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ASSESSMENT OF PEST PROBLEMS IN INTENSIVELY MANAGED STM TEAK PLANTATIONS

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ABSTRACT

A preliminary study was carried out on pest problems in inrensively managed teak plantations raised by Sterling Tree Magnum Company in Tamil Nadu. The major pests recorded were the teak defoliator, *Hyblaea puera* and the teak skeletonizer. *Eutectona machaeralis*. Light trap catches from the plantation at Panagudy during January to May 1997 indicated the presence of *Hyblaea* moths during the months April and May and presence of *E. machaeralis* throughout the period. Fortnightly field sampling during June 1997 to April 1998 indicated peak incidence of the teak defoliator during September to October. Even though tender leaves were available throughout the year, no correlation between the foliage and the pest incidence was observed. The peak period of teak defoliator incidence in the plantation at Andipetty was during September–November. Incidence of *E. machaeralis* was observed during December – February. In general. the teak defoliator incidence in the northern Tamil Nadu appeared to be correlated with the onset of north-east monsoon. Other minor pests recorded from the plantations include, an unidentified species of mealy bug, the teak sapling borer *Sahyadrassus malabaricus*, bark feeding subterranean termites, white fly, *Aleurodicus* sp. the cerambycid beetle *Dihammus* sp and coffee borer *Zeuzera coffeae*. In one of the plantations at Rasinagapuram where ground nut was raised as a cover crop, serious damage to terminal bud of teak by *Helicoverpa armigera* was recorded for the first time. This suggests the possibility of indigenous pests getting adapted to intensively managed teak plantations.

1 INTRODUCTION

Teak *(Tectona grandis* Linn.f.) is a highly prized constructional timber in India and elsewhere. It occurs in India, Myanmar, Thailand and Laos naturally. Demand for various end uses was met in older times from naturally grown teak trees. This method of extraction could not be continued for ever and during 1842-44, plantations of teak were established for the first time at Nilambur in Kerala. This was the beginning of the plantation programme of teak and now under forestry sector, about 1.4 million ha are under teak plantations in India. However, in plantation sector, no intensive management practices are adopted, except weeding during the initial years of establishment and thinning operations.

Unlike in agriculture, intensive management was not practised in forestry until in the 1990's when the private sector came forward with the idea of raising high input tree plantations. The motive behind this venture was that by adopting intensive management practices such as fertilisation, irrigation, pest and disease control etc.. the rotation age of teak could be brought down to about 20 years from the present 60 years. The private companies expected that the public would be interested to invest in such programmes. However, one of the basic questions as to whether the fast grown teak will have the same quality timber compared to slow grown teak from forest plantations remains to be answered.

Since 1992, the Sterling Tree Magnum (STM (l) Ltd.) a public limited company with its headquarters at Chennai started off with high input teak plantations in about 6,500 ha in different parts of India including Tamil Nadu, Andhra Pradesh, Orissa and Madhya Pradesh. These plantations belonged to different age groups.

Teak is known to be infested by a variety of insects including leaf feeders and stem borers (Beeson, 1941: Sudheendrakumar. 1994). The major pests are the teak defoliator, *Hyblaea puera* Cramer (Lepidoprera: Hyblaeidae); teak skeletonizer. *Eutectona machaeralis* Walker) (Lepidoptera: Pyralidae). and the sapling borer *Sahyadrassus malabaricus* (Moore) (Lepidoptera : Hepialidae) in young plantation and the trunk borer *Alcterogystia cadambae* (Moore) (Lepidoptera: Cossidae) in older teak. The STM teak plantations have been raised outside the natural teak belts with intensive management practices and there is lack of information as to how

these practices affect the pest dynamics and also on the pest scenario in such plantations.

The project was undertaken with the following objectives:

1. To identify major pests in intensivelv managed teak piantarions of STM

2. To examine how the intensive management practices like irrigation and fertiliser application affect the pest dynamics.

2 METHODOLOGY

2.1 STUDYAREA

The information provided in the report was generated mostly from the STM teak plantations located in Tamil Nadu. Intensive data collection was confined to two plantations. one at Panagudi (near Thirunelveli) in the western part of Tamil Nadu and Andipetti (near Udumalpet). in the northern Tamil Nadu. Data generated from some of the plantations in Andhra Pradesh are also included.

The Panagudi plantation was divided into eight blocks and each block was sub-divided into compartments. Five randomly selected trees from each compartment were marked for regular observations on pest incidence. At Andipetti. 25 trees were marked in each of the ten blocks for the above purpose. Observations were made at fortnight interval and the following details in a questionnaire were collected with the help of trained field staff of STM. Combined visits were made by both KFRI scientists and STM staff once in a month and information on identity of the observed tree / plant. foliage level, availability of tender Ieaves, defoliation score and the insets pests involved were recorded in the prescribed proforma.

