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## RESEARCH ARTICLE

### POPULATION DYNAMICS OF SCARLET MITES (*BREVIPALPUS PHOENICIS*) AT TEA GARDEN AGAINST SYNTHETIC PESTICIDE, BIO-PESTICIDE AND NATURAL EXTRACTS IN TERAI REGION OF WEST BENGAL, INDIA

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#### ABSTRACT

The population dynamics of Scarlet mites against synthetic pesticide, bio-pesticide and neem extract in Terai region were studied. In two experimental locations the decreasing percentage of alive Scarlet mites against three pesticide treatments, the result is more or less same for particular pesticide. In contrast between three pesticides, Hexythiazox 5.45% EC was found to be effective. Apart from that bio-pesticide and Neem oil based formulation containing Azadirachtin 0.03% respectively reduced the population of mites.

#### Key words:

Tea garden, Scarlet mite, Pesticides.

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## INTRODUCTION

Scarlet mites attacks the under surface of the tea leaves chiefly along the midrib and petiole (Barua, 2008). It attacks mainly in the young leaves (Singh, 2005; Kabir and Das, 2015). The damage is characterized by yellowing of the leaves, brown scurfy discoloration along the midrib, which extends to both sides of the midrib, and also the basal part which subsequently dries up (Barthakur and Singh, 2002; Sinha, 2010). The axillary buds are also attacked which ceases to grow (Anonymous, 1994). Severe infestation results in defoliation of bushes and the recovery of affected plants are rather slow (Muraleedharan, 1991). Sometimes splitting of stem bark may also occur (Kabir and Das, 2015). It occurs in the month of February to November (Barthakur and Singh, 2002; Sinha, 2010; Kabir and Das, 2015). The eggs are bright red, elliptical and laid in clusters of 5-7, on the under surface of leaves.

Incubation period is 7-10 days (Muraleedharan, 1991). Before hatching the chorion becomes white and splits along the broader end of the egg. The larvae is dull red and has 3 pairs of legs (Anonymous, 1994). It passes through three developmental stages before adult stages and each developmental stage is followed by a quiescent stage. They are six legged larva, protonymph and deutonymph. Total development period from egg to adult is 30-36 days. Males are very rare and reproduction is by parthenogenesis (Muraleedharan, 1991).

#### Systematic position of Scarlet mite

**Kingdom:** Animalia

**Phylum:** Arthropoda

**Class:** Arachnida

**Sub-class:** Acari

**Order:** Trombidiformes

**Family:** Tenuipalpidae

**Genus:** *Brevipalpus*

**Species:** *phoenicis*

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## MATERIALS AND METHODS

**Location of the experiment:** The experiment was conducted at Sukna Tea Estate Section number 14 and Sukna Tea Estate Section number 10RP. Sukna Tea Estate is located in Latitude 26°46'2"N, Longitude 88°23'54"E and altitude is 478 feet above sea level.

**Experimental design and Layout:** Two different locations were taken for two field trials. In both the tea fields, 24 plots were taken and each plot contained 24 bushes. Area of the each plot was 10.08 square meters. Each field trial contained one untreated control and three treatments. There were total 4 treatments and each treatment had 6 replications (Sarkar and Kabir, 2016).

Treatment 1 (T1): Untreated Control ■  
 Treatment 2 (T2): Hexythiazox 5.45% EC (DIMITE) ■  
 Treatment 3 (T3): Bio-pesticide (RISHAV) ■  
 Treatment 4 (T4): Neem oil (MULTINEEM) ■

The experiments were laid out in Randomised Block Design (RBD).

**Collection of pre-treatment Scarlet mite effected leaves:** Hundred leaves were collected from each plot including all bushes.

