

RECORD OF WEED FLORA OF CASHEW PLANTATIONS AS HOSTS OF TEA MOSQUITO BUG

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INTRODUCTION

In cashew, four mirid species of Heteroptera viz., *Helopeltis antonii* Signoret, *H. bradyi* Waterhouse, *H. theivora* Waterhouse and *Pachypeltis maesarum* Kirkaldy are considered as tea mosquito bug (TMB) infesting leaves, shoots, panicles, immature fruits and nuts. In India, infestation by TMB alone results in loss of 40 % cashew yield (Sundararaju and Sundarababu, 1999). Besides pests, weeds are also problematic in cashew. According to Samantha et al. (2010) weeds cause huge reductions in crop yields as well as increase cost of cultivation, reduce input efficiency, interfere with agricultural operations, impair quality, act as alternate hosts for several insect pests, and nematodes. In cashew, up to 70 % yield reduction was observed due to weeds (Abdul Salam, 1993). In cashew plantations, two weed species viz., *Chromolaena odorata*, *Leea sambucina*, *Careya arborea* and *Lactuca runcinata* (Fam: Asteraceae) were previously reported as host plant for TMB (Sundararaju, 1984, Srikumar and Bhat, 2013). This indicates that weeds are not only competitors of cashew but also support a key pest thereby posing threat to cashew production. But there are no further reports on weed species supporting different TMB species, period of occurrence of particular TMB species on particular weed species, their spread, extent and nature of damage. Since TMB is a low density serious pest of cashew having fast devastating capacity, there is a need for continuous watch on occurrence of TMB on weeds of cashew plantations so as to monitor TMB population and to time management strategies. Hence, the present study was undertaken to record the weeds of cashew plantations that harbour different species tea mosquito bug, their season of occurrence and the extent of infestation.

MATERIALS AND METHODS

Random surveys were undertaken in cashew plantations of 130 ha at Puttur and Shantigodu of South Karnataka, India located at 12.45° N, 75.4° E; 90 m a.s.l. during 2012 and 2013 to record the weed species serving as hosts for different TMB species. These regions are located between the West coast and the Western Ghats of India. The nature of weed flora is almost similar in both the places. A quadrat of 1 x 1 m was marked in 10 places/ha covering both inside as well as the border of cashew plantations of different age groups and the flora of weeds inside was observed randomly at weekly intervals for the presence of tea mosquito bug and its feeding damage. A minimum of 25 and a maximum of 200 plants in each weed species were observed during the survey. The period of occurrence of particular TMB species on particular weed species, nature and intensity of damage were recorded. Percentage of infested weed plants of each species was worked out by dividing the number of infested plants by total weed plants observed and multiplied by 100. The infested plant parts were dissected out under a stereo microscope to find out the eggs of tea mosquito bug. The representative TMB specimens and the weed species were identified using the available literature.

ABSTRACT

In cashew plantations, during 2012 and 2013, fourteen weed species belonging to eleven different families were recorded as hosts for a serious pest of cashew viz., tea mosquito bug (TMB) between July and February. Different species of TMB were recorded on weed species like *Terminalia paniculata*, *Getonia floribunda*, *Macaranga peltata*, *Chromolaena odorata*, *Melastoma malabathricum*, *Meremmia vitifolia*, *Solanum torvum*, *Cissus repanda*, *Strychnos nuxvomica*, *Ixora* sp., *Lantana camera*, *Leea* sp. and two ornamental plants viz., *Acalypha hispida* and *Acalypha wilkesiana*. Among them, euphorbiaceae plants were dominant represented by three species followed by combretaceae with two species. Highest TMB infestation was noticed during October on weeds like *C. odorata* (29 % of weed population), *M. peltata* (6 %) and *G. floribunda* (12 %). The dominant species of TMB, *H. antonii* was recorded on two weed hosts, while, *H. bradyi*, *H. theivora* and *P. maesarum* were recorded on one, nine and seven different weed species respectively. On weeds like *C. odorata*, *M. malabathricum*, *S. torvum*, *M. peltata* and *A. hispida*, occurrence of both *H. theivora* and *P. maesarum* was noticed. The species of TMB occurred on particular weed plant, extent of damage and period of occurrence are presented.

