

INTRODUCTION

Tea is a major cash crop as well as an export commodity of Bangladesh meeting almost the entire domestic demand of this cheapest health beverage. Now, there are 166 tea estates having about 61,605 hectare of tea plantation producing about 85.05 million kg of finished tea per annum with an average yield of about 1,530 kg per hectare in Bangladesh (BTB, 2017).

Tea plants are subjected to the attack of several insect, mites, nematodes, fungal pathogens and weeds. In Bangladesh tea, so far 25 insects, 4 mites and 10 species of nematodes have been recorded (Ahmed, 2005). Among them, Tea mosquito bug, Red spider mites, Thrips, Looper caterpillar, Termite and Nematodes are the major pests of tea. About 10-15% of its crop could be lost by various pests particularly insects, mites and nematodes. Chemical pesticides have been used for a long time to control these maladies, but have serious drawbacks, such as direct toxicity to beneficial insects, fishes and human being; pesticide induced resistance, health hazard and increased environmental, social costs and undesirable pesticide residue in made tea. Therefore, managing these pest populations within economic threshold level is important for which application of pesticides becomes imperative in Integrated Pest Management (IPM) system. So, attempts were made to evaluate different components of integrated pest management (IPM) strategy for the major insect pests i.e. tea mosquito bug, red spider mite, thrips and looper caterpillar in tea in Bangladesh.

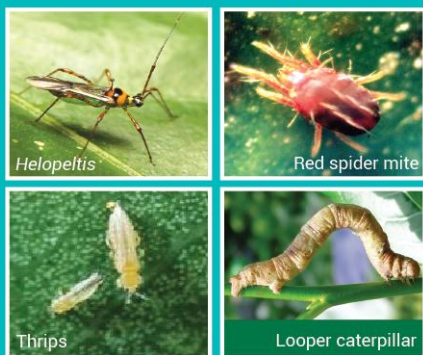


Plate 1. Major pests of tea in Bangladesh.

A sub-project entitled "Integrated Pest Management (IPM) Approaches to Major Pests of Tea for Sustainable Tea Production" under Competitive Research Grant (CRG) of NATP-2 of PIU, BARC was initiated by Bangladesh Tea Research Institute to minimize the load of synthetic pesticides through a sustainable management practice along with consumers' safety by adopting IPM practices during May 2017 to September 2018.



Plate 2. Components of IPM package for major pests of tea



Plate 3. Experimental plot at BTRI, Srimangal & Panchagarh.

Sub-project goal: Minimizing the load of synthetic pesticides through a sustainable management practice along with consumers' safety

Sub-project objective(s):

a. To develop integrated pest management (IPM) strategy by incorporating all the suitable methods in a compatible manner for the management of major pests of tea for sustainable tea production in Bangladesh.

b. To introduce a permanent control measures with safety of natural enemies and reducing comparative use of synthetic pesticides to keep the surroundings healthy.

c. To minimize the risk of pesticide residue in made tea through utilization of IPM practices and ensure consumers safety.

Research highlight/findings

● A pest management laboratory with modern scientific equipments has been established at BTRI sub station, Panchagarh.

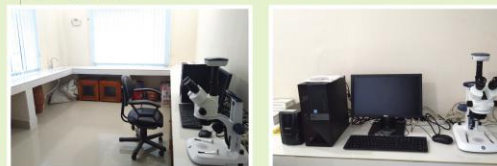


Plate 4. Newly established pest management laboratory.

● An IPM field laboratory has been established at BTRI sub station, Panchagarh.



Plate 5. Newly established IPM field laboratory.

● Resistant or susceptible clones (BT1-BT21) against major pests of tea have been screened out. BT1, BT2 & BT15 clones were found less attacked by Helopeltis. BT5, BT6 & BT17 clones were found less attacked by Red spider mite. BT3, BT4, BT8, BT9, BT12, BT13, BT14, BT15, BT18, BT19, BT20 were found less infested by thrips.



Plate 7. Screening of BTRI released tea clones.

● Solar power light traps, yellow & blue sticky traps as mechanical control measures against major pests of tea have been developed. Solar power light trap & yellow sticky trap captured greater number of thrips, *S. dorsalis* and moths of looper caterpillar.



