



A Preliminary Study Of Insect Pests Of Tea In The Negheriting Tea Estate Of Dergaon, Golaghat District, Assam, India

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Abstract

The present study investigates the diverse array of insects pests effecting tea cultivation in the Negheriting area of Dergaon, Golaghat District, Assam the study revels the prevalence of 30 number of tea pests belonging to 10 orders and 25 families affecting all parts of the plant leaf, stem, roots, flowers and seed and are fed upon by at least one pests species and resulting 11% - 75% loss. During the investigation period order Lepidoptera (20%), Trombidiformes (20%), Blattodea (19%) has been recorded with the dominant insects pests species. From this survey it was found that in Negheriting tea estate of the Dergaon, Golaghat District, these pests namely Termites (*Odentotermes formosanus*), Red spider mites (*Oligonychus coffeae*) and Black Citrus Aphide (*Toxoptera aurantii*) and Brown Citrus Aphide (*Toxoptera citricida*), Tea looper Caterpillar (*Biston suppressaria*), Bistre (*Biston regalis*), stinging nettle oriental moth (*Monema flavescens*) are primarily found to affect the tea plantations.

Keywords : Insects pests, Negheriting tea garden, Dergaon, Management practice, Tea plantation.

INTRODUCTION

Tea, *Camellia sinensis*, the beloved beverage cherished world for its aroma and flavor holds significant economic and cultural importance particularly in region like Negheriting, Golaghat, Dergaon, districts of Assam where tea cultivation thrives. However, the sustained productivity and quality of tea are constantly challenged by various biotic and abiotic factors with insect pests emerging as one of the primary adversities.

Research shows tea can improve insulin sensitivity, protect pancreatic cells from further damage, and decrease inflammation, all benefiting those at risk for or already diagnosed with diabetes. It is good for

brain. Regular tea consumption may lower the risk of getting Alzheimer's disease and other neurodegenerative diseases. Green tea acts as a remedy for Irritable Bowel Syndrome.

The introduction sets the stage by providing an overview of the significance of tea cultivation in the local economy and culture of Assam particularly in Golaghat district. It highlights the importance of understanding and addressing the challenges posed by insect pests to ensure the continued prosperity of the tea growers in the region.

AIM AND OBJECTIVES

The study was done in Negheriting Tea Estate of Dergaon, Golaghat District with the following objectives :

- To study the different types of insect pests in the study area.
- To study the effects of tea pests in the tea garden area .

METHODOLOGY



Fig- Map of India



Fig - Map of Assam

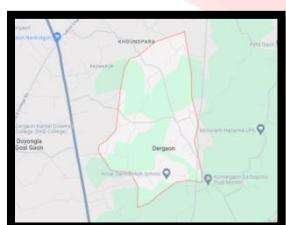


Fig – Location Dergaon

(Latitude : 26.6969° N, Longitude 93. 9853° E)



Fig : Location of Negheriting Tea Estate (Dergaon)



Fig : Sign Board of Negheriting Tea Estate

1. Study area

Negheriting tea estate was followed for the study, which is situated in the Dergaon region of Golaghat District. The tea estate covers 1140 hectares of land. The tea estate was followed and visited during the season of January to May.

2. Survey Methods

The survey was based on interview method. The local people and those working in the garden areas were asked different questions and the survey was carried out. The people were very kind and explained thoroughly the tea plants and the pests' behavior along with the climatic condition of the area.

3. Materials

- a. Camera
- b. Lens (200x magnification Smartphone Microscope)
- c. Magnifying glass
- d. Mobile
- e. Ethanol
- f. Measuring cylinder
- g. Sample collecting Bottles for preservation
- h. Forceps
- i. Tray
- j. Insect killing jar
- k. Aerial net
- l. Distilled water
- m. Pen, pencil, pins, notebooks etc.
- n. Thermocol sheet.
- o. Ethyl Acetate
- p. Gloves

4. Collection

The site, Negheriting Tea estate was visited on a fine day and an extensive survey was done wherein the sites were coded accordingly as site 1 and site 2. Here using Quantitative Collection Methods which the methods involve collecting quantitative data, which can include experimental, inferential, and survey method such as area, time, effort etc. Pests were collected by netting and hand picking method. Aerial net are using to collect flying insects flies, moths etc. Collecting kit using such as fieldnote book here we collecting the data of the tea insect pests, than Using killing jar : killing jar is a tool used by entomologists to euthanize insects quickly and humanely for preservation and study. It is typically a glass jar with a tight-fitting lid, containing a substance that releases toxic fumes to kill the insect without causing physical damage. Common substances used include ethyl acetate.

