Journal of Intellectuals (JoI)

*Review article*

# Damages caused by the tea pests of the family Geometridae: A review

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**Abstract:** Tea being a popular beverage and a cash crop becomes very essential from the economic point of view. Tea is a food source for many insects. There are many different pests of tea which cause heavy loss to the crop. The damages done to the crop indeed are potentially harmful and also sometimes bear serious economic consequences. As a result, checking them becomes very essential. The very first step for controlling the pest is the identification of pests and the damages caused by them. Among the insect pests of tea, Lepidopterans possess a serious threat. In India damages due to the family Geometridae is observed more. Through this review a modest effort has been made to look at the damages caused by the different pests and their intensities.

**Keywords:** Pest; Tea; IPM; Crop; Lepidoptera.

**Citation:** Bhattacharjee, S.; Das, R. (2022). Damages caused by the tea pests of the family Geometridae: A review. *Journal of Intellectuals*, 2(1), 26–30. Retrieved from https://journals.bahonacollege.edu.in/index.php/joi/article/view/joi2022-2-1-3

Received: 24 July, 2022
Revised: 28 October, 2022
Accepted: 18 December, 2022
Published: 25 December, 2022



## 1. Introduction

Tea, Camellia sinensis (L.) Kuntze is very popular as a widely favorite and consumable beverage worldwide. It is grown in more than 34 countries in over 2.71 million hectares of land. (Hazarika et al., 2009) with China and India being its major producer. Though different countries have different tea pests some of them remain common (Nadda et al., 2013). Tea plants have over 250 insect pests associated to their name (Barthakur, 2011), among which Lepidopterans and Hemipterans constitute the majority (Paul et al., 2017). Some popular lepidopteran pests of tea according to Hazarika et al., (2009) includes tea loopers, Buzura suppressaria Guenee, red slug Caterpillars, Hyposidra talaca (Walker), Ectropis Hubner etc. having the potential of about 40% crop loss (Roy et al 2018) Lepidopterans bag the title of being the largest of all groups of primary defoliators of tea pests (Chen and Chen 1989).Among the Lepidopterans the family Geometridae holds a special position of importance as it is more prevalent in India and is a serious threat to this perennial monoculture crop. Insecticide sprays are the most popular options when it comes to the solution of pest but ith their growing and ruthless use on one hand the pests are becoming resistant and on the other hand their residues in the tea produced becomes a matter of additional concern. (Mamun et al., 2014). The seemingly obvious way out to this problem remains the use

of alternative ways and also implementation of IPM. Additionally, the change in the tea ecosystem as a result of world's climate change is actually getting compounded with the problem of pest management. (Sinu et al 2011).

To successfully address all these problems and also for creating the best possible pest management strategies it becomes very essential to know the nature of damage caused by the pest. The proper knowledge of the damage caused by the pest on one hand will aid us to develop a better strategy to control and manage the pest and also will give us a more qualitative way to understand which pest needs to be attended more seriously and primarily. With this perspective this review compiles the data on the nature of damage caused by the pest.

**Tea looper, Biston (Buzara) suppressaria Guenne**

Its presence in India was reported first in 1963 by Das et al. Its life cycle can vary from 60 days to complet in the month of June- July, to 72 days to complete in March-May (Roy et al., 2018a, 2018b). In India, B. suppressaria shows about 5 to 6 generations in a year (Sharma & Gunasekare 2018).

**Damage caused**

With the young loopers feeding on the tender leaves irregular holes are created alongside the margins. Semi mature to mature leaves are more preferred by mature caterpillars theirby causing defoliation.It is mostly during night and in morning, the damage mostly occurs. (Sharma & Gunasekare 2018). On severe attack bushes loose all their leaves. And when the leaves are not present even the bark and tender branches are also eaten. (Roy et al., 2018a). During March – June i.e., during pre-monsoon season maximum infestation occurs which subsequently gets reduced during the monsoon and again during winter gradually increases. Occasional occurrence is also seen in between March to /July and also during September and October (Ahmed et al., 2010).

