

INSECT-PEST COMPLEX OF *FLEMINGIA SEMIALATA* ROXB - A BUSHY HOST FOR LAC CULTIVATION

S. C. MEENA, K. K. SHARMA, A. MOHANASUNDARAM, SWETA VERMA AND MD. MONOBRULLAH

Lac Production Division, Indian Institute of Natural Resins and Gums,
Namkum - 834 010, Ranchi
e-mail: scmeena.iinrg@gmail.com

KEYWORDS

Lac insect
Flemingia semialata
Insect-pest complex

Received on :
03.04.2014

Accepted on :
18.10.2014

*Corresponding
author

ABSTRACT

Flemingia semialata Roxb., a small bushy shrub is a valuable host plant for lac insect, *Kerria lacca* (Kerr), is mainly grown for *kusmi* lac cultivation. Globally, it is planted for conservation of soil and as a fodder crop. Not much information is available on insect-pests of *semialata* plant. Therefore, a study was planned to document the insect pests of *semialata* plant. A pest complex of about 32 insect pests belonging to six orders and 20 families has been recorded. All the major parts of this legume plant viz. pod/seed, leaf, stem and root were found to be infested but most of the insects were foliage feeders. Out of 32 insects-pests, 23 have been recorded as foliage feeders, 7 as sap suckers and one each as pod and root feeders.

INTRODUCTION

Lac, a natural resin produced by the tiny lac insect *Kerria lacca* (Kerr) (Hemiptera: Tachardiidae) is considered as an important income-generating produce for rural people in eastern India, particularly for the tribal communities residing in and around forest areas. India is the largest producer of lac in the world and the average national production of sticklac during last five years (2007-08 to 2011-12) is 16,249 tons. Contribution of Jharkhand in national lac production is about 57.20 per cent followed by Chhattisgarh (17.87%), West Bengal (7.82%), Madhya Pradesh (7.26%) and Maharashtra. These five states contribute around 95.45 per cent of the national lac production (Pal *et al.*, 2013). Lac cultivation is generally carried out on a limited number of indigenous tree species *i.e.*, *kusum* (*Schleichera oleosa* Oken), *palas* (*Butea monosperma* Taub), *ber* (*Ziziphus mauritiana* Lam) *etc.*, found scattered in forests and cultivable land. These plant species take years for establishment whereas bushy hosts like *Flemingia semialata* Roxb. (Family: Fabaceae) can be utilized for lac cultivation after one year of planting.

F. semialata is commonly known as Winged Stalked *Flemingia* (known as *Bara solpan*, *Ban chola* in Hindi and as *Marotonoya* in Oriya) but among the lac growers it is popular as *semialata*. Winged stalked *Flemingia* is an erect shrub with dense hairs on young branches. Leaves are trifoliate and flowering starts in August-September. It is a small bushy shrub and a valuable host plant for lac insect (*Kerria lacca* Kerr), is mainly grown for *kusmi* lac cultivation. Globally, it is planted for conservation of soil and as a fodder crop. *Semialata* is economically important because it is a bushy host of perennial nature suitable for *kusmi* lac cultivation. Lac cultivation can be done

by women as all operations can be carried out from ground level. It is suitable for integrated farming systems with fruit and vegetable crops without any problem. Also being a leguminous crop, it fixes the atmospheric nitrogen into the soil.

Semialata, not being a plant of commercial importance except for lac cultivation, information available on insect pests of *F. semialata* is meagre. Earlier reported pests of this crop include only *Lawana conspersa* by Mohanasundaram *et al.*, 2012. Looking on importance in lac cultivation, knowledge of the insect-pests of this shrub merits attention, so that resurgence of any one of the pests may not become a cause of serious concern, affecting adversely the lac production. Not much information is available on insect-pests of *semialata* plant. Therefore, this study was planned to record the insect pests of *semialata* plant so that preventive measures can be taken well in advance to avoid any crop damage.

MATERIALS AND METHODS

To document the insect pests of *semialata* plant, similar method was followed as adopted by Tara *et al.*, 2013. For this, Lac Integrated Farming System (LIFS) plot at Institute Research Farm of Indian Institute of Natural Resins and Gums, Ranchi was monitored regularly from July, 2011 to April, 2012 either daily or at an interval of 1-2 days for the incidence of insect-pests of *F. semialata*. The immature stages of the pests were collected for rearing in the laboratory. The collected adult insects were also killed in ethyl acetate, mounted either on insect pins or paper points depending on its size and labelled properly. They were preserved in boxes using naphthalene balls as

repellent. Soft bodied insects were preserved in 70% alcohol. The specimens were sent to Indian Agricultural Research Institute, New Delhi for identification.

