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INSECT PESTS ON COMMON WEEDS UNDER CASHEW PLANTATIONS IN PUTTUR REGION OF KARNATAKA

The present investigation has documented insect pests on 18 common weed species under cashew plantations in Puttur. Weeds are one of the major constraints in cashew plantations, especially under coastal regions. Depending on the severity of weed infestation in cashew plantations, yield reduction was observed to be between 60 and 70% (Abdul *et al.*, 1993). It is a fact that weeds could also serve as host plants to insect pests which infest main crop. In order to realize the yield potential of cashew, management of weeds is necessary. But, regular weeding is not practiced in most of the farmers' plantations and in most occasions, mechanical weeding by slashing of the bushy growth during harvesting period is done primarily to facilitate nut collection. Recently, Tocklai (2010) and Vanitha *et al.* (2014) had reported around 10 and 14 weed species, supporting a major pest known as tea mosquito bug in tea and cashew plantations, respectively. Present investigation aimed to record the common insect species occurring on weeds of cashew plantations and their natural enemies, if any.

Random surveys were undertaken at fortnightly intervals in cashew plantations covering 70ha at Puttur and Shantigodu of South Karnataka, India located at 12.45° N, 75.4° E; 90 m asl between 2012 and 2015. These regions are located between the West coast and the Western Ghats of India. The vegetation cover of the study site was dominated by cashew which was grown as a mono crop. Temperature in the area varied from 16.0°C to 39.0°C. The region received heavy rain during the Southwest monsoon between June and September with an annual mean rainfall of 3970mm. The relative humidity varied from 42 to 99%, generally above 90% from June-November. The soil type is lateritic. The nature of weed flora was almost similar in both the places. For the tree species like *Terminalia paniculata* and *Macaranga peltata*, observations were restricted to the young plants and the regrowth of slashed plants. The period of occurrence of insect species on particular weed, nature and intensity of damage were recorded. The weed species were identified by consulting the horticulturists and botanists and the insect species were identified by taxonomists at IARI, New Delhi and Calicut, Kerala.

Though monocot and dicot weeds were present in the cashew plantations, abundance of dicot weeds was more throughout the year. Present investigation resulted in recording of insect pests on 18 weed species of the cashew plantations (Table 1). Except perennial weed

species, most weeds were seen only during rainy season between June and December. Whenever slashing of weeds was taken up between December-January, subsequent weed population during summer (February-May) was very less. Among the weed species, *Chromolaena odorata*, *Mimosa pudica*, *Macaranga peltata*, *Clerodendron* sp., *Melastoma malabathricum*, *Terminalia paniculata*, *Getonia (Calycopteris) floribunda*, *Ixora* sp. and *Hyptica* sp. were found common and dominant.

In general, among the three years, insect pest infestation on weeds was high during 2013, compared to 2014 and 2015. The insect pest species recorded were belonging to Coleoptera, Hemiptera, Lepidoptera, Thysanoptera and Hymenoptera, among which hemipterans were dominant followed by coleopterans. The weed species like *T. paniculata*, *G. floribunda*, *M. peltata*, *C. odorata*, *M. malabathricum*, *Strychnos nuxvomica* and *Ixora* sp. were recorded to be infested by a major pest of cashew known as tea mosquito bug. Different species of tea mosquito bug infested different weed species (Table 1). Among the weed species, incidence of *H. antonii* was noticed only on *T. paniculata*. Tender shoots of *G. floribunda* were infested by *H. theivora* between Aug-Sep during 2013-14, while, *C. odorata*, *M. peltata* and *M. malabathricum* were infested by both *H. theivora* and *P. maesarum* during July-October. Earlier, Sundararaju (1996) has reported *C. odorata* as host for *H. theivora* and *Lactuca runcinata* for *H. antonii* in cashew eco system of Karnataka. Thus, these weed species being common in certain cashew growing locations require timely monitoring for TMB occurrence.

