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Diversity, Biology and Control of Insect pests of teak *Tectona grandis* (Linnaeus) from western Maharashtra

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ABSTRACT

Teak *Tectona grandis* (Linnaeus) is an important component of western Ghats as a forest wood plant. It is attacked by 30 species of insect pests belonging to genera *Myllocerus, Astycus, Trachypholis, Xyloborus, Cryphalus, Silvanus, Eugonius, Plateros, Psiloptera, Adelocera, Mesomorpha, Aspidomorpha, Aegosoma, Gelonaetha etc.* of order Coleoptera and *Hyblaea, Pyrausta, Eutectona* of order Lepidoptera and *Monophlebus* and *Aleurodicus* of order Hemiptera. Their abundance, damage, life cycle and control were reported on teak from the fields of western Maharashtra. Encouragement to predators and parasitoids helped in pest control. Release of *Trichogrmma* spp. 1-1.5 lakhs/ha found effective for control of Lepidopterous pests. Spraying 0.15% carbaryl/ 0.1 % malathion/Azadirachtin was also found effective against teak pests.

Keywords: Teak, Insect pests, Diversity, Abundance, Damage, Life cycle, Control, Western Maharashtra. .

INTRODUCTION

Teak *Tectona grandis* (Linnaeus) is one of the important hardwood trees of Indian forest which has commercial utilization in making furniture and other domestic usages. TamilNadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Madhya Pradesh and Uttar Pradesh etc. are major teak growing states of India. In India, it grows naturally in about 9 million hectares. The teak plant is attacked by about 174 species of insect pests all over the world (Sen Sharma, 1983). In past, insect pests of teak have been studied by Stebbing (1914), Sen Sharma (1983), Sen- Sharma and Thakur (1985), Browne (1986), Jha and Sen Sharma (1994), Sathe and Padharbale (2008), Sathe (2009,2014 a), Sathe and Kadam (2015), etc.

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Materials and Methods

Insects pest of teak *T. grandis* have been studied from Western Maharashtra (Kolhapur, Sangli and Satara) including Ghats by visiting various study spots and noting pest insects at weekly interval. The collected insects have been identified in the laboratory by consulting appropriate literature (Gahan, 1906; Ghosh and Agrawal, 1993; Stebbing, 1914; Jacoby, 1908; Roonwal et. al. 1950; Hampson, 1894, 1895, 1896; etc.). Nature of damage of insects towards teak crop have been studied in field condition by spot observation. Similarly, their abundance have also been studied by spot observation by one man one hour search method at

weekly interval throughout the years, 2014-2015. Life cycles in pests were studied by noting different immature stages of pests in natural conditions. Incubation, larval period, pupal period and adult formation period were taken in to account for the record. Field sex ratio was determined by counting number of both the sexes. Biocontrol agents have been screened during the development of immature stages of pests and identified by consulting appropriate literature (Sathe, 2003; Sathe *et al.,* 2003; Sathe and Patil, 2003; Sathe and Jadhav, 2008; Sathe, 2014 a,b; Sathe and chougule, 2014; Shendage and Sathe, 2016; etc.).

Results

The results recorded in table -1 & 2 and fig. 1 to 6 indicated that, a total of 30 species of insect pests have been recorded on teak from western Maharashtra including Ghats. Out of which 23 were from order Coleoptera, 4 from Lepidoptera and 3 from order Hemiptera. On the teak crop, Coleopterous insects were dominant, Lepidopterous were moderate and Hemipterous pests were least in number (Fig-1). Results indicated that Cerambycid and Scolitids beetles were dominant in the region and the dominant genera reported were *Myllocerus* and *Xyloborus*. From Lepidoptera defoliating insects were dominant. *Myllocerus* weevils were defoliators, while cerambycids were found boring the stems of crop.

The scale insects, Jassids and whiteflies were found sucking the cell sap of teak plant. Tender portions, especially leaves, buds, flowering bodies and twigs were preferred by the insects for sucking the cell sap. These insects secreted honey dew like substance on the leaves which was responsible for causing sooty moulds over leaves, and further affecting the photosynthesis, growth and quality of wood of teak plant. These insects were also responsible for transmitting viral diseases to the crop and completed many generations during a year.

Cerambycid beetles completed their life cycle within 1 to 2 years. Most of the species came out of the tunnel during monsoon season for mating and reinfesting the crop. The grub, after hatching from the eggs, started tunneling bark and then hard wood and travelled from branches to main trunk, their by causing the death of teak in severe infestion. Scolytid beetles also tunneled the teak branches and completed many generations during a year.

