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Predatory Potential and Stage Preference of a Reduviid Predator *Allaeocranum quadrisignatum* Reuter on *Dysdercus cingulatus* Fabricius

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ABSTRACT

Predatory potential and stage preference of the reduviid predator, *Allaeocranum quadrisignatum* Reuter were studied under laboratory conditions. The total developmental period on an average was 84.06 days. The younger nymphal instars (I to III) of the predator consumed lesser number of prey than the older (IV & V) nymphal instars. The predatory rate gradually increased as the nymphal development progressed. The nymphs and adults preferred the I and II instar nymphs respectively of *Dysdercus cingulatus* Fabricius.

KEY WORDS : *Allaeocranum quadrisignatum, Dysdercus cingulatus,* predatory potential, stage preference

The assassin bug *Allaeocranum quadrisignatum* Reuter was found preying upon a number of insects such as, *Corcyra cephalonica* Staint. *Dysdercus cingulatus* Fabricius, *Oxycarenus hyalipennis* Costa, *Helicoverpa armigera* Hubner, *Pectinophora gossypiella* Saunders and *Odontotermes obesus* Rambur.

Though four species of *Rhinocoris* and one of *Coranus* reduviid predators were reported as biocontrol agents of *D. cingulatus* (Sitaramaiah *et al.*, 1975; Nayar *et al.*, 1976; Ambrose, 1985, 1988; Lakkundi, 1989), no report is available on the biocontrol potential of any reduviids on *D. cingulatus*. This study was aimed to assess its predatory potential and stage preference on the early nymphal stages of *D. cingulatus*, a pest of cotton and vegetables.

MATERIALS AND METHODS

Adults of *A. quadrisignatum* were collected from Userathukudieruppu, V.O. Chimbaranar district, Tamil Nadu, South India (77^0. 56'. 48"E and 8^0. 22' N) and reared in the laboratory in plastic containers (80 ml) (temperature 30-32^0 C; RH 75-85% and photoperiod 11-13 hrs) on *D. cingulatus*. Nymphs hatched from the eggs were reared individually on the I and the II instar nymphs of *D.cingulatus* which were maintained on soaked cotton seeds in the laboratory in plastic troughs (22x10x4 cm). The cotton seeds were changed once in two days. Newly hatched nymphs of *A. quadrisignatum* were given known number of I and II instar nymphs of *D. cingulatus* till they became adults to study their predatory potential. The number of nymphs consumed was recorded every 24 h till they became adults. Biological observations like the duration of individual stadium and the nymphal mortality were recorded.

Stage preference studies were conducted in all the five nymphal instars and in the adults. Nymphal instars I, II and III of *D. cingulatus* were introduced into the plastic containers (80 ml) and allowed to move undisturbed for 10 minutes. All the nymphal instars and adults of *A. quadrisignatum* were then introduced into the containers and the feeding events were recorded continuously for 24 h. Successful predation and stage of the prey preferred were recorded. All the observations were adequately replicated.

RESULTS AND DISCUSSION

The total number of prey consumed and the predatory rate of all the five nymphal stage o' *quadrisignatum* on the I and the II nymphal instars of *D. cingulatus* are presented in Table 1. The predatory potential of *A. quadrisignatum* showed that the I instar nymphs consumed less number of I and II nymphal instars of *D. cingulatus* and it gradually increased as they grew older (Table 1). It consumed more number of I nymphal instars (31.96) than the II nymphal instars (19-26) of *D. cingulatus*. The nabid predator *Nabis alternatus* Parshley, also consumed more number of I nymphal instar than the other instars of *Lygus haspersis* Knight (Perkins and Watson, 1972).

Table 1. Predatory potential of *A. quadrisignatum* on the I and II nymphal instars of *D.cingulatus* ($\bar{X}$ ± SE)

Life stages of predator	n	No. of prey killed in instar		Total no. of prey killed	No. of prey killed-day
		I	II		
NYMPHS					
Instar	22				
I	19	4.59 ± 0.19	0.00 ± 0.00	4.59 ± 0.19	0.26 ± 0.02
II	17	6.31 ± 0.78	2.21 ± 0.54	8.52 ± 0.59	0.63 ± 0.06
III	16	6.46 ± 0.52	3.11 ± 0.32	8.88 ± 0.71	0.69 ± 0.06
IV	16	6.50 ± 0.64	5.12 ± 0.04	11.56 ± 0.87	0.77 ± 0.07
V	16	9.68 ± 0.63	8.56 ± 0.51	18.25 ± 0.53	1.03 ± 0.06
ADULT	16	31.96 ±0.55	19.26 ±0.51	51.52 ± 0.58	0.61 ± 0.19

Irrespective of stages of the prey, the attack rate was lower in the I nymphal instar which gradually increased as they grew older (0.26, 0.63, 0.69, 0.77 and 1.03 prey/day/ for I, II, III, IV and V nymphal instars, respectively). Similar observations were made by Eveleight and Chant (1981) and Mukerji and Le Roux (1969). This might be due to the fact that as the predators become larger in relation to prey size, the rate of attack increases because a larger predator can move faster and more successful in capturing prey, as reported by Hassel *et al.* (1976).

When the nymphs and adults of *A. quadrisignatum* were provided with the I and II nymphal instars of *D. cingulatus*, the nymphal predators preferred the I nymphal instar. The preference for I nymphal instar of prey gradually decreased from the I nymphal instar to the adults. The preference for the II nymphal instar gradually increased from the II nymphal instar to adult predator (Table 2). A similar observation was reported by Sureshkumar and Ananthakrishnan (1985) and Fuller (1988). Large size prey obviously provided more food per individual than did small ones and younger nymphal predators needed less amount of food than older nymphal predators. Similar observations were made by Weselch (1985) in *Calosoma sycophanta* L. on *Lymantria dispar* (L.). The preference of adult predator to II nymphal instars of *D. cingulatus* might be due to the greater amount of food being available from those prey. Singh and Singh (1987) observed that the I nymphal instar *R. fuscipes* preferred only the II nymphal instars of *Nezara virudula* Linn. Similarly, in the present observation, the I nymphal instar of *A. quadrisignatum* preferred only the I nymphal instar of *D. cingulatus*. These results indicate that the larger predator preferred the larger size prey and the smaller predator preferred the smaller size prey and so the timely release of a predator is very important in biocontrol programmes.

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Table 2. Stage preference (%) in the life stages of *A.quadrisignatum* on the nymphal stages of *D.cingulatus* (n=30)

Life stages of predator	Nymphal stages of prey preferred (%)	
	I	II
NYMPHS		
Instar		
I	100.00	-
II	90.00	10.00
III	76.66	23.33
IV	70.00	30.00
V	63.33	36.66
Adult	33.33	66.66

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