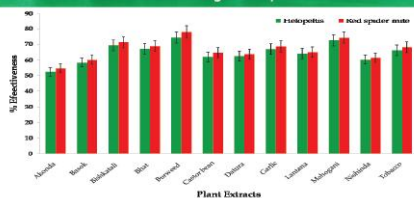
Plate 8. Solar light trap, yellow & blue sticky trap.

● Strong based IPM techniques in tea such as plucking, pruning & field sanitation as cultural control measures against major pests of tea have been developed. Result revealed that light pruning (LP) significantly reduced the infestation of pests of tea other than skiff pruning. Seven days plucking round significantly reduced the incidence of Helopeltis. Weeding significantly reduced the infestation of red spider mite in tea.

Plate 6. Some cultural control measures (pruning, plucking, weeding) against major pests of tea.



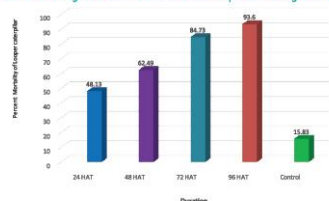
- Some indigenous plant extracts against major pests of tea have been evaluated. Akonda (*Calotropis procera*), Basok (*Adhatoda vasica*), Bishkatali (*Polygonum hydropiper*), Bhat (*Clerodendron infortunatum*), Burweed (*Xanthium strumarium*), Castor bean (*Ricinus communis*), Datura (*Datura metel*), Garlic (*Alium sativum*), Lantana (*Lantana camara*), Mahogani (*Swietenia mahagoni*), Nishinda (*Vitex negundo*) and Tobacco (*Nicotiana tabacum*) @ 5.0, 7.5, 10.0% have strong insecticidal properties and can be used as an alternative to chemical pesticides for controlling *Helopeltis*, Red spider mite & thrips.



- Bio-control agent *Bracon hebetor* as larval parasitoid against Looper caterpillar has been evaluated. *Bracon hebetor* as a larval parasitoid @ 5 adults/30 larvae is effective against Looper caterpillar infesting tea.



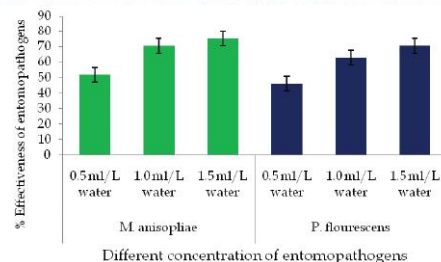
Plate 10. Bio-control agent *Bracon hebetor* as larval parasitoid against Looper caterpillar.



- Some commercial entomopathogens (*Metarhizium anisopliae*, *Pseudomonas fluorescens*) against Red spider mite and *Bacillus thuringiensis* against Looper caterpillar have been evaluated. *Metarhizium anisopliae* and *Pseudomonas fluorescens* @ 1.0 ml/L showed the toxic effect on red spider mite, *Oligonychus coffeae* infesting tea and significantly reduced the mite population. Bacterial formulation of *Bacillus thuringiensis* @ 2.0g/L showed the toxic effect on looper caterpillar in tea and significantly reduced the pest population.



Plate 11. Two commercial entomopathogens against Red spider mite.



CONCLUSION

Thus, the developed strong based IPM strategies of major pests of tea will be easily adopted by the planters in large scale for their high return of the production of pesticide free, high value commodities for domestic as well as export markets. Habitat management, exploitation of hitherto under used natural enemies such as predator, parasitoid & entomopathogen, use of the novel biorational pesticides, management of pesticides to extend their useful life, proper use of semiochemicals and the use of information technology are some major tactics to be employed in the IPM programme in tea in the coming years.



Project ID-337

INTEGRATED PEST MANAGEMENT (IPM) APPROACHES TO MAJOR PESTS OF TEA FOR SUSTAINABLE TEA PRODUCTION

A CRG sub project under NATP phase-2

Project Duration
May 2017 to September 2018



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Implemented by



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Srimangal-3210, Moulvibazar
&
Bangladesh Tea Research Institute
Panchagarh Sub Station

Funded by



Bangladesh Agricultural Research Council (BARC)
Farmgate, Dhaka
September 2018