

**A COMPARATIVE SURVEY OF THE PEST PREVALENCE
AND CHEMICAL CONTROL PRACTICES IN THE TEA
GARDENS OF SONITPUR DISTRICT OF ASSAM**

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ABSTRACT

The aim of this investigation was to go for a comparative study of the pest prevalence in the tea gardens of Tezpur and Gohpur sub-divisions of Sonitpur district of Assam with reference to the chemical control measures adopted in those gardens. From survey, it was found that the overall infestation in the seventeen surveyed tea gardens of the district was shown by eight types of pests, namely Tea Mosquito bug (*Helopeltis theivora*), Red spider mites, two species of Looper caterpillars, Red slug, Green fly, Thrips, Aphids and Bunch caterpillars. The maximum numbers of TRA approved pest control agents used in the gardens of Tezpur and Gohpur sub-divisions of the district were 22 and 25 respectively. *Helopeltis* was found to develop resistance against adverse climatic conditions while Looper caterpillar became resistant to Deltamethrin (Decis), a commonly used synthetic pyrethroid pesticide. Deltamethrin has also caused an increase in the resurgence of red spider mites because of the impact of the chemical on the non target natural predators of the latter. As a deterrent, systemic bio-pesticides are frequently used as they pose no threat to the predators. With a view to tackling the overall biotic stress and impact of pesticides, discovery of suitable plant extract with antifeedant effect becomes an urgent need at the moment.

Key words: TRA, Deltamethrin (Decis), synthetic pyrethroid, biotic stress, antifeedant effect.

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1. INTRODUCTION:

Several tea pests were reported to affect tea plantations in different gardens of Assam, causing huge crop loss every year. To eradicate or control these pests, wide varieties of pesticides have been used as per recommendations of Tea Research Association (TRA) as a measure of protecting tea plantations apart from cultural, mechanical and biological control practices. However, keeping in view probable harmful impact of these pesticides on non target species including men, animals and plants, it was indeed very essential to acquire knowledge about the types of pesticides used in different gardens. The present investigation deals with a comparative study of the tea pest prevalence and chemical control measures adopted in the gardens of Sonitpur district of Assam.

2. MATERIALS AND METHODS:

2.1. Selection of gardens:

With a view to studying the tea pest prevalence and pesticide application practices, altogether seventeen tea gardens- ten from Tezpur and the other seven from Gohpur sub-division of Sonitpur district were selected adopting lottery method (Table 1).

2.2. Collection of data:

The primary data relating to the (a) pest attack on tea plantations and (b) types of pest control agents (pesticides etc.) used were collected by the following methods.

Roving survey: Survey routes based upon endemic areas were identified during peak period of infestation (June-July). After that roving was undertaken at every 1 km distance initially at weekly intervals and thereafter at 10 days intervals in the selected gardens. Every day, 20 spots were observed with the aid of garden labourers and field officers.

Field scouting: Based on the results of roving surveys, field scouting was initiated for tea pests once in 3-5 days in the concerned gardens to observe pest occurrence with prior permission from the garden authorities and with the help of garden labourers and field officers.

Semi- structured interviews: The managers and assistant managers were contacted personally to know about cultural, mechanical, chemical and biological control practices adopted in the

gardens.

Questionnaires: Questionnaires were prepared separately for the managerial staff and field officers (welfare officers) to know about the efficacy of specific pesticides belonging to various chemical classes in controlling tea pests.

Table 1. Gardens selected in Tezpur and Gohpur sub-divisions of Sonitpur district.

Gardens of the survey region Tezpur:	Distance (approx) from Tezpur town:	Gardens of the survey region Gohpur	Distance (approx) from Gohpur town
1. Sonabheel T.E	13kms	1. Boroï T.E	27 kms
2. Tezpur & Ghogra T.E	15 kms	2. Halem T.E	15 kms
3. Durrung T.E	16 kms	3. Dufflghar T.E	21 kms
4. Sessa T.E	20 kms	4. Brahmajan T.E	12 kms.
5. Dhullapadung T.E	25 kms	5. Nirmala T.E	11 kms.
6. Harchurah T.E	25 kms	6. Bholaguri T.E	6.5 kms.
7. Phulbari T.E	26 kms	7. Purupbari T.E	1 kms.
8. Naharani T.E	27 kms		
9. Borjuli T.E	25 kms		
10. Ghairali T.E	30 kms		

Table 2. Gardens infected by different tea pests in Tezpur sub-division √ → Pest infestation. -- → No infestation.