### Doses of the pesticides:

Hexythiazox 5.45% EC (DIMITE) @ 0.8ml/litre  
 Bio-pesticide (RISHAV) @ 1.5ml/litre  
 Neem oil (MULTINEEM) @ 1ml/litre

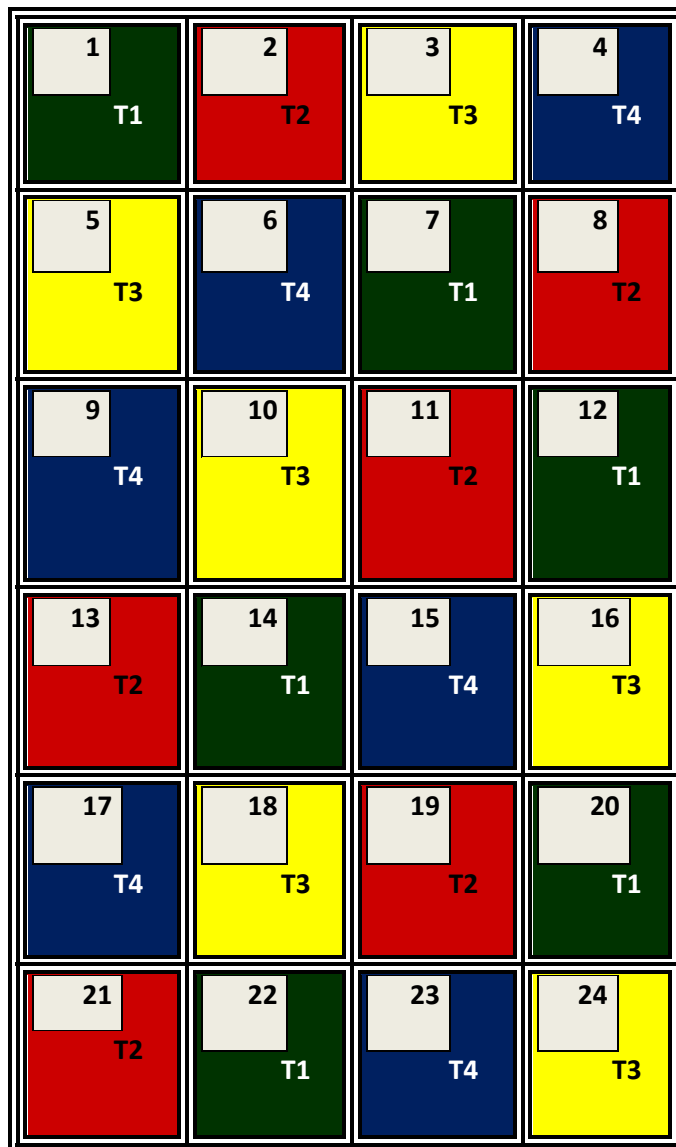


Figure 2. Lay out (Sukna Tea Estate Section number 10RP)

**Collection of post-treatment Scarlet mite effected leaves:** After 7 days of treatment, first observation was taken. In first observation hundred leaves were collected from each plot including all bushes. After 14 days of treatment, second observation was taken using the same method.

## RESULTS AND DISCUSSION

Before spray (pre-treatment), total number of alive Scarlet mites were counted with the help of magnifying glass from hundred number of leaves which were collected from each plot. After treating with pesticides (post-treatment), same procedure was followed. Then number of alive Scarlet mites of pre-treatment and post-treatment were compared.

