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Some Ethological Aspects of *Chrysocoris Stolli* Wolf (Heteroptera - Pentat Omidae - Scutellerinae)

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Review Article

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ABSTRACT

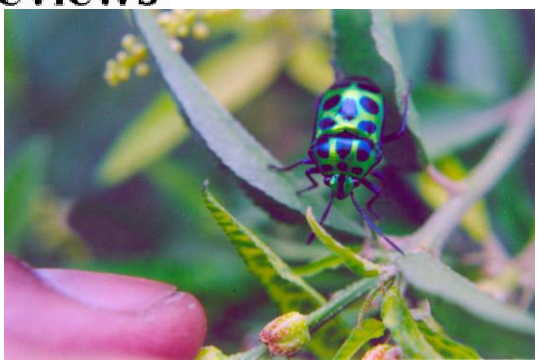
Pentatomid bugs are generally injurious to crops of human consumption and causes considerable loss. *Chrysocoris stolli* infests cereal food plants of economic value as mentioned by Dhiman & Kumar. In this paper some ethological aspects of this beautiful metallic green bug are taken. Studies were carried out during three consecutive years (2004 to 2006) both in laboratory and field. Hibernation occurs in adult stage from November to February gregarious behaviour occurs in nymphal stages while adults are found solitary. Younger nymphs remain aggregated at one leaf. These nymphs show alarming mimicry which provides protection from enemies. It was also observed that female adult bug remains nearby to younger nymphs showing parental care. The evolution of parental care represents an extra ordinary breakthrough in adaptation of an organism to their environment. Female also scarce away egg and nymphal parasitoid by kicking legs and fluttering wings. For migration, generally local flights are performed in search of food and mate while long flights are taken in absence of food plants. For taking long flights, bugs take position on the plant surface, take out hind wings from beneath the scutellum and then taking leap in the air starts beating its wings. At the new place, on host plant, at first, only few bugs appear which after reproduction starts building population. Over crowding is also a one of the reasons for migration. For copulation, competition was observed between a female and three male. After 15 minutes only one male succeeded for copulation.

INTROUDUCTION

Pentatomid bugs are often injurious to agricultural crops and horticultural trees of economic value. By their desapping habit these cause extensive damage and the yield of crop is reduced *Chrysocoris stolli* (Heteroptera-Pentatomidae-Scutellerinae) is a polyphagus bug of this group which has beautiful colouration (metallic and green blue with black spots) and causes considerable loss to many plants of economic value, such as Cassia occidentalies, Pennisetum typhoides Litchi chinensis. On this insect, only few studies have been carried out. Yet , by Chaudhary and Dass [1] Ghosh et.al. [2], Misbahuddion and Etheshamuddin [3], and Dhiman and Kumar [4,5,6,7]. In this paper an endeavors has been made to record its some ethological aspects.

MATERIALS AND METHODS

For recording some ethological aspects of C.stolli extensive surveys were carried out of different areas of district Saharanpur, Muzaffarnagar, Ghaziabad and Meerut during 2005. Migration, parental care and hibernation were observed in field. Experiments were also conducted in laboratory in temp, and R.H. control cabinet.



Food plant Croton sparisiflorum of C.stolli

First nymphal instras of C. stolli

RESULTS AND DISCUSSION

In this paper gregarious, parental care, migration and hibernation behaviour are studied and described.

Gregarious behavior

It appears to be especially common during adult diapause in various species of Hemipetera. Behavioural adaptation such as aggregation of conspecific species clearly benefits many herbivoures during feeding and ensure maintenance of genetic demes in select habitats. Large aggregation of pentatomids are reported during the dry season by choudhary and Dass [1].

During summer months, May and June In field condition all nymphal stages and adults of C.stolli congregate when the temperature rises up to 35-42^0 but during morning and evening hours; they disperse for feeding. When the temperature fall down upto 21^{0}C, the adult and nymphal instars disperse. The aggregation increases the density of population of C.stolli significantly which modifies. The bug micro environment by reducing evaporative water loss and lowering incident radiation. It lasts for 6 to 7 weeks of May and June during which temperature remains at its extreme.

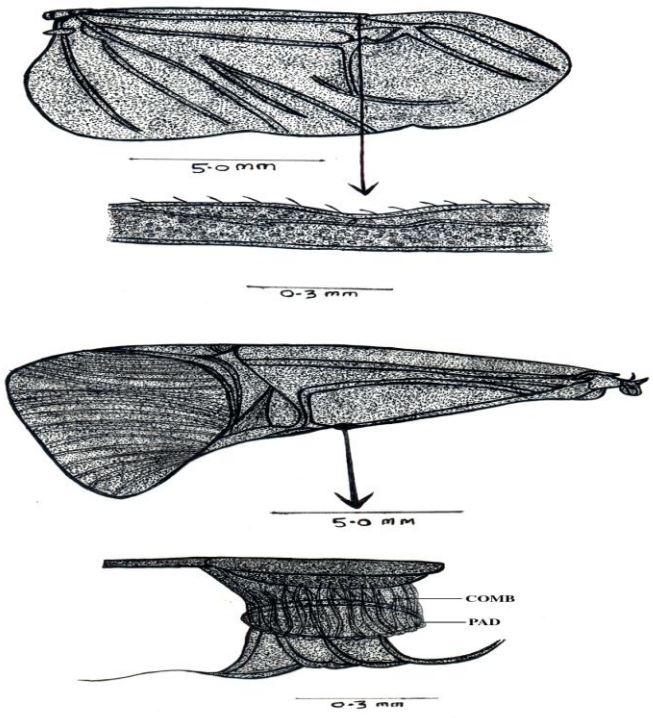


Fig-1 Wing copuling device found in forwing and hindwing of ***C.stolli***

Food plant (Bajra) Pennisetum typhoides of C.stooli

Food plant Cassia occidentalies of C. stolli

The gregarious behaviour disappears and the bugs become reproductive active and starts mating during morning and evening time. In rainy season gregarious ness again develops due to food factors. During rainy season all the food plants of C.stolli are available in nature and their tender parts are full of sap, hences, gregareous ness develops on tender parts of the main food plants, such as Cassia occidentalies. The nymphs feed gregariously on the sap of tender leaves. This habit lasts for the entire rainy season, July to August. This is also a means of deferrer from consistent raining.

Parental care

The evolution of parental care represent extra ordinary break through in an adaptation of an organism to their environment. In its most promitive state parental care is limited to physical protection of eggs which are extended by female C.stolli. It lays eggs, generally, on the under surface of the leaves of host plants, which protect them from desiccation and from the sight of natural enemies. Although, tree parental care is not observed in case of C.stolli but some sort of this behaviour exits in the field during extremes high temperature which occurs in May and June in this locality. The adults hide their younger nymph under their cover in aggregation to protect them from extremes of high temperature (40-42^{0}C). Both the sexes take part in this behaviour. This activity was confirmed experimentally. A glass trough was taken and in it a watch glass full of water was placed. Now, 10 nymphs of each stage and 10 adults of each sex were released in the trough along with food. The trough was covered by muslin cloth and then placed in temperature and R.H. control cabinet. Temperature was raired to 35^{0}C. After half an hour it was observed that first to IInd instar nymphs came under the Male as well as female which made hide cover for them. The same experiment was repeated several times and same results were obtained. It was futher observed that after laying egg batch, the female lives nearly the eggs to protect them from predators by its warning colouration.

Migration

The flight may be functionally classified as migratory flight, long range and short range or local flight. In the long range flight or so called trivial flight, the insect travel generally concerned with feeding, mating or oviposition.

The migration of C.stolli from one host plant to another or from one place to other is of fundamental interest from the economic point of view. Through, it is not a good flier, it can be conventionally divided into three problems.

(I) Distance travelled or flown by bugs.

(II) The cause of the start of migration from previous host plant.

(III) Cause of attraction to, Cassia occidentalies or (Bajra) Pennisetum typhoides and height of flights. The attraction can excrt an influence and answers of these questions are given in following text. Migration of C.stolli was studied in district Saharanpur and adjacent areas where a good number of Cassia occidentalies plants are present. As mentioned in the host specificity, C.stolli prefers Cassia occidentalies among its host plants. Though, true migration was not observed in case of C.stolli, but local flights were observed within the territory indifferent seasons when the climatic condition become unsuitable. In adverse conditions it goes to other suitable host plant for the purpose of feeding, mating breeding and for taking shelter. The unsuitability arises due to extreme lowering of temperature in winter (upto 2^{0}c), high temperature in summer (upto 42^{0}C) and low R.H. (30-40^0) as well as disappearance of food plants. In rainy months July to September, due to heavy rains heavy wind and stormes, it migrates to the safer places such as nearby houses, tree trunk holes, crevices, under fallen tree and leaves and under the bark of its sheltering tree. It migrates in a specified area on its main or accessory host plants. The bug as already said is not a true flier and only able to

take short distance flights and it can only fly for few seconds to one minute and can travel few meters to 100 meters at a time. Flight are also performed to search a mate before copulation. Due to heavy winds, storms and rains, a good mortality was resulted in the migratory population. Field investigations have revealed that due these factors, good mortality occurs in adults and nymphals population. Torrential, raining is the major factor for the mortality. Some times wildfier also kills many bugs. It was further observed migratory bug are crushed under the foot as well as vehicles on the roods. Some bugs which come into nearby houses from the field area are picked up by children's and are generally killed. Wing coupling device, present in for and hind wings (Fig-1) helps in performing efficient flight for short distance.

(IV) Hibernation: In beginning of winter months, late November to last February adult hide themselves to protect from lower temperature. For this purpose, they migrate to nearby hiding places. The preferred hiding places used by C.stolli are under the bark of tree, trunk, in crevices, in holes, under fallen leaves, under stones bricks, logs etc. It remains in hide upto first week of February, and as temperature starts rearing and food plants develop new foliage, hibernation is broken and adults come out of their hiding places and resume life activities. It was further observed that C.stolli only hibernation in adults stage. Dhiman [8] also observed hibernation behaviour in a Heteroptera bugs Cletu signatus.

Table 1: Food Plants of *Chrysocoris Stolli* Migration to Seasonal Occurrence

S. No	Host Plant	Family	Time of occurrence	Host pest relation ship
1.	Litchi chinese's	Sapindaceae	Apr, May, June	Food and Shele berrding
2.	Croton bonplandianus	Euphorbiacea	Jan, Feb, March, April, July, Aug, Sep.	Food and breeding
3.	Adhatoda vesica	Acantheceae	March, April, Feb, July, Sep, Jan.	Shelter only
4.	Croton sparisiflorum	Euphorbiacea	Feb. March, April, May, June, July, Aug., Oct. Nov.	Food and Breeding shelter
5.	Brassica compestries	Crueiferae	Feb, March	Shelter only
6.	Mongiferar indica	Anacardiaceae	April, May, Jun	Shelter only
7.	Pennisteum typhoclies (Bajra)	Poaceae	Sep, Oct, July, Nov.	food shelter and breeding
8	Parthenium	Compositae	April, May, June, July	Shelter only
9.	Indian Jujuba	Rhamnaceae	Feb, March, April, Aug.	shelter only
10.	Cassia occidentalies	Leguminosae	Feb, March, April, May,June, July, ug., Sept.,Oct.,Nov.	feeding and shelter

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