RESULTS AND DISCUSSION

Thirty two insect-pests were recorded during the year on *semialata* plants of which 7 belonged to Hemiptera, 20 to Lepidoptera, 2 to Coleoptera and 1 each to Orthoptera, Isoptera and Diptera (Table 1). It was observed that the pest species infested different parts *viz.* pod/seed, stem, leaves of this legume plant but most of the insects were foliage feeders. Major pests which caused significant damage were *Hypena reactivitalis* Moore, *Spodoptera litura* Fabricius, *Amsacta lactinea* Cramer, *Dasychira mendosa* Hubner. Details pertaining to insect pests, plant parts infested and period of activity are given as under.

Foliage feeding pests

***Hyposidra talaca successaria* (Walker) (Geometridae: Lepidoptera)-Black looper**

In the earlier stages, it feeds by scraping the leaves resulting in small holes, later on it starts consuming the leaves making it leathery (Fig. 1). Its infestation was observed in the field from July and continued till January. It pupates amidst the leaves. Black inch worm or Black looper is a major defoliator of tea and it also feeds on teak (Parikh *et al.*, 2010), castor, lantana, litchi, silk cotton, *Shorea* spp., *Ficus* spp. etc.

***Archips epicyrta* (Meyrick) (Tortricidae: Lepidoptera) - Tortrix moth caterpillar**

Larva feeds on leaves leaving midribs only after feeding and makes it leathery. Infestation was noticed during August-October. Tortrix moth caterpillar also feeds on *Lantana camara*, *Duranta*, *Psidium guajava*, citrus, apple, apricot, pear, rose, mango, ragi, *Acacia nilotica*, *Bombax ceiba*, *Cassia fistula*, *Cedrela toona*, *Chrysanthemum*, coffee, *Cosmos*, *Dillenia indica*, *Dalbergia sissoo* etc.

***Argyroloce aprobola* (Meyrick) (Tortricidae: Lepidoptera) - Leaf webber**

The larvae roll or web the leaves of the food plant together, feeding on them within this shelter. It attacks during July-September. Leaf Webber / roller tortrix feeds on cashew (*Anacardium occidentale*), mango (*Mangifera indica*), lychee (*Nepheliu litchi*), guava (*Psidium guajava*), roses (*Rosa* sp.), lantana (*Lantana camara*), dahlia (*Dahlia* sp), mast tree (*Polyalthia longifolia*) and queens flower (*Lagerstroemia flosreginae*).

***Orgyia* sp. (Lymantriidae: Lepidoptera) - Rusty tussock caterpillar**

Larvae feed on soft young leaves of the plant *semialata* plant. Its infestation was noticed in the first week of October and continued up to January. Vapourer/Rusty tussock caterpillar is a polyphagous and feeds on a wide range of deciduous trees and shrubs, namely birch (*Betula*), *Crataegus*, lime (*Citrus*), *Prunus*, *Quercus*, *Rubus*, *Salix*, *Tamarix* and *Vaccinium*, *ber* etc.

***Anarsia ephippia* (Meyrick) (Gelechiidae: Lepidoptera) - Peach twig borer**

Larvae are primarily attracted to new shoot growth of *semialata*.

The larva of peach twig borer bores into the twig. Affected part, when examined, can be seen with the entry mark and some excreta. The growing twig turn black due to rotting and wilting, eventually kills the terminals. On young plants, repeated death of terminals causes stunted growth and reduced plant vigour. Larva attacks during July to December. Peach, apricot, apple, cherry, plum etc. are the other host plants infested by this pest.

***Hypena reactivitalis* (Moore) (Noctuidae: Lepidoptera) - Lantana defoliator**

Larvae feed on soft yellow leaves of the plant. First instar larvae scrap the epidermis of the soft leaves while the later stages start biting and chewing the leaves making holes in the leaf (Fig. 2). Its infestation was found during the month of July and continued up to November. Other species of Lantana defoliator caterpillar (*Hypena*) feeds on *Alnus rugosa*.