From Lepidoptera defoliators were dominant over stem borer. Both, *Hyblaea puera* Cramer (Lepidoptera) and *Eutectona machaeralis* (Walker) completed their life cycle within 1 month while, hepialid caterpillar S*ahyadrassus malbaricus* (Moore) taken 1 year for completion of its life cycle. *H. puera* have been parasitized by 4 parasitoids namely *Brachymeria lasus* (Chalcidae:Hymenoptera), *Eriborus gardneri* (Ichneumonidae:Hymenoptera), *Plalexorista sp.* (Tachinidae:Diptera) and *Sympiensis* sp. (Eulophidae:Hymenoptera). Similarly, *E. machaeralis* was attacked by 5 parasitoids namely, *Trichogramma minutum* (Trichogrammatidae:Hymenoptera), *Cedria paradoxa* (Braconidae:Hymenoptera), *Trichogramma pickle, T. brasilensis* and *T. evansence.* while, *S. malbaricus* was attacked by 2 fungi namely, *Metarhizium anisopliae* and *Beauveria bassiana* The parasitoids recorded on above lepidopterous pests were found to be potential biocontrol agents for them. Nature of damage and the abundance of other insects of teak are recorded in table – 1.

Field sex ratio in all three orders studied was favoring the females. However, in Hemiptera (sucking insects) it was more favoring the females while, Lepidopteran pests showed slightly favoring the females.

Treating the crop with carbaryl 0.15 spray found suppresing pest population considerably. For sucking type of insects, biocontrol agents such as lady bird beetle, lace wings, dragonflies, and mantids were prevalent in the region which suppressed the pest population considerably. The present data will add great relevance as a base line data for advancement of ecofriendly control of teak pests in near future.

Preventive control measures:

1) Collection and destruction of plant parts along with insect pest stages.
2) Clean cultivation.
3) Ploughing and digging the field for exposing pest stages to natural mortality factors.
4) Cerembycid beetles be collected and destroyed in monsoon season when they leave tunnels for mating.

Biological Control:

1) Release *Trichogramma* spp in the field at 1 to 1.5 lakh/ha.
2) Encourage above said parasitoids and predators.
3) Microbial control:
4) NPV 250 LE can suppress the population of lepidopterous pests.

Table – 1: Abundance and damage if insect pests of *T. grandis* from Western Maharashtra including Ghats.

Sr. No	Common Name	Scientific Name	Family	Damage	Abundance
Order – Coleoptera					
1.	Teak weevil	*Astycus lateralis*	Curculionidae	Feed on young leaves and buds	Rare
2.	Mylloceros weevil	*Myllocerus viridanus*	Curculionidae	Feed on leaves	Common
3.	Curculionid weevil	*M. carinirostris*	Curculionidae	Feed on leaves	Common
4.	Curculionid weevil	*M. discolar variegatus*	Curculionidae	Feed on leaves	Rare
5.	Cerambycid beetle	*Acgosoma costipens*	Cerambycidae	Stem borer	Common
6.	Kulsi teak borer	*Stomatium longicorne*	Cerambycidae	Stem borer	Common
7.	Long horn teak borer	*Gelonaetha hirta*	Cerambycidae	Stem girdler, borer	Rare
8.	Scolytid beetle	*Trachipholis hisida*	Scolytidae	Twig borer	Rare
9.	Cucugid beetle	*Silvans advena*	Cucugidae	Feed on leaves	Common
10.	Dermestid beetle	*Eugonicus gratus*	Dermestidae	Twig borer	Common
11.	Malacodermid beetle	*Plateros dispallens*	Malacodermidae	Twig borer	Rare
12.	Malacodermid beetle	*Plasteros spp.*	Malacodermidae	Twig borer	Rare
13.	Chalicophorin beetle	*Psiloptera fostule*	Buprestidae	Stem	Common
14.	Chalicophorin beetle	*P. viridanus*	Buprestidae	Stem	Rare
15.	Elaterid beetle	*Adelocera modesta*	Elateridae	Stem	Rare
16.	Tenebrionid beetle	*Mesomorpha villiger*	Tenebrionidae	Stem	Common
17.	Crysomelid beetle	*Aspidomorpha sanctqecrucis*	Chysomelidae	Stem	Common
18.	Teak defoliator	*Attelabus sp.*	Curculionodae	Feed on leaves	Common
19.	Scolytid beetle	*Cryphalus tectonae*	Scolytidae	Beetle bore bark and tunnel the wood	Common
20.	Teak defoliator beetle	*Xyleborus hagedorni*	Scolytidae	Beetle bore bark and tunnel the wood	Common
21.	Teak pinhole borer	*Xyleborus naxius*	Scolytidae	Beetle bore bark and wood	Common
22.	Teak scolytid	*Xyleborus velatus*	Scolytidae	Beetles bore bark and wood	Common
23.	Cerambycid beetle	*Stromatium barbatum*	Crambycidae	Bore stem	Common
Order – Lepidoptera					
24.	Hyblaeid teak moth	*Hyblaea puera*	Hyblaeidae	Larvae feed on leaves	Common
25.	Teak pyralid moth	*Eutectona machaeralis*	Pyralidae	Larvae feed on leaves	Common
26.	Hepialid caterpillar	*Sahyadrassus malbaricus*	Hepialidae	Larvae bore stem and tap roots	Common
27.	South teak caterpillar	*Alceterogystia cadambae*	Hepialidae	Feed on leaves	Rare