The process generally involves the following steps:

1. Placing piece of absorbent material, such as cotton or paper, inside the jar.
2. Adding a few drops of the chemical agent as ethyl acetate onto the absorbent material.
3. Allow the fumes to disperse within the jar.
4. Introducing the insect into the jar and seal it tightly.
5. Leave the insect in the jar until it is no longer moving, indicating that it has been euthanized.

And then another we using collecting kit as Mobile Camera where we captured the photos of pest by using 200x Magnification Smartphone microscope lens and Macro lens and by smartphone camera taking pictures of these were clicked from different angles, and also the photos were taken of the plants' part which was harmed by them. The insects were collected in the morning hours .

5. Preservation

The preservation of the pests was done in two ways-

- 1) Dry Preservation
- 2) Wet Preservation

1) Dry Preservation

Handle the dried specimens with care using fine forceps or gloves to prevent damage. Dry preservation is particularly suitable for insects that have robust exoskeletons and can maintain their shape and structure without the need for a liquid medium. Here are some types of insects that are commonly preserved using dry preservation methods such as Beetles (Coleoptera), Moths (Lepidoptera), True Bugs (Hemiptera), Mantises (Mantidae).

We Stored the dried specimens in insect drawers, display cases, or airtight containers. Ensure they are free from pests and contaminants. While the insect is still fresh and pliable, carefully position its legs, wings, and antennae using fine forceps or pins to display its natural appearance. This is often done on a pinning thermocol sheet board. Standard Pinning: For larger insects, inserting an insect pin vertically through the thorax. For smaller insects, use minutiae pins or card points to mount the specimen. Place the pinned insects in a dry, well-ventilated area. A dedicated drying cabinet or an airy room works well. Then we clearly label the container with detailed information, including the species Common Name, Scientific Name, Order, Family .

2) Wet Preservation

The Wet Preservation was done for soft-bodies insect such as Aphids, Lepidoptera Larvae, Nymphs of Hemiptera etc. It is done in a 70 % solution of ethanol by using measuring solution. Placing the insect in a small container filled with 70% ethanol for long-term storage. The concentration of 70% ethanol is typically sufficient and than we clearly label the container with detailed information, including the species Common Name,.Scientific Name, Order, Family . Proper labeling is crucial for future reference and study. Seal the Container: Ensure the container is airtight to prevent evaporation and contamination.

6. Identification

The collected species were identified by using the available literature after separating them in their orders and family. The population of insect is regulated both by biotic and a biotic factors. In this study it is found that the pests' occurrence is directly related with the temperature, as during the month of January the number of pests found was the least and in the month of May it was the highest. The abundance of the tea pest increased with the rise in the temperature as the summer started to approach.

Results

After survey the present study it found 30 Tea insects pests species belonging to 10 insects orders and 25 families of tea pests. The description of identified insects pests and which plant parts damage are below.

SI No.	Common name	Scientific name	Order	Family	Nature of Damage
1	Assasin bug	<i>Ricolla pallidinervis</i>	Hemiptera	Reduviidae	Leaves such as stippling discoloration,necrotic spot.
2	Bistre	<i>Biston regalis</i>	Lepidoptera	Geometridae	leaves
3	Black Citrus Aphid	<i>Toxoptera aurantii</i>	Hemiptera	Aphididae	Damage of plant tissues
4	Brown Citrus Aphid	<i>Toxoptera citricida</i>	Hemiptera	Aphididae	Damage of plant tissues
5	Bush Cricket	<i>Caedicia simplex</i>	Orthoptera	Tettigoniidae	Damage of leaf, stems, fruit.
6	Dead nettle leaf beetle	<i>Chrysolina fastuosa</i>	Coleoptera	Chrysomelidae	Creating holes in the leaf causing defoliation.
7	Gaint Cricket	<i>Tarbinskiellus portentorus</i>	Orthoptera	Gryllidae	Root damage & chewing on tea leaves, creating