***Neostauropus (Stauropus) alternus* Walker (Notodontidae: Lepidoptera)-Lobster moth caterpillar**

Larva of this insect feeds on older leaves of *semialata* plant and it starts feeding on both sides of leaf one by one, leaving behind the midrib only and move ahead from basal part of leaf to the distal end by completely devouring the leaf. Its appearance in field started during November-December. Other hosts on which Lobster moth or Crab caterpillar feed are *Cajanus cajan*, tamarind, *Albizia lebbek*, *Albizia procera*, *Cassia fistula*, rose, mango, cocoa, coffee, *Acacia catechu*, *Grevillea robusta*, etc.

***Epicephala* sp. (Lithocolletidae: Lepidoptera) - Leaf miner**

Minute larvae feed on green matter of the *semialata* leaves between the epidermis resulting the infested part of leaf into a whitish papery appearance. Larvae can be seen easily inside the papery portion by keeping the affected portion in the direction of sun. Its infestation was observed on *semialata* plants from August onwards and continued till January. Other host plants of Leaf miner caterpillar are *Jatropha* and *Glochidion* etc.

***Pingasa ruginaria* (Guenee) (Geometridae: Lepidoptera) - Flower eating caterpillar**

Larvae feed on soft leaves of *semialata* from the outer margin of the leaf. Larvae resembles to the petiole of the leaves and it is very difficult to distinguish. It was noticed during November only. Measuring worm/ Flower eating caterpillar is polyphagous in nature and feeds on *Crotolaria*, *Lepisanthes rubiginosa* etc.

***Dasychira (Olene) mendosa* (Hubner) (Lymantriidae: Lepidoptera) - Tussock moth**

Larvae feed on *semialata* leaves from upper and outer margin and also newly emerged leaf (Fig. 3). Its infestation is noticed in the month of July and continues upto January. Tussock moths survive the winter as fuzzy egg masses and the female moths cement to their old pupal cases and cover with hairs. The females are flightless and cling to their cocoons where they deposit pearly-white eggs in a grey mass of body hairs bonded together with saliva. The eggs overwinter attached to the cocoon. Host plants are tea, castor, sorghum, sun hemp, maize, pigeon pea, lantana, mango, *ber*, sapota, brinjal, potato, coffee, cotton, teak, *Acacia catechu*, *Cannabis sativa*,

