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# SUPPRESSION OF *Helicoverpa armigera* (HÜBNER), *Nezara viridula* (L.) AND *Riptortus clavatus* THUNBERG INFESTING PIGEONPEA BY THE REDUVIID PREDATOR *Rhynocoris fuscipes* (FABRICIUS) IN FIELD CAGES

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*Rhynocoris fuscipes* effectively suppressed the infestation of *Helicoverpa armigera*, *Nezara viridula* and *Riptortus clavatus* in pigeonpea field cages. Reduced pod and flower damages were observed in *R. fuscipes* released field cages. *R. fuscipes* release significantly enhanced the yield of healthy pods (grains). Field observations suggested this predator's pest suppression and grain damage reduction efficacy.

**Lepidoptera, Noctuidae, Heteroptera, Pentatomidae, Alydidae, Reduviidae, *Cajanus cajan*, pest insects, natural enemies, India**

CLAVER, M. Anto, AMBROSE, D. P.: Grabežljiva stjenica *Rhynocoris fuscipes* (Fabricius) učinkovito potinula zaraženost mahuna *Cajanus cajan* od štetnika *Helicoverpa armigera* (Hübner), *Nezara viridula* (L.) i *Riptortus clavatus* Thunberg u kavezima u polju. Entomology Research Unit, St. Xaviers's College (Autonomous), Palayankottai - 627 002, Tamil Nadu, India, E-mail: tvl_sxcent@sancharnet.in - Entomol. Croat. 2003. Vol. 7. Num. 1-2: 85 - 88.

Predator *Rhynocoris fuscipes* učinkovito je potisnuo zarazu vrstama *Helicoverpa armigera*, *Nezara viridula* i *Riptortus clavatus* u poljskim kavezima. Zapaženo je smanjenje šteta na mahunama i cvjetovima biljke kajan (*Cajanus cajan)* u kavezima u koje su ispušteni *R. fuscipes*. Prisutnost predatora signifikantno je povećala prirod zdravih mahuna i zrna. Poljski pokusi ukazuju na učinak predatora na smanjenje zaraze štetnicima i sniženje šteta.

**Lepidoptera, Noctuidae, Heteroptera, Pentatomidae, Alydidae, Reduviidae, *Cajanus cajan*, štetnici, predatori, Indija**

## Introduction

*Rhynocoris fuscipes* (F.) (Heteroptera: Reduviidae) is documented as an important predator of several pests of pigeonpea in India (SHANOWER et al., 1999). For successful establishment of an insect predator, it is necessary to evaluate its biocontrol potential under semifield / field situations. *R. fuscipes* positively responded to the

changing abundance of prey and exhibited Holling's second model of functional and numerical responses (AMBROSE and CLAVER, 1997). This predator will require information on field release practices to utilize it in Integrated Pest Management programme against the gram pod borer and the bean bugs in pigeonpea (SHANOWER et al., 1999; AMBROSE and CLAVER 2001). Hence, an attempt was made to evaluate the biocontrol potential of *R. fuscipes* against the gram pod borer, *Helicoverpa armigera* (Hübner), bean bugs *Nezara viridula* (L.) and *Riptortus clavatus* Thunberg in pigeonpea field cages.

## Materials and Methods

*Insect collection:*

The adults of *R. fuscipes* were collected from pigeonpea agroecosystem at Alengulam (77º47' E and 8º30' N) near Thirunelveli. They were reared (30 ± 3ºC temperature; 12 ± 1 hr. photoperiod; 70 ± 5% relative humidity) in rearing containers (10 x 15 cm) on rice moth larvae, *Corcyra cephalonica* Stainton as reported by AMBROSE and CLAVER (1997). Laboratory mass reared adults of *R. fuscipes* were used. Pest infested flowers and pods were collected at Alengulam pigeonpea agroecoregion along with shoots for release into field cage plots.

*Cage design:*

Experiments were carried out from field cages (6 x 4 x 7.5 feet) covered with zinc mesh screen (18 x 4 mesh) at Entomology Research unit experiment station, St Xavier's College Campus, Palayankottai on pigeonpea, *Cajanus cajan* (L.) Millspaugh. Plants were raised inside the cages in three rows of 10 plants. Insecticides were not used at any stage of plant growth. Plants were at pod forming stage when the experiment was initiated. Plants were infested with larvae of *H. armigera* and III nymphal instar of both *N. viridula* and *R. clavatus* at the rate of two per plant in separate cages. Thus, on the 40$^{th}$ day after sowing there were seventy *H. armigera*, *N. viridula* and *R. clavatus* each per cage. Plants were infested by placing III instar *H. armigera* larvae on the plant terminals using a fine brush and both III instar *N. viridula* and *R. clavatus* nymphs on the pods. Forty adult *R. fuscipes* were released into the experimental cages manually between rows. Cages infested with *H. armigera*, *N. viridula* and *R. clavatus* but without *R. fuscipes* served as control.

*Observation:*

After each release, the cages were checked and live *H. armigera*, *N. viridula*, *R. clavatus* and predator *R. fuscipes* were counted every 3$^{rd}$ day on all plants by whole plant search. Cannibalised and dead predators found during counting were replaced.



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Suppression potential of *R. fuscipes* against *H. armigera*, *N. viridula* and *R. clavatus* in experimental cages was evaluated by comparing the mortality data from experimental and control cages. The damage to pods was recorded by counting the total and bored pods. On maturation pods were harvested at an interval of two days. Damaged and healthy pods were weighed separately, and grain yield assessed in each cage. Pest suppression, pod damage and grain yield in test cage plots were compared with that of control and the difference was statistically analysed using ANOVA.