KEY WORDS

Cashew plantations
Tea mosquito bug
Weeds
Host plants

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RESULTS AND DISCUSSION

Generally, TMB population is extremely low during heavy rain (South-West monsoon) and occurs suddenly on cashew at high populations during September-October when it put forth new flushes. The present study identifies that, TMB also survive on an array of weeds from July onwards during which time cashew trees are yet to produce new flush, spends its initial life, multiplies and later move on to cashew trees during October. Thus, weeds serve as a bridge between dormant (June-August) and flushing period of cashew (September-October), providing suitable resources needed for TMB growth which subsequently leads to infestations in cashew trees. During the survey, fourteen weed species of eleven different families found in the cashew plantations were noticed as hosts for different species of tea mosquito bug. The weeds observed to support TMB are *Terminalia paniculata*, *Getonia floribunda*, *Macaranga peltata*, *Chromolaena odorata*, *Melastoma malabathricum*, *Merremia vitifolia*, *Solanum torvum*, *Lantana camera*, *Acalypha hispida*, *A. wilkesiana*, *Cissus repanda*, *Strychnos nux-vomica*, *Leea sp.* and *Ixora sp.* The number of weed species that support *H. antonii*, *H. bradyi*, *H. theivora* and *P. maesarum* are two, one, ten and seven respectively. These weeds were noticed to be infested by TMB from July to February. Among the weed species supporting TMB, weeds belonging to Combretaceae and Euphorbiaceae were dominant (Table 1). It was observed that even the very common exotic weed, *Lantana camera*, when grown among *C. odorata* was also found to be infested by *H. theivora*. Besides, the ornamental plants like *Acalypha hispida* and *A. wilkesiana* found in the survey area were also seen to support TMB during August. The period of occurrence of species of TMB on particular weed plant is presented in fig 1. TMB infestation reached maximum during October on weeds like *C. odorata* (29 %), *M. peltata* (6 %) and *G. floribunda* (12 %). Hence, monitoring the cashew plantations time to time over large areas is necessary to understand the host range and spread of

TMB.

Two common weed species viz., *T. paniculata* Roth and *Leea sp.* were found to harbour *H. antonii*, which is the predominant species of TMB found in India (Sundararaju et al., 2002; Srikumar and Bhat, 2012) that attracts attention. *H. antonii* eggs were seen on petioles (Fig 3a. and c.) and leaf midribs, and the hatched nymphs could complete its all nymphal stages and become adults in field condition. The typical damage symptoms include, formation of necrotic lesions around the point of stylet insertion by the bug and the lesions coalesced later. Damage was seen as black patches on leaves as well as shoot tips that dried subsequently (Fig. 2a). Each insect has got potential to damage atleast three to four tender shoots. *H. antonii* population were seen on these weeds even during panicle emergence and fruiting period of cashew indicating this weed also as preferred host next to cashew among other weed species.

Similarly, another weed of consideration is the widely

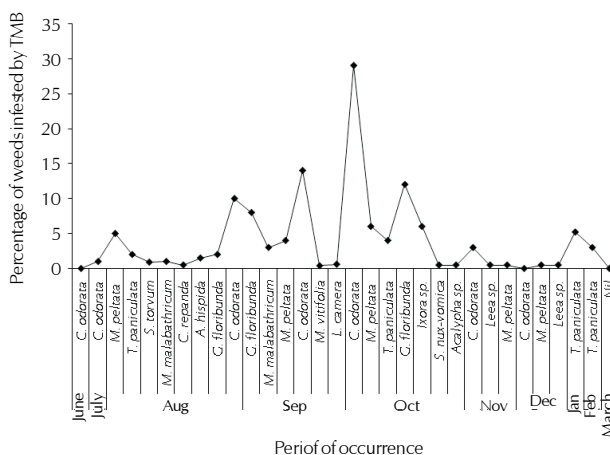


Figure 1: Percentage of weed population infested by tea mosquito bug during different months

