

Insects associated with *Ipomea carnea* Jacq. (Convolvulaceae) in Jammu and their potential for its biological control

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ABSTRACT

Ipomea carnea (Convolvulaceae), though introduced from South America at the beginning of the nineteenth century and grown as fences and also for its beautiful flowers. In a field study in Jammu, India during 2005-06, nearly 20 insects species were collected from this weed, 7 species were regarded as potential insects for its control because of their wide distribution, narrow host range, high population and damage on the plant. These were Tortoise beetles namely *Aspidomorpha miliaris*, *Aspidomorpha indica*, *Lacoptera quadrimaculata*, *Colosposoma mettlacium*, *Cassida circumdata*, *Cassida varians* and Stem borer- *Stibara tetraspolita*. However, there are several others which could pose great threat to growth and reproduction of *I. carnea* but their host range is not available and needs further studies and evaluation. The nature of damage by the important species was discussed.

Key Words : *Ipomea carnea*, biocontrol, insects

I. carnea is a semi-aquatic, lignose herb up to 3m high. Its large leaves and large rose purple flower make it attractive plant for cultivation in tropical and subtropical climates. It is wildly recognized as alien invasive plant species and has been nominated as among the hundred of the world worst invader. Originally exported from the South American countries such as Peru, Venezuela, Argentina, Ecuador into the Indian agro-horticultural gardens (Bhattacharyya, 1976) in the nineteenth century. Now it has spread throughout the tropical, subtropical areas of the world including India and some of the regions have been currently experienced serious problem with *I. carnea* infestation. It can affect agriculture by out competing native pastures by interfering with the misting of cattle, and by causing death of stock by poisoning (Swarbrick *et.al.*1998).

As this weed cover extensive areas, the mechanical and chemical control become expensive especially for developing countries like India. In addition undesirable environmental hazards associated with chemical control measures and their limited effectiveness has led to growing interests in the use of biological control especially using insects as natural enemies. Biological control of *I. carnea* can offer a sustainable long term control and is only feasible method to provide some level of control of these infestations which cover huge areas and are difficult to access and do not warrant the high cost of physical and chemical control. With this background, studies were undertaken to search the insect species associated with this invasive weed in Jammu, India.

MATERIAL AND METHODS

At most of the sites, surveys were conducted during pre-monsoon, monsoon and post-monsoon each year. A few sites were visited each week or month during the growing seasons based on the distance of the sites from the collectors, location and the importance of the insects species. At each survey site all the insects on *I. carnea* weed were collected. Specimens were hand picked from plants. In addition to the leaves, great attention was focused on the important parts of the plants (e.g., root, stem, flower, seeds) to recover root and stem borers internal fruit feeders or gall makers. Type and severity of damages on the plant and other relevant information of natural enemies were recorded. larvae were reared to adults. The insects were identified from Indian Agricultural Research Institute, (I.A.R.I) New Delhi by Prof. V.V.Ramamurthy Principal Scientist, Entomology Division. The sites from where insects were collected Botanical garden, Bahu-fort, Sidhra and R.S.Pura (Jammu), Mansar lake, Nud and Samba (Udhampur), Dayalachack, Ghagwal, Hiranagar and Jasrota-fort (Kathua)

RESULTS AND DISCUSSION

During the survey 20 species of insects belonging to four orders were found in association with *I. carnea*.

Table-1 shows the species and relative importance of the insects collected during 2005-06. Most of the insects were collected from leaves, but stem borers, bud feeder, flower and fruit feeders were also recovered. No insect was found to attack the roots.

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Key insect species

Of the 20 insect species collected from the weed in Jammu, 7 species were regarded as potential agents because of their wide distribution, narrow host range, great population and damage to the plants. Tortoise beetles namely *Aspidomorpha miliaris*, *Aspidomorpha indica*, *Lacoptera quadrimaculata*, *Colasposoma mettalicum*, *Cassida circumdata*, *Cassida varians* and the stem borer *Stibara tetraspolita*. were considered as important species.

Index: R

Rare taken at one or two sites in one place usually in small numbers; **O**: Occasionally collected

at 2> sites in one or two places; **C**: Common taken at most sites in more than two places; **Po**: Polyphagus species from other families; **OL**: Oligophagus species occurring mainly on Convolvulaceae.

