Journal of Biological Control, 33(3): 271-273,2019, DOI: 10.18311/jbc/2019/22832

Research Article

Tri-trophic interaction of different diet fed *Corcyra cephalonica* (Stainton) on feeding efficiency of reduviid predator, *Sycanus collaris* (Fab.) under laboratory condition

SAURABH PADAMSHALI*, JAYA LAXMI GANGULI, SONALIKA KOLHEKAR, RASHMI GAURHA and R. N. GANGULI

Department of Entomology, College of Agriculture, Indira Gandhi Agricultural University, Raipur – 492012, Chhattisgarh, India

**Corresponding author E-mail*: saurabhpadamshali@gmail.com

ABSTRACT: *Sycanus collaris* Fabricius (Hemiptera: Reduviidae) are voracious and polyphagous reduviid predators of economically important insect pests of agriculture and forest. Only limited work has been done in case of *S. collaris*, but life history of these predators on *Corcyra cephalonica* Stainton were documented. The present study was carried out at the Bio-control laboratory, Department of Entomology, College of Agriculture, IGKV, Raipur (C.G.), during February to May, 2018 with an aim to assess influence of various diets fed *C. cephalonica* larvae on feeding efficiency of reduviid predator, *S. collaris*, which are responsible for preference and non-preference of reduviid bugs for mass rearing in laboratory conditions. For this experiment, ten freshly hatched first instar *S. collaris* nymphs were placed in Petri-dish, replicated thrice and larvae of *C. cephalonica* reared on twelve different diets were provided throughout their life cycle and the feeding efficiency was recorded. Results indicated that feeding efficiency of *S. collaris* was found to be maximum (183.31) in T1 (Rice), whereas it was found to be minimum (91.33) in T9 (Maize + Groundnut) reared larvae of *C. cephalonica.*

KEY WORDS: *Corcyra cephalonica,* feeding efficiency, reduviid, *Sycanus collaris*

(Article chronicle: Received: 13-11-2018; Revised: 26-07-2019; Accepted: 15-08-2019)

INTRODUCTION

Reduviid bug, commonly known as “Assassin bugs” or “Kissing bug” belongs to family Reduviidae of the suborder Heteroptera under the order Hemiptera. Reduviids are abundant, occurring worldwide and are highly successful polyphagous predators. Reduviid bugs like *Sycanus collaris* (Fabricius) are alate, entomo-succivorous, polyphagus, polymorphic, crepuscular, multi-voltine assassin bugs, predominantly found in the jungles, semi-arid zones, tropical rain forests and agro-ecosystems. *S. collaris* is mainly distributed in South-East Asia particularly in India. *S. collaris* are voracious and polyphagous predators of other insects especially economically important pests of agriculture and forest. They kill more prey than they need to satiate themselves.

Adult bugs are yellow and black in colour having an elongated head with a distinct narrow neck, long legs with their size often ranging from 15 to 20 mm. in length and a prominent, segmented long rostrum or beak to kill the prey. Female bug lays eggs in form of clusters which are cemented to each other and to the substratum. Incubation period is 11-15 days. The nymphs molt five times in about 10 weeks before they reach imago stage. Nymphal development time is about 70-77 days.

These insects are of considerable economic importance, as they keep a check on important pests of agriculture and forests. They play a vital role in the biological control of >20 insect pests. It is also a potential larval predator on lepidopteran pests in various agro-ecosystems viz. rice, sugarcane, cotton, soybean, pigeonpea, castor, tobacco, okra, pumpkin, brinjal, citrus etc. (Sahayraj, 2002). Effectiveness of these as bio-control agents have been demonstrated, and the field releases usually result in quick and effective control of the target (Ambrose, 2010). Currently, very few reduviids have been used in the pest management programme because of the lack of rearing methodsand are not commercially available anywhere in the world. However, very little efforts have been made to rear reduviids in large scale under laboratory conditions on larvae of rice meal moth, *Corcyra cephalonica* Stainton (Sahayaraj, 2002a).

