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Efficacy of *Bracon hebetor* say against *Etiella zinckenella* in comparison with other lepidopteran host larvae

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Abstract
Agriculture plays an important role in the economic position of developing countries. The chemical control is generally practiced by farmers for higher crop yield, but this injudicious application has created many health hazards. Under such circumstances the use of bio pesticides in pest management is considered as environment friendly. *Bracon hebetor* is a cosmopolitan polyphagous ectolarval parasitoid of many lepidopteran pest larvae of field crop as well as stored products. To enhance the biological control program it is necessary to study parasitizing ability of *B. hebetor* on various host species. Hence the present study aimed to determine the efficacy of *B. hebetor* parasitoid on *E. zincknella*. We compared parasitization of *B. hebetor* on four different lepidopteran pest. A comparative study of parasitization of *B. hebetor* to *E. zincknella. M. vitrata, E. vittella* and *C. cephalonica* was undertaken during the period of December to January 2024 by providing them a alternate hosts under laboratory conditions the present study investigated that when all hosts were offered to *B. hebetor* the highest parasitization occurred on *C. cephalonica* followed by *M. vitrata, E. zincknella* and *E. vittella*. When two host were offered *B. hebetor* preferred *C. cephalonica* over *M. vitrata, M. vitrata* over *Etiella zincknella* and *Etiella zincknella over Earias vittella* when individual host where offered *B. hebetor* depositing more eggs forming more larvae, pupae and emerging more adults on *C. cephalonica* followed by. *M.vitrata, E. zinckenella* and *E. vittella.* It was evident that *B. hebetor* paralysed and parasitized *Etiella zincknella, hence B. hebetor* proved effective parasitoid of *E. zincknella.*#

Keywords: *Bracon hebetor, Etiella zincknella*, *Earias vittella*, parasitoid, Biological control

Introduction
E. zincknella damaged 57 % of pods, even insecticide procted plots (Lit singer *et al*., 1978). *E. zincknella* causes about 40 % yield loss in soyabean in Iran (parvin 1981). Soyabean is one of most important crop which is resulted in to low productivity due to pest attacks. Major pest commonly found to be cause damage to soyabean crop are *S. littoral*, *O. phaseoli* and *E. Zinckenella*. (Berg H.V *et al* 2010) The increasing global demand for economical and ecofriendly pesticides needs the search for biological pesticides as chemical pesticide causes serious health hazards. *Bracon hebetor* is a gregarious, polyphagous, ectolarval parasitoid which parasitizes many economically important pests of stored products. as well as field crops. It is used as a bio-controlling agent, because of long lifespan high fecundity, wide range of host insects and host finding ability. To enhance the biological control program it is necessary to study the parasitizing ability of *B. hebetor* on different lepidopteran host species. In present study an attempt was made to evaluate efficacy of *B. hebetor* against *E. zinckenella*. The study was carried out during the period of December to January 2023 under laboratory condition.

Materials and methods
Insect host culture maintenance – Host insects were collected from various sources and reared in the laboratory at constant temperature and relative humidity 27°C and 60% respectively on their natural diet. *E. zinckenella and M. vitrata* was collected from fields of cowpea and *E. vittella* from okra field. *C. cephalonica* was collected from infested stored grains. Mass rearing of these host insect was carried out in the laboratory.
Collection and rearing of *B. hebetor*- Initial culture of *B. hebetor* was obtained from the National Institute of plant health management Rajendranagar (NIPHM). The *B. hebetor* parasitoid was maintained on *C. cephalonica* larvae to increase population of adults for experiment in the laboratory at constant temperature and relative humidity 27°C and 60% respectively 50% honey solution was provided as food for adult *B. hebetor*.

Experiment
Host larvae of *Corcyra cephalonica, Etiella zinckenella, Maruca vitrata and Earias. Vittella* were used to study parasitization of *B. hebetor*.The sandwich method followed by NIPHM for mass production of *B. hebetor* was used, in which four glass jar (12 cm x 10 cm) provided with a cotton swab of 50 % honey solution inside the jar wall as a food for adults. 20 mated adult females were released in each glass jar. 10 larvae of each tested host species placed over the muslin cloth on the mouth of each jar and then covered with the another muslin cloth and secured tightly in position with the rubber band, so that the host larvae remained between the two layers of muslin cloth, three replication sets were made for each host species. After 24 hours parasitized host larvae along with eggs of *Bracon hebetor* were carefully transferred into glass petri plates (9 cm x 1.5 cm) with the help of smooth brush and reared for further observations. The number of eggs, larvae pupae and adults of *Bracon hebetor* were recorded.
The total number of larvae, pupae formed and adult emerged were used as response variables to determine the parasitizing ability of *B. hebetor,* host species are independent variables. To analyze effect of independent variables on the response variables mean of total data of and measure of data variability standard deviation around mean of a treatments was calculated and presented as Mean ± SD.