Table 1: Occurrence of tea mosquito bug on weeds of cashew plantations qa

Sl. No	Weed species Family	Common name	Scientific name	Species of TMB
1.	Combretaceae	Kindal tree	<i>Terminalia paniculata</i> Roth*	<i>H. antonii</i> *
2.	Combretaceae	Pelawas plant	<i>Getonia floribunda</i> Roxb. (Lamk.)*	<i>H. theivora</i> *
3.	Convolvulaceae	Grape leaf wood rose	<i>Merremia vitifolia</i> (Burm. F.) Hallier F.*	<i>H. theivora</i> *
4.	Verbanaceae	Wild sage	<i>Lantana camera</i> L.*	<i>H. theivora</i> *
5.	Vitaceae	Pani Bel	<i>Cissus repanda</i> Vahl.*	<i>P. maesarum</i> *
6.	Leeaceae	-	<i>Leea sp.</i> *	<i>H. antonii</i>
7.	Loganiaceae	Quaker buttons	<i>Strychnos nux-vomica</i> L.*	<i>H. theivora</i> *
8.	Rubiaceae	West Indian Jasmine	<i>Ixora sp.</i>	<i>H. theivora</i>
9.	Asteraceae	Siam weed	<i>Chromolaena odorata</i> L.	1. <i>P. maesarum</i> * 2. <i>H. theivora</i>
10.	Melastomataceae	Malabar Melastome	<i>Melastoma malabathricum</i> L.	1. <i>P. maesarum</i> * 2. <i>H. theivora</i> *
11.	Solanaceae	Turkey berry	<i>Solanum torvum</i> Sw.*	1. <i>P. maesarum</i> * 2. <i>H. theivora</i>
12.	Euphorbiaceae	Copper leaf	<i>Acalypha wilkesiana</i>	1. <i>P. maesarum</i> * 2. <i>H. theivora</i>
13.	Euphorbiaceae	Chenille plant/ fox tail	<i>Acalypha hispida</i> Burm. F.	<i>P. maesarum</i>
14.	Euphorbiaceae	Chandada plant	<i>Macaranga peltata</i> (Roxb.) Mueller *	1. <i>P. maesarum</i> * 2. <i>H. theivora</i> *