Research revealed that artificial rearing is very imperative for the mass production of reduviids which could be used in pest management. Only limited work has been done in case of *S. collaris*, but life history of these predators on *C. cephalonica* were documented. Nymphal development, longevity, size and their predatory efficiency may be greatly influenced by the quality of the available food. Influence of food on the development of many insect pests and predators are available in plenty but no information is available for reduviids reared on *Corcyra* larvae fed on different diets. The present study thus facilitates the assessment of various diets, which are responsible for preference and non-preference of reduviid bugs for mass rearing in laboratory conditions.

MATERIALS AND METHODS

Corcyra cephalonica larvae are used as an alternative laboratory host for mass multiplication of the reduviid, *Sycanus collaris*. Influence of *Corcyra cephalonica* reared on different diets on feeding efficiency of reduviid predator, *S. collaris* was studied under laboratory conditions in the Bio-control laboratory, Department of Entomology, College of Agriculture, IGKV, Raipur (C.G.), during February to May 2018.

The experimental treatments comprised of 12 diets (Table 1) and were conducted in Completely Randomized Design (CRD) replicated thrice.

For this experiment, ten freshly hatched first instar nymphs of *S. collaris* were placed in petri-dish, replicated thrice and 3rd instar larvae of *C. cephalonica* reared on different diets were provided andfeeding efficiency was recorded on daily basis throughout their life cycle.

Table 1. Experimental treatments comprised of 12 diets

Treatment	Host diet
T_1	Rice
T_2	Wheat
T_3	Maize
T_4	Sorghum
T_5	Pearl millet
T_6	Mix (Rice + Maize + Pearl millet)
T_7	Rice + Groundnut
T_8	Wheat + Groundnut
T_9	Maize + Groundnut
T_{10}	Sorghum + Groundnut
T_{11}	Pearl millet + Groundnut
T_{12}	Mix (Rice + Maize + Pearl millet) + Groundnut

RESULTS AND DISCUSSION

From the data depicted in Table 2, it is clear that the mean maximum number of *Corcyra cephalonica* larvae consumed by *Sycanus collaris* was from those reared on T_1 (183.31) which is significantly at par with T_8 (149.33), T_{10} (143.67), T_5 (141.67) and T_2 (140.33), whereas minimum was recorded in case of T_9 (91.33).

Table 2. Number of larvae of *Corcyra cephalonica* reared on 12 different diets consumed by *Sycanus collaris*

Treatments	Replications			Total	Average
	R_1	R_2	R_3		
T_1	249	113	188	550	183.33
T_2	180	118	123	421	140.33
T_3	125	112	108	345	115.00
T_4	145	122	118	385	128.33
T_5	157	141	127	425	141.67
T_6	145	131	121	397	132.33
T_7	157	115	132	404	134.67
T_8	164	145	139	448	149.33
T_9	88	98	88	274	91.33
T_{10}	165	135	131	431	143.67
T_{11}	156	127	122	405	135.00
T_{12}	141	100	99	340	113.33
SEM±					13.22
CD (5%)					45.11

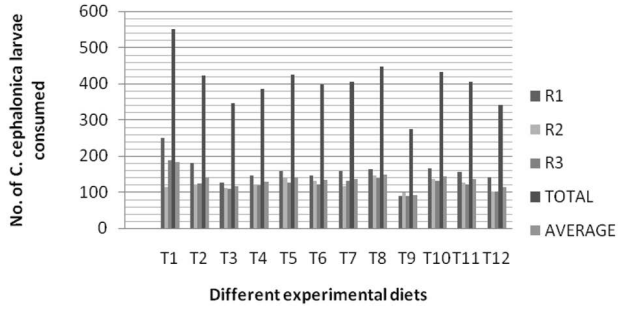

Fig. 1. Graphical representation of number of larvae of *Corcyra cephalonica* reared on 12 different diets consumed by *Sycanus collaris.*

Table 3. Weight of 3rd instar larvae of *Corcyra cephalonica* (in gms) reared on 12 different diets

