



Management of Tea Mosquito Bug (TMB)– major pest of cashew

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Introduction

Tea Mosquito Bug (TMB) *Helopeltis* spp. (Hemiptera: miridae) is one of the major pests of cashew affecting its tender shoots, panicles, nuts and apples. Both nymphs and adults feed by sucking the plant parts, injecting polyphenol oxidase (salivary enzymes). Typical feeding damage by *Helopeltis* spp. appears as a discolored necrotic area or a lesion around the point of feeding. The infestation by TMB results in a burnt appearance of the trees. Four species of TMB, *Helopeltis antonii* Signoret, *Helopeltis bradyi* Waterhouse, *Helopeltis theivora* Waterhouse and *Pachypeltis maesarum* Kirkaldy are found in India. Among them, *H. antonii* is the dominant species. Each insect can damage up to 3 or 4 shoots or panicles leading to heavy loss in yield. Under outbreak situations, a damage of 25-30 per cent and even 100 % may be expected.

Biology

The adult bugs are slender, elongate, 6 to 8 mm long, reddish brown in colour with a black head, red thorax and black and white abdomen. Colour variation among the adults has been reported. A pin like, knobbed scutellar process occurs dorsally in both the nymphs and adults except in the first instar nymphs.

The pre-oviposition and oviposition periods ranged from 3 to 5 days and 5 to 10 days, respectively. More than 75 per cent of the eggs are deposited during the first half of oviposition period. The presence of sex pheromone in females of TMB has been demonstrated. The eggs are inserted into tender shoots; stalk of inflorescence and on the leaf midrib and petioles, either singly or in groups of 2 to 6. Presence of a pair of minute silvery hair like unequal chorionic processes indicates the presence of an egg. The five nymphal instars are completed in 8 to 13 days. Adults live for about 5 to 18 days and the total life cycle is 20 days. A mass culture technique for TMB has been standardized using cashew shoot as a host material.



Host range

TMB is polyphagous in habit and the nymphs and adults of feed on a wide variety of crop plants such as eucalyptus, mahogany, neem, cocoa, cinchona, guava, drumstick, black pepper, Singapore cherry, cotton, *Lawsonia inermis* (mehendi) and Allspice. During off season, the activity is mainly confined to these hosts and some weed plants like *Chromolaena odorata*, *Macaranga peltata*, *Melastoma malabathricum*, *Calycopteris floribunda* etc and the pest migrates to cashew during flushing, flowering and fruiting period of cashew. But, cashew is the most preferred host for TMB during the cropping season.

Distribution of the pest

The pest is distributed in most of the cashew growing regions of our country including Kerala, Karnataka, Goa, Maharashtra, Tamil Nadu, Andhra Pradesh, Gujarat, Chhattisgarh and Orissa. The pest is severe in West coast regions compared to East coast regions. Neem is the primary host of *H. antonii* especially in Tamil Nadu and southern parts of Karnataka and Andhra Pradesh. The pest spreads to cashew from neem in these areas, whereas in Maharashtra, Gujarat and Chhattisgarh it is confined mainly to cashew. Apart from *H. antonii*, *H. theivora*, *H. bradyi*, and *P. mesarum* are also causing similar damage to cashew in certain areas.

Nature and symptoms of damage

Both nymphs and adults suck the sap from tender leaves, shoots, panicles and immature nuts and apples by insertion of stylets which induces exudation of resinous gummy substance. Certain toxic secretions viz., proteolytic enzymes are released during feeding into cashew which lead to the typical formation of necrotic lesion symptoms around the point of stylet insertion by the bug. The lesions on shoots coalesce and ultimately result in drying of shoots/ shoot blight.

The infestation of inflorescence or panicles results in blossom blight. In certain endemic areas, most of the flushes dry up and the tree presents a scorched or burnt appearance. The immature nuts infested by TMB shrivel and dry up, while older nuts and apples develop a scabby appearance. Each insect can damage 3-4 shoots or panicles during its life cycle thereby, leading to heavy loss in nut yield.



Seasonality of pest incidence

The build-up of the pest commences during October - November synchronizing with the emergence of new flushes, after the cessation of the South-West monsoon. In general, the activity is minimum during the monsoon period (June - September). The population reaches a peak during January, when the trees are in full bloom. However, the activity of this pest is seen upto May in cashew. In young plantations, the pest is noticed continuously with a higher intensity during January till March.

Reactions of cashew types

Though all the germplasm accessions and related varieties are potentially susceptible to this pest, a cashew variety "Bhaskara", developed at Directorate of Cashew Research, Puttur escapes TMB damage due to non-overlapping of the cropping period with that of peak pest population. This variety is a selection identified during 1982 from severely of TMB infested location, at Goadengrem, Canacona Taluk, South Goa. This variety has mid-season flowering habit which aids in escaping from the attack of TMB under low to moderate outbreak situation. In case of pest damage on first batch of panicles due to TMB, subsequently, the trees of this variety flower again ensuring the chances of good yield during the same season.

Association of TMB with disease incidence

The fungal pathogens, viz., *Gloeosporium mangiferae* and *Phomopsis anacardii* have been reported to cause blossom blight in association with TMB. The feeding injury by the bug is one of pre-disposing factors for the infection and expression of die-back disease caused by *Colletotrichum gloeosporoides* and *Botryodiplodia theobromae*. When the dried shoot is split open, discolouration may be seen in matured softwood region indicating the manifestation of the fungal disease. A loss of 25 to 50 per cent nut in nut in yield has been reported from Karnataka, Maharashtra, Goa, Kerala and West Bengal due to combined effect of TMB and disease incidence.

