



Teak defoliator: changing host preference - may be climatic effect in Madhya Pradesh, India

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ABSTRACT: *Hyblaea puera* is a key defoliator pest of *Tectona grandis* commonly known as teak. Preliminary examination of teak shows that there is no attack or negligible attack on *H. puera* in Madhya Pradesh, India. But *Vitex negundo* which is a medicinal plant growing in the region which is moist enough have been attacked by these larvae. The larvae were collected from 150 plants and categorized in accordance with the no. of larvae collected. The change in host plant from Teak to *Vitex negundo* is a phenomenon which involve climatic parameters and biological parameters.

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KEYWORDS: *Hyblaea puera*, *Tectona grandis*, *Vitex negundo*, host preference, climatic effect

Teak defoliator, *Hyblaea puera* Cramer native to South-East and belonging to the order Lepidoptera and family Hyblaeidae is a serious pest of Teak (*Tectona grandis*) (Arun and Mahajan, 2012). Teak is multipurpose tree species being used in building boats, deck houses, doors, furniture, etc., because it produces very good quality timber. Many insect pests attack this beautiful tree and *Hyblaea puera* is one of them. The life cycle of *H. puera* is generally completed within a month and around twelve generations are possible every year. The eggs are laid on the leaves of the food plants. Typically, the larvae turn over the leaf margin and attach it to the rest of the leaf with a silken thread. The larvae are red headed and have orange colour margin or wholly black body.

The population of insect are dependent on two factor: density dependent factors (i.e., the direct or indirect negative feedback exerted by the increasing

population) and density independent factor (abiotic, like weather factors) (Turchin, 1995). In a two-year light trap study at Jabalpur in 1978 and 1979 (Vaisharnpayan *et al.*, 1987), collection of teak: defoliator moths were restricted to July, August and September. Saur *et al.* (1999) has recorded the defoliation of *Avicennia germinans* by *H. puera*. Similarly, the infestation of Asian *Avicennia* species by *H. puera* has been observed in Thailand (Murphy 1990) and India (Mehlig and Menezes, 2005). Javaregowda and Naik (2007) reported the incidence of *Hyblaea puera* in Karnataka, India. Peak population of *H. puera* in Madhya Pradesh is available in June and July and least was reported at September onwards (Khan *et al.*, 1988). Nair *et al.* (1985) reported that the moths migrates up to 10 km in search of suitable host trees. Similarly, Nair and Sudheendrakumar (1986) reported the migration of adult *H. puera* from one locality to others.

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Vitex negundo also called Chinese chaste tree is a bushy shrub or small tree growing from 2 to 8 m. They are mostly found near water bodies. Both Teak and Chinese chaste tree belongs to the family Lamiaceae. Leaves are palmately compound with 3-5 foliate; and distributed in Andaman & Nicobar Islands, Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Sikkim, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal (Western Ghats website).

The larvae of *Hyblaea puera* were collected from Bhedaghat area of Jabalpur (Madhya Pradesh) India. The geographical coordinates of the Bhedaghat is 23.132° N 79.801° E. The observation was taken in the month of August and September, 2016. The moisture content of the area was too high. Also because of the rainy season, the water flow of Narmada river was also on its peak. Almost 150 small shrubs of *Vitex negundo* were identified infected with these larvae. The average height of the shrubs was approximately 5 feet (Figure-1). The *H. puera* has been collected mostly from the apex leaves of each branch of *V. negundo*. The apex of each branch was seen folded and when it was opened, there was *H. puera* eating the leaves from inside and preparing itself for turning into the pupae.

The defoliator *H. puera* mostly feed on *Tectona grandis*. The *H. puera* is Oligophagus in nature and feeds and breeds on many plants belonging to the family Verbenaceae, Bignoniaceae, Araliaceae, Juglandaceae and Oleaceae (Beeson, 1941; Mathur, 1960 and Mohandas, 1986).

During the survey in Jabalpur during August and September for the collection of *H. puera*, a large area dominated with *Tectona grandis* was found free from *H. puera*. There was no serious attack of this larvae. The Teak Skeletonizer *Eutectona machaeralis* was somewhere available but still no significant sign of large attack was observed on teak. The larvae of *H. puera* needs good moisture

content and relative humidity. Though the Jabalpur area is good for the development of the *Hyblaea* larvae but still negligible amount of larvae was collected from teak.

Bhedaghat is large area of which river Narmada flows and has water falls. The large area of Bhedaghat has *V. negundo* shrubs growing over the marble rocks. *V. negundo* shrubs is dominating the area as there was sufficient amount of moisture content and relative humidity over the area. As *V. negundo* also require such climates to grow so it is being dominating and growing in some space to each other. But wherever it grows 2-5 stems are originating from a single place means they are growing in cluster or bunches of stems at one point of emergence of the shrubs of *V. negundo*.