Tea pests	Gardens infected:										Total no. of gardens infected
	1	2	3	4	5	6	7	8	9	10	
1. <i>Helopeltis theivora</i> . (Tea mosquito bug)	√	√	√	√	√	√	√	√	√	√	10
2. <i>Oligonychus coffeae</i> . (Red spider mite)	√	√	√	√	√	√	√	√	√	√	10
3. <i>Buzura suppressaria</i> and <i>Hyposidra talaca</i> (Looper caterpillars)	√	√	√	√	√	√	√	√	√	√	10
4. <i>Eterusia magnifica</i> (Red slug)	--	--	--	--	√	--	√	--	√	√	4
5. <i>Empoasca flavescens</i> (Greenfly)	--	--	--	√	--	--	--	--	--	--	1
6. <i>Toxoptera aurantil</i> (Aphids)	--	√	--	--	--	--	--	--	--	--	1

Table 3. Gardens infected by different tea pests in Gohpur subdivision. √ → Pest infestation. --- → No infestation.

Tea pests	Gardens infected:							Total no. of gardens infected
	1	2	3	4	5	6	7	
1. <i>Helopeltis theivora</i> . (Tea mosquito bug)	√	√	√	√	√	√	√	7
2. <i>Oligonychus coffeae</i> . (Red spider mite)	√	√	√	√	√	√	√	7
3. <i>Buzura suppressaria</i> and <i>Hyposidra talaca</i> (Looper caterpillars)	√	√	√	√	√	√	---	6
4. <i>Scirtothrips dorsalis</i> (Thrips)	√	---	√	√	---	---	√	4
5. <i>Empoasca flavescens</i> (Greenfly)	√	---	√	√	√	---	---	4
6. <i>Eterusia magnifica</i> (Red slug)	√	---	√	√	---	---	---	3
7. <i>Andraca bipunctata</i> (Bunch caterpillar)	---	√	---	---	---	---	---	1



Fig 1. Tea eaves damaged by *H. talaca*



Fig 2. Tea leaves damaged by *Helopeltis theivora*



Fig 3. Tea leaves damaged by *Oligonychus coffeae*

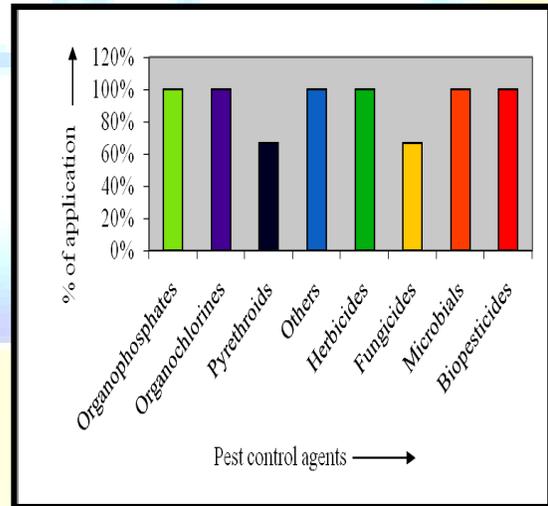


Fig 4. Percentages of various Pesticides used in Garden No.1 (SONABHEEL T.E.)