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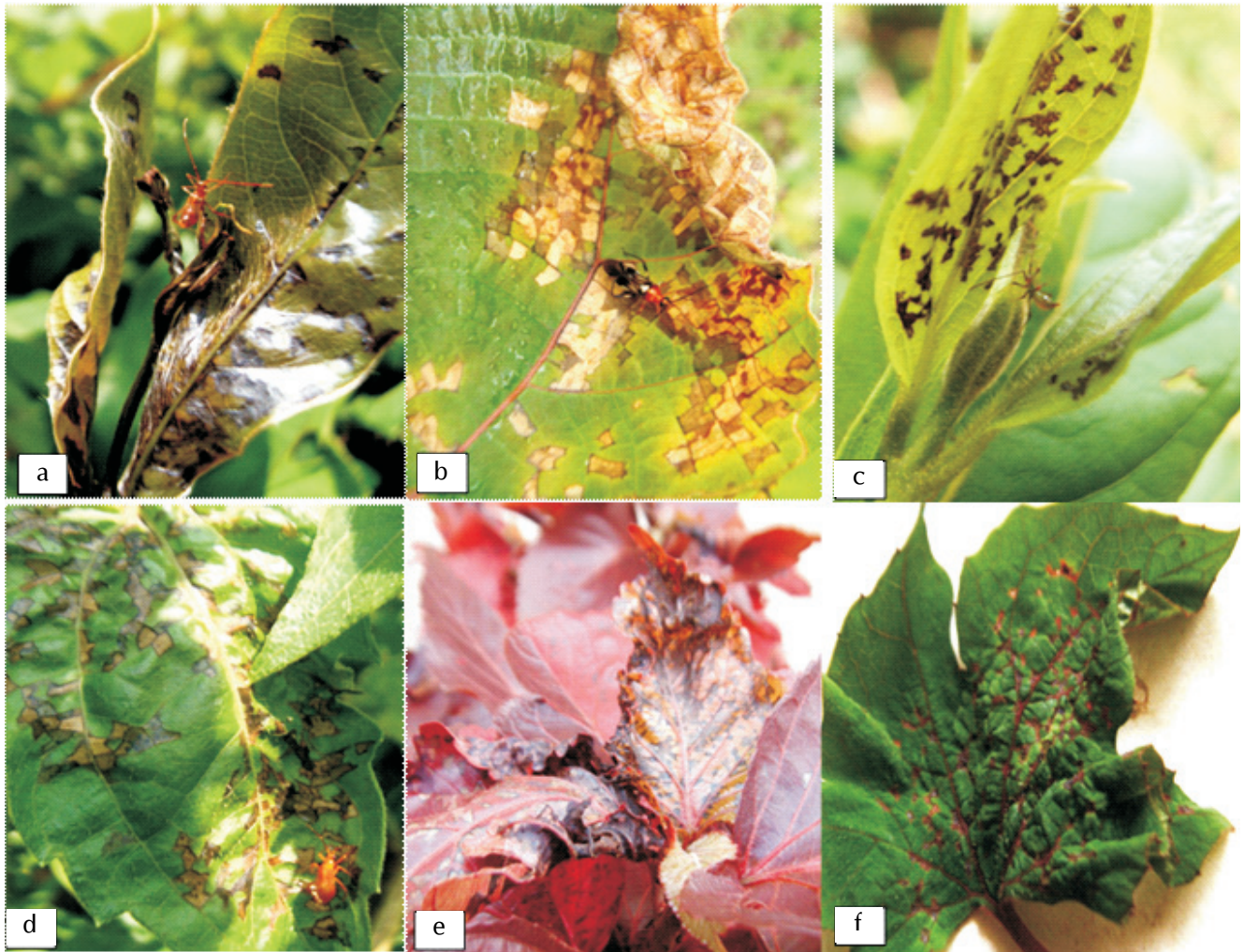


Figure 2: TMB damage, a. *H. antonii* nymph on *T. paniculata* b. *P. maesarum* adult on *M. peltata* c. *H. theivora* nymph on *G. floribunda* d. *P. maesarum* damage on *C. odorata* e. *P. maesarum* damage on *A. hispida* f. *H. theivora* damage on *M. vitifolia*

occurring weed, *G. floribunda* which was infested by *H. theivora* during August- October. *H. theivora* could complete its life cycle on this weed and around 6 to 18 shoot tips per plant were observed to be severely damaged by *H. theivora*. The damage occurred as black lesions on leaves and shoot tips and the affected shoots completely dried off.

Likewise, *M. peltata*, one of the most widely occurring early successional woody species of Western Ghats, India was found as a potential host for *P. maesarum* and *H. theivora*. Feeding by the bugs resulted in brown patches on the leaves that dried consequently and severe feeding resulted in crinkling and curling of the tender leaves (Fig. 2b). Severe occurrence of *H. theivora* on a most common weed, *C. odorata* was seen for the consecutive years. An egg of *H. theivora* laid in the shoot of this weed is shown in Fig 3b. In addition to *H. theivora*, severe infestation of *P. maesarum* was also noticed on *C. odorata* during August and September and infestation by *bradyi* was seen during November. Feeding spots appeared as black patches on tender leaves giving dried up appearance and severely affected shoots dried off. Eggs of *H. bradyi* hatched in 8 days under laboratory conditions on *C. odorata*

and nymphs were able to survive for 4-6 days. Among the weeds, *M. malabathricum* and *Ixora* sp. were previously reported as a host for *H. theivora* in tea ecosystems of North East India (Tocklai, 2010).