Aspidomorpha miliaris (Fabricius)

Both the adult tortoise beetles and the larvae voraciously feed on *I.carnea* and cause significant damage to this weed. The larvae are gregarious and feed in cluster where as the adult beetles make big holes on the leaf blade. These adult beetles exhibit strict host specificity and utilize only plant belong to the Convolvulaceae which include the cultivated species and other weed hosts.

Table 1 : The insect species collected in Jammu during 2005-06 and their relative frequency and possible host range.

Family	Species	Relative Frequency	Possible Host range
Coloeptera			
1. Chrysomelidae	<i>Aspidomorpha miliaris</i>	C	OL
	<i>A. indica</i>	C	OL
	<i>Lacoptera quadrimaculata</i>	C	OL
	<i>Colasposoma mettalicum</i>	C	OL
	<i>Cassida ciccumdata</i>	C	OL
	<i>C. varians</i>	C	OL
	<i>Chirodopsis bipunctata</i>	O	OL
	<i>Chrysolina spp.</i>	O	OL
2. Cerambycidae	<i>Stibara tetraspolita</i>	C	OL
3. Coccinellidae	<i>Henospilachna vigintioctopunctata</i>	R	OL
4. Meloidae	<i>Mylabrius phallata</i>	O	PO
5. Scarbaeidae	<i>Oxycetonia versicolor</i>	O	PO
6. Nitidulidae	<i>Carpophilus spp.</i>	O	OL
7. Curculionidae	<i>Alcidodes spp.</i>	O	PO
Lepidoptera			
8. Noctuidae	<i>Spodoptera litura</i>	O	PO
9. Danaidae	<i>Danaida chrysippus</i>	O	OL
10. Totricidae	<i>Homona mieth cofferia</i>	O	PO
Hemiptera			
11. Alydidae	<i>Riptortus spp.</i>	R	OL
12. Pentatomidae	<i>Fanitecoma furcellata</i>	R	OL
Orthoptera			
13. Tettigoniidae	<i>Conocephalus maculatus</i>	R	OL

Lacoptera quadrimaculata Thunberg

Both the adult as well as larvae feed on *I.carnea*. After hatching the newly emerged larvae are sluggish and rarely moved from its feeding sites until it disturbed. The larvae are not gregarious as in *Aspidomorpha miliaris*, the larvae carry the exuviae's and starts feeding on fresh *Ipomea carnea* leaves and make small holes on the leaves and not completely defoliate the leaf.

Aspidomorpha indica Boheman

Both the adult as well as the larvae feed on

Ipomea carnea leaves, causing substantial damage to it and make small holes in patches on the leaf. The larvae remain in gregarious form and defoliate the leaf completely.

Colosposoma mettalicum Clark

The adult makes small holes on the leaf during the monsoon season and feed voraciously on the leaves.

Cassida circumdata (Hbst)

The larvae and the adult of this beetle cause substantial damage to the *Ipomea carnea* by making

small grooves in patches on the upper side of leaves.

***Cassida varians* Spaeth**

The larvae and adult of this tortoise beetles make small holes on leaves.

***Stibara tetraspolita* Hope**

The adult beetles do not cause much damage to the *I.carnea* plants as they just nibble upon the stem. The female beetles however damage the plants by girdling them prior to their egg laying inside the stem. The larvae, however cause a quite a serious damage to *I.carnea*. The larvae excavate inside the stem and eat away the woody parts, thus hollowing it almost completely from inside. The plants which are hollowed from inside usually succumb to attack. Besides larval tunneling structures weaken the stem and thus facilitate mechanical breakage due to wind gust. The attacked plants show marked reduction in their vigour and growth.

In addition to the above seven species, there are several others which could pose great threat to the growth and reproduction of the *I. carnea*. Efforts are on to determine the biocontrol potential of these insects in the Jammu region. Among these, only one insect species, *Cassida circumdata* is a pest of sweet potato, *Ipomea batatas*, the cultivated variety. Other six insects species are the pests of *I. aquatica*, *Convolvulus arvensis*, *I. palmata* and *I. reniformis*,

the problematic weeds in India (Murugesan and Paulraj, 2003)

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