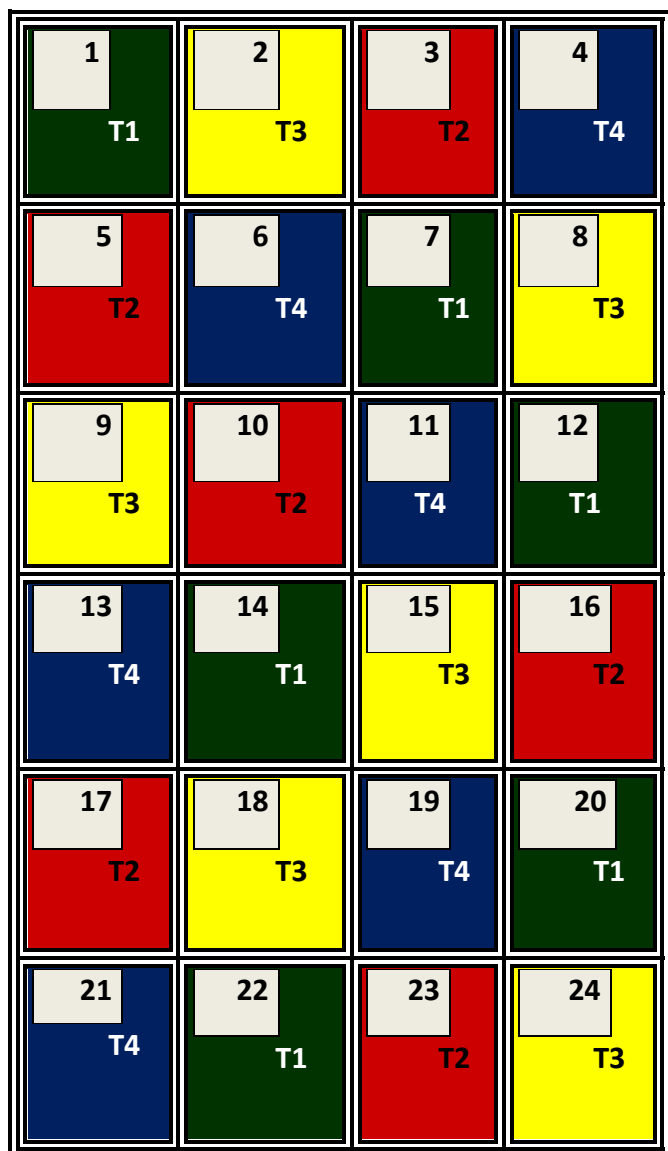


Figure 1. Lay out (Sukna Tea Estate Section number 14)

**Table 1. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 14 (1<sup>st</sup> Observation)**

Treatment	Name of the treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of post-treatment	Difference of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment and post-treatment	Percentage(%) of increase or decrease
T1	Untreated Control	3126	3382	-256	-08.19
T2	Hexythiazox5.45% EC	3924	3215	709	18.07
T3	Bio-pesticide	3683	3167	516	14.01
T4	Neem oil	4191	3770	421	10.04

**Table 2. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 14 (2<sup>nd</sup> Observation)**

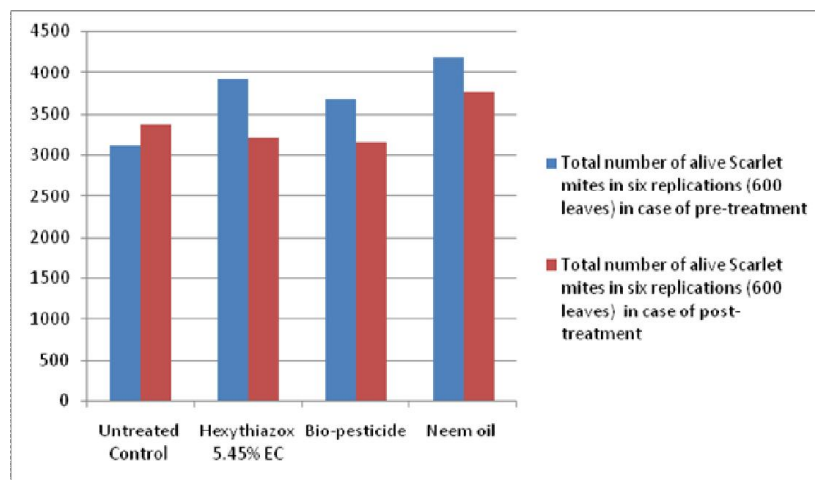
Treatment	Name of the treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of post-treatment	Difference of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment and post-treatment	Percentage(%) of increase or decrease
T1	Untreated Control	3126	3674	-548	-17.53
T2	Hexythiazox5.45% EC	3924	2796	1128	28.75
T3	Bio-pesticide	3683	2951	732	19.87
T4	Neem oil	4191	3544	647	15.44

