International Multidisciplinary Research Journal 2022, 12: 1-3
doi: 10.25081/imrj.2022.v12.7538
https://updatepublishing.com/journal/index.php/imrj

Research Article

ISSN: 2231-6302

Preliminary studies on parasitization potential of Braconid Wasp (*Bracon hebetor* Say) against certain Lepidopteran insect pest

A. Karthikeyan*, P. Pavithradevi, T. Gavya, K. Harini

Department of Crop Protection (Agricultural Entomology), Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi-642103, Tamil Nadu, India

Received: October 10, 2021
Revised: March 14, 2022
Accepted: March 17, 2022
Published: March 25, 2022

***Corresponding Author**
A. Karthikeyan
E-mail: karthientomo@gmail.com

ABSTRACT

A study on parasitization percentage of *Bracon hebetor* Say on certain lepidopteran insect pest on Rice moth (*Corcyra cephalonica* Stainton), Tomato fruit borer (*Helicoverpa armigera* Hubner),Tobacco leaf eating caterpillar (*Spodoptera litura* Fabricius) and okra fruit borer (*Earias vitella* Fabricius), studied at ordinary room temperature under *invitro* conditions and revealed that *C. cephalonica* was the most suitable host for the development of *B. hebetor* among the host species tested regarding the parasitization percentage was high in *C. cephalonica* followed by *S. litura*, *H. armigera* and *E. vitella*.

KEYWORDS: Bracon hebetor, Parasitization percentage, lepidopteran insect pest

INTRODUCTION

Nowadays biological pest control gaining a greater momentum. Biological control has come to have a significant role in integrated pest management (IPM) because of its advantages over chemical methods, pest resistance to conventional pesticides and compatibility with other IPM methods (DeBach & Rosen, 1991; Dent, 2000). The mass rearing of parasitoids, as biological control agents of insect pests, has improved substantially in recent years (Anderson & Leppla, 1992). Biological control includes various components like Natural enemies (predators and parasitoids) and Entomopathogenic Fungi, Bacteria, virus, Nematodes and protozoans. Among these parasitoid from Braconidae family was chosen for the present study. Braconid wasps represent one of the most diverse and abundant of the parasitoid groups (LaSalle & Gauld, 1993). *Bracon hebetor* Say (Hymenoptera: Braconidae) is a gregarious, idiobiont, cosmopolitan ectoparasitoid that attacks lepidopteran larvae (Magro & Parra, 2001; Jhansi & Babu, 2002; Fagundes *et al.*, 2005; Yasodha & Natarajan, 2006; Shojaei *et al.*, 2006; Desai *et al.*, 2007; Kyoung *et al.*, 2008; Mohapatra *et al.*, 2008). It attacks a variety of important lepidopterous pests of stored product and pests of field crops (Richards & Thomson, 1932; Athanassiou & Eliopoulos, 2003; Darwish *et al.*, 2003; Gupta & Sharma, 2004; Shojaei *et al.*, 2006). This is a well-known parasitoid of several pyralid species of lepidoptera.

MATERIAL AND METHODS

In vitro studies on Parasitization potential of Braconid against certain lepidopteran insect pests were carried out in the Department Of Agricultural Entomology, Vanavarayar Institute of Agriculture, Manakkadavu, Pollachi during the period of 2015-2016.

The materials used and methods adopted in various experiments of the present are detailed here under. *B. hebetor* is a common gregarious ecto – larval parasitoid. There are two strains of the parasitoid, one attacking field pests and the other stored product pests. *B. hebetor* is reared on *C. cephalonica* under room temperature and fluctuating relative humidity for effective parasitization. *B. hebetor* adults were purchased from Coconut Research Station, Aliyar. They were released inside the beaker with a strip of cotton dipped with honey solution and the beaker is covered by tissue paper. On the tissue paper 5th instar larvae are provided for oviposition again the larval layer is covered by another tissue paper. And the parasitized larva removed daily from the tissue paper and maintained separately. After 25 days the adults were emerged from parasitized larvae. Those emerged adults were used for further parasitization and counted separately. *B. hebetor* adults were collected from parasitized larvae of *C.cephalonica*.

Mass Culturing of Tobacco Caterpillar, *Spodoptera Litura* Fabricius

S. litura larvae collected from bhendi fields were fed with fresh bhendi leaves daily and were maintained in plastic buckets (25 × 20 cm) covered with muslin cloth. The full-grown larvae were allowed to pupate in the sterilized soil spread at the bottom of plastic buckets. The pupae were then collected; surface sterilized with 0.1 per cent sodium hypochlorite and kept on a layer of sawdust spread in a petriplate. The petriplate containing the pupae was kept inside a plastic bucket and observed for adult emergence. The top of the bucket was covered with muslin cloth and strips of cloth were hung inside for easy climbing and stretching of the wings by the emerging moths. On emergence, the moths were fed with 10 per cent sucrose solution fortified with 0.1 per cent ABDEC® multivitamin solution impregnated in cotton wool, placed in a small petriplate covered with wire gauze. The moths, thus emerged were collected using test tubes and six pairs were allowed inside a plastic bucket (25 × 20 cm) for mating and subsequent oviposition. Bhendi leaves were placed inside for oviposition. The stalks of the leaves were immersed in water in a conical flask so as to keep them afresh.