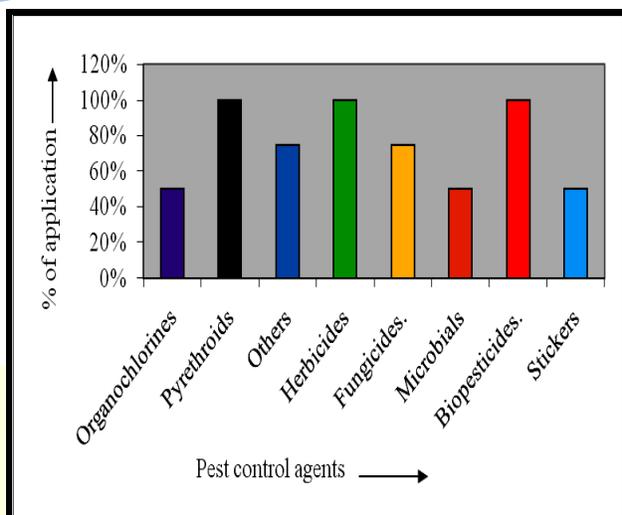


Fig 5. Percentages of various Pesticides used in Garden No.11. (BOROI T.E.)

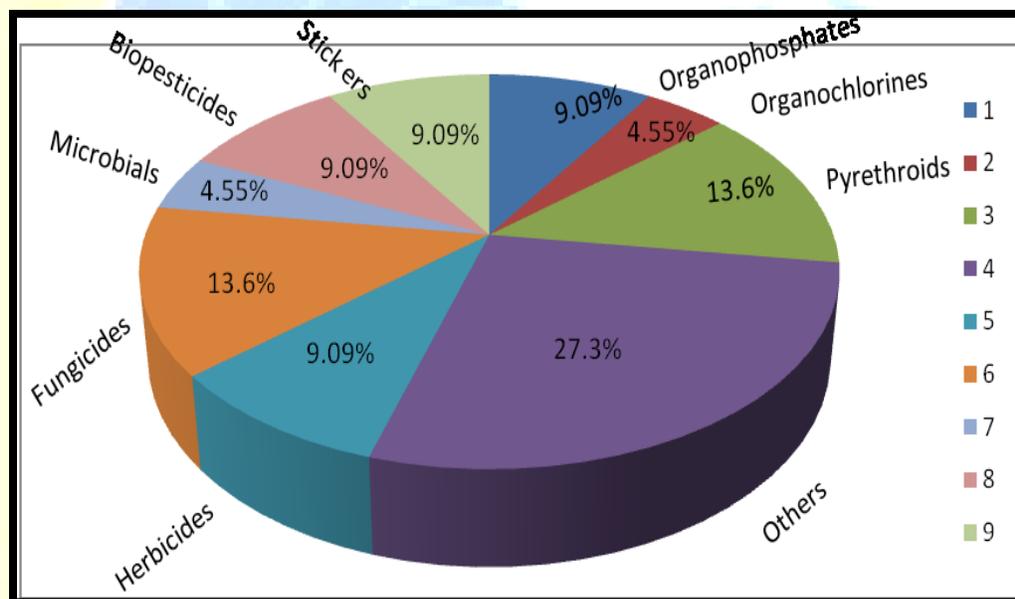


Fig 6 (a). Overall percentages (approx) of various Pest control agents used in the tea gardens of Tezpur sub-division.