Results and Discussion

The *B. hebetor* female parasitized almost all host larvae but we found difference in parasitization. When single host larvae was offered to *B. hebetor* the mean number of larvae, pupae and adults of *B. hebetor/* host larva were highest 21.5 ± 3.5, 20.15±2.5, and 18 ± 4.9 respectively on *C. cephalonica* and 15.4 ± 4.3, 13.20 ± 4.7, and 10.2 ± 2.8 respectively on E. *zinckenella*. When *M. Vitrata* larvae were offered to *B. hebetor* the mean number of larvae, pupae and adults of *B. hebetor/* host larva were 18.6 ± 1.5, 15.6 ± 2.3, and 13.6 ± 2.5 respectively and 10.9 ± 5.2, 8.25 ± 6.2, and 7.8 ± 5.3 respectively on *E. vittella*.

In second experiment when *C. cephalonica* and *E. zinckenella* were offered to *B. hebetor* less number of larvae, pupae and adults of *B. hebetor/* host larvae were *15.30* ± 3.4, 14.17 ± 6.8, and 13.5 ± 3.2 observed respectively and highest on *C. cephalonica* 24.17 ± 2.5, 22. ± 2.7, and 20.4 ± 2.5 respectively. When choice was given between *E. zinckenella* and *M. vitrata* highest number of larvae, pupae and adults of *B. hebetor/* host larvae were *17.35* ± 1.2, 15.12 ± 2.7, and 14.5 ± 7.2 formed on *M. vitrata respectively*. Lowest on *E. zinckenella* 13.15 ± 2.5, 11.35 ± 7.2, 9.2 ± 3.4.

In third experiment when multiple host larvae were offered to adult female *B. hebetor* maximum number of number of larvae, pupae and adults of *B. hebetor/* host larvae were observed on *C. cephalonica* 24.14± 2.5, 23.12 ± 4.3, and 22 ± 6.2 followed by *M. vitrata*22.6 ± 2.8, 19.5 ± 2.3 and 17.12 ± 6.3, *E. zinckenella* 19.2 ± 3.2, 16.2 ± 5.2, 15.5 ± 2.8 and *E. vittella* 17.4 ± 5.6, 15.3 ± 5.2 and 12.5 ± 2.6 respectively.

Table -1 Parasitization of *B. hebetor* on *C. cephalonica*, *E. zinckenella, M. vitrata and E. vittella*

Experimental jars	Host Insect	No. of *B. hebetor* Larvae formed /host larva	No. of *B. hebetor* pupae formed/ host larva	No. of *B. hebetor* adults emerged /host larva
Jar 1	*C. cephalonica*	21.5 ± 3.5	20.15 ± 2.5	18 ± 4.9
Jar 2	*E. zinckenella.*	15.4 ± 4.3	13.20 ± 4.7	10.2 ± 2.8
Jar 3	*M. vitrata,*	18.6 ± 1.5	15.6 ± 2.3	13.6 ± 2.5
Jar4	*E. vittella*	10.9 ± 5.2	8.25 ± 6.2	7.8 ± 5.3

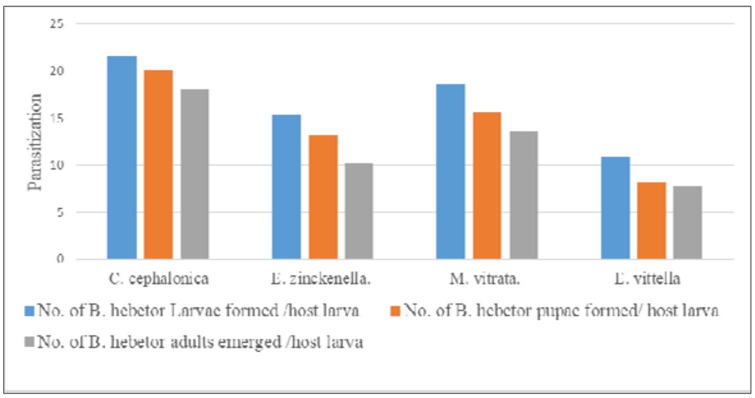

Fig 1: Parasitization of *B. hebetor* on *C. cephalonica*, *E. zinckenella, M. vitrata and E. vittella*

Table – 2 Parasitization of *B. hebetor* on *E. zinckenella* with *C. cephalonica, M. vitrata and E. vittella* as alternate host