**Table 3. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 10RP (1<sup>st</sup> Observation)**

Treatment	Name of the treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of post-treatment	Difference of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment and post-treatment	Percentage (%) of increase or decrease
T1	Untreated Control	4279	4597	-318	-07.43
T2	Hexythiazox5.45% EC	3864	3177	687	17.78
T3	Bio-pesticide	4612	4039	573	12.42
T4	Neem oil	4376	3924	452	10.32

**Table 4. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 10RP (2<sup>nd</sup> Observation)**

Treatment	Name of the treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment	Total number of alive Scarlet mites in six replications (600 leaves) in case of post-treatment	Difference of alive Scarlet mites in six replications (600 leaves) in case of pre-treatment and post-treatment	Percentage(%) of increase or decrease
T1	Untreated Control	4279	5061	-782	-18.27
T2	Hexythiazox5.45% EC	3864	2808	1056	27.33
T3	Bio-pesticide	4612	3769	843	18.28
T4	Neem oil	4376	3753	623	14.24

**Figure 3. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 14 (1<sup>st</sup> Observation)**

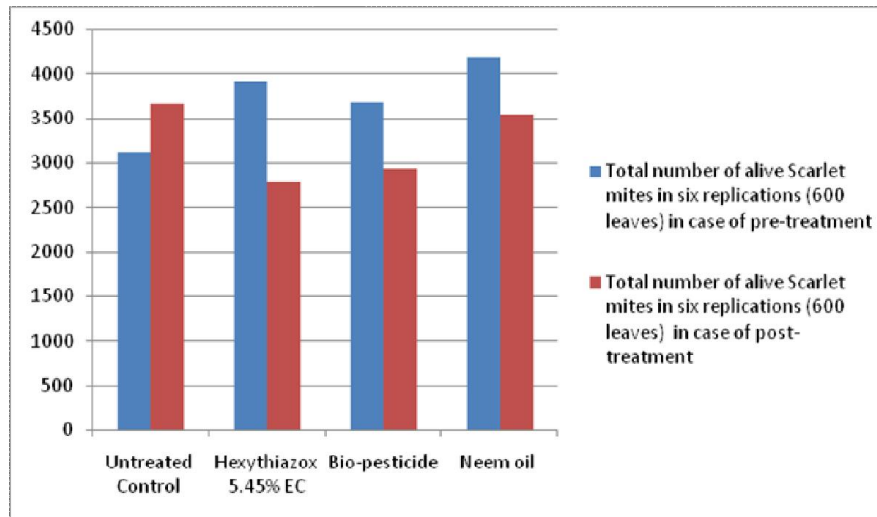


Figure 4. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 14 (2<sup>nd</sup> Observation)

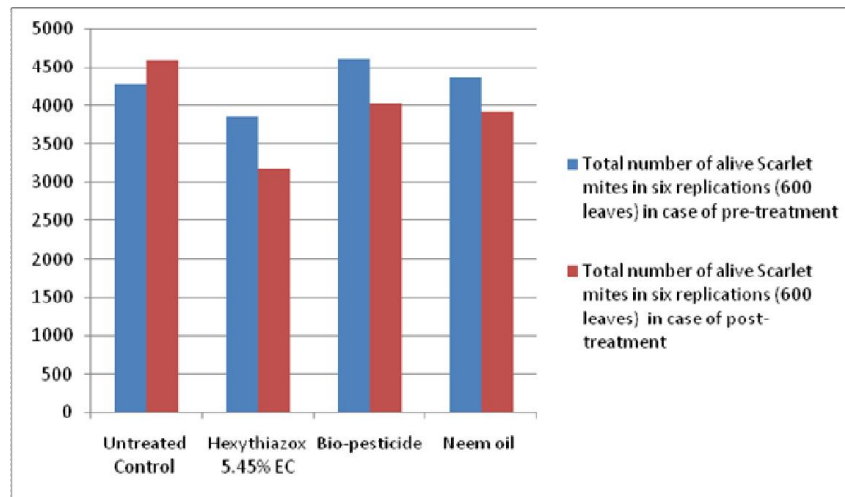


Figure 5. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 10RP (1<sup>st</sup> Observation)