During May-June 2013, shoots of *T. paniculata* were found to be damaged by chrysomelid beetles namely, *Cryptocephalus bisexsignatus* and *C. sexsignatus* and by a leaf twisting weevil, *Paramacolabus discolour*. Apart from these insects, *Amblyrhinus poricollis*, *Eurybrachis* sp., *Oenospila flavifusata*, membracid bugs, lymantrid hairy caterpillar, *Hyposidra talaca* and *Orthaga exvinacea* also infested *T. paniculata* which are also pests of cashew (Table 1 and Fig. 1). Earlier, cashew pests like tasar silkworm, *Antheraea mylitta* Drury (Shivakumar and Shamitha, 2013) and chrysomelid beetle, *Monolepta longitarsus* (Sundararaju, 1984) were already reported on *T. paniculata*.

During July-October of all the three years sometimes up to January, development of leaf galls and

Table 1: Insect pests of weed species under cashew plantations and their seasonality.

Sl. No.	Weed species		Insect pest species	Infestation noticed during	Plant portion infested
1	<i>Terminalia paniculata</i> Roth. (Combretaceae)	Hemiptera	<i>Helopeltis antonii</i> Signoret* (Miridae)	July-Sep, Feb	Leaf, shoots
			<i>Eurybrachis</i> sp.* (Eurybrachidae)	May-June	Shoot
			<i>Oxyrachis</i> sp* (Membracidae)	June-Aug	Shoot
			Green hoppers (Cicadellidae) (sp. indet.,)	June-Aug	Shoot
			Cercopidae hopper (sp. indet.,)	June-Oct	Shoot
		Coleoptera	i. <i>Cryptocephalus bisexsignatus</i> Suffrian (Chrysomelidae)	May-June	Leaf
			ii. <i>C. sexsignatus</i> F. (Chrysomelidae)		
			<i>Amblyrhinus poricollis</i> Bohemen in Schönherr* (Curculionidae)	May-June	Shoot
			<i>Myllocerus</i> sp. (Curculionidae)	May-June	Leaf
			<i>Paramecolabus discolor</i> Fahraeus (Attelabidae)	May-June	Shoot
			Weevil (sp. indet.,) (Anthicidae)	May-June	Shoot
			<i>Schizotrachelus</i> sp.* (Brentidae)		
		Lepidoptera	<i>Oenospila flavifusata</i> Walker* (Geometridae)	July -Aug	Leaf
			Slug caterpillar (sp. indet.,)	May-June	Leaf
			Hairy caterpillar* (sp. indet.,) (Lymantridae)	May-June, Feb	Leaf
			<i>Hyposidra talaca</i> (Walker)* (Geometridae)	May-June	Leaf
			<i>Orthaga exvinacea</i> (Hampson)* Pyralidae	May-June	Shoot
Unidentified species	Unidentified shoot borer and leaf webber - (sp. indet.,)	May-June	Shoot and leaves		
2	<i>Getonia floribunda</i> Roxb. (Lamk.) (Combretaceae)	Hemiptera	<i>Helopeltis theivora</i> Waterhouse* (Miridae)	June-Oct	Leaf, stem, shoots