Table 1: Insect-pests of *Flemingia semialata*

Order	Family	Insect-Pest	Common name	Plant part affected	Period of Activity	*Degree of damage /Pest abundance
Coleoptera	Chrysomellidae	<i>Cassida circumdata</i> (Herst)	Green tortoise beetle	Leaf	September-October	Moderate
		<i>Aspidomorpha miliaris</i> (F.)	Tortoise shell beetle	Leaf	October-November	Moderate
Diptera	Agromyzidae	<i>Melanagromyza obtusa</i> (Malloch)	Pigeon pea pod fly	Seed	November - January	Moderate
Isoptera	Termitidae	<i>Odontotermes obesus</i> (Rambur)	Termite	Dry, hard stem, roots	June - August	Moderate
Hemiptera	Alydidae	<i>Leptocoris oratorius</i> (F.)	Rice earhead bug	Sap sucker on leaves	July - December	Moderate
	Aphididae	<i>Aphis</i> sp.	Aphid	Sap sucker on leaves	December - January	Moderate
	Cercopidae	<i>Poophilus</i> sp.	Spittle bug or froghopper	Sap sucker on leaves	July- November	Moderate
	Flatidae	<i>Lawana conspersa</i> (Walker)	White moth cicada	Sap sucker on leaves	August	Moderate
	Margarodidae	<i>Icerya aegyptiaca</i> (Douglas)	Egyptian fluted scale	Sap sucker on leaves tender stem	September- January	Moderate
	Membracidae	<i>Leptocentrus taurus</i> (F)	Cowbug/ thorn mimic treehopper	Sap sucker on leaves tender stem	October - December	Moderate
Lepidoptera	Plataspidae	<i>Megacopta cribaria</i> (Fabricius)	Globular stink bug/Lab-lab bug	Sap sucker on leaves	July - October	Moderate
	Arctiidae	<i>Amsacta lactinea</i> (Cramer)	Red hairy caterpillar	Leaf feeder	August-September	Moderate
	Crambidae	<i>Lamprosoma paeonalis</i> (Walker)	Moth legume web spinner	Leaf feeder	July- September	Moderate
	Gelechiidae	<i>Anarsia ephippia</i> (Meyrick)	Moth (minute) peach twig borer	Leaf bud	July - December	Mild
		<i>Brachmia</i> sp.	Sweet potato leaf roller	Leaf feeder	June-August	Moderate
	Geometridae	<i>Ectropis</i> sp.	Leaf eating twig caterpillar	Leaf feeder	September- December	Moderate
		<i>Gnophos tephrosiaria</i> (Moore)	-	Leaf feeder	mid-September-mid October	low
		<i>Hyposidra talaca successaria</i> (Walker)	Moth black inch worm	Leaf feeder	July - January	Moderate
		<i>Pingasa rugimaria</i> (Guenee)	Measuring worm/Flower eating caterpillar	Leaf feeder	November	Mild
		<i>Epicephala</i> sp.	Leaf miner caterpillar	Leaf feeder	August - December.	Moderate
		<i>Dasychira (olene) mendosa</i> Hubner	Tussock hairy caterpillar	Leaf feeder	July -January.	Moderate
		<i>Euproctis</i> sp.	Moth tussock moth	Leaf feeder	July- April	Moderate
		<i>Orgyia</i> sp.	Vapourer / rusty tussock caterpillar	Leaf feeder	October - January	Moderate
		<i>Somena scintillans</i> (Walker)	-	Leaf feeder	November - December	Moderate
	Noctuidae	<i>Acronicta</i> sp.	Dagger moth	Leaf feeder	November- January	Moderate
		<i>Feliniopsis indistans</i> (Guenee)	-	Leaf feeder	October- November	Moderate
		<i>Hypena reactivitalis</i> (Moore)	Lantana defoliator caterpillar	Leaf feeder	July - November	Moderate
		<i>Spodoptera litura</i> (Fabricius)	Tobacco caterpillar	Leaf feeder	September-October	Moderate
		<i>Stauropus alternus</i> (Walker)	Lobster moth	Leaf feeder	November-December	Moderate
		<i>Archips epicyrta</i> (Meyrick)	Tortrix moth	Leaf feeder	August - October	Moderate
		<i>Argyroproloce aprobola</i> (Meyrick)	Leaf webber moth tortrix	Leaf feeder	July - September	Moderate
Orthoptera	Tettigoniidae	<i>Neoconocephalus incertus</i> (Walker)	Three eyed cone head katydid	Leaf feeder	July - December	Moderate

*Degree of damage or pest abundance is recorded on the basis of visual observations made in the field.

Major foliage feeders of *F. semialata*



Figure 1: *Hyposidra successaria* (Walker)



Damage symptoms of *H. successaria*



Figure 2: *Hypena rectivittalis* (Moore)



Damage symptoms of *H. rectivittalis*



Figure 3: *Dasychira (Olene) mendosa*



Damage symptoms of *D. mendosa*

Dalbergia sissoo, etc.

***Spodoptera litura* (Fabricius) (Noctuidae: Lepidoptera) - Tobacco caterpillar**

The early stage feeds on outer margin of soft *semialata* leaves including the veins. In the later stage it feeds voraciously and in absence of food, the larvae can eat other larvae. Its infestation is high during July-August but decline during September onwards and continue upto October. Commonly known as Tobacco caterpillar, it has a very wide host range of over 120 plant species, including: lettuce, cabbage, beetroot, peanuts, geranium, cotton, banana, fuchsias, *Acacia*, African oil palm,

amaranth, alfalfa, strawberry, sorghum, sugarcane, tomato, asparagus, apple, eggplant, beet, bean, broccoli, elephant's ear, corn, flax, lantana, papaya, orange, mango etc.

***Amsacta lactinea* (Cramer) (Arctiidae: Lepidoptera)- Red hairy caterpillar**

Larvae are voracious feeder on *semialata* leaves and completely devour the leaves. It prefers to feed on tender leaves just emerging from growing bud. Its infestation was noticed during August-September. Red hairy caterpillar/ Red tiger moth has been recorded as a minor pest of sweet potato, beans (Gupta, 1990), castor, coffee, jute, groundnut, teak, ragi, sunflower,



Figure 4: *Euproctis* sp.

maize. Mehra and Sah recorded it as a pest of *bhalia* (*F. macrophylla*).

