



## Prey deprivations on the predatory rate of *Canthecona furcellata* Wolff. (Hemiptera: Pentatomidae) on poplar defoliator, *Clostera fulgurita* Walk

S.N.Ray

### ABSTRACT

Laboratory experiments were conducted to find out the impact of the prey, *Clostera fulgurita* Walk (Lepidoptera: Notodontidae) deprivation period on the feeding behavior and predatory rate of *Canthecona furcellata* Wolff (Hemiptera: Pentatomidae). Results revealed that prey consuming time, and predatory rate were gradually increased in accordance with the prey deprivation period and this predator could be used for the biological control agent of *C. fulgurita*. However more studies are necessary to recommend this predator as a biological control agent.

**Key words:** *Canthecona furcellata*, *Clostera fulgurita*, prey deprivation

### INTRODUCTION

Poplar occupy an important place among fast growing tree species due to their multiple uses as raw materials in pulp and paper industry, match factory, plywood, pencil and packing cages industries (Gangoo *et al.*, 1997). These poplars have been seriously infested by two serious epidemic defoliators such as *Pygaera fulgurita* Walk and *Clostera cupreata* Walk (Lepidoptera: Notodontidae) (Singh *et al.*, 1983). *Canthecona furcellata* (= *Eocanthecona furcellata*) is predaceous on larvae of *Notolophus antiqua* (= *Orgyia antiqua*) a defoliator of primary tasar food plants (Sharma *et al.*, 2003). It is an important predator of several economically important forest insect-pests. There is lot of scope for utilizing this predator as a biological control agent against many insect pests. Primarily laboratory observations of the author show that *C. furcellata* also feeds the poplar defoliator, *C. cupreata*.

Owing to its regular presence in poplar nurseries and plantations in Uttar Pradesh and Haryana, predatory behavior and the predatory potential of different nymphal instars and the adults were studied by Ahmad *et al.* (1996). As physiological factors may influence the predatory behavior of insects, this study was designed to evaluate the possible impact that hunger has on the search path of a polyphagous predator, *Canthecona furcellata* Wolff. (Hemiptera: Pentatomidae). However no one studied the impact of prey deprivation on the predatory behavior and bioefficacy of this predator. Keeping in view the enormous damage caused by this pest to poplars, the present investigations were under taken to study the impact of prey deprivation on feeding behavior of *C. furcellata* under laboratory conditions.

### MATERIALS AND METHODS

Continuous laboratory culture of *C. fulgurita* was maintained in 5 liters glass jars with fresh leaves of poplar. Culture of *C. furcellata* was also maintained in the laboratory in one liter capacity of plastic jars provided with sufficient larvae of *C. fulgurita*. Jars were covered with sieve cap. Laboratory emerged adults of *C. furcellata* were starved for 8, 12, 16, 20 and 24 hours. Each *C. furcellata* was released in to 20 x 5 cm plastic vials and provided with fourth instar larvae of *C. fulgurita*. Predatory act like consumption time (handling time) was recorded and the vial was then covered with sieve cap for aeration. Each treatment was replicated with ten different predators of the same age groups. After 24 and 48 hours, predatory rate (number of prey killed/consumed/predator) was recorded. Data was subjected to F test and the significance was expressed at 1 per cent level.

### RESULTS AND DISCUSSION

Influence of starvation/prey deprivation on the sucking time or handling time and predatory potential of *C. furcellata* on fourth instar larvae of *C. fulgurita* is presented in table 1. From the table it was very clear that the prey handling time was significantly ( $F = 17.75$ ,  $P < 0.01$ ) and gradually increased from 8 hours prey deprivation to 24 hours deprivation. Handling time depends upon factors such as speed of pursuit of predator and prey escape or prey capture success (Akhtarruzaman and Ahmed, 1998; Sahayaraj, 1994).