Sr. No	Common Name	Scientific Name	Family	Damage	Abundance
Order – Hemiptera					
28.	Teak scale	*Monaphlebus sp.*	Coccidae	Suck cell sap from stem and leaves	Common
29.	Jassid	*Unidentified*	Jassidae	Cell sap sucker of leaves	Common
30.	Whitefly	*Alerodicus dispersus*	Aleurodidae	Cell sap sucker of leaves	Rare

Table–2. Field sex ratio of insect pests of teak from Western Maharashtra.

Sr. No.	Species Order	Sex ratio Male: Female
1.	Coleoptera	1 : 1.18
2.	Lepidoptera	1 : 1.09
3.	Hemiptera	1 : 1.37

Figure-1. Abundance of insect pests on teak from Kolhapur region of Maharashtra.

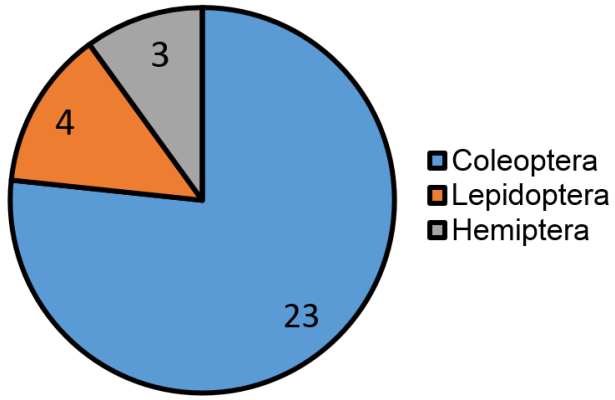

Figure.2 *T.grandis*

Figure-3 Cerambycid beetle (male)

Figure-4 *S. longicorne*

Mechanical control:

1) For cerambycid beetle control, the tunnel should be filled with petroleum or kerosinised water and closed with mud. This will kill the pest in tunnel.
2) For sucking type of insects yellow sticky traps were found suitable.

Chemical control:

1) Spray the crop with 0.15% carbaryl or 0.1 % malathion or 0.1 % azadirachtin.

Figure-5 ***A. disperses***

Figure-6 ***Myllocerus sp.***

Discussion

Sathe (2009) reported 4 species of weevils *M. viridanus, M. carinirostris, M. discolor variegatus*. and *Attelabus* sp. on Teak *T. grandis* from western Maharashtra. The weevils were defoliators of *T. grandis.* He also reported 4 species of cerambycid beetles as bark and stem borers. He further reported *Hyblaea puera* cramer and *Eutectona machaeralis (Walker)* as defoliators of *T. grandis*. Sathe (2014 a) also studied the diversity of cerambycid beetles from western Maharshtra. He reported 24 species of cerambycids and gave records of host plants and life cycle duration in various species. In the present study, a total 30 insect pests were reported belonging to the orders Coleoptera, Lepidoptera and Hemiptera. According to Sathe *et al.,* (2015) the colour of plant parts, light and texture play an important role in attracting insect pests and their utility in pest management. In the present study, yellow sticky traps were found useful against sucking type of insect pests.

The present observations indicate that the suggested control measures can solve the pest problem on teak. However emphasis should be given on the biological pest control strategies, since it is ecofriendly and very good alternative for chemical control which is difficult to adopt in forest ecosystems.

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Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper.

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