## Results and Discussion

The predator *R. rufipes* significantly suppressed *H. armigera* (16.3 and 31.9), *N. viridula* (17.30 and 38.53) and *R. clavatus* (19.2 and 34.1 for experimental and control, respectively) pigeonpea field cage plots (Table 1). Predation of *H. armigera*, *N. viridula* and *R. clavatus* observed was similar to the observation of RICHMAN et al. (1980), SAHAYARAJ and AMBROSE (1977) and AMBROSE (2000) for reduviids *Arilus cristantus* (Linnaeus), *Ectomocoris tibialis* Distant and *Rhynocoris kumarii* Ambrose and Livingstone against lepidopteran larvae and red cotton bug in small cotton and okra field cage plots, respectively.

Table 1. *H. armigera*, *R. clavatus* and *N. viridula* control by *R. fuscipes* in pest-infested pigeonpea cage plots (n= 3; X ± SD)

| Treatment | Pest/cage plot | Pod damage (%) | Yeld (kg/ha) |
|---|---|---|---|
| 70 *H.armigera* + 40 *R. fuscipes* | 16.3 ± 2.54 a* | 21.5 ± 1.92 a | 1104 ± 20.84 b |
| 70 *H. armigera* | 31.9 ± 3.18 b | 48.3 ± 5.35 b | 442 ± 34.41 a |
| 70 *R. clavatus* + 40 *R. fuscipes* | 19.2 ± 2.93 a | 14.5 ± 1.47 a | 1045 ± 18.50 b |
| 70 R. *clavatus* | 34.1 ± 4.35 b | 39.21 ± 4.49 b | 684 ± 41.81 a |
| 70 *N. viridula* + 40 *R. fuscipes* | 17.3 ± 2.72 a | 18.36 ± 3.49 a | 1149.8 ± 101.43 b |
| 70 *N. viridula* | 38.53 ± 4.39 b | 42.40 ± 5.66 b | 743.4 ± 97.29 a |

* Means followed by the same alphabets in a column are not significantly different (P = 0.05) by DMRT

R. fuscipes significantly reduced the pod damage to pigeonpea plants feeding on *H. armigera* (21.5 and 48.3), *N. viridula* (18.36 and 42.40) and *R. clavatus* (14.5 and 39.2 for experiment and control, respectively) inside cages (Table 1). Similarly AMBROSE (2000) reported that assassin bug protected the okra fruits, foliage and flowers

from *H. armigera* and *A. flava* infestation in field cages. Moreover, GRUNDY and MAELZER (2000) reported that the release of three *Pristhesancus plagipennis* (Walker) (Hemiptera: Reduviidae) nymphs per meter of row improved soybean pod retention.

R. fuscipes release significantly enhanced the yield of healthy grain. AMBROSE (2000) reported that release of predatory reduviids increased the yield. Moreover, a higher number of the pests observed in the control plots might have led to a reduction in yield. Although the results have clearly established the potential of *R. fuscipes* in field cages, augmentative release and subsequent monitoring of their synchronization with plant phenology are furtherly required for their effective recommendation in IPM. Efforts are also made to enhance the efficiency of mass production to make it economical, and to ensure timely and adequate supply.

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Članak je četvrti prilog u projektu Hrvatskoga entomološkog društva za sastavljanje cjelovitog popisa znanstvenih i znanstveno popularnih radova za entomološku bibliografiju Hrvatske. Građa za razdoblje 1990 - 1996. objavljena je u Vol. 3(1997) 1998, za 1994. u Vol. 4(1998) 1999. i 1995 - 1996. u Vol. 5. 2001. Ovaj popis sadrži podatke o 148 bibliografskih jedinica 144 autora i koautora iz opće i primijenjene entomologije (sensu lato), uključivo stručne i znanstveno popularne priloge. Članci iz područja humane i veterinarske entomologije nisu uključeni. Autori su hrvatski entomolozi i biolozi te inozemni stručnjaci s radovima relevantnim za entomofaunu Hrvatske. Nisu uvršteni članci iz novina. Na kraju je popis korištenih časopisa.

**Entomologija, bibliografije, Hrvatska.**

MILOŠEVIĆ, B. 2003. Materials for the Entomological Bibliography of Croatia 1997. - Entomol. Croat. 2003, Vol.7. Num. 1 - 2: 89 - 109.

This paper is the fouth contribution within the Croatian Entomological Society's Project of completing the bibliography of Scientific and Popular Scientific papers for the Entomologocal Bibliography of Croatia. Materials for 1990 - 1993 were published in Vol. 3(1997) 1998, for 1994 in Vol. 4(1998) 1999; for 1995 - 1996 in Vol. 5. 2001. In the present article, data are given on 148 bibliographic units by 144 authors and co-authors on general and applied entomology (sensu lato), including professional and popular scientific papers. Contributions from human and veterinary entomology are not included. The authors are Croatian entomologists and biologists and foreign specialists who have published papers relevant to Croatian entomofauna. Articles from newspapers are not included. The index of journals is added.

**Entomology, bibliographies, Croatia.**

## Uvod

U prvom prilogu građe za entomološku bibliografiju Hrvatske objavljeni su podaci od 1990. do 1993. godine i važnije reference bibliografija do 1989. god. (MILOŠEVIĆ, 1998, Entomol. Croat. Vol.3(1997) 1998(1-2): 49 - 66). U drugom je prilogu objavljena građa za 1994. god. (Entomol. Croat. Vol.4. (1998) 1999 (1-2): 81 -