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Biology and Prey Preference of *Sycanus versicolor* Dohrn (Hemiptera : Reduviidae)

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ABSTRACT

***Sycanus versicolor* Dohrn is an alate, entomophagous, multivoltine, harpactorine reduviid found in the Courtallam tropical evergreen forests of Southern India. Investigations on the biology revealed that it laid the first batch of eggs 13 days after emergence. The eggs hatched in 9-10 days. Total stadial period from I instar to adult ranged from 52-69 days. The adult males and females lived for 23.5 and 44 days, respectively. The sex ratio was male biased (1.0 : 0.6). *S.versicolor* preferred *Heliothis armigera* Hubner than *Earias insulana* Boisdual which was evidenced from the highest predatory value, the largest amount of food taken and the shortest stadial period observed when *H.armigera* was given as prey.**

KEY WORDS : *Sycanus versicolor,* biology, pest preference, *Heliothis armigera, Earias insulana*

Reduviidae constitute an important group of predatory insects (Ambrose, 1988). Lack of knowledge on the natural history of reduviids, proved to be a limiting factor in pursuing their effective utilization as biocontrol agents in the integrated pest management programmes. Hence an attempt was made to study the biology of the assassin bug *Sycanus versicolor* Dohrn (Fig. 1 & 2), a voracious predator upon *Heliothis armigera* Hubner and *Earias insulana* Boisdual. The host preference of *S.versicolor* was also studied by using bioenergetics as a tool.

MATERIALS AND METHODS

The nymphs of *S.versicolor* were collected from the litters and foot of trees in and around Shenbagadevi falls area of Courtallam tropical evergreen forest (77°.16'.30"E and 8°.56'N) of Nellai Kattabomman district. They were maintained on *H.armigera* and *E.insulana* caterpillars in plastic containers (12x6x4cm) under laboratory condition (Temperature 32°c, R.H. 75-85% and photoperiod 11-13). The adults emerged were allowed to mate. The containers were examined at regular intervals and the eggs were collected and recorded. The different batches of eggs were kept separately to hatch in plastic containers with wet cotton swabs for maintaining optimum humidity. The cotton swabs were changed periodically in order to prevent fungal growth. The nymphs hatched were isolated in plastic containers and reared on the above mentioned preys. Observations on oviposition, incubation and stadial periods, nymphal mortality, adult longevity and sex ratio were recorded. An index of oviposition days was calculated from the percentage of egg laying days in the total adult female life span (Ambrose, 1980). Camera lucida illustrations were prepared from 70% ethanol- preserved specimens.

The prey preference of *S.versicolor* IV and V nymphal instars was studied for *H. armigera* and *E.insulana.* The predatory value, conversion ratio, food consumption and stadial period were taken as indices. The conversion ratio and predatory value were calculated using the following expressions (Fewkes, 1960).

$$\text{Convertion ratio} = \frac{\text{Increase in weight}}{\text{Weight consumed}} \times 100$$

$$\text{Predatory value} = \frac{\text{Weight of food consumed during instar}}{\text{Duration of instar}}$$

Fresh weights were taken for calculation. The experiment was conducted in the IV and V nymphal instars of *S. versicolor*.

RESULTS AND DISCUSSION

S. versicolor was found to inhabit the crevices of big boulders at the foot of big trees and in litter beneath the shrubs at the Shenbagadevi falls area of Courtallam tropical rain forest. Another reduviid *Epidaus bicolor* Distant and the crazy ant *Anoplolepis longipes* Jerdon were also seen in the microhabitat. When provoked, *S. versicolor* spitted saliva as a defensive behaviour as reported in *Platymeris rhadamanthus* Gerst (Edwards, 1962), *Ectomocoris tibialis* Distant (Ambrose, 1980) and *Catamiarus brevipennis* Serville (Ambrose *et al.*, 1985).