			<i>Coptosoma</i> (?) bug * (Plataspidae)	May-June	Shoot
			<i>Oxyrachis</i> sp. * (Membracidae)	March-Dec	Shoot
		Coleoptera	Buprestid beetle (sp. indet.,) (Buprestidae)	Aug-Oct	Stem bark
			<i>Celosterna scabrator</i> F. (Cerambycidae=Lamiidae)	Jun-Sep	Stem bark
			Adult <i>Xylotrechus quadripes</i> Chevrollet (Cerambycidae)	Nov-Dec	-
		Hymenoptera	<i>Megastigmus viggianii</i> Narendran & Sureshan (Torymidae)	Jul-Nov	Leaf
			<i>Systole calicopterae</i> (Eurytomidae)	Jul-Nov	leaf
		Thysanoptera	<i>Scirtothrips dorsalis</i> Hood * (Thripidae)	Jun-Nov	Leaf, shoots
			<i>Thrips hawaiiensis</i> (Morgan)* (Thripidae)	July-Oct	Leaf
			<i>Liothrips</i> sp. (Phlaeothripidae)	July-Jan	Leaf
			<i>Mesothrips</i> sp. (Phlaeothripidae)	July-Oct	Leaf
		Lepidoptera	Leaf defoliating larva (sp. indet.,)(Pterophoridae)	Aug-Oct	Leaf
			<i>Sylepta derogatta</i> F.* (Pyralidae)	Aug-Oct	Leaf
			Caterpillar (sp. indet.,) (Drepanidae)	Aug	Leaf
			Looper (sp. indet.,) (Geometridae)	July-Aug	Leaf
3	<i>Chromolaena odorata</i> L. (Asteraceae)	Hemiptera	TMB <i>H. theivora</i> * and <i>Pachypeltis maesarum</i> Kirkaldy* (Miridae)	July-Oct	Leaf, shoot tips
			Plataspid bug * (Plataspidae)	May-June	Shoot
			<i>Aphis</i> sp. (Aphididae)	May-Oct	Shoot, leaf
			Cicadellid hoppers (sp. indet.,) (Cicadellidae)	July-Oct	Shoot, leaf
		Lepidoptera	Mealy bugs (sp. indet.,) (Pseudococcidae)	Sep-Oct	Leaf
			<i>Hyposidra</i> sp.* (Noctuidae)	May-June	Leaf
			Leaf twisting weevil, <i>Hoplapoderus</i> (?) <i>hystrix</i> (F.), (Attelabidae)	July-Oct	Leaf
4	<i>Muntinga</i> sp. (Muntingiaceae)	Lepidoptera	Leaf roller (sp. indet.,)	May-June	Leaf
		Coleoptera	TMB (<i>H. theivora</i> and <i>P. maesarum</i> *) (Miridae)	Jul-Sep	Leaf
5	<i>Macaranga peltata</i> (Roxb.) Mueller (Euphorbiaceae)	Hemiptera	Mealy bug (sp. indet.,) (Pseudococcidae)	May-June	Shoot tip
		Hemiptera	TMB (<i>H. theivora</i> , <i>P. maesarum</i> *) (Miridae)	Aug-Oct	Leaf
6	<i>Melastoma malabathricum</i> L. (Melastomaceae)	Lepidoptera	Slug caterpillar (sp. indet.,)	Aug-Sep	Leaf
		Lepidoptera	Leaf roller, <i>Glyphodes</i> sp. (Crambidae)	Jul-Oct	Leaf
7	<i>Holarrhena antidysenterica</i> (Linn.) Wall. (Apocynaceae)	Lepidoptera	Leaf roller, <i>Glyphodes</i> sp. (Crambidae)	Jul-Oct	Leaf

