural plantations (Nair 2001). This could be due to the succulent nature of the stems of intensively managed teak which may attract the borer. The white fly collected in the present study could not be identified. However, an introduced polyphagous *A. dispersus* has been reported to attack teak in the state of Karnataka in southern India (Remadevi *et al.* 2005).

The striking observation during the study was the occurrence of a major agricultural pest, *H. armigera* in the forestry sector. Though the insect initially survived on the groundnut crop, which was planted as an intercrop with teak, the fact that they could feed and sustain on young teak, especially by preferential feeding on terminal buds is of great concern. This is the first report of this notorious pest on a forestry crop which may emerge as a potential pest problem when teak plantations are raised under agroforestry systems.

It is certain that intensive management practices in forestry will be on the increase to maximize productivity and this will also bring in varied and hitherto unknown pest problems. The chances of less known indigenous pests attaining major pest status also cannot be ruled out. Thus, what is required is to have a regular pest monitoring system as part of raising high input managed teak plantations.

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