					irregular holes and notches.
8	Gelechiid moth or Twiler moth	Gelechia	Lepidoptera	Gelechiidae	Heavy infestations can lead to significant leaf loss.
9	Green bush cricket	Tettigonia viridissima	Orthoptera	Tettigoniidae	Creating irregular holes on leaf and cause stem damage.
10	Green crab spider	Diaeа dorsata	Araneae	Thomisidae	Does not damage its is beneficial predator.
11	Jumping spider	Phintella vittata	Araneae	Salticidae	Damage to young shoots & leaves.
12	Leaf roller	Caloptilia theivora	Lepidoptera	Gracillaridae	Creating holes and irregular patches.
13	Metallic Green mosquito	Condylostylus caudatus	Diptera	Dolichopodidae	Does not damage it is natural pest controllers.
14	Praying Mantis	Tenodera	Orthoptera	Mantidae	Does not damage it feed other insect.
15	Red cotton bug	Dysdercus cingulatus	Hemiptera	Pyrrhocoridae	Feed on developing seeds, piercing them suck sap.
16	Red spider mite	Oligonychus coffeae	Trombidiformes	Tetranychidae	Infested leaves may show reddish discolorating and damage to the plant tissue.
17	Scarlet mite	Brevipalpus californicus	Trombidiformes	Tenuipalpidae	Feed on the undersides of tea leaves by piercing the leaf tissue and sucking out the plant sap. This process damages the leaf cells.
18	Soldier Beetles	Cantharis livida	Coleoptera	Cantharidae	Not damage to the tea plant.
19	Stinging nettle oriental moth	Monema flavescens	Lepidoptera	Limacodidae	Creating large holes in the leaf causing defoliation.
20	Striped lynx spider	Oxyopes salticus	Arachnida	Oxyopidae	Does not damage it is a beneficial predator that help control insect pest population
21	Tea looper Caterpillar	Biston suppressaria	Lepidoptera	Geometridae	The feed on tender leaves making punctures along the margins

22	Tea green leaf hopper	<i>Empoasca onukii Matsuda</i>	Hemiptera	Cicadellidae	Feed on phloem of young tea leaves by piercing and sucking out of the sap infested leaves obtain curly ,turned yellow or bronze and damage the leave tissues
23	Tea mosquito bug	<i>Helopeltis theivora</i>	Hemiptera	Miridae	Feeds by piercing the leaves with its needle like mouth parts and sucking out plants sap.
24	Tea tortrix	<i>Homona Caffearia</i>	Lepidoptera	Tortricidae	Larve roll the leaves secure them with silk . Feed on the tender leave tissues and feed on young shoots
25	Tea twing Caterpillar	<i>Ectropic bhurmitra</i>	Lepidoptera	Limacodidae	Caterpillar are known for their habit of rolling or folding leaves to create a protective shelter and chewing on the plant tissues
26	Termite	<i>Odentotermes formosanus</i>	Blattodea	Termitidae	They damage roots of the tea plant and lower stems.
27	Two spotted Spider	<i>Tetranychus urticae</i>	Trombidiformes	Tetranychidae	Feed on the undersides of tea leaves by piercing the leaf tissues with their mouth parts and sucking out the cell contents .
28	Vine Chafer beetle	<i>Holotrichia impressa</i>	Coleoptera	Scarabaeidae	They feed on the roots of tea plants cause significant damage
29	Yellow mite	<i>Polyphagotarsus nemus latus</i>	Trombidiformes	Tarsonemidae	Feed on the undersides young leaves injecting toxic saliva that causes severe distortion.
30	Yellow tea thrips	<i>Scirtothrips kenyensis</i>	Thysanoptera	Thripidae	Feed on the surface of the leaves by rasping the epidermal cells and sucking out the contents.

Photographs showing the different types of pests species during the study period and sampling sites (From January-May, 2024)



Fig - 1

Common name - Assassin bug

Scientific name - *Ricolla pallidinervis*

Order - Hemiptera

Family - Reduviidae



Fig - 2

Common name - Bistre

Scientific name - *Biston regalis*

Order - Lepidoptera

Family - Geometridae



Fig - 3

Common name - Black Citrus Aphid

Scientific name - *Toxoptera aurantiis*

Order - Hemiptera

Family - Aphididae



Fig - 4

Common name - Brown Citrus Aphida

Scientific name - *Toxoptera citricida*

Order - Hemiptera

Family - Aphididae



Fig - 5

Common name - Bush Cricket

Scientific name - *Caedicia simplex*

Order - Orthoptera

Family - Tettigoniidae



Fig - 6

Common name - Dead nettle leaf beetle

Scientific name - *Chrysolina fastuosa*

Order - Coleoptera

Family - Chrysomelidae

Photographs showing the different types of pests species during the study period and sampling sites (From January-May, 2024)



