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Food Requirement of *Rhinocoris fuscipes* Fab. (Heteroptera, Reduviidae)

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Rhinocoris fuscipes Fab. was reported as a potential predator of various insect pests (Cherian, 1937; Singh and Gangrade, 1975; Kumaraswami, 1991; Singh and Singh, 1987). In the present work, the food requirement of *R.fuscipes* has been assessed in terms of predatory value (Fewkes, 1960). The predatory value and conversion ratio were taken as indices to determine whether there was a characteristic fixed value or variable range for each instar of the species. It will also help to find out the optimum stage of the predator, wherein quicker control over the pest can be achieved after releasing them in the field.

Adults and fifth nymphal instars of *R.fuscipes* were collected from Azhagarkoil scrub jungle (78°. 18'. 45"E and 10°. 71". 3"N) near Madurai, South India. They were reared on larvae of *Corcyra cephalonica* Staint in the laboratory (Temperature 30-35°C; RH 75-85%) in separate plastic containers (6 x 4 cm). *C. cephalonica* eggs were sprinkled over wheat flour on the plastic troughs, and the hatched larvae were reared until second instar. The second instar larvae thus reared were used as prey for the predator.

After the first moult, the second instar predators were kept in isolation on *C. cephalonica*. The predators and prey were examined and weighed daily and fresh prey was provided whenever necessary. The moulted nymphs of the predator were weighed after the completion of tanning. The experiment was carried out continuously for 21 days after imaginal moult. The weight of food consumed by the predators during these days was recorded.

The values of conversion ratio and predatory value were calculated using the following expression (Fewkes, 1960).

$$\text{Conversion ratio} = \frac{\text{Weight gained}}{\text{Weight consumed}} \times 100$$

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

Where all weight are fresh weights.

The initial weight recorded for the nymphal instars steadily increased from the second instar to the adult (Table 1). A remarkable five - fold increase was observed between the initial weight of the third and the fourth nymphal instars. But, the weight increase from the second to the third instar and from the fifth instar to the adult was only two-fold and that of fourth to fifth instar was almost three - fold. The highest weight gained was observed in the fifth nymphal instar and the adult and the lowest in the second nymphal instar. As the age of the predator increased, the amount of weight gained also increased which is evident from the positive correlation ($Y = 5.92x - 11.67$; $r = +0.9801$) obtained. Similarly, the amount of food consumed also increased as a function of aging. The third nymphal instar consumed food nine times greater than the second nymphal instar. In all the other nymphal instars two - fold increase in consumption was observed ($Y = 19.055 - 46.06$; $r = +0.9407$).

The conversion ratio of *R. fuscipes* was comparatively higher in the younger instar than in the V instar and the adult. Earlier

Table 1. Food requirements of life stages of *R.fuscipes* fed on the larvae of *C. cephalonica* ($\bar{X}$ ±SE)

Parameters	Nymphal instars				Adult
	II	III	IV	V	
Initial weight (mg)	0.66 ± 0.06	1.27 ± 0.12	6.64 ± 0.27	18.89 ± 39.92	38.18 ± 1.35
Initial weight next instar (mg)	1.32 ± 0.11	6.32 ± 0.40	17.76 ± 1.07	39.92 ± 1.15	61.08 ± 3.65
Weight gained (mg)	0.62 ± 0.06	5.05 ± 0.30	11.12 ± 0.96	21.03 ± 1.25	22.23 ± 3.51
Weight of food consumed (mg)	1.11 ± 0.13	10.21 ± 0.96	17.46 ± 1.41	41.06 ± 1.79	80.96 ± 10.90
Conversion ratio (%)	58.10 ± 5.20	51.21 ± 2.33	64.94 ± 4.80	51.26 ± 2.48	26.90 ± 4.52
Duration of instar (days)	4.0 ± 0.0	5.5 ± 0.22	6.88 ± 0.30	7.84 ± 0.19	21.0 ± 0
Predatory value (mg/day)	0.27 ± 0.03	1.90 ± 0.19	2.56 ± 0.21	5.86 ± 0.25	3.85 ± 0.51
Number of meals	1.0 ± 0.0	1.9 ± 0.1	2.55 ± 0.17	3.46 ± 0.18	8.0 ± 0.66
Average weight of meals (mg)	1.1 ± 0.13	5.33 ± 0.32	6.88 ± 0.37	12.06 ± 0.57	10.09 ± 1.10
Number of observations	10	10	9	13	8