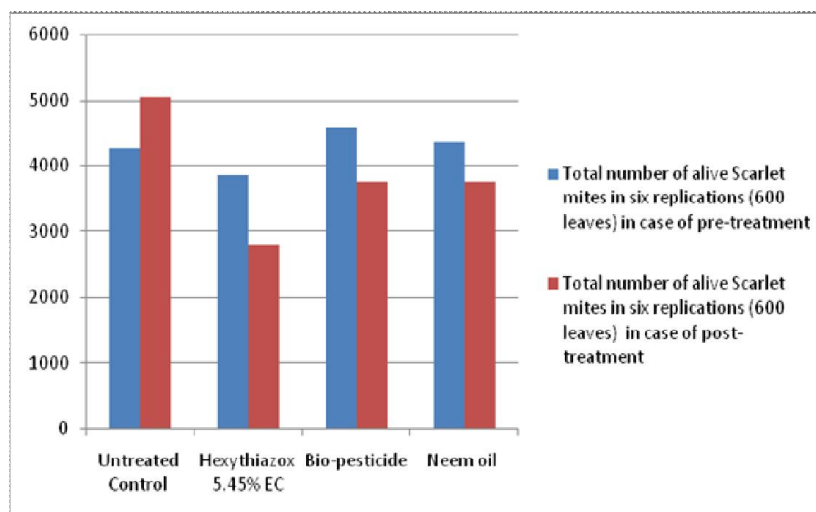


Figure 6. Comparison of pre-treatment and post-treatment alive Scarlet mites at Sukna Tea Estate Section number 10RP (2<sup>nd</sup> Observation)

## Conclusion

In two experimental locations the population of alive Scarlet mites against three pesticide treatments was more or less same. Among three treatments, Hexythiazox 5.45% EC was found to be most effective. Bio-pesticide and Neem oil were also effective to some extent. The increase in population of Scarlet mites was continuous which was observed in the first and second observations at both the locations in untreated controls. Against Hexythiazox 5.45% EC, the decreasing percentage of Scarlet mites population was 18.07% and 17.78% (1<sup>st</sup> observation) at Sukna Tea Estate section number 14 and section number 10RP. During (2<sup>nd</sup> observation) at both the locations, it was 28.75% and 27.33% which is most effective rather than other treatments. It was found that the population dynamics of Scarlet mites against bio-pesticide treatment decreased 14.01% and 12.42% (1<sup>st</sup> observation) respectively at Sukna Tea Estate section number 14 and section number 10RP. In case of 2<sup>nd</sup> observation the percentage of decreasing population was 19.87% and 18.28% respectively at both locations. It was also observed that Neem oil based formulation containing Azadirachtin 0.03% decrease 10.04% and 10.32% (1<sup>st</sup> observation) population of alive Scarlet mite at both locations. 2<sup>nd</sup> observation shows that 15.44% and 14.24% of alive Scarlet mites population was decreased at both locations.

## REFERENCES

- Anonymous, 1994. Pest of Tea in North-East India and their control. Tea Research Association. Tocklai Experimental Station. Page no.: 01-208.
- Barthakur, M. and Singh, K. 2002. Biology and Control of Tea and Shade Tree Pests. Notes on Field Management. Page no.: 171-192.
- Barua, D. N. 2008. Pest and diseases. Science and Practice in Tea Culture. Tea Research Association. Page no.: 545-576.
- Kabir, S. E. and Das A. P. 2015. Pest Control. Tea Cultivation in the plains of North East India. Page no.: 154-197.
- Muraleedharan, N. 1991. Pest Management in Tea. UPASI-Tea Research Institute. Page no.: 01-118.
- Sarkar, S. and Kabir, S.E. 2016. Studies on the impact of commonly used herbicides on beneficial soil microbes in Terai tea plantation, West Bengal, India. Annals of plant sciences. Volume 5.1. Page no.: 1254-1260.
- Singh, I. D. 2005. Plant Protection. The Planter's Guide to Tea Culture and Manufacture. Page no.: 109-153.
- Sinha, M. P. 2010. Pest Control in Tea. World Tea Production and Manufacturing. Page no.: 252-273.

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