After two to three days of adult release, the eggs were collected along with a little portion of leaf and placed on moist filter paper inside a petriplate and observed for eclosion. Upon hatching, the neonates were transferred to bhendi leaves with the help of camel hairbrush and maintained for five days in glass jars of 20 × 10 cm size. The five days old (II instar) caterpillars were then enclosed in plastic buckets of 20 lit. Capacity in batches of 25 larvae and were allowed to feed on bhendi leaves. Fresh leaves were supplied daily and the larvae were allowed to pupate in the soil spread at the bottom. The container and glassware used for rearing were sterilized with 0.1 per cent mercuric chloride solution. While rearing, the diseased and unhealthy larvae were removed from the culture to avoid contamination and mass mortality (Anitha-Bharath, 2005).

Mass Culturing of Bhendi Fruit Borer, *Helicoverpa Armigera* Hubner

Matured larvae of *H. armigera* were collected from bhendi fields and were allowed to feed on bhendi fruit pieces kept in multicavity trays individually. The larvae were observed daily and decayed, dried fruits were removed and fresh fruit pieces were provided to ensure undisturbed growth of larvae. The diseased or abnormal larvae were discarded at once. The larvae were allowed to pupate and the pupae thus obtained were surface sterilized with 0.1 per cent sodium hypochlorite and collected in a petriplate containing a thin layer of saw dust.

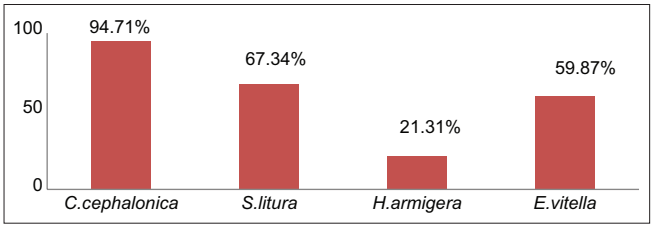

Figure 1: Parasitisation potential of *Bracon hebetor* on different lepidopteran host

Then the pupae were kept in mud pots covered with muslin cloth and periodically observed for adult emergence. The emerging moths were fed with 10 per cent sucrose solution fortified with 0.1 per cent ABDEC® multi-vitamin solution and were allowed to mate and lay eggs on the muslin cloth as well as strips of cloth hung inside the mud pots. The egg cloth was replaced from the third day onwards and kept folded in a polythene bag (20 × 15 cm). The polythene bags with egg cloths thus collected daily were placed in a plastic trough (60 × 30 × 20 cm) having a thin film of water to provide high humidity and low temperature. The egg cloths were observed regularly for larval emergence and the emerged neonates were allowed to feed on chickpea seedlings grown in plastic trays (20 × 10 cm) by spreading the egg cloth over the seedlings.

After 2-3 days, the second instar larvae were transferred to multicavity trays using camel hairbrush and were regularly fed with bhendi fruits until pupation. Thus, a continuous, disease free culture of *H. armigera* was maintained in the laboratory (Selvanarayanan, 2004).

Mass Culturing of Shoot and Bhendi Fruit Borer, *Eariasvitella* Boisdual

The field collected *Earias* spp. larvae were reared on bhendi fruits spread in plastic trays measuring 40 × 30 cm. Fresh fruits were supplied regularly and the larvae were observed for pupation. The pupae, thus formed were collected in a petriplate, bottom of which was lined with a layer of saw dust. The pupae were then kept inside a jar and observed for adult emergence. The emerging adults were released in a specially designed oviposition cage, which consisted of a glass jar (25 × 15 cm) covered with muslin cloth. Bhendi shoots were excised from the plant and were kept inside the cage. The base of the shoot was kept immersed in water in a small vial to keep the shoot afresh. Cotton swabs dipped in 10 per cent sucrose solution fortified with 0.1 per cent ABDEC® multi-vitamin solution were also kept, which enabled feeding of moths. The moths were allowed to mate and lay eggs on fruit. The eggs thus laid and the emerging larvae were utilized for subsequent culture maintenance.

RESULTS AND DISCUSSION

The present study reveals 94.71 per cent of parasitization potential of *Bracon hebetor* on rice moth *Corcyra cephalonica* which is a serious pest of most of the stored produce. The overall parasitization potential of *B. hebetor* on test insects *Viz.*, Tobacco caterpillar *(S. litura)* 67.34 per cent, bhendi fruit borer *(H. armigera)* 21.31 per cent, and bhendi shoot and fruit borer *(E. vitella)* 59.87 per cent respectively. The variations are may be due to environmental deviations (Figure 1).