Sl. No.	Weed species		Insect pest species	Infestation noticed during	Plant portion infested
8	Soap nut tree <i>Strychnos nuxvomica</i> L. (Loganiaceae)	Lepidoptera	<i>Macroglossum gyrans</i> Walker (Sphingidae)	Aug-Oct	Leaf
		Hemiptera	Pentatomid bug (sp. indet.), (Pentatomidae)	Aug-Oct	Shoot
9	<i>Ixora</i> sp. (Rubiaceae)	Hemiptera	TMB (<i>H. theivora</i>)* (Miridae)	Jul-Sep	Shoot tips
10	<i>Calotropis gigantea</i> (L). R. Brown. (Asclepiadaceae)	Coleoptera	Leaf blue beetle, <i>Corynodes peregrines</i> (Chrysomelidae)	May-Aug	Leaf, pods
			<i>Aulacophora foveicollis</i> (Lucas) (Chrysomelidae)	May-Aug	Leaf
		Hemiptera	Orange beetle, <i>Sebaethe indica</i> Chen. (Chrysomelidae)	May-Sep	Leaf
			<i>Erthesina fullo</i> (Thunberg)* (Pentatomidae)	May-Aug	Leaf
			<i>Aphis nerii</i> (Aphididae)	May-Aug	Leaf, pod
			Seed bug, <i>Leptocorisa acuta</i> (Thunberg) (Alydidae)	May-Aug	Pod, seed
11	<i>Cassia alata</i> L. (Fabaceae)	Hymenoptera	<i>Crematogaster</i> sp., (Formicidae-Myrmicinae)	Jul-Aug	Leaf
			<i>Tetraponera rufonigra</i> (Jerdon)(Formicidae-Pseudomyrmicinae)		
12	<i>Cassia</i> sp.	Lepidoptera	<i>Catopsilia crocale</i> Cramer (Pieridae)	Jul-Aug	Leaf
		Hemiptera	Plataspid bug (Plataspidae)	May-Jul	Leaf, pods, flowers
			<i>Anoplocnemis</i> sp. (Alydidae)	Apr- May	Pod
			<i>Acanthocoris scabrator</i> F. (Coreidae)	Apr- May	Pod
		Hymenoptera	<i>Meranoplus bicolor</i> (Guérin-Ménéville) (Formicidae-Myrmicinae)	May-Jun	Extrafloral nectarine, Pod
13	<i>Lantana camara</i> L. (Verbanaceae)	Lepidoptera	Hairy caterpillars (sp. indet.,)	Aug	Leaf
		Hemiptera	Aphids (sp. indet.,) (Aphidiade)	Jul-Aug	Leaf
14	<i>Passiflora foetida</i> L. (Passifloraceae)	Lepidoptera	<i>Acraea terpsicore</i> (F.) Nymphalidae	Jul-Aug	Leaf
15	<i>Buchanania lanzon</i> Spreng. (Anacardiaceae)	Coleoptera	<i>Monolepta</i> sp.*(Chrysomelidae)*	Jul-Aug	Leaf
16	<i>Clerodendron infortunatum</i> L. (Lamiaceae)	Hemiptera	<i>Erthesina</i> sp.* (Pentatomidae)*	May-Nov	Leaf, leaf buds
			Plataspid bugs* (Plataspidae)	May-Nov	Leaf
17	<i>Sida acuta</i> Burm. F. (Malvaceae)	Coleoptera	<i>Altica coerulea</i> (Oliver) (Chrysomelidae)	Jul	Leaf
18	<i>Spermacoce latifolia</i> Aubl. (Rubiaceae)	Coleoptera	<i>Oides bipunctata</i> (F.) (Chrysomelidae)	Jun-Aug	Leaf