The dominant species of TMB, i.e., *H. antonii* was recorded on two weed hosts, while, *H. bradyi*, *H. theivora* and *P. maesarum* were recorded on one, nine and seven different weed species respectively indicating that the later two species have wide host range and high adaptability. Occurrence of both *H. theivora* and *P. maesarum* on *C. odorata*, *M. malabathricum*, *S. torvum*, *M. peltata* and *A. hispida* indicates that these two TMB species have more or less common niche requirement. In future, these two species, so far considered as less dominant in cashew may become serious if they multiply fast on various weeds and later spread on to cashew.

Hence, monitoring TMB population on weeds is imperative to trace the spread of TMB and also for efficient management in cashew. A few other cashew pests were also recorded on weeds, for example, *Inderbella quadrinotata* Walker (Metarbelidae) on *M. peltata* (Mathew, 1997); tasar silkworm *Antheraea mylitta* Drury (Shiva kumar & Shamitha, 2013) and

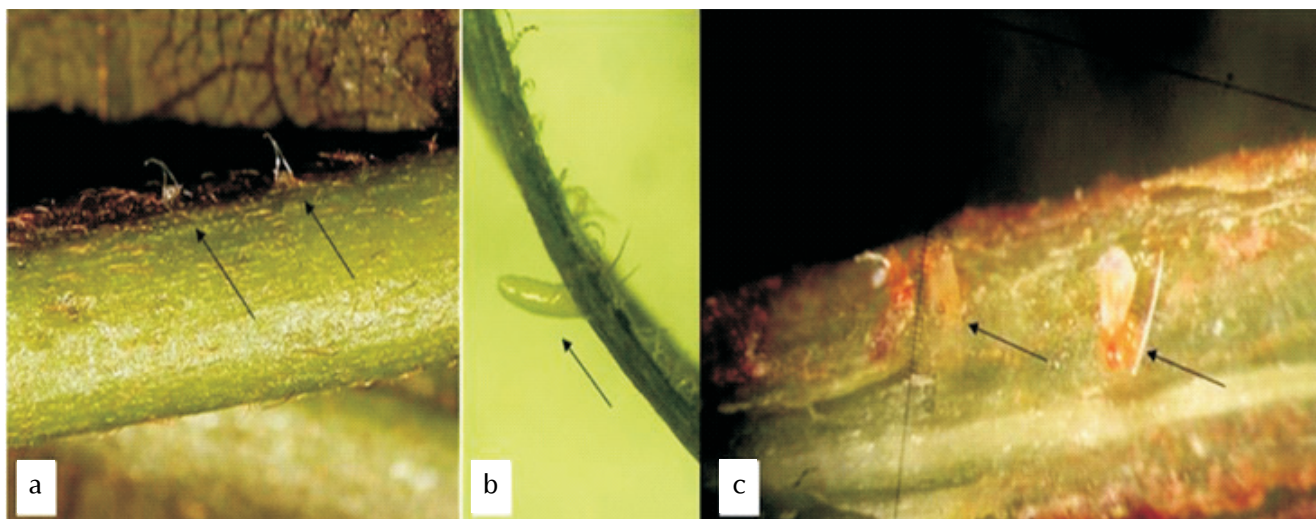


Figure 3: a. Eggs of *H. antonii* laid inside the petiole of *T. paniculata*, b. Eggs of *H. theivora* dissected out of the terminal shoot of *C. odorata* c. Hatched eggs of *H. antonii* seen inside the petiole of *Leea* sp

a chrysomelid beetle, *Monolepta longitarsus* (Sundararaju, 1984) on *T. paniculata*. Thus, weed management is also essential indirectly for pest management in cashew. In tea, removal of weeds like thoroughwort (*Eupatorium* sp.) and fragrant thoroughwort (*Chromolaena* = *Eupatorium odoratum*) was already in recommendation for effective control of *H. theivora* (Somnath and Mukhopadhyay, 2009). Hence, these weeds are of great concern and are to be monitored periodically to minimize the spread of TMB. This study stands as an indicator for monitoring the weeds for TMB incidence throughout cashew growing countries. A close understanding of the role of weeds in tea mosquito bug demographics may suggest opportunities to develop innovative ways in the perspective of IPM.

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