Experimental jars	Host Insect	No. of *B. hebetor* Larvae formed/host larva	No. of *B. hebetor* pupae formed/host larva	No. of *B. hebetor* adults formed/host larva
Jar 1	*E. zinckenella.*	15.30 ± 3.4	14.17 ± 6.8	13.5 ± 3.2
	C. cephalonica	24.17 ± 2.5	22 ± 2.7	20.4 ± 2.5
Jar 2	*E. zinckenella.*	13.15 ± 2.5	11.35 ± 7.2	9.2 ± 3.4
	M. vitrata,	17.35 ± 1.2	15.12 ± 2.7	14.5 ± 7.2
Jar 3	*E. zinckenella.*	16.5 ± 3.7	15 ± 7.2	12.3 ± 2.4
	E. vittella	11.35 ± 2.9	9.28 ± 3.8	7 ± 5.3

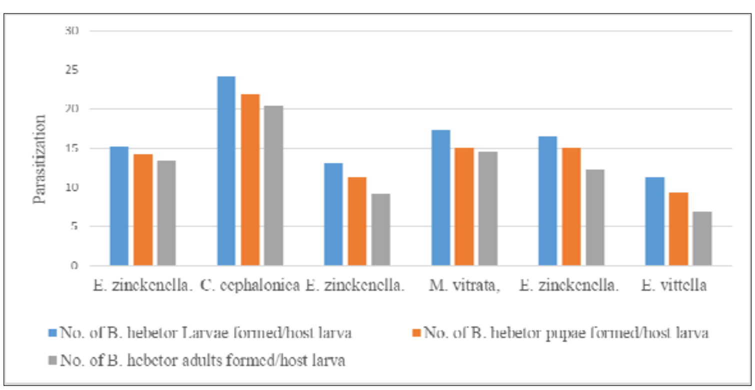

Fig 2: Parasitization of *B. hebetor* on *E. zinckenella* with *C. cephalonica, M. vitrata and E. vittella* as alternate host

Table 3: Parasitization of *B. hebetor* on *C. cephalonica*, *E. zinckenella, M. vitrata and E. vittella* multiple host

Host Insect	No. of *B. hebetor* Larvae formed/host larva	No. of *B. hebetor* pupae formed/host larva	No. of *B. hebetor* adult formed/host larva
C. cephalonica	24.14 ± 2.5	23.12 ± 4.3	22 ± 6.2
E. zinckenella.	19.2 ± 3.2	16.2 ± 5.2	15.5 ± 2.8
M. vitrata,	22.6 ± 2.8	19.5 ± 2.3	17.12 ± 6.3
E. vittella	17.4 ± 5.6	15.3 ± 5.2	12.5± 2.6

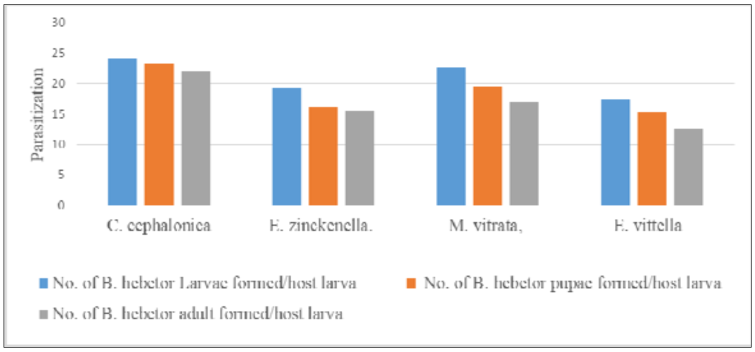

Fig 3: Parasitization of *B. hebetor* on *C. cephalonica*, *E. zinckenella, M. vitrata and E. vittella* multiple host

The finding of the present study indicated that when single host larva was offered to *B. hebetor* maximum number of larvae, pupae and adults were formed on *C. cephalonica* followed by *M. vitrata E. zinckenella*, and *E. vittella*. The *B. hebetor* females may alter their clutch size in response to host can support (Yu et.al 2003).

When two hosts *C cephalonica* and *E. zinckenella* were offered maximum number of larvae, pupae and adults of *B. hebetor*/larva were observed on *C.cephalonica* compared to *E.zinckenella* when the two alternative host *E.zinckenella* and *M.vitrata* was provided to *B.hebetor* higher number of larvae, pupae and adults of *B. hebetor* / larva were observed on *M.vitrata* then *E.zinckenella*. When two host *E.zinckenella* and *E.vittella* was offered to *B.hebetor* number of larvae, pupae and adults of *B. hebetor* / larva were formed on *E.zinckenella* compared to *E.vittella.*

When all hosts *C.cephalonica, E.zinckenella M. vitrata and E.vittella* were provided to *B.hebetor* maximum number of larvae pupae and adults of *B.hebetor* were formed on *C.cephalonica* followed by *M.vitrata, E.zinckenella*, and *E.vittella*.

The results from the present study indicated that the *B.hebetor* paralyzed and parasitized all host larvae that were offered. However, *B.hebