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Natural enemies of tea mosquito bug (*Helopeltis* spp.), a devastating pest of cashew

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Introduction

Cashew is an important commercial tree nut crop grown in tropical and sub tropical regions. More than 30 countries grow cashew and the major countries producing cashew are Vietnam, Brazil, India, Tanzania etc. Tea mosquito bug (TMB) is considered as a serious pest of cashew in most of the cashew growing regions. Tea mosquito bug comprises four species *viz*., *Helopeltis antonii* (TMB), *H. bradyi*, *H. theivora* and *Pachypeltis maesarum*. Among which, *H. antonii* is a major species infesting cashew. Tender shoots, inflorescence, immature nuts and apples at various stages of development are damaged by TMB. Feeding results in development of black necrotic lesions and drying (Fig. 1). A yield loss of 30-40 % can occur due to TMB (Devasahayam and Nair, 1986), during outbreak situations 100 % loss can also occur if management measures are not taken up. The co-existence of *H. theivora* and *H. bradyi* with *H. antonii* was found in the west coast of India (Sundararaju and Sundarababu, 1999) and in few other parts of India (Ambika and Abraham, 1984). As there is no resistant cashew variety for TMB, chemical management is presently followed for its management. Biological control efforts are also taken up to some extent.

Under field conditions, TMB population is regulated by several parasitoids, predators and also by pathogens. Brief details on natural enemies of TMB recorded in India and their status are presented here.

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Fig 1: Tea mosquito bug and its damage symptoms

A. Parasitoids

i. Egg parasitoids

Though the eggs of *Helopeltis* spp. are laid deep and concealed, they are often attacked by a range of parasitoids. The five egg parasitoids recorded on TMB are *Telenomus cuspis*, *Erythmeles helopeltidis*, *Chaetostricha* sp., *Ufens* sp. and *Gonatocerus* sp. (Sundararaju, 1996, Sundararaju and Sundarababu, 2000). All these species are solitary parasitoids. The highest parasitism up to 70.8 % by *Telenomus cuspis* during certain months in some places of coastal Karnataka was recorded (Sundararaju, 1996). Though *T. Cuspis* is a dominant species in cashew ecosystem of west coast of India, it is not predominant in TMB eggs collected from neem trees in east coast especially in Tamil Nadu. While, *Ufens* sp., is the dominant egg parasitoid recorded in the neem ecosystem of Tamil Nadu.

Attempts made for mass rearing of any of the egg parasitoids was not successful in laboratory since they are host specific and requires freshness in the plant host having TMB eggs for emergence, hence they cannot be exploited for TMB control at present.

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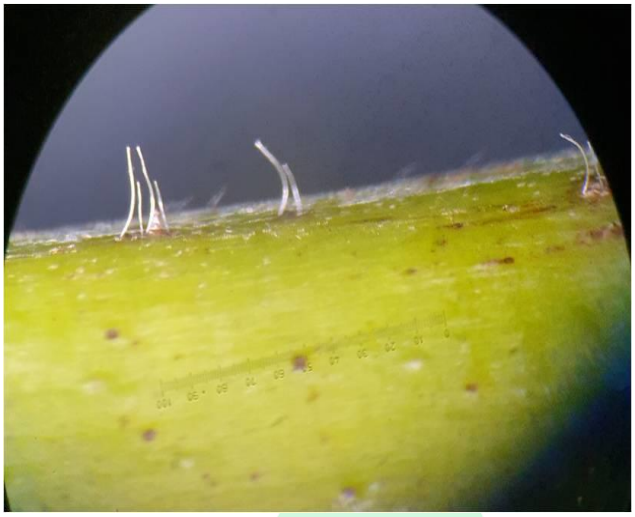

TMB eggs (inside plant tissue) with respiratory processes seen above

Chaetostricha sp. parasitizing TMB eggs

ii. Nymphal-adult parasitoid

A nymphal parasitoid of genus *Leiophron* (Hymenoptera: Braconidae) is also found to occur on TMB. Parasitism takes place during nymphal period, which death results in adults. But its occurrence is at very low intensity. A maximum parasitism of 1.3 % was recorded at Puttur cashew plantations of Karnataka, of which 59.4 % was observed during the month of June (Bhat and Srikumar, 2014).

iii. Entopathogenic nematode

Besides, an entomopathogenic nematode, namely *Agamermis paracaudata* Steiner (Mirmithida: Mirmithidae) has been reported from *H. theivora* on tea (Durgadas and Sambhunath, 1956) and subsequently also on *H. antonii* in cashew.