Brachmia sp. (Gelechiidae : Lepidoptera)

Sweet potato leaf roller larva feeds on *semialata* leaves where excreta of the larvae are seen but older instar larvae fold the leaves and feeds inside the rolled leaves. Infestation recorded during June-August.

***Gnophos tephrosiaria* (Moore) (Geometridae : Lepidoptera)-semilooper**

Its infestation was found during mid-September to mid-October feeding on leaves. It looks and moves like a semilooper. This insect also feeds on *Calluna*, *Saxifraga*, *Sedum*, *Rubus* and many other plants.

***Somena scintillans* (Walker) (Lymantriidae : Lepidoptera) - Hairy caterpillar**

Larvae feed on *semialata* leaves irregularly from the outer margin of the leaf. It noticed during October-November. The hairy caterpillar is polyphagous and commonly recorded on ragi, castor, pigeon pea, cowpea, field bean, cucurbits, mango, ber, citrus, hibiscus, rose, ficus, coffee, tea, etc.

Euproctis sp. (Lymantriidae: Lepidoptera) - Yellow tail moth

Larvae are foliage feeder (Fig. 4) and noticed during first week of July to April. Other host plants of Tussock moth or Yellow-tail or gold tail moth or swan moth are rice and ragi.

***Cassida circumdata* (Herst) (Chrysomelidae : Coleoptera) - Green tortoise beetle**

Beetles are generally found on the underside of the *semialata* leaves. Older grub and adults bite large round holes in the leaves. It was observed in the field during September-October. Green tortoise beetle also feeds on sweet potato (*Ipomea batatas*) and other *Ipomea* sp.

***Aspidomorpha miliaris* (F.) (Chrysomelidae : Coleoptera)-Tortoise shell beetle**

Larvae have a gregarious habit and feed on *Ipomea* species, with dangerous impact on crops. Its infestation in *semialata* is found in August -November. Sweet potato (*Ipomea batatas*) is the main host of the Tortoise shell beetle.

***Neoconocephalus incertus* (Walker) (Tettigoniidae : Orthoptera) - Cone head katydid**

Three eyed cone head katydid nibbles the leaves along the midrib and can be seen feeding on plants. This insect was



Damage symptoms of *Euproctis* sp.

reported from July to December.

Sap sucking pests

Leptocentrus taurus (F) (Membracidae : Hemiptera)-Cow bug
Nymph and adults suck the sap from the tender parts of the *semialata* which reduces the vigour of the plants. It was noticed from October to December. Cow bug/ thorn mimic tree hopper also attacks sandal and pigeon pea. *Aphis* sp. (Aphididae: Hemiptera)

Aphids suck the sap from the lower surface of the *semialata* leaves. Its infestation was noticed in the month of December-January. Low to moderate numbers of leaf-feeding aphids are usually not damaging, however, large populations cause curling, yellowing and distortion of leaves and stunting of shoots. They can also produce large quantities of a sticky substance known as honeydew, which often turns black with the growth of a sooty mould fungus. It has one of the broadest host ranges, having been recorded from species of nearly 130 plants infesting groundnut, cotton, cabbage, beans, soybean etc.

***Megacopta (Coptosoma) cribraria* (Fabricius) (Plataspidae : Hemiptera) - Stink bug**

Assembles on the parts of *semialata* plant and suck the sap. Adults overwinter and become active in April. In Karnataka State, India, they are active all year (Thippeswamy and Rajagopal, 2005). Lab lab bug or stink bug feeds on numerous agricultural crops, particularly soybean (Zhang 1985) and lablab bean (Thippeswamy and Rajagopal, 2005). Pigeon pea (*Cajanus indicus* Spreng), *Phaseolus* sp. (kidney beans, lima beans, etc.) (Easton and Pun, 1997) and broad beans (*Vicia faba* (L.) are additional hosts. *Poophilus* sp. (Cercopidae : Hemiptera) - Frog hopper

Spittle bug or frog hopper appearance was observed during July- November. The nymphs pierce plants and suck sap causing little damage, much of the filtered fluids go for the production of froth, which has an acrid taste, deterring predators.