Treatments	Replications			TOTAL	AVERAGE
	R1	R2	R3		
T1	0.011	0.013	0.017	0.041	0.0136
T2	0.010	0.011	0.008	0.029	0.010
T3	0.016	0.018	0.017	0.051	0.017
T4	0.016	0.017	0.014	0.047	0.0156
T5	0.020	0.017	0.021	0.058	0.019
T6	0.018	0.020	0.016	0.054	0.018
T7	0.014	0.016	0.012	0.042	0.014
T8	0.013	0.011	0.013	0.037	0.012
T9	0.014	0.018	0.017	0.049	0.016
T10	0.018	0.018	0.017	0.053	0.0176
T11	0.022	0.019	0.020	0.061	0.020
T12	0.016	0.019	0.017	0.052	0.0173
SEM±					0.00089
CD (5%)					0.00303

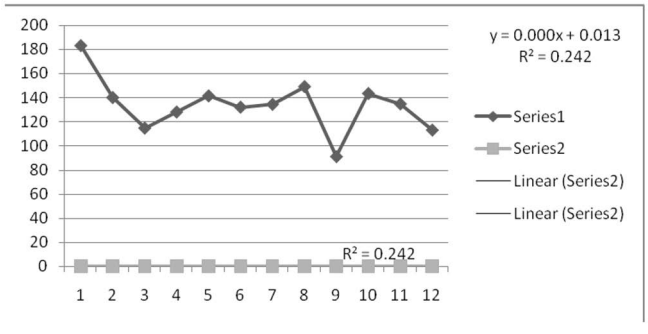

Fig. 2. Graphical representation of correlation between feeding efficiency of *Sycanus collaris* and weight of 3rd instar *Corcyra cephalonica* larvae.

The sequence of preference in descending order can be classified as $T_1 > T_8 > T_{10} > T_5 > T_2 > T_{11} > T_7 > T_6 > T_4 > T_3 > T_{12} > T_9$. The data depicted in Table 3, shows that there were significant differences between the treatments and the mean maximum weight of 3rd instar *C. cephalonica* larvae was found from those reared on Pearl millet + Groundnut (T_{11}) 0.020 gms and minimum in case of Wheat (T_2) 0.010 gms.

The sequence of weight of 3rd instar larvae in descending order can be classified as $T_{11} > T_5 > T_6 > T_{10} > T_{12} > T_3 > T_9 > T_4 > T_7 > T_1 > T_8 > T_2$. Fig. 2 shows negative correlation (-0.305) between feeding efficiency of *S. collaris* and weight of 3rd instar *C. cephalonica* larvae, showing that feeding efficiency of *S. collaris* decreases with increase in larval weight.

Thus, from the present studies it can be concluded that among the various diets tested *C. cephalonica* larvae reared on rice was preferred most and that reared on Maize + Groundnut was least preferred by *S. collaris.* Hence, for the mass multiplication of *S. collaris,* the larva of *C. cephalonica* maintained on rice seems to be most suitable.

REFERENCES

Ambrose DP, Nagarajan K. 2010. Functional response of *Rhynocoris fuscipes* (Fab.) (Hemiptera: Reduviidae) to teak skeletonizer *Eutectona machaeralis* (Walker) (Lepidoptera: Pyralidae). *J Biol Control* **4**: 175-178.

DeBach P, Hagen D. 1991. *Biological control by natural enemies*. 2nd ed. Cambridge University Press, Cambridge, UK.

Sahayaraj K. 2002. Small- scale laboratory rearing of reduviid predator *Rhynocoris marginatus* (Fab.) (Hemiptera: Reduviidae) on *Corcyra cephalonica* (Stainton) larvae by larval card method. *J Cent EurAgric.* **3**: 137-148.

Sahayaraj K. 2002a. Field bio efficacy of a reduviid predator *Rhynocoris marginatus* (Fab.) and plant products against *Aproaerema modicella* (Dev.) and *Spodoptera litura* (Fab.) of groundnut. *Indian J Entomol.* **64**: 292-300.