B. Predators

On the other hand, the predatory fauna reported in cashew plantations include a wide number of spiders, reduviid bugs, ants, praying mantids, mantispid flies, robber flies, pentatomid bugs etc which predate on several insect pests.

i. Spiders

Among these predators, spiders are the most abundant predators of arthropod-pest complex (Beevi and Mahapatro 2008) in cashew ecosystems and more than 120 species have been documented in Puttur region (Bhat *et al*., 2013). Major spider species include *Telamonia dimidiate, Oxyopes shweta, Argiope pulchella, Cyclosa fissicauda, Eriovixia laglazei,*

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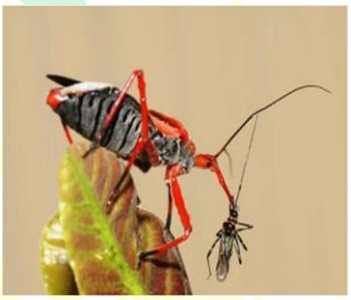
Neoscona mukerjeri, Nephila pilipes, Oxyopes sunandae, Bavia kairali, Carrhotus viduus, Epocilla aurantiaca, Hyllus semicupreus, Achaearanea mundula, Camariacus formosus and *Thomisus lobosus.*

ii. Reduviids

Reduviids are also commonly found in cashew plantations which serve as predators of pests including TMB. The common species include *Euagorus plagiatus*, *Sycanus* spp., *Sphedanolestes signatus*, *Irantha armipes*, *Occamus typicus*, *Cydnocoris gilvus*, *Endochus* spp., *Epidaus* spp., *Panthous bimaculatus*, *Rhynocoris* sp., *Rihirbus trochantericus* (Sundararaju, 1984; Vennison and Ambrose, 1990; Bhat *et al*., 2013).



A reduviid bud, *Panthous bimaculatus* predating *Helopeltis theivora*

iii. Praying mantids

Like reduviids, praying mantids also act as excellent predators of different pests including TMB. Predation of *H. theivora* by praying mantids has been reported (Mamun and Ahmed 2011). Among the 16 mantids recorded in cashew plantations of Puttur, Karnataka, *Ephestiasula pictipes*, *Hestiasula brunneriana*, *Euantissa pulchra*, *Humbertiella similis* and *Elmantis lata* are the common mantid species (Vanitha *et al*., 2017).

A nymph of a praying mantid *Euantissa pulchra*, predating *Helopeltis antonii*

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iv. Ants

Three species of ant genera, *viz. Tetraponera*, *Crematogaster* and *Oecophylla* were noticed as predators of *Helopeltis* spp. (Beevi and Mahapatro, 2008). The aggressive predators namely, red ants (*Oecophylla smaragdina*) actively predate on TMB and other pests of cashew, thus providing service to farmers in reducing the pest attack. In a field experiment, Sreekumar *et a*l. (2011) reported TMB population was significantly lower in plants colonized by red ants. Thus the cashew trees having good number of ant nests must be spared of insecticidal sprays so as to allow them to take care of pests in those trees besides conserving the ants.

v. **Chrysopids**:

Chrysoperla carnea (Neuroptera: Crysopidae) has been reported as predator of *H. theivora* by Das *et al*. (2010). Another green lacewing (*Mallada* sp.) consumed 10 to 11 nymphs/hr and the time taken to consume a single nymph varied from 3 to10 minutes.

vi. Predatory mites:

Adults of *H. antonii* and *H. theivora* were found to be infested by predatory mite, *Leptus* sp. attached by mouth parts to the ecdysial lines on the bugs head and thorax.

C. <u>Pathogens</u>

Aspergillus flavus Johann and *A. tamarii* (Eurotiales: Trichocomaceae) can cause infection to *H. antonii* (Sathiamma and Saraswathy, 1990, Satapathy, 1993). An entomopathogen, Beauveria bassiana Bals. (Hypocreales: Clavicipitaceae) was isolated from *H. antonii* infesting guava (Visalakshy and Mani, 2011) and was found effective to little extent against TMB in cashew during certain months. Field application of *Baeauveria bassiana* isolate during flushing and flowering period with concentration of 107 spores/ml is a potential approach for the management of TMB (Makawana *et al*., 2017).

Table 1: Seasonal incidence of important natural enemies of TMB

Natural enemies	Season of occurrence	Peak occurrence
Egg parasitoids	Throughout the year	July - February
Nymphal-adult parasitoid	December - August	June - August
Pathogens	November - February	December - January
Reduviids	Throughout the year	August - February

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Praying mantids	Throughout the year	July - January
Ants	Throughout the year	Throughout the year
Spiders	Throughout the year	Throughout the year

To conclude, natural enemies especially egg parasitoids and spiders play a key role in reducing the population of tea mosquito bug under field conditions. However, much research is needed to mass multiply these potential natural enemies and to develop suitable augmentation measures as biological control of tea mosquito bug in cashew remains as a challenge still now.