The foliage level and tender foliage were recorded as percentage of full foliage available. The defoliation score was recorded as follows:

1 = <5%; 2 = 6-25%; 3 = <26-50%; 4 = 51-75%; 5 = 76-95%; 6 = 96-100%

In addition to the above observations, 15 light traps were operated in each of the blocks at Panagudi to record presence of adult moths of *H.puera* and *E. machaeralis.* The light traps were of an improvised type with a normal bulb hung over a trav with water and placed on a tripod. The light traps were placed above one metre from ground level and light trap data were collected for only 6 months starting rom June 1997. Regular surveillance on pest incidence in the plantations was also made by the field observers on a daily basis and control measures were carried out.

3 RESULTS AND DISCUSSION

3.1 PANAGUDI PLANTATIONS

3.1.1 Light trap collection of H. puera and E. machaeralis

The light traps were operated only at Panagudi plantations and the data generated over six months from January 1997 are presented in Figure 1. The incidence of moths of *H.puera* and *E. machaeralis* was noted during the above period. *E. machaeralis* was present almost throughout, while *H. puera* was present only during the months of April and May. Collection of field data on the incidence of pests by ground checking in a systematic way was started by June 1997. But then, due to practical difficulties further data using light traps could not be collected at regular intervals. However. based on the data presented it may be inferred that *E. machaeralis* was present more or less throughout whereas occurrence of *H. puera* was limited to the months of April and May. Further observations indicated that a small population of *E. machaeralis* was present almost throughout the year, but not at a noticeable level in the observation plots, either by way of typical feeding symptoms on the leaf or with the presence of larvae.

3.1.2 Field sampling

The data gathered on the foliage status as well as damage caused by H. *puera* for almost one year *i.e* from June 1997 to April 1998 showed that (Fig.2) tender foliage was available throughout the period. Though teak is a deciduous tree. total leaf fall was not observed and this may be due to the drip irrigation facilities provided in the plantation.

Average leaf damage per tree was around 9% during September and about 2% during October-November.

Field data showed that in spite of the availability of tender foliage throughout, *H. puera* incidence was limited to August and September in 1997.