It was also reveals that handling time was also influenced by the prey deprivation period of the predators too. It is presumed that when hunger was increased the predator,

Table 1. Prey deprivation period (in hours) on mean handling time (in minutes) and predatory rate of *Canthecona furcellata* on *C. fulgurita*

| Starvation (in hour) | Handling time (in minutes) | Larvae consumed (%) |          |
|----------------------|----------------------------|---------------------|----------|
|                      |                            | 24 hours            | 48 hours |
| 8                    | 217.75                     | 24.37               | 44.37    |
| 12                   | 233.50                     | 26.87               | 46.25    |
| 16                   | 273.75                     | 40.62               | 83.75    |
| 20                   | 268.50                     | 37.50               | 77.50    |
| 24                   | 269.00                     | 41.87               | 80.62    |
| F value              | 17.75*                     | 33.0*               | 70.72*   |
| C.D. at 1%           | 24.95                      | 5.86                | 9.64     |

\* Significant, NS= Non-significant.

handling time also increased. Statistical analyses between eight hours to other deprivation periods were significant at 5% by DMRT. Similarly predatory potential of *C. furcellata* adult on fourth instar larvae of *C. fulgurita* was also significantly increased from eight hours prey deprivation to 24 hours deprivation both at 24 and 48 hours observation. The statistical comparison between the different starvation intervals like 8 hrs with 16 hrs, 20 hrs, and 24 hrs, 12 hrs with 16 hrs, 20 hrs and 24 hrs were significant ( $P < 0.01$ ). Furthermore the predatory rate was doubled at 48 hours observation than 24 hours observations. Searching of *Deraeocoris lutescens* Schilling (Heteroptera: Miridae) was greatly diminished when the predator was provided with *Rhopalosiphum padi* (Linn.) (Homoptera: Aphididae) (Lamine *et al.*, 2005). Consumption of more predators during the starvation is an adaptive feature of this predator as reported in reduviid predators (Sahayaraj, 2006). The present findings reveal that *Canthecona furcellata* can be exploited as possible bio-control agent against many lepidopterous pests including *Clostera fulgurita*.

#### ACKNOWLEDGEMENT

The authors are thankful to G.P.Pant University of Agriculture and Technology, Pantnagar, the Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi, and Indian Council of Agricultural Research, Krishi Bhawan, New Delhi for providing necessary facilities to carry out the research work.

#### REFERENCES

- Ahmad, M., Singh, A. P., Sharma, S., Mishra, R. K. and Ahmad, M. J. 1996. Potential estimation of predatory bug, *Canthecona furcellata* Wolff (Hemiptera: Pentatomidae) against poplar defoliator, *Clostera cupreata* (Lepidoptera: Notodontidae) *Annals of Forestry*, **4** (2): 133-138.
- Akktarruzzaman, M. and Ahmed, M. 1998. Handling time interference constant, quest constant and area of discovery of coccinellid predator. *Thai Journal of Agriculture science*, **31**: 342-351.
- Gangoo, S. A., Mughal, A. H. and Makaya, A. S. 1997. Fertilizer response by two species of poplars on initial growth parameters. *Indian Forester*, **123** (3): 240-244.
- Lamine, K., Michel Lambin and Claude Alauzet. 2005. Effect of Starvation on the Searching Path of the Predatory Bug *Deraeocoris lutescens*. *BioControl*, **50** (5): 717-727.
- Sahayaraj, K. 1994. Capturing success by reduviid predators *Rinocoris kumarii* and *Rhynocoris marginatus* (Fab.) on different age groups of *Spodoptera litura* (Fab.), a polyphagous pest (Heteroptera: Reduviidae). *Journal of Ecobiology*, **6**(3): 221-224.
- Sahayaraj, K. 2006. Ecological adaptive features of Hunter Reduviids (Heteroptera: Reduviidae: Reduviinae) and their biological control. In: *Perspective in animal ecology and reproduction.*, (Volume 3) (Guptha, VK and Verma AK eds.). Daya Publishing House, New Delhi. 22-49 **PP**.
- Sharma, S. P., Ram Kishore, Sinhadeo, S. N., Roy, G. C. and Sinha, B. R. R. P. 2003. Biology and predation potential of *Canthecona furcellata* Wolff. (Hemiptera: Pentatomidae) on *Notolophus antiqua* Linn. a pest of primary tasar food plants. *Entomon*, **28**(4): 385-388.
- Singh, Pratap; Rawat, D. S., Mishra, R. M. Masharrat, Fasih, Prashad, G. and Tyagi, B. D. S. 1983. Epidemic defoliation of poplars and its control in Tarai, Central Forest division, Uttar Pradesh. *Indian Forester*, **109** (9): 675-693.

#### S. N. Ray

Department of Entomology, Bihar Agricultural College, Sabour, Bhagalpur-813210 Bihar, India, E-mail: drsnray@rediffmail.com