References

Ambika B and Abraham C C. 1984. Effect of tropical application of JH analogue on the development and survival of the cashew mirid bug *Helopeltis antonii* Sign. (Miridae: Heteroptera). Cashew Research and Development, Indian Society for Plantation crops, CPCRI. Kasargod, India, pp 111–5.

Beevi, P.S and Mahapatro, G.K. 2008. Species-spectrum and inter-relationship between ant and spider fauna in cashew agro-ecosystem. *Journal of Plantation Crops*, 36 (3): 375–81.

Bhat, P.S, Srikumar, K.K, Raviprasad, T.N, Vanitha, K., Rebijith, K.B. and Asokan, R. 2013. Biology, behaviour, functional response and molecular characterization of *R. trochantericus* Stal var. *luteous* (Hemiptera: Reduviidae: Harpactorinae) a potential predator of *Helopeltis* spp. (Hemiptera: Miridae). *Entomological News*, 23(4): 264–77.

Bhat, P.S., Srikumar, K.K. and Raviprasad, T.N. 2013. Seasonal Diversity and Status of Spiders (Arachnida: Araneae) in Cashew Ecosystem. *World Applied Sciences Journal* **22**(6): 763–70.

Bhat, P.S. and Srikumar, K.K. 2014. Occurrence of Parasitoid, *Leiophron* Sp. (Hymenoptera: Braconidae), on Adults of *Helopeltis antonii* Signoret in Cashew. *Journal of Horticultural sciences*, **9** (1): 103-105.

Das, A. 2010. Diversity of arthropod natural enemies in the tea plantations of North Bengal with emphasis on their association with tea pests. *Current Science* 99(10): 1 457–63

Devasahayam, S. and Nair, C.P.R. (1986). The tea mosquito bug *Helopeltis antonii* Signorett on cashew in India. *Journal of Plantation Crops*, 14(1): 1-10.

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Durgadas, M. and Sambhunath, R. 1956. Occurrence of a mermethid worm parasite on *Helopeltis theivora* Waterhouse. *Current Science*, 2: 60–61.

Makawana, A.I., Hasmukh N. Leua, H.F. Patel, V.K. Patel, R.B. Patel and J.P. Makati. 2017. Cashew tea mosquito bug and its management. *Rashtriya Krishi*, 12 (2): 1-3.

Mamun, M.S.A and Ahmed, M. 2011. Integrated pest management in tea: prospects and future strategies in Bangladesh. *Journal of Plant Protection Sciences* 3(2): 1–13.

Satapathy, C.R. 1993. 'Bioecology of major insect pests of cashew (*Anacardium occidentale* Linn.) and evaluation of certain pest management practices'. Ph D thesis, UAS, Bangalore, p 224.

Sathiamma, B. and Saraswathy, N. 1990. Mycosis on tea mosquito, *Helopeltis antonii*. *Indian Journal of Entomology*, 52: 516.

Sreekumar, K.M, Vasavan, N., Madhu, S., Sijila, J., Sreedharan, M. P and Sreelekha, S. 2011. Managing tea mosquito bug in cashew by augmenting red ants. *Journal of Plantation Crop*, 39(1): 119–22.

Sundararaju, D. and Sundarababu, P.C. 1999. *Helopeltis* spp. (Heteroptera: Miridae) and their management in plantation and horticultural crops of India. *Journal of Plantation Crops* 27: 155–74.

Sundararaju, D. 1984. Cashew pests and their natural enemies in Goa. *Journal of Plantation Crops*, 12: 38–46.

Sundararaju, D. 1996. 'Studies on *Helopeltis* spp. with special reference to *H. antonii* Sign. in Tamil Nadu.' Ph D thesis, TNAU, Coimbatore, p 210.

Sundararaju, D. and Sundarababu, P.C. 2000. Egg parasitoids of neem mosquito bug from cashew. *Cashew*, 14 (1): 32–4.

Vanitha K., P.S. Bhat and T.N. Raviprasad. 2017. Mantid fauna of cashew plantations, seasonal occurrence and biology of few species. *Indian journal of plant protection*, 45 (4):

Vennison, S.J. and Ambrose, D.P. 1990. Biology and behaviour of *Sphedanolestes signatus* Distant (Insecta: Heteroptera: Reduviidae) a potential predator of *Helopeltis antonii* Signoret. *Uttar Pradesh Journal of Zoology*, 10: 30–43.

Visalakshy, P.N.G. and Mani, M. 2011. Record of *Beauveria Bassiana* on tea mosquito bug, *Helopeltis antonii* Signoret in guava ecosystem. *Journal of Biological Control*, 25(2): 149–51.