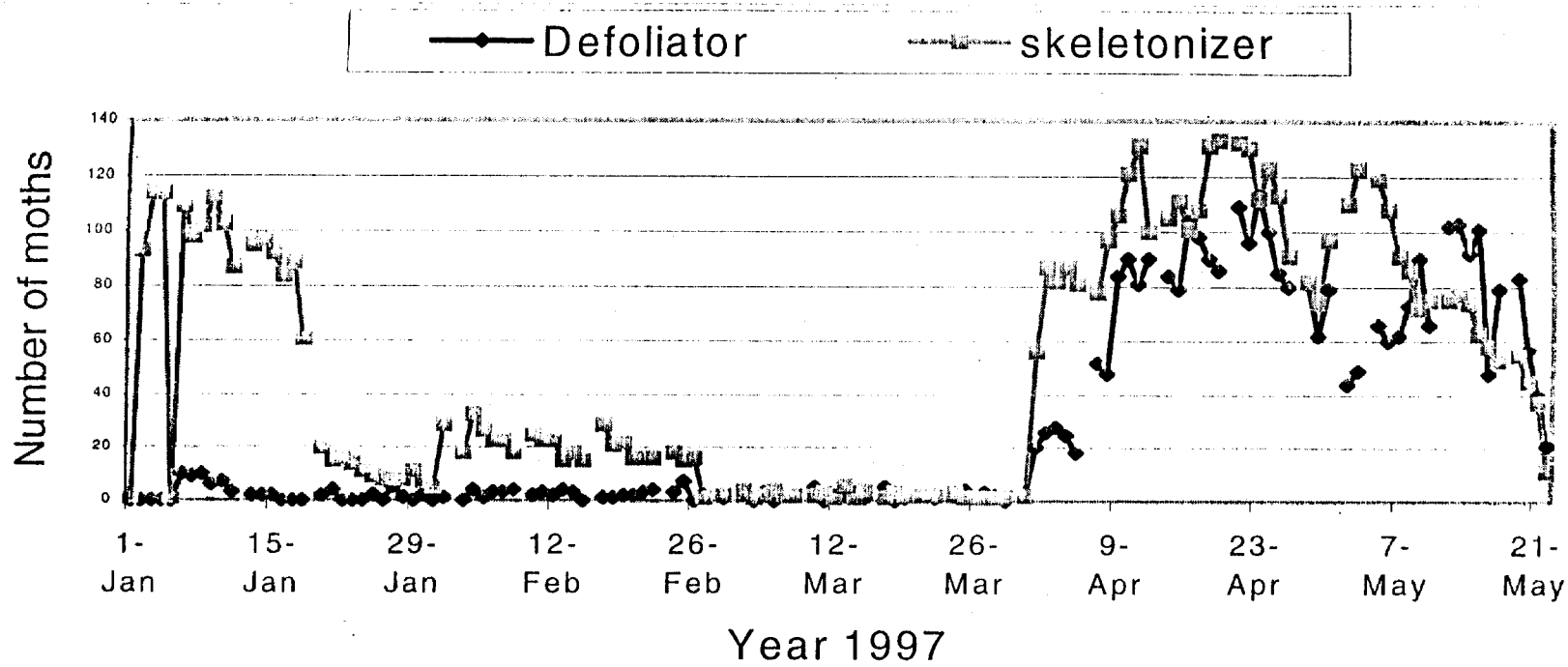

Fig 1. Daily record of trap catch of the teak defoliator and teak skeletonizer in Panagudy plantation

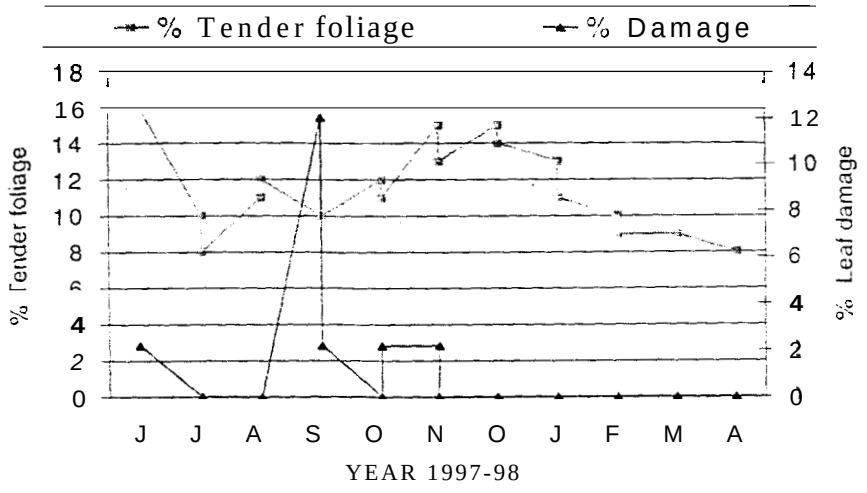

Fig.2. Foliage status and *H. puera* damage percentage in Panagudy plantation

In the same year, a small outbreak of *H. puera* was also observed during October and November. Based on limited observations for 1 year at Panagudi and also based on reports from other teak growing areas in Tamil Nadu. the peak incidence of the teak defoliator. *H. puera* was during September-October, With limited data available, the dependence of the two variables viz., foliage status and defoliator incidence was tested and found that the correlation coefficient values were far below 1. indicating no correlation between the two variables.

3.1.3. Incidence of other pests

Other than the teak defoliator and the teak skeletonizer. the following insect incidences were observed in the Panagudi plantation.

* In blocks 6 and 7, attack by mealy bugs (unidentified)was noticed in a few plants.
* Incidence of sapling borer, *Sahyadrassus malabaricus* was obsen-ed in 10- 15 plants at random.
* In some instances. the bark portion of some of the tall trees was eaten up by subterranean termites.

3.2 ANDIPETTI PLANTATION

3.2.1 Field sampling

Tender foliage was available throughout the observation period from May 1997 to February 1998. A small outbreak population of *H. puera* was noticed in May 1997. However, the pest incidence was more serious during September to November 1997.

During November 1997, the teak skeletonizer, *E. machaeralis* was noticed in small numbers on several plants. However, the incidence of this pest was less compared to that in Panagudi plantations.

As indicated earlier. the peak incidence of *H. puera* in the northern Tamil Nadu also seems to be correlated with the onset of north - east monsoon *i.e.* September to November.

3.2.2 Incidence of other pests

The attack by the mealy bugs *Planococcus* sp. was noticed in a number of plants during the months from February to June and also in September. In spite of the application of insecticides, the pest population could not be completely controlled. On a couple of occasions, the predatory ladybird beetle was also released to contain the pest. In addition the following pest incidences were also recorded :

* Minor incidence of White fly, Aleurodicus sp. was found in a few plants
* The incidence of the coffee borer, *Zeuzera coffeae* was noticed in about 37 plants.
* The incidence of the stem borer, *S. malabaricus* was observed in about 20 plants.

3.3 PEST INCIDENCE IN OTHER STM PLANTATIONS

Though the detailed studies were limited to the two plantations at Andipetti and Panagudi, data on pest problems were also collected from some of the other STM teak plantations.

At Rasingapuram teak plantation in Tamil Nadu, there was a serious attack of *Helicoverpa* armigera (=Heliothis *armigera* (Hubn.)) on teak saplings. The larvae partly bored into the terminal shoot causing serious damage. H. *armigera* attack on teak was noticed for the first time and detailed field investigations showed that *H.armigera* was breeding on the ground nut crop being raised along with teak as an intercrop. A commercial Bacillus thuringiensis (B.t) preparation, Biobit (marketed by Sandoz) was used to contain the pest. At the same time the groundnut crop was removed from the plantarion to avoid further build up of the pest.