Fig - 7

Common name - Gaint Cricket

Scientific name - *Tebbinskiellus portentorus*

Order - Orthoptera

Family - Gryllidae



Fig - 8

Common name - Gelechiid moth or Twiler moth

Scientific name - *Gelechia*

Order - Lepidoptera

Family - Gelechiidae



Fig - 9

Common name - Green bush cricket

Scientific name - *Tettigonia viridissima*

Order - Orthoptera

Family - Tettigoniidae



Fig - 10

Common name - Green crab spider

Scientific name - *Diae dorsata*

Order - Araneae

Family - Thomisidae



Fig - 11

Common name - Jumping spider

Scientific name - *Phintella vittata*

Order - Araneae

Family - Salticidae



Fig - 12

Common name - Leaf roller

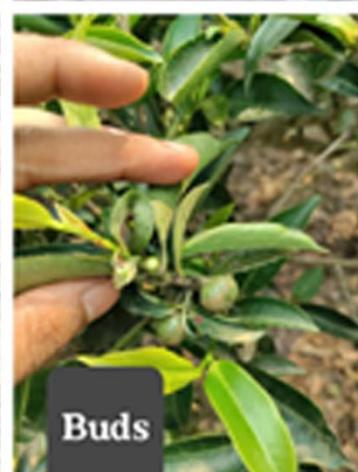
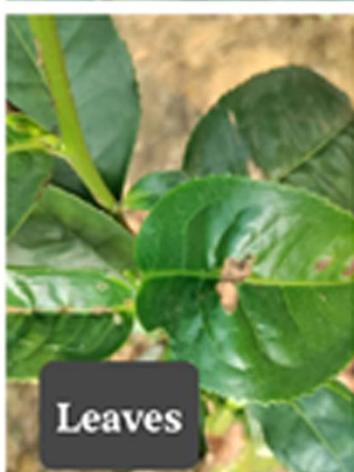
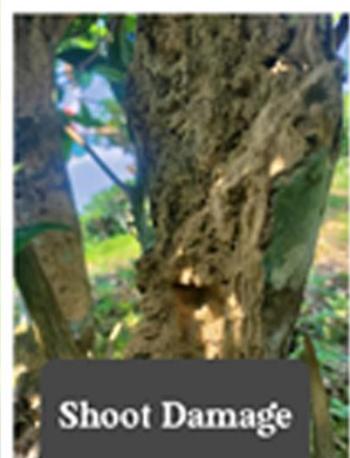
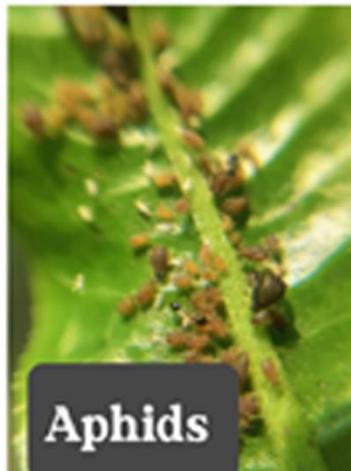
Scientific name - *Caloptilia theivora*

Order - Lepidoptera

Family - Gracillariidae

Photo plate - 4

Photographs showing the insect pests of tea effect the tea plant



Discussion

The study of insect pest of tea is of great significant. The study was carried in the Nehereting region, wherein we identified the most important insect pest of tea. Insect pests are insects that destroy or harm crop plants. They damage plants by cutting their roots, stems and leaves. Invasive insect pests in particular extensively damage the biodiversity, economy, and ecology of the affected areas.

The present study found 30 species of insect pest belonging to 10 orders - Archanida, Araneae, Blattodea, Coleoptera, Diptera, Hemiptera, Lepidoptera, Orthoptera, Thysanoptera, Trombidiformes and 25 families Aphididae, Cantheiridae, Chrysomelidae, Cicadellidae, Gelechiidae, Geometridae, Gracillaridae, Gryllidae, Limacidae, Mantidae, Miridae, Oxyopidae, Pyrrhocoridae, Mantidae, Miridae, Oxyopidae, Salticidae, Scarabaeidae, Tarsonemidae, Tenuipaldae, Termitidae, Tetranychidae, Tettigoniidae, Thomisidae, Thripidae, Tortricidae.