H. puera was feeding on the leaves of *V. negundo* by folding it. The apical part of almost every branch was folded and *H. puera* was collected from it (Figure-1). Observation regarding no. of larvae collected from each plant has been taken and average height of the shrubs has also been estimated by ocular method. Different category has been formed according to the larvae collected from *V. negundo* viz. number of larvae collected, 1-5 larvae collected, 6-10, 11-15, 16-20, 21-25, 26-30 and 31-35 larvae collected. No. of plants in each category has been identified summed up to

Table1. Number of *Hyblaea puera* collected in *Vitex negundo* shrubs

S.No.	<i>H. puera</i> larvae	Shrubs <i>V. negundo</i>
1	0	11
2	1-5	23
3	6-10	29
4	11-15	22
5	16-20	26
6	21-25	15
7	26-30	8
8	31-35	16

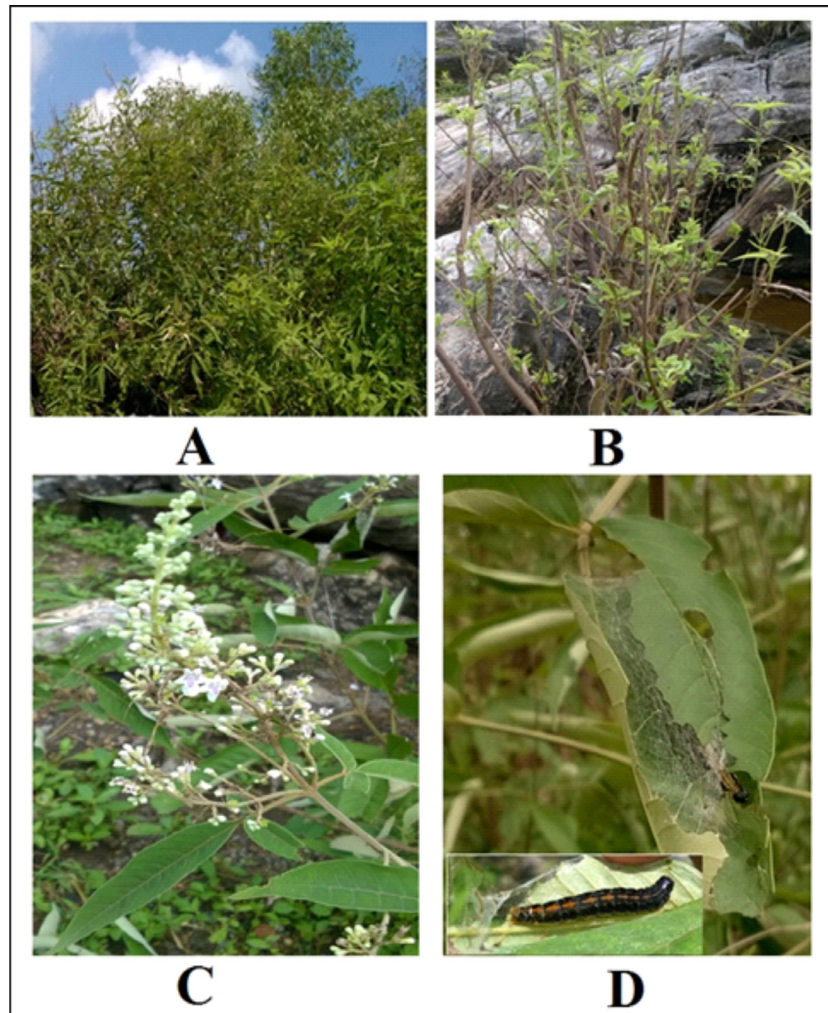


Figure 1. [A-D]: A-Healthy *Vitex negundo* plant, B-Infected *Vitex negundo*, C-Flowering of *Vitex negundo* plant showing 3-5 foliage pattern and D- Larvae of *Hyblaea puera* Inside the leaves folding and inset of D showing stretched leaves with *H. puera* larvae.

understand the no. of plants of *V. negundo* attack by *H. puera* (Table 1). It has been concluded that the *V. negundo* has been attacked by *H. puera* on functional basis. 31-35 larvae of *H. puera* has been collected from 16 plants out of 150 plants of *V. negundo*. Plants of *V. negundo* with more than 5 larvae collected were identified as 116 which is 77.3% of total plant studied (Figure 2). This shows that the *V. negundo* has been severely attacked by *H. puera* in the region and at the same time it has been found that *Tectona grandis* does not have more than 5 larvae on any single tree. This may be because of the climatic effect as the teak growing in the region have changes in the moisture or

temperature regime. The area inhabitant with *V. negundo* has good climate required for the *H. puera* and because of the same family of *V. negundo* and *T. grandis* which is Lamiaceae the chemical constituents of both the species could be same up to some extent.

But Insects are insect and they destroy the food crops some are beneficial but in the case of *H. puera* it is not. It destroys the teak area in all over world which indirectly give less returns to the farmers who is growing the teak plantation and that leads to the gap in demand and supply to the wood-market. However, in Java the *H. puera* is being

collected for edible purpose (Lukiwati, 2010) but in Indiasuch activity is not being reported. As *V. negundo* is a medicinal plant which is being used in treating many disorders it is very important plant as per medicinal point of view. It is being used in analgesic, anti-inflammatory, anticonvulsant, antioxidant and insecticidal and pesticidal activities (Tandon, 2005). If the *H. puera* is been shifted towards *V. negundo* off course, there would be some positive in context of teak but from medicinal part it is would highly impact the *Vitex* plant and there would be negative impact.

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