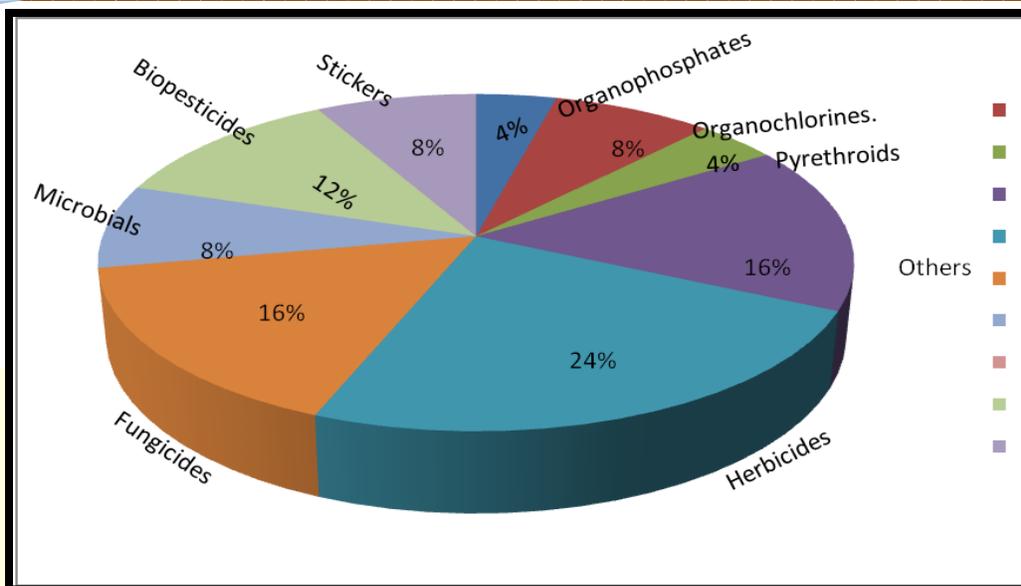


Fig 6 (b). Overall percentages (approx) of various Pest control agents used in the tea gardens of Gohpur sub-division.

Table: 4 (a) Statistical analysis of data relating to pesticide application using t-test by SPSS (Group statistics)

Pesticide categories	Regions	N	Mean	Std. deviation	Std. Error Mean
Organophosphate	Tezpur	10	.20	.632	.200
	Gohpur	7	.14	.378	.143
Organochlorine	Tezpur	10	.90	.316	.100
	Gohpur	7	.71	.756	.286
Pyrethorid	Tezpur	10	2.10	.876	.277
	Gohpur	7	.86	.378	.143
Pesticides of other categories	Tezpur	10	4.50	1.434	.453
	Gohpur	7	2.86	1.069	.404
Herbicides	Tezpur	10	1.10	.994	.314
	Gohpur	7	3.57	1.718	.649
Fungicides	Tezpur	10	1.90	.994	.314
	Gohpur	7	1.71	1.380	.522
Microbials	Tezpur	10	.10	.316	.100
	Gohpur	7	.71	.756	.286
Biopesticides	Tezpur	10	1.20	.789	.249
	Gohpur	7	1.10	1.000	.378
Stickers	Tezpur	10	1.20	.789	.249
	Gohpur	7	.86	.690	.261

Table: 4 (b) Statistical analysis of data relating to pesticide application using t-test by SPSS
(Independent sample test)

Pesticide categories	t-Test for Equality of Means				
	t	df	Sig. (2-tailed)	Mean difference	Std. Error Difference
Organophosphate	.213	15	.834	.057	.269 .246
Organochlorine	.702	15	.494	.186	.265 .303
Pyrethorid	3.507	15	.003	1.243	.354 .312
Pesticides of other categories	2.564	15	.022	1.643	.641 .607
Herbicides	-3.765	15	.002	-2.471	.656 .722
Fungicides	.324	15	.751	.186	.574 .609
Microbials	-2.320	15	.035	-.614	.265 .303
Biopesticides	.461	15	.651	.200	.433 .453
Stickers	.927	15	.369	.343	.370 .361

Significant level is at $P < 0.05$

3. RESULTS:

3.1. Pest infestation in tea gardens of Tezpur sub-division:

From survey it was found that altogether six types of tea pests were prevalent in the surveyed tea gardens of Tezpur sub-division. Three pests namely Helopeltis, Red spider mite and two species of Looper caterpillar were found to affect tea plantations in all the ten gardens. In four gardens (Garden no: 5, 7, 9 and 10) Red slugs, in one garden greenfly (Garden no: 4) and in another garden (Garden no: 2) Aphids were also found to infect tea plantations. (Table 2).

3.2. Pest infestation in tea gardens of Gohpur sub-division:

The survey has shown the prevalence of seven types of tea pests in the surveyed tea gardens of Gohpur sub-division. Helopeltis and Red spider mites were found to be dominant affecting tea

plantations of all the gardens. Infestation of two species of Looper caterpillars (*B.suppressaria* and *H.talaca*) was noticed in six gardens (Garden nos.1 to 6) except garden no.7. Thrips attack was noticed in four gardens (garden nos. 1, 3, 4 and 7). Green fly attack was noticed in four gardens (garden nos.1, 3, 4, and 5). Red slug caterpillar attack was noticed in three gardens (garden nos.1, 3 and 4). Bunch caterpillar attack was seen in garden no 2 only (Table 3).