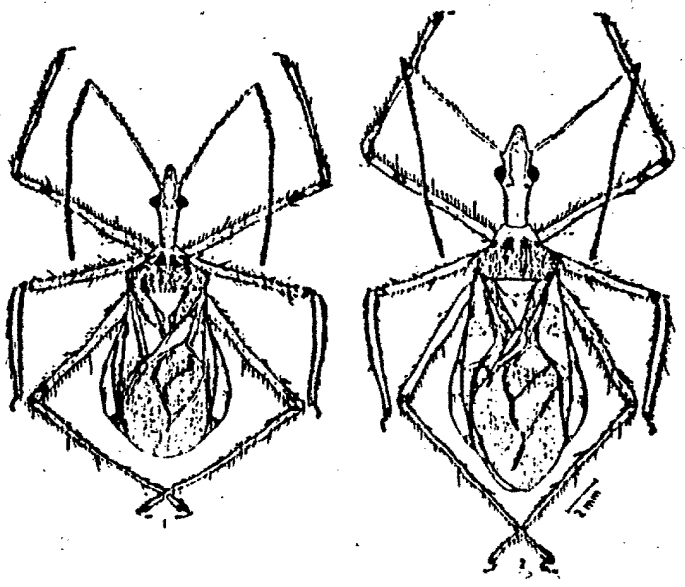

Fig.1 & 2. *S. versicolor* male and female respectively.

S. versicolor laid its first batch of eggs 13 days after emergence. Eggs were laid in clusters. Each cluster consisted of 10 to 30 eggs. In the laboratory, the eggs were glued to the sides of the container both basally and laterally with gelatinous gelly like cementing material. Each egg was attached to the substratum as well as to the previously laid ones, giving a polygonal shape to the completed egg mass. The egg mass was converted into almost an ootheca as reported in some Harpactorine species (Southwood, 1956; Vennison and Ambrose, 1989). *S. versicolor* did not glue the eggs to the fresh excreta unlike that reported in several other reduviids (Ambrose, 1980, Vennison, 1989). Seasonal influence on egg hatching as observed by Tawfik *et al.* (1983) in *A. biannulipes* was not observed in this species. Guarding the eggs by either parents as reported for *R. albospilus* Signoret and *Zelus* sp. (Ralston, 1977) was not recorded in this species. A female laid on an average 3 batches of eggs. A minimum of 10 and a maximum of 30 eggs per batch were recorded. Index of oviposition days was 10.35. Neither 100% nor 0% hatchings was registered. The hatching was 76.66%. The unfertilized egg looked normal when freshly laid but subsequently became shrunken (Fig 3). The eggs hatched in 9-10 days. Hatching took place between 8 a.m. and 3. p.m. The duration of eclosion was 4 to 7 minutes. Six hours after eclosion, the nymphal instars started their first feeding. They preferred inactive and relatively small size prey.

The stadial period of the I, II, III, IV and V nymphal instars lasted for 7-17, 7-12, 7-20, 10-21 and 12-30 days, respectively (Table 1). The total stadial period from I to V nymphal instars lasted for 52.59 days. The males emerged earlier than the females. Nymphal instars black; anteocular area, basal part of postocular area, posterior lobe of pronotum and coxae bright reddish ochraceous; antennae, rostrum, leg, abdomen beneath pale ochraceous. Head long, shining, slightly raised postocular area; compound eyes