***Leptocoris oratorius* (F.) (Alydidae : Hemiptera) : Rice earhead bug**

This long alydid bug can be seen congregating on the plants in large numbers under the shade of the leaves and suck the cell sap from the leaves. Its appearance was recorded in the field from July-December. The primary hosts of the rice earhead bug are rice and *Echinochloa* sp. The secondary hosts are

Alloteropsis cimicina (L.), *Artocarpus* sp. (breadfruit), *Bothriochloa pertusa* (L.), *Brachiaria miliiformis* (Presl), *B. mutica* (Forssk.), *Camellia sinensis* (L.) (Tea), *Mangifera indica* (L.), *Myristica* sp. (nutmeg), *Panicum miliaceum* (L.), *P. repens* (L.), *Paspalidium* (Burm.), *A. camus*, *Phaseolus* sp. (beans), *Psidium guajava* (L.) and *Setaria glauca* (L.).

***Icerya aegyptiaca* (Douglas) (Margarodidae: Hemiptera) - Egyptian fluted scale**

Immature as well as adults of this insect suck the cell sap from leaves and upper soft portion of the *semialata* plant, resulting in leaf drop and stunted growth. As with the most sap-sucking insects, production of honeydew was also observed leading to growth of sooty mould on the affected plant parts. It appears from September to till the end of January. *I. aegyptiaca* (Douglas) also act as alternate host of *Aprostocetus purpureus*; an endoparasitoid of lac insect, (Meena *et al.*, 2012). Egyptian fluted scale or breadfruit mealy bug being polyphagous insect, have a very wide host range. This insect attacks *Annona muricata* (sour sop), *Artocarpus saltilis* (breadfruit), *A. heterophyllus* (jackfruit), citrus, *Mangifera indica* (mango), *Manilkara zapota* (sapodilla), *Morus alba* (mulberry), *Psidium guajava* (guava), *Ficus* sp., *arhar* (*Cajanus cajan*), papaya and castor.

***Lawana conspersa* (Walker) (Flatidae: Hemiptera) white moth cicada**

White moth cicada in this study is reported as a new sucking insect pest of lac host-plants. It has been found infesting various lac host plants *viz.*, *Flemingia* sp., *B. monosperma* (*palas*), *Cajanus cajan*, (red gram), *Z. mauritiana* (*ber*) and *Dalbergia assamica*. It is noticed from July-September. The hoppers feed on young shoot tips, young leaves and flowers by sucking plant sap and drawing energy from the plant, causing dehydration of plant parts. Highly infested plants are sticky with honeydew and support thick crusts of sooty mould caused by excretion of the insects. Besides damaging the host-plant, the waxy exudates of the nymph cover the tender twigs hindering the settlement of lac larvae at the time of inoculation resulting indirectly, in decreased lac yield (Mohanasundaram *et al.*, 2012).

Pod/Seed damaging pests

***Melanagromyza obtusa* (Malloch) (Agromyzidae: Diptera) - Pigeon pea pod fly**

The Pigeon pea pod fly female oviposits individually in the developing pods. The infested pods do not show any external symptoms of damage until the fully-grown larvae chew the pod wall, leaving a thin papery membrane intact called as window, through which adults exit the pods. White maggots feed on the developing grain and pupate inside the pod. The pod fly damaged grains do not germinate. Kulkarni, 1966 reported that seeds of *Moghania* (= *Flemingia*) *macrophylla* are damaged by *Melanagromyza obtusa* from November to January. The percentage of infestation of the pods by this fly varies from 4% to 74%. The average percentage of adult emergence is 87%, the sex-ratio is 1.26:1 and loss in weight in 100 g of seeds is 63.5%. Other hosts infested by this insect are *Flemingia congesta*, mungbean (*Vigna radiata*), cowpea (*Vigna unguiculata*), pigeonpea, green gram, chickpea, *Rhynchosia minima* etc. and *Flemingia macrophylla* (Shanower *et al.*,

1998).

D. Stem/Root damaging pests

Odontotermes obesus (Rambur) (Termitidae: Isoptera)

It feeds on the dry stubbles of *F. semialata* formed after pruning and doesn't allow new flush to come out from these pruned stubbles. It also inflicts damage to lac insect by making mounds of soil in the stem of *semialata*, especially during rainy season, where growing lac insect are affected and dies due to these mounds. Though it is active round the year but pronounced affect is during rainy season from June - October.