**Twig caterpillar, Ectrophis bhurmitra Walker**

It is named as twig caterpillar because of its dead twig like appearance while resting.It was first recorded in India in 1991 (Hutachen & Tublin, 1995, Muraleedharam 1991, Majumder 2008, Prasad & Mukhopadhyay 2013b). their life cycle takes about 8 to 9 weeks to complete and about 6 generations are seen per year. (Danthanaraya & Kathiravetipillai 1969).

**Damage caused**

They are also potential defoliators. The young loopers eating epidermis of leaves begin with eating the leaves along the margins thereby creating tiny holes. With them growing they start eating small pieces of leaf leaving the rib structure intact which ultimately leads to defoliation. This feeding activity takes place mostly during night and in the morning

(Cranham, 1966a; Danthnarayana, 1966).

**Black Inch worm, Hyposidra talaca Walker**

It has been reported as the potential pest of tea in India (Rahman et al., 2007; Das & Mukhopadhyay, 2008; Nair et al. 2008; Basu Majumder et al., 2010). Its life cycle takes 30 to 55 days to complete based on the temperature. It takes less time to complete its life cycle during April to June compared to that of December to February (Roy et al.,)

**Damage caused**

New and tender leaves are preferred by the first to third instar larvae where they nible and create pinholes. (Basu Majumder et al., 2010 & Basu Majumder & Ghosh 2004). When it comes to older leaves, they are devoured voraciously by fourth, fifth and sometomes sixth instar larvae. The consumption rate of fifth instar larva is four times higher than than fourth instar larvae. (Prasad & Mukhopadhyay 2018a). They feed equally on leaves both day and night. All the leaves in the tea bushes needs to be removed in case of serious infestations. The fourth and fifth stage caterpillar are responsible for significant defoliation.

**Huang hook moth, Hyposidra infixaria Walker**

Their developmental period ranges from 4-5 weeks in summer and 8-9 weeks in winter.

**Damage caused**

This pest can cause severe damage and complete defoliation in case of extreme infestation. These can cause significant damage to the tea bushes throughout the year. A sudden outbreak due to a fact unknown loopers in various tea garden during the summer of 2007. The severity of the outbreak was so much that it effected 100% of some gardens, resulting in a crop loss of almost about 48%. (Majumder & Tapan 2009, Anonymous, 2008).

**Giant Looper, Ascotis selenaria Denis & Schiffermuller**

The adult female lives for 5-6 days and lays about 3000 eggs. A selenaria has 5 generations in a year. (Izhar & Wyoski 1995).

**Damage caused**

This pest is also a potent defoliator and in case of severe attacks eats the whole leave leaving behind on the mid rib. (Wysoki et al.,1975).

**Neem looper Cleora cornaria**

It was recently reported in Northern India. (Anonymous 2022). The adult male and females' moths live on an avareage 5-8 days respectively.

**Damage caused**

It is also a defoliating pest causing complete defoliation under severe attack.

**Ways of control of pests**

Knowing the nature of damage of the pests is very much essential to device out a way to control them. For the purpose of controlling the pest cultural methods such as plucking and pruning, scraping tea barks, fire torches can be used. Ways of physical and mechanical control involves manual removal method, use of light traps, smoke treatment, sticky traps and barriers preventing the pests can be used. Synthetic products can be used for chemical control methods, but due to environmental obligations and health concerns, now a days alternative ways are given more importance. Promoting of suitable botanical products with least environmental concerns like neem formulations are in use now a days. Also, natural enemies of the pests are used as a part of biological control of pest.

**Future prospects and Conclusion**

The lepidopteran pests possess a serious threat to the tea,of which the family Geometridae is a significant one which causes substantial loss in the production of this cash crop in India. Lepidopteran pests in India are potent to cause loss from 5% upto 55%. (Hazarika et al., 2009). Since tea is a major cash crop having economic significance therefore it becomes very essential to know the pests and damage caused by them so the problem of pest control can be addressed properly and instead of relying on synthetic chemicals new methods can be implied. More stress should be given on biological control (Das et al., 2023) as it's an environment friendly way out and safer overall.

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