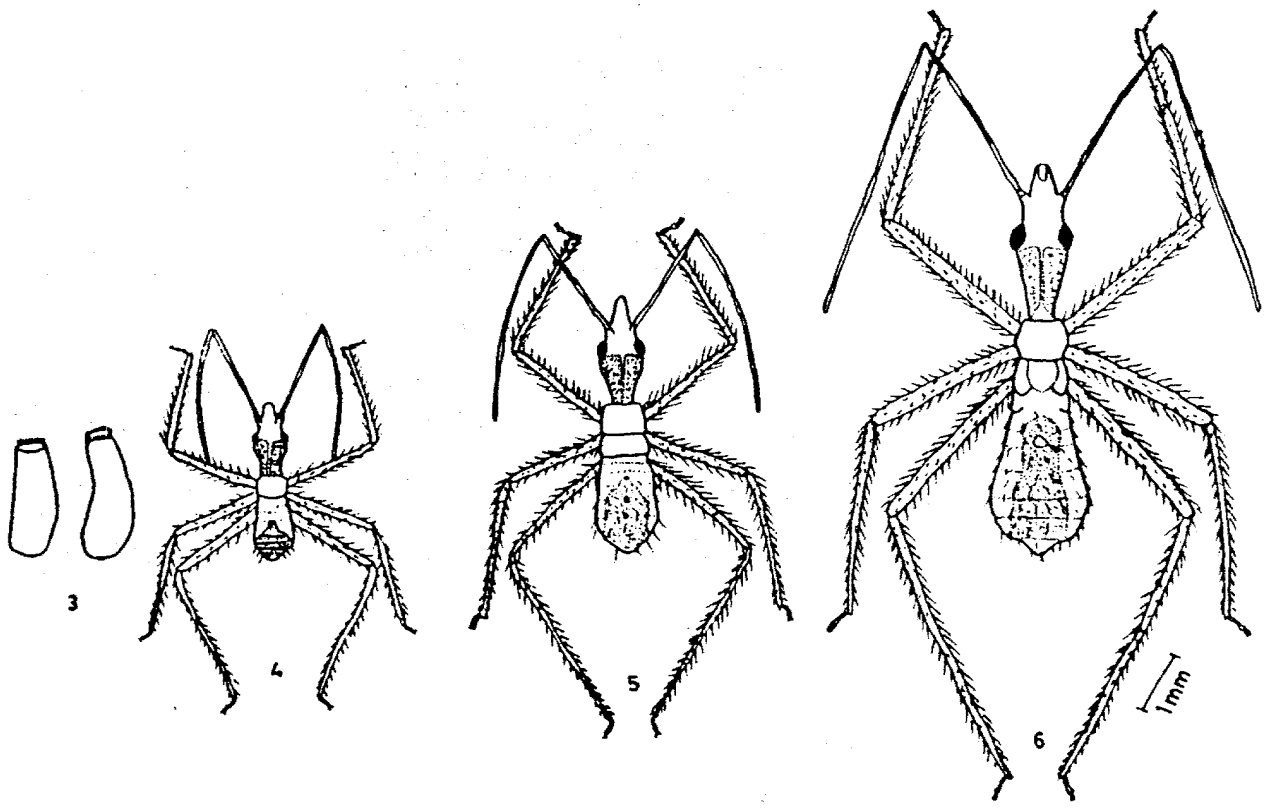

Fig. 3, 4, 5 &, 6. *S. versicolor* Egg and I to III nymphal instars, respectively

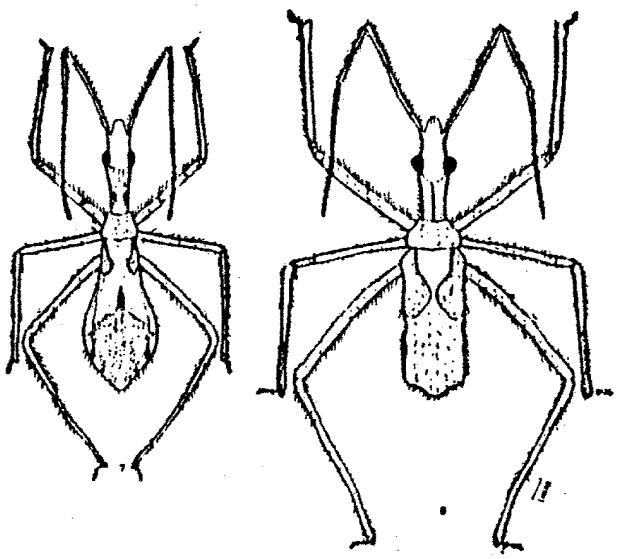

Fig.7 & 8. *S.versicolor* IV & V nymphal instars, respectively

slightly laterally protruding; 4 segmented long and slender antennae; scarcely pilose; scape longer than head; 1st flagellar segment the shortest and finely pilose; 2nd flagellar segment the longest; scape, pedical and 1st flagellar segment bear annulation; rostrum bow shaped and robust; 1st segment subequal in length with anteocular portion; 2nd segment the longest and the 3rd segment the shortest.

Pronotum transversely divided with oblique longitudinal streak and longly pilose; legs elongate and slender, strongly pilose; fore and mid legs subequal in length and the hind leg the longest; tibia without fossula spongiosa.

Abdomen longer than broader in all the nymphal instars; abdomen sparcely longly pilose (Fig. 4 to 8). The following key has

Table 1. Biological data of *S. versicolor*

Particulars	Duration (days)
Incubation	9.48 ± 0.06
Nymphs	
I instar	10.36 ± 0.48
II instar	9.68 ± 0.26
III instar	10.2 ± 0.52
IV instar	13.48 ± 0.52
V instar	
Male	15.28 ± 0.89
Female	18.8 ± 2.92
Adult longevity	
Male	23.5 ± 2.33
Female	32.0 ± 1.73

been formulated to identify the stages of nymphal instars.

1. Length of head equals thrice the width of head; scape unicoloured .....I instar
   Length of the head exceeds thrice the width of head; scape bicoloured .....(2)
2. First rostral segment shorter than width of pronotum; wing rudiments not visible .....II instar
   First rostral segment longer than width of pronotun; wing rudiments visible .....(3)
3. Scape length equals twice the length of anteocular area; wing rudiments develop upto 1st abdominal segments ...III instar
   Scape exceeds twice the length of anteocular area; wing rudiments develop beyond 1st abdominal segment .....(4)
4. Ocelli marking not prominent; wing rudiments develop up to 2nd abdominal segment .....IV instar
   Ocelli marking prominent; wing rudiments develop up to 4th abdominal segment .....V instar

Nymphal mortality was recorded due to the abnormalities in hatching and moulting. The highest nymphal mortality (42.8%) was recorded in the IV nymphal instar. In I, II, III and V nymphal instars, 6.06%, 3.33%, 30% and 0% mortalities, respectively, were observed.

The males and females lived for 23.5 and 44 days, respectively. The sex ratio of male : female was 1: 0.6. Laboratory breeding experiments indicated that *S. versicolor* was a multivoltine species.

When IV and V nymphal stages of *S. versicolor* were provided with *H.armigera* and *E. insulana*, they preferred *H. armigera* as evidenced from the highest predatory value, the largest amount of food intake, the highest increase in weight and the shortest stadial period (Table 2). The *H. armigera* -fed IV and V nymphal instars of *S. versicolor* gained

Table 2. Host preference of nymphal instars of *Sycanus versicolor* fed on the larvae of *Heliothis armigera* and *Earias insulana* (n = 6, $\bar{X}$ ± SE)

Parameters	V instar		IV instar	
	H.armigera	*E. insulana*	*H.armigera*	*E. insulana*
Initial weight (mg)	25.41 ± 1.8	25.81 ± 2.72	11.02 ± 1.11	7.78 ± 0.90
Initial weight next instar (mg)	82.44 ± 9.55	87.55 ± 1.27	32.60 ± 1.28	26.43 ± 2.9
Increase in weight (mg)	57.03 ± 8.10	61.74 ± 1.82	29.93 ± 3.24	18.65 ± 3.05
Weight of food consumed	135.29 ± 14.94	99.66 ± 13.26	73.66 ± 6.52	46.87 ± 5.06
Conversion ratio (%)	42.68 ± 5.30	70.11 ± 6.9	46.78 ± 7.72	38.80 ± 4.97
Duration of instar (days)	15.0 ± 0.64	18.0 ± 0.83	13.0 ± 0.0	13.2 ± 0.32
Predatory value (mg/day)	9.10 ± 1.12	5.44 ± 0.78	5.66 ± 0.62	3.60 ± 0.31
Number of meals	3.0 ± 0.0	3.0 ± 0.0	3.0 ± 0.0	2.8 ± 0.30
Average weight per meal (mg)	44.87 ± 4.24	33.33 ± 4.4	24.55 ± 2.72	17.61 ± 1.59

29.93 and 57.03 mg of live weight respectively, whereas, those reared on *E. insulana* gained 18.65 and 61.74 mg respectively.