Other pests

Other lepidopterous pest's *viz.*, Dagger moth, *Acronicta* sp. Noctuidae; Leaf eating twig caterpillar, *Ectropis* sp. Geometridae; legume web spinner, *Lamprosoma poeonalis* (Walker), Crambidae and *Feliniopsis indistans* (Guenee), Noctuidae were also recorded as foliage feeding pests of *semialata* plant.

Not being a crop of commercial importance except for lac cultivation, information available on insect pests of *F. semialata* is meagre. Earlier studies on pests of *Flemingia macrophylla*, a close relative of *F. semialata*, recorded *Hypena iconicalis* Walker, *Hemithea tritonaria* (Walker), *Nephopteryx leucophaella*, *Platyepelus aprobola* (Meyrick), *Dasychira mendosa* (Hubner) and *Spodoptera litura* (Fabricius) as its pests (Bhattacharya, 2011). Some of these namely *D. mendosa*, *D. aprobola* Meyrick and *S. litura* are common to *F. semialata* also. Probably none of the lac host plant is infested by such a large group of insects as is *F. semialata*. Though, none of these insects have been recorded as severe pests as yet, but in this era of ever changing climate resurgence of any one of the pests could become a cause of serious concern in future for this shrub, affecting adversely the lac production.

ACKNOWLEDGEMENT

The authors are thankful to Dr R. Ramani, Director, IINRG for his inspiration and motivation and providing necessary facilities during the course of study.

REFERENCES

- Bhattacharya, A. 2011. Pests of major lac hosts-plants In: Sharma, K.K. and Ramani, R. (eds.) *Recent advances in lac culture*. 319. Indian Institute of Natural Resins and Gums, Ranchi. pp. 116-118.
- Easton, E. R. and Pun, W. W. 1997. Observations on some Hemiptera /Heteroptera of Macau, Southeast Asia. *Proceedings of the Entomological Society of Washington*. **99(3)**: 574-582.
- Gupta, S. L. 1990. Key for the identity of some major lepidopterous pests of vegetables in India. *Bulletin of Entomology*. **31(1)**: 69-84.
- Meena, S. C., Sharma, K. K., Mohanasundaram, A. and Monobrullah, Md. 2012. *Icerya aegyptiaca* Douglas: a new pest of *Flemingia semialata* and as an alternate host of *Aprostocetus purpureus* (Cameron) in lac ecosystem. *Indian J. Entomology*. **74(4)**: 404-405.
- Mehra, B. P. and Sah, B. N. 1977. Bionomics of *Amsacta lactinea* Cramer a pest of *bhalia*. *Indian J. Entomology*. **39(1)**: 29-34.
- Mohanasundaram, A., Sharma, K. K. and Meena, S. C. 2012. New record of *Lawana conspersa*. Walker (Homoptera; Flatidae) as a pest of lac host plants. *Indian J. Entomology*. **74(4)**: 399-401.
- Pal, G., Jaiswal, A. K., Bhattacharya, A. and Yogi, R. K. 2013. Lac,

Plant Resins and Gums Statistics at a Glance 2012. p. 24.

Parikh, P., Sonavane, S. and Ahir, K. 2010. Diversity of moths in GIR protected area, Gujarat. *Deccan Current Science*. **3(2)**: 122-129.

Kulkarni, S. M. 1966. Infestation, sex-ratio and damage by *Melanagromyza obtusa* (Diptera: Agromyzidae) to *Moghania macrophylla* seeds in the field. *Entomologia Experimentalis et Applicata*. **9(3)**: 323-326.

Shanower, T. G., Lal, S. S. and Bhagwat, V. R. 1998. Biology and management of *Melanagromyza obtusa* Malloch (Diptera: Agromyzidae). *Crop Protection*. **17**: 249-263.

Tara, J. S., Sudan, M. and Sharma, B. 2011. A report on the occurrence of insect pests on *Zanthoxylum armatum* DC (Family: Rutaceae), an important medicinal plant in jammu region. *The Bioscan*. **6(2)**: 223-228.

Thippeswamy, C. and Rajagopal, B. K. 2005. Life history of lablab bug, *Coptosoma cribraria* Fabricius (Heteroptera: Plataspidae) on field bean, *Lablab purpureus* var. *lignosus* Medikus. *Karnataka J. Agricultural Sciences*. **18(1)**: 39-43.

Zhang, S. M. 1985. *Economic Insect Fauna of China* (Hemiptera: Plataspidae). *Science Press, Beijing*. **31**: 34-35.