Results obtained from research article "Reproductive parameters of *B. hebetor* on seven different hosts by Dabhi *et al.* July" is

66.92, 55.69, 60.75, and 59.42 per cent for Rice moth, Tobacco caterpillar, bhendi fruit borer, bhendi shoot and fruit borer respectively.

REFERENCES

Anderson, T. E., & Leppla, N. C. (1992). *Advances in Insect Rearing for Research and Pest Management*. Boulder, Colorado: Westview Press.

Anitha-Bharath, K. 2005. Preliminary evaluation of commercial pesticides against selected insect pests. M.Sc (Ag.) Thesis, Annamalai University.

Athanassiou, C. G., & Eliopoulos, P. A. (2003). Seasonal abundance of insect pests and their parasitoids in stored currants. *Bulletin-OILB/SROP, 26*,283-291.

Darwish, E., El-Shazly, M., & El-Sherif, H. (2003). The choice of probing sites by *Bracon hebetor* Say foraging for *Ephestia kuehniella* Zeller (Lepidoptera: Pyralidae). *Journal of Stored Products Research, 39*, 265-276. https://doi.org/10.1016/S0022-474X(02)00023-1

DeBach, P., & Rosen, D. (1991). *Biological control by natural enemies*. (2nd ed.). Cambridge, UK: Cambridge University Press.

Dent, D. (2000). *Insect pest management*. Wallingford, UK: CAB International.

Desai, V. S., Nagwekar, D. D., Patil, P. D., & Narangalkar, A. L. (2007). Field evaluation of a larval parasite Bracon hebetor Say against coconut black headed caterpillar. *Journal of Plantation Crops, 35*, 188-189.

Fagundes, G. G., Mohamed, H., & Solis, D. R. (2005). Biological responses of Anagasta kuehniella and its parasitoid, *Bracon hebetor*, to microwaves radiation (2450 MHz). *Revista de Agricultura Piracicaba, 80*, 12-34.

Gupta, S., & Sharma, H. B. (2004). *Bracon hebetor* Say is the natural enemy of *Ephestia calidella* (Guen.) a pest of stored dry fruits. *Uttar Pradesh Journal of Zoology, 24*(3), 223-226.

Jhansi, K., & Babu, P. C. S. (2002). Life table studies of *Bracon hebetor* (Say) on *Corcyra cephalonica* (Stainton) and *Maruca testulalis* (Geyer) under laboratory conditions. *Journal of Applied Zoological Researches, 13*(1), 22-24.

Kyoung, D. J., Ha, D. H., Nho, S. K., Song, K. S., & Lee, K. Y. (2008). Upregulation of heat stock protein genes by envenomation of ectoparasitoid *Bracon hebetor* in larval host of Indian meal moth, Plodia interpunctella. *Journal of Invertebrate Pathology, 97*(3), 306-309. https://doi.org/10.1016/j.jip.2007.10.001

LaSalle, J., & Gauld, I. D. (1993). Hymenoptera: their diversity, and their impact on the diversity of other organisms. In J. LaSalle & I. D. Gauld (Eds.), *Hymenoptera and biodiversity* (Pp. 1-26) Oxford: CAB International, xi + 348 pp.

Margo, S. R., & Parra, J. R. P. (2001). Biology of the ectoparasitoid *Bracon hebetor* Say, 1857 (Hymenoptera: Braconidae) on seven lepidopteran species. *Scientia Agricola, 58*(4), 693-698. https://doi.org/10.1590/S0103-90162001000400007

Mohapatra, S. D., Duraimurugan, P., & Saxena, H. (2008). Natural parasitization of *Maruca vitrata* (Geyer) by *Bracon hebetor* Say. *Pulses Newsletter, 19*(4), 11.

Richards, O. W., & Thomson, W. S. (1932). A contribution to the study of the genera *Epesthia*, Gn. (including Strymax, Dyar) and *Plodia*, Gn. (Lepidoptera: Phycitidae) with notes on parasite of the larvae. *Transactions of the Royal Entomological Society of London, 80*(6), 169-250.

Selvanarayanan, U. (2000). *Host plant resistance in tomato against fruit borer (Helicoverpa armigera Hubner)*. Ph.D. Thesis, Annamalai University.

Shojaei, S., Safaralizadeh, M., & Shayesteh, N. (2006). Effect of temperature on the functional response of *Habrobracon hebetor* Say (Hymenoptera: Braconidae) to various densities of the host, Plodia interpunctella (Hubner). *Pakistan Entomologist, 28*, 51-55.

Yasodha, P., & Natarajan, N. (2006). Diversity of natural enemies of Leucinodes orbonalis Guenee. *Entomon, 31*, 323-326.