The IV and V nymphal instars of *S. versicolor* consumed respectively 73.66 and 135.29 mg *H. armigera*. But they consumed only 46.87 mg and 99.66 mg respectively of *E. insulana*. The *H. armigera*-fed V nymphal instar had a higher predatory value (9.10 mg) than the *E. insulana* fed ones (5.44 mg/day). Similarly, the *H. armigera*-fed IV nymphal instar had higher predatory value (5.66 mg/day) than the *E. insulana* fed V nymphal instar (3.595 mg/day). *H.armigera*-fed IV and V nymphal instar had a shorter stadial period (15.0 ± 0.64 days and 13.0 ± 0.0 days, respectively).

From the foregoing account, it is clear that *S. versicolor* nymphal instars preferred more of *H. armigera* than *E. insulana* larvae. Similar observation was recorded by Stride (1956) when he provided *Odontopus sexpunctatus* and *Dysdercus voelikeri* Schmidt as prey for the reduviid *Phonoctonus lutescens* (Guerin and Percherson). He found that *P. lutescens* preferred more of *O. sexpunctatus* due to the distastful nature of *D. voelkeri*. Further studies on the biochemistry of repugnatorial glands of pest preys will explain the mechanism of host-pest interaction and pest-preference.

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REFERENCES

AMBROSE, D.P. 1980. Bioecology, Ecophysiology and Ethology of reduviids (Heteroptera) of the scrub jungles of Tamil Nadu. *Ph.D. thesis, Univ., of Madras.* 229 pp.

AMBROSE, D.P. 1988. Biological control of insect pests by augmenting assassin bugs (Insecta : Heteroptera : Reduviidae). *Proc. Bicovas.*, **2**, 25-40.

AMBROSE, D.P., LAZER, X. and JEBANESAN,A. 1985. Effect of starvation and competition on the predatory behaviour of *Catamiarus brevipennis* Serville (Insecta : Heteroptera : Reduviidae). *Bull. Env. Sci.*, **2**, 1-6.

EDWARDS, J.S. 1962. Observations on the development and predatory habits of two reduviids (Heteroptera) *Rhinocoris carmelita* Stal and *Platyeris rhadamanthus* Gerst. *Proc. R. Entomol. Soc. London*, **37**, 89-98.

FEWKES, O.W. 1960. The food requirements by weight of some British Nabidae (Heteroptera). *Ent. exp. & Appl.*, **3** 231-237.

RALSTON, J.S. 1977. Egg guarding by male assassin bugs of the genus *Zelus* (Hemiptera : Reduviidae). *Psyche*, **84**, 103-106.

SOUTHWOOD, T.R.E. 1956. The structure of the egg of terrestrial Heteroptera and its relationship to the classification of the groups. *Trans. R. Entomol. Soc. London*, **108**, 163-221.

STRIDE, G.O. 1956. On the biology of certain West African species of *Phonoctonus* (Hemiptera : Reduviidae), mimetic predators of the pyrrhocoridae. *J. ent. Soc. S. Afr.*, **19**, 52-69.

TAWFIK, M.F.S., AWADALLAH, K.T. and ABDULLA, M.M.H. 1983. Effect of temperature and relative humidity on the various stages of the predator *Allaeocranum biannulipes* (Montrouzier & Signoret). *Bull. Soc. ent. Egypt.*, **64**, 239- 250.

VENNISON, S.J. 1989. Bioecology and ethology of chosen assassin bugs. Ph.D. thesis, Madurai Kamaraj University, Madurai.

VENNISON, S.J. and AMBROSE, D.P. 1989. Biology, behaviour and biocontrol efficiency of *Sycanus reclinatus* Dohrn (Insecta : Heteroptera : Reduviidae)from Southern India. *Mitt. Zool. Mus. Berl.*, **68**, 143-156