From this survey it was found that in Negheriting tea estate of the Dergaon, Golaghat District, these pests namely Termites (*Odentotermes formosanus*), Red spider mites (*Oligonychus coffeae*) and Black Citrus Aphide (*Toxoptera aurantii*) and Brown Citrus Aphide (*Toxoptera citricida*), Tea looper Caterpillar (*Biston suppressaria*), Bistre (*Biston regalis*), stinging nettle oriental moth (*Monema flavescens*) are primarily found to affect the tea plantations. The Preying mantis (*Tenoder*), Vine chafer beetle (*Holotrichia impressa*) Tea green leaf hopper (*Empoasca onukii*), Jumping spider (*Phintella vittata*) are found in very low in number as compared to other pests.

Major tea pests affecting both the study sites damaging the tea plants roots and stems by termites and the leaves are damages by tea green during Tea looper Caterpillar by creating the irregular holes on leaf causing defoliation. Red spider mites infested leaves may so reddish this colouration and damage to the plant tissue, Tea tortrix larver role the leaves secure them with silk and they fit on the dander leaves tissues.

But some of the pests does not damage the tea plant they are beneficial predator that helps controls insects pests population. According to the highest number of tea pests found in the month of May 52% of pests and lowest number of pests is 6% in the month of January insects pests are found all are shown in the graph.

The abundance of these insect pests was varied in different months based on the climatic condition and other disturbances. The population of insect is regulated both by biotic and abiotic factors. The abundance of the pests increased with the rise in temperature as the summer started to approach. In this study it was found that the frequency of tea pest species had positive correlation with temperature.

Frequency of insect pest showed negative correlation with humidity in this study. This would have been one of the reasons why insect pest population decreased as relative humidity increases.

REFERENCE

Beauti Kakoti, Bhabesh Deka et. al. (2023) IPM strategies to control scale insects in tea eco system

Bhabes Deka and Azarria Babu (2021) Tea pests management

Brijmohan Singh Bhau, Jiten Mech , Sangita Borthakur, Montu Bhuyan, Pranab Ram Bhattacharyya (2014) Morphological and genetic diversity studies among populations of tea mosquito bug : (*Helopeltis theivora*)

Das Soma, Mukhopadhyay Ananda, Roy Somnath, Biswa Ritesh (2010) Emerging Lopper pests of tea crop from sub Himalaya West Bangal India

Dr. Supriya Sonowal, et. al (2023) A microbial approach of tea pests and disease management

Gireesh Nadda, S. G. E. R. and A. S (2013) Insects of Mites pets of tea and the management

Gita Shrestha and Resham B. Thapa (2015) Tea pests and pesticide problems and integrated management

Heinrich Lehmann-Danzinger (2000) Diseases and Pests of Tea: Overview and Possibilities of Integrated Pest and Diseases Management Journal of Agriculture in the Tropics and ..., 2000 - jarts.info

Jesu Chhetri (2007) study of arthropod pest of tea and it's diversity in Teesta Valley Tea Garden Darjeeling

Lakhmi K. Hazarika, Mantu Bhuyan and Budhindra N. Hazarika (2008) Insects Pest of Tea and their management

M. S. A. Mamun and A. V. K. Iyengar Nilgiris (2009-2010) and Coimbatore Districts in Tamil Nadu, South India to Established the approaches to Tea pest management in South India

M.S.A. Mamum, M.Ahmed and S. K (2014) Integrated approaches in tea pests management forstainable tea production

Soma Das, Ananda Mukhopadhyay, Somnath Roy (2010) Morphological Diversity, Developmental traits and seasonal occurrence of lopper pests of tea crop

Somnath Roy and M. M (2014) Red Spider mite (*Oligonychus coffeae*) : its status biology, ecology and management tea planatation

St. Joseph, Michigan (2003) Tea pest : and expert system for insect pests management...., jarts. Info

Zhuang JiaXiang, Fu JianYu, Zhan ZhiXion (2009) The Regional Diversity of resistance of Tea Green Leafhopper, *Empoasca spp.*