Natural enemies of TMB

A total of four endo-parasitoids have been recorded parasitizing eggs of TMB in West coast regions of the country. They are *Erythmelus helopeltidis* Gahan. (Mymaridae) *Telenomus cuspis* Rajmohana and Srikumar (Scelionidae), *Chaetostricha* sp. (Trichogrammatidae) and *Gonatocerus* sp. nr. *bialbifuniculatus* Subba Rao. In the East coast, *Ufens* sp. is the only parasitoid observed on TMB eggs. However, the attempts to multiply these endo-parasitoids



under laboratory conditions were not successful, as these require large number of live TMB eggs alone for the development.

Around 120 species of spiders have been recorded in cashew plantations. The species like *Hyllus* sp., *Telemonia dimidiata*, *Oxyopes swetha*, *Phidippus* sp. and *Matidia* sp. have been observed predated on TMB. Besides, 17 species of reduviid bugs (including *Sycanus collaris* (Fab), *Sycanus galbanus*, *Sphedanolestes signatus* Dist., *Endochus inornatus* Stal., *Irantha armipes* Stal., *Panthous bimaculatus* and *Occamustypicus* Dist. have also been recorded as predators of TMB. Ants of the species *Crematogaster wroughtonii* Forel (Formicidae) and *Oecophylla smaragdina* Fabricius predate on nymphs of the pest. In addition, there are praying mantids, pentatomid bugs and other predatory insects that predate on TMB in cashew. Similarly, *Aspergillus flavus* and *A. tamarii* are reported as entomopathogens on TMB. Specific strain of *Beauveria bassiana* is also found causing mortality of TMB in certain months. However, detailed information on the effectiveness and methodology of application needs to be further developed.

Management using botanicals

A few plant products have been tested for their insecticidal activities against TMB. The aqueous emulsions of pongamia oil (3%) was found to cause high mortality of TMB up to 7 days after spraying followed by neem oil (3%). Besides, neem seed extract was also found to cause mortality of TMB but at less than 50% level. Similarly, seed extracts of *Annona reticulata* and *A. squamosa* were found to cause less than 50 % mortality of TMB, but not *Strychnos nuxvomica*. In another experiment, 5 % leaf extracts of *A. reticulata*, *Tephrosia vogelii* and *S. nuxvomica*, *Butea frondosa*, *Adathoda vasica* were found not effective against TMB. The commercial neem pesticides like Nimbecidine, Godrej Achook, Limanool and RD-9 Repellin at 1% were not effective in causing mortality of TMB, but have noticeable ovipositional deterrence effect similar to Pongamia oil and neem oil.

Insecticidal management

Proper surveillance for pest damage symptoms during flushing, flowering and fruiting period is very essential for the management of this pest as the pest has a short life cycle and can inflict serious damage in a few days. Whenever, the incidence of pest is noticed on 5-10 per cent of the flushes, the first round of pesticide spray should be given. The second round of the spray should be invariably completed within 2-3 week, if the TMB population still persists. If panicle damage is severe (> 50%) because of delayed insecticidal application, further sprays



will not result in improved yields. Hence, it is absolutely necessary to keep a constant surveillance of the pest especially during first month of flushing to initiate timely insecticidal intervention. The third spray can be a need based on in case pest population persists even after the second spray. Never should the same insecticide be used for spraying again for subsequent spray.

The present recommendation for chemical management of TMB is as follows:

First spray	: λ -cyhalothrin (0.003% i.e., 0.6 ml/lit) or Imidacloprid (0.6 ml/lit), or Acetamiprid (0.5 g/lit) or Profenophos (0.05% i.e., 1.5 ml/lit) - at flushing stage
Second spray	: λ -cyhalothrin (0.003%) or triazophos (0.05% i.e., 1 ml/lit) - at flowering stage.
Third spray (if pest persists)	: λ -cyhalothrin (0.003%), or profenophos (0.05 i.e., 1.5 ml/lit) - at fruit set stage

Though cashew is an insect pollinated crop, use of λ -cyhalothrin (0.003%) during the flowering stage did not affect the fruit set. Among the different insecticides, λ -cyhalothrin (0.003%) has higher benefit cost ratio (4.0 - 4.5). Whenever die-back disease is noticed, the affected shoots and branches below the site of infection should be pruned and destroyed. The cut surface should be protected with Bordeaux paste (10%). Spraying the canopy with Bordeaux mixture (1%) may be followed after this process.

Spraying should be done in the early hours of the day (7 - 11 am) or in the evenings (3 - 5 pm). Spraying should be taken up immediately when initial symptoms of TMB damage are noticed. If it rains immediately after spraying, the spraying has to be repeated and entire canopy area should be sprayed. Approximately, 6-8 litres of solution is required for a tree of 15 -20 years depending upon the canopy.

Empty chemical containers should be destroyed by puncturing / cutting into pieces and buried into the soil. Drinking water source should not be contaminated while spraying. Cloth mask



covering nose and mouth should be invariably used by the persons who attend to spraying of insecticide.

Recent approaches in semio-chemical pest management

Extensive trials on presence of sex pheromone system in TMB have indicated that the females release pheromones which induce quick and intense response from males in field condition. Hence, collaborative trials are in progress to characterize and synthesize the sex pheromone components for developing sex-pheromone traps which can be used to monitor and trap the insect population during the cropping season. This approach reduces the dependence on insecticides which lead to residue related issues and avoids any possibility of environmental pollution.

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