workers (Johnson, 1960; Kasting and McGinnis, 1959) observed that the conversion ratio varied between the instars and the younger instars were more efficient than the older ones. However, Fewkes (1960) found an exactly opposite trend in Nabids. The reason for decrease in efficiency of older instar and adult is not clearly known. But Gordon (1959) observed that the efficiency of conversion of the German roach *Blatella germanica* decreased as the body weight increased and suggested that if the weight of a German roach increased two times then the absorption surface area of the gut increased only 1.8 times. The same suggestion might be true for *R. fuscipes*. When looking at the conversion ratio and the weight of food consumed for the nymphal instars of *R. fuscipes* (Table 1), *Phonoctonus nigrofasciatus* (Evans, 1962) and *Rhodnius prolixus* (Buxton, 1930), it was found that there was no negative correlation between the two quantities in all the three insects. Hence, it was suggested that the decrease in the value of conversion ratio was not merely due to general increase in food consumption of the later instars and adults but is due to some more fundamental physical or metabolic limiting factors.

The duration of the stadia gradually increased as the age of the predator increased ($Y = 3.644 - 5.552$; $r = +0.8407$). The predatory value also increased as the predator grew older ($Y = 1.112x - 1.56$; $r = +0.8359$). Evans (1962) obtained similar results in another assassin bug *P. nigrofasciatus*. He considered the predatory value as a general guide to measure the potential value of the predator. During the course of its development from second nymphal instar to adult, each *R.fuscipes* consumed about 69 mg of *C. cephalonica*. Evans (1962) calculated the food requirements of *P. nigrofasciatus* for its development from first instar to adult as 500-574 mg of *Dysdercus* sp. The lower requirement of *R. fuscipes* could be attributed to the tiny size of its adult which weighed only 38.18 mg when compared to the adult weight of *P. nigrofasciatus* which was 219.2 mg, 5.5 times heavier than *R. fuscipes*. It is interesting to note that the fifth nymphal instar of *R.fuscipes* required more amount of food and had higher predatory value than adult.

KEY WORDS : *R. fuscipes*, predatory value, conversion ratio, food requirement, biocontrol agent, reduviid predator

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REFERENCES

BUXTON,P.A. 1930. The biology of blood sucking bug *Rhodnius prolixus* (Hemiptera). *Trans. R. Ent. Soc. Lond.*, **78**, 222-236.

CHERIAN,M.C. 1937. Administration Report of Government Entomologist, Coimbatore for 1936-1937. *Rept. Dept. Agric. Madras.*, pp. 126-133.

EVANS,D.E. 1962. The food requirement of *Phonoctonus nigrofasciatus* Stal. (Hemiptera : Reduviidae). *Ent. exp. Appl.*, **5**, 33-39.

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

GORDON,H.H. 1959. Minimal nutritional requirement of the German Roach *Blatella germanica* L. *Ann. N.Y.Acad. Sci.*, **77**, 290-351.

JOHNSON,C.G. 1960. The relation of weight of food ingested to increase in body weight during growth in the bed bug, *Cimex lectularis* L. (Hemiptera). *Ent. exp. Appl.*, **3**, 238-240.

KASTING,R. and McGINNIS, S.A.J. 1959. Nutrition of the pale western cutworm, *Agrotis orthogonia* Morr. (Lepidoptera : Noctuidae). *Can. J. Zool.*, **37**, 713 -720.

KUMARASWAMI,N.S. 1991. Bioecology and ethology of chosen predatory bugs and their potential in biological control. *Ph.D. thesis, Madurai Kamaraj University, Madurai.*

SINGH,O.P. and GANGRADE,G.A. 1975. Parasites, predators and diseases of larvae of *Diacrisia obliqua* Walker (Lepidoptera: Arctiidae) on soybean. *Curr. Sci.*, **44**, 481-488.

SINGH,O.P. and SINGH,K.J. 1987. Record of *Rhinocoris fuscipes* Fabricius as a predator of green stink bug, *Nezara viridula* Linn. infesting soybean in India. *J. Biol. Control*, 1(2), 145-146.