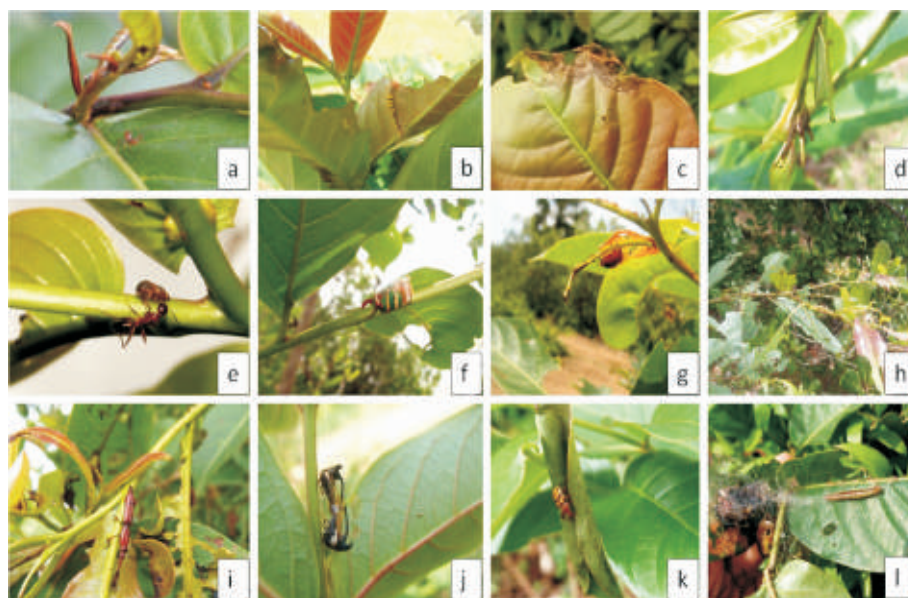


Fig. 1: Insect pests of *Terminalia paniculata*, a. *H. antonii*, b. Lymantrid caterpillar, c. *O. flavifusata*, d. *A. poricollis*, e. *Camponotus* sp. tending a nymph of *Oxyrachis* sp., f. *Eurybrachis* sp., g. *Cryptocephalus* sp., h. Damage by *Cryptocephalus* spp., i. *Schizotrachelus chizotrachelus* sp. weevil, j. *Oxyrachis* sp., k. *Paramacolabus discolor*, l. *Orthaga* shoot webber

*Also pest of cashew

shoot drying were noticed on *G. floribunda* (Fig. 2 e, f and g). The galls were sac like, sub-globose, and were unevenly thick. Some of the leaves almost turned into a mass of gall with hardly any portion of normal lamina left which later turned in to brown colour and dried. On leaves and tender shoots, *Scirtothrips dorsalis* Hood and *Thrips hawaiiensis* (Morgan) were noticed, while inside the leaf galls, two thrips species namely, *Liothrips* sp., and *Mesothrips* sp. were seen. Besides, wasps namely, *Megastigmus viggianii* and *Systole calycopterae* were also occasionally present inside the galls. It is to be noted that *S. dorsalis* and *T. hawaiiensis* also

damage cashew flowers and immature nuts (Sundararaju, 1984). Thrips were considered as one of the important gall makers in plants besides other organisms like midges and nematodes (Mani, 1973). According to Narendran and Sureshan (1988), *M. viggianii* could be inquiline or parasites inside the bud galls of *G. floribunda*. Likewise, other two species of *Megastigmus* viz., *M. sonneratae* Narendran and Girish Kumar sp. nov. and *M. dharwadicus* were recorded on leaf galls of *Sonneratia apetala* Buch. Ham. and Eucalyptus, respectively (Narendran *et al.*, 2010). Earlier, *Systole calycopterae* was found to be

associated as parasitoid of an unspecified psyllid in the leaf galls of *Calycopterus floribunda* (Narendran, 1994). However in the present study, psyllids were not encountered inside the galls. Besides galls, bark damage by a beetle, viz. *Celosterna scabrator* was also seen on *G. floribunda* (Fig. 2b). The adult feeds on the bark of young plants, causing death or breakage of the shoots. Similar kind of damage by *C. scabrator* was reported on young eucalyptus plants by Chatterjee and Singh (1968).

Shoots of *C. odorata* were found to be severely infested by *Aphis* sp. (Aphididae) during July-October