At Veeravanallur and Gandharvakottai plantations. both from Tamil Nadu. the teak defoliator, H.puera incidence was noticed during the months of September-October. At Veeravanallur, incidence of the stem borer. S.malabaricus was also noticed.

Scattered information on pest incidence from Andhra Pradesh was obtained though the local STM plantation staff. From many plantations, incidence of both *H. puera* and *E.* machaeralis has been reported.

From one of the plantations, a borer affected plant was brought to KFRI and the insect identified as *Dihammus* sp. This cerarnbycid borer is not generally regarded as a major pest on teak, but further information on the prevalence of this pest in the plantation could not be collected.

Also from a couple of plantations the specimens brought were identified as the coffee borer, *Z.coffeae,* which was also noticed in the study plots at Andipetti in Tamil Nadu.

3.4 GENERAL DISCUSSION

In general, there is dearth of information on the pest problems associated with intensively managed forest plantations and in particular on teak. In this study also the anticipated data could not be generated due to abrupt closure of the Project. It may also be pointed out here that no attempt could be made to study the impact of some of the important pests on the teak trees. This is because, as and when pest problems were noticed, appropriate control measures were adopted to prevent further spread of insects in the plantation and also to save the affected plants.

Based on the data generated on the pests, it may be inferred that both *H.puera* and E.machaeralis are the major pests. However, the intensity of damage as seen in natural teak plantations could not be realised because of the adoption of timely control measures. Nair *et al* (1985, 1996) reported the impact of the teak defoliator, *H. puera* on growth increment of plantation grown teak and showed that about 44% of the potential wood volume is lost. In the intensively managed teak plantations. the idea was to bring down the rotation to about 20 years compared to the conventional 55-60 years and therefore unless stringent measures to monitor and control the teak defoliator are adopted, the desired growth cannot be expected during the 20 year period. Of course, other management inputs are also essential to achieve the expected growth.

Under Kerala conditions. Nair *et al.* (1988) have shown that the teak skeletonizer. *E. machaeralis* was not **a** major problem of economic concern compared to the teak defoliator, *H.puera.* However, in Tamil Nadu and in other teak growing States, the situation can differ and at least in the Panagudi plantation of Tamil Nadu, the skeletonizer incidence was on the increase. However, as indicated earlier, the impact of this pest on the growth of teak could not be studied. But it is necessary to generate such data from different States of India where teak is grown.

Another point to be discussed based on the data obtained is on the food availability and teak defoliator incidence. Due to the drip irrigation facilities, tender foliage was available throughout the year in the intensively managed plantations. But despite this, teak defoliator incidence was limited to September – October coinciding more or less with the north-east monsoon. However, further data on a long-term basis would be required to confirm this. It was believed that presence of tender foliage would be the most important factor for the establishment of *H.puera* (Nair, 19881. However. the present findings indicate that the favourable condition of tender foliage availability is not the only factor for *H.puera* population to get established. Under Kerala conditions, major teak defoliator outbreaks in naturally grown teak plantation occur prior to or during the southwest monsoon period. In the intensively managed teak piantations also, there is seasonality in the occurrence of the teak defoliator. It may further be noted that in the two plantations of STM in Tamil Nadu, even after eradicating the existing population of *H.puera* using insecticidal spray (as part of the management system) further incidences

occurred indicating the possibility of an immigrant population from elsewhere. Based on detailed observations on the population dynamics of this pest, Nair (1988) had also indicated this possibility.

Thus the two known major defoliator pests of teak are likely to be of concern in the intensively managed plantations.

Other than the defoliator pests, some of the borers such as the Hepialid S. malabaricus. the Cerambycid, Dihammus sp. and the Coccid *Z.coffeae* are likely to pose problem in intensively managed plantations. All the borers mentioned above are polyphagous with several other forest trees recorded as hosts (Beeson, 1941 : Nair, 1982). It is possible that some of the less known borers of teak can attain a pest status in intensively managed plantations.

The chances of some of the indigenous localised pests getting adapted to teak also cannot be ruled out. For example, the incidence of ***H. armigera*** artack on teak where ground nut was raised as an inter crop.

It is certain that intensive management practices in forestry will be on the increase to maximise the productivity. Invariably this will also bring in varied and hitherto unknown pest problems.

Impact of the major pests on growth and productivity of teak as envisaged in the proposal could not be studied as timely control of the pest in the plantations was not feasible.

Definite conclusions are not possible with this untimely completed project. But regular pest monitoring should become part of the plantation management system to carry out appropriate control measures at the right time.

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