3.3. Comparative study of the Pest control agents used in the Tea gardens of Tezpur and Gohpur sub-divisions of Sonitpur district:

The survey conducted in the gardens of Tezpur and Gohpur sub-divisions of Sonitpur district has shown that a large number of pesticides belonging to different chemical classes and certain biocontrol agents (microbials) were used for controlling tea pests [Fig.6 (a) and (b)].

3.4. Statistical analysis of data:

The analysis of data relating to the application of pesticides in Tezpur and Gohpur Sub-divisions of Sonitpur district of Assam using t-test by SPSS (Table 4 a and b) has shown that in the two regions, use of Pyrethroids, pesticides of other categories, Herbicides and Microbials were found to be significantly different at 0.05 level. The mean use of Pyrethroids and pesticides of other categories was higher in Tezpur sub-division while the mean use of Herbicides and Microbials was higher in Gohpur Sub-division than Tezpur Sub-division.

4. DISCUSSION:

The tea pest prevalence scenario in the Tezpur and Gohpur sub-divisions of Sonitpur district during the last two years turned worse with the severe infestation caused by Helopeltis, Red spider mites and Looper caterpillars. Until July, 2012, the forest looper, *Hyposidra talaca* was not detected in the tea gardens located in the South bank of Assam. Our investigation has shown that the species earlier endemic to the gardens of north bank has migrated to a number of gardens of south bank, rapidly spread to new areas causing huge crop loss and escalation in the cost of pest control thereby compelling the tea planters of the region to adopt an integrated pest management strategy. The overall infestation in the seventeen surveyed tea gardens of the district was shown by eight types of pests, namely Helopeltis, Red spider mites, two species of Looper caterpillars, Red slug, Green fly, Thrips, Aphids and Bunch caterpillars. Of these, the first five types were major pests common in the gardens of both sub-divisions. The mixed infestation of

Helopeltis, Red spider mites, two species of Looper caterpillars and Red slug was observed in Dhullapadung, Phulbari, Borjuli and Ghairali T.E.s of Tezpur sub-division. In Boroi, Dufflaghar and Brahmajan T.E.s of Gohpur sub-division, Helopeltis, Red spider mites, two species of Looper caterpillars, Thrips, Green fly and Red slug showed mixed infestation and damage making pest management critical. The pesticides widely used in the gardens of Tezpur sub-division were: Deltamethrin Decis, (a synthetic pyrethroid), Propergite (Omite, an acaricide) and Glyphosate 41% SL (Glycel, a herbicide). The pesticides widely used in the gardens of Gohpur sub-division were: Deltamethrin (Decis), Propergite (Simba), Glyphosate 41% SL (Glycel, a herbicide), Thiomethoxam 25% WG (Actara, an insecticide), 2, 4-D Amine salt 58% SL (Ankamine, a herbicide) and Azadirachtin 5%EC (Nimbion). The use of pesticides like Thiodan (Endosulfan- a cyclodiene organochlorine compound) has been banned keeping in view their lingering toxicity and consequent health hazards on the non-target species.

5. CONCLUSION:

The study carried out has shown that only the TRA approved pesticides were used as a means of protecting tea plants in all the gardens. It is noteworthy that certain pests like *Helopeltis* developed resistance against adverse climatic conditions. The black Looper caterpillars, on the other hand, became resistant to Deltamethrin, a commonly used pyrethroid pesticide. Deltamethrin has also caused an increase in the resurgence of red spider mites because of the impact of the chemical on the non target natural predators of the latter. Systemic bio-pesticides are suitable in such cases as they pose no threat to the predators though they alone cannot control tea pests effectively. Keeping in view the extensive use of pesticides, pesticide residue in the tea leaves as well as processed tea needs to be constantly monitored to reduce the chances of human health hazards. With a view to tackling the overall biotic stress and impact of pesticides, discovery of suitable plant extract with antifeedant effect is an ardent need of the hour.

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