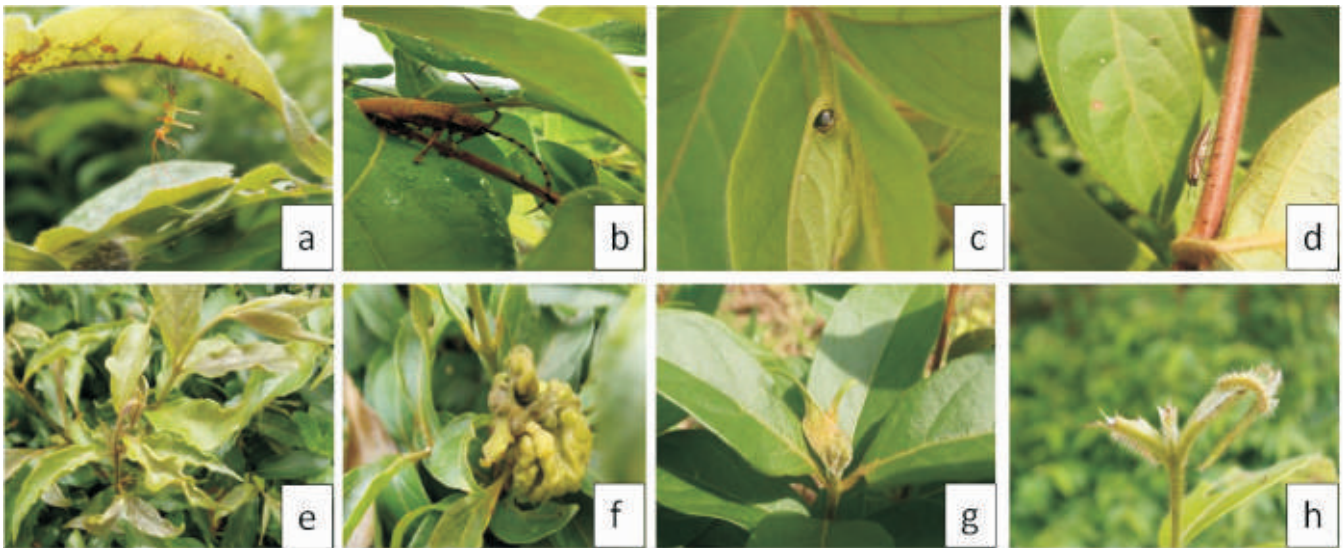


Fig. 2: Insect pests damage on *Getonia floribunda*, a. successful moulting of *H. theivora* nymph, b. *Celosterna scabrator* feeding on the bark, c. Plataspid bug, d. Buprestid beetle e. leaf curl by *Scirtothrips dorsalis* f. Leaf gall g. Shoot damage by *S. dorsalis* h. Unidentified Pterophorid caterpillars.

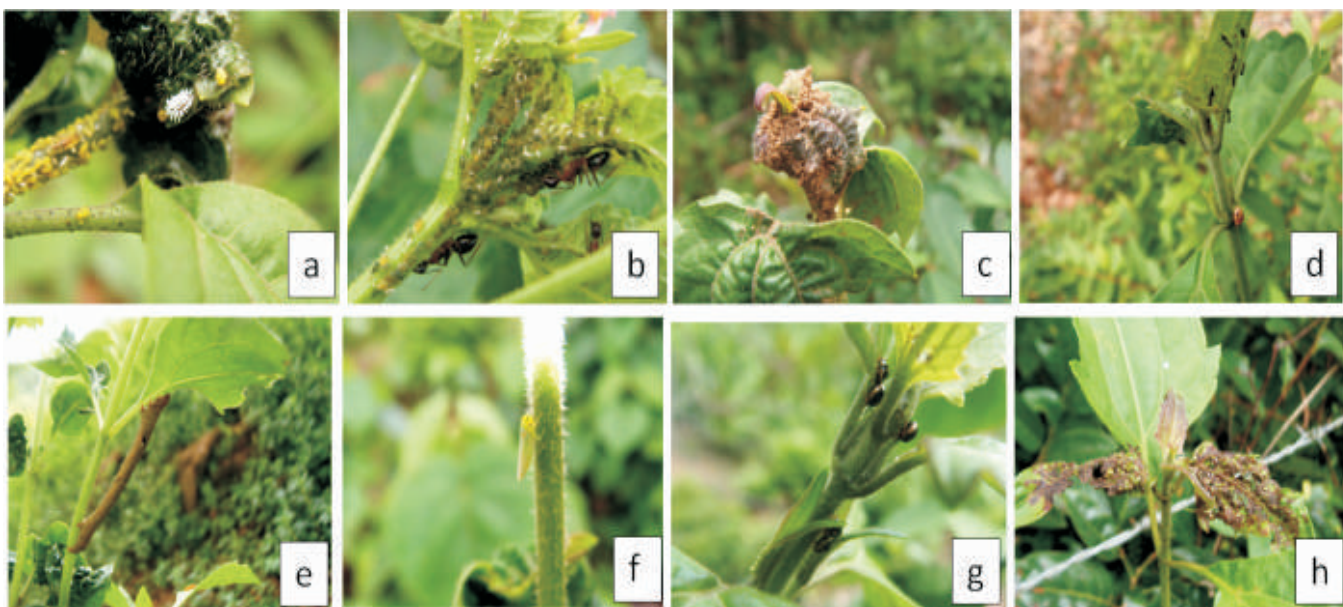


Fig. 3: Insect pests of *Chromolaena odorata*, a. *Aphis* sp. and its predators b. *Camponotus* sp. tending aphids c. Nest of *Monomorium* sp. on aphid infested shoot d. *Crematogaster* sp. tending aphids e. *Hyposidra talacaf* f. Cicadellid g. Plataspid bug h. *H. theivora* damage

which resulted in severe distortion of affected shoots. Upon severe infestation, plants remained stunted (Fig. 3 a and c). But, aphid population was controlled by predators involving coccinellids and syrphids as well as by parasitoids within a short period (Fig. 3 a and d). Besides, ants like *Monomorium* sp. and *Crematogaster* sp. were also commonly seen on aphid infested plants. In Nigeria, the ants, *Crematogaster africana* Mayr. were strongly associated with *Aphis spiraeicola* Patch infested *C. odorata* (Oigiangbe *et al.*, 2007). During the present study, the milk weed, *C. gigantea* was found to be infested by many insect pests like *Corynodes peregrinus*, *Sebaethe indica*, *Erthesina fullo*, *Spilostethus* sp., *Leptocoris acuta*, *Aphis nerii*, *Aulacophora foveicollis*, *Anosia chrysippus* etc between May-July. Likewise, caterpillars of *Catopsilia crocale* Cramer were found defoliating severely on *Cassia alata* during July- September during all the years. Up to 25 eggs were seen on a compound leaf and the caterpillars fed gregariously the tender leaves leaving alone the midrib (Fig. 4 I and j). Egg laden shoots were collected and kept in laboratory to record larval and pupal period. Hatched out

larvae were fed with fresh shoots of *C. alata*. It was found that larval and pupal period were completed in 8-9 and 6-7 days, respectively. Similarly on *Spermacoce* sp., severe defoliation was resulted by a chrysomelid beetle namely, *Oides bipunctata* during July every year (Fig. 4a).

Apart from these pests, certain ant species and their nests were noticed on certain weeds *viz.*, *Oecophylla smaragdina* on *Terminalia paniculata*, *Macaranga peltata*, *Clerodendron* sp.; *Crematogaster* sp. and *Tetraponera rufonigra* on *Cassia alata*; *Crematogaster* sp. on *Cassia* sp.; *Monomorium* spp. and *Crematogaster* sp. on *Chromolaena odorata*. Presence of domatia, floral nectar, extra floral nectarines and infestation by sucking pests like aphids might have attracted ants to these plants. It was reported that beccarian bodies in young leaves of *Macaranga* sp. provide lipid source (Itioka and Kawano, 2011). Interestingly, *Meranoplus bicolor*, *Tetraponera rufonigra* and *Crematogaster* spp. fed upon leaf, floral buds and flowers of *Cassia alata* and *Cassia* sp. and irregular feeding was noticed (Fig. 4). Ant herbivory has

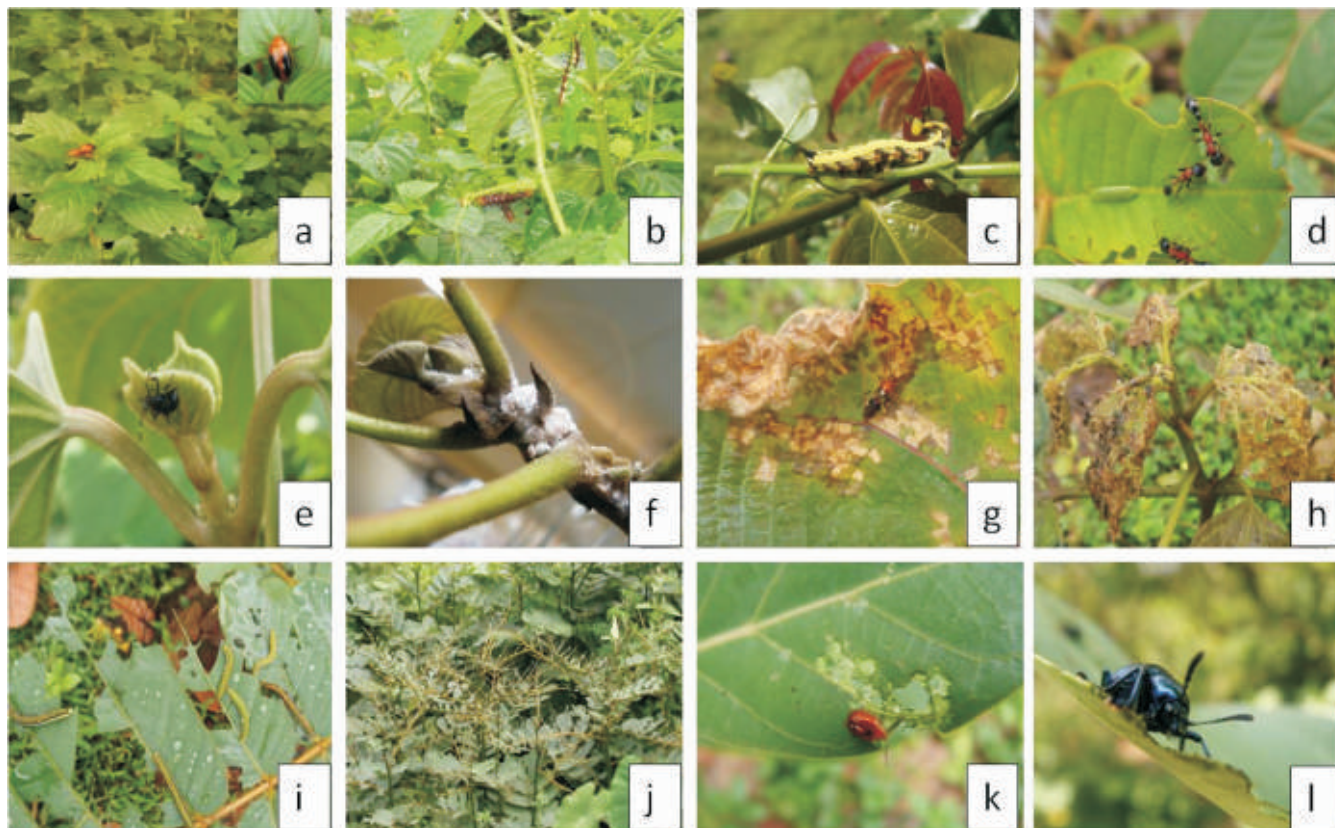


Fig. 4: Insect pests on other common weeds a. *Oides bipunctata* on *Spermacoce* sp., b. *Acraea terpsicore* on *P. foetida* c. *Macroglossum gyrans* on *S. nuxvomica* d. *Tetraponera rufonigra* defoliating *C. alata* e. *Erthesina* bug on *Clerodendron* sp. f. Mealy bug on *Clerodendron* sp. g. *Pachypeltis* damage on *M. peltata* h. Unidentified hairy caterpillars on *M. Peltata* i. *Catopsilia crocale* on *C. alata* j. Severe defoliation by *C. crocale* k. *Sebaethe indica* on *C. gigantea* l. *Corynodes peregrines* on *C. gigantea*.

Acknowledgement

Authors express their gratitude to Dr. V.V. Ramamoorthy and Dr. Sushila Joshi, Taxonomists, NPIB-Insect Biosystematics Lab, Division of Entomology, IARI, New Delhi for their identification service provided. Authors also thank Dr. Santhosh Sreevihar, TCN Trust for Animal Taxonomy for identifying the insect species and Dr. Rachana, NBAIR, Bengaluru for identifying thrips. Authors also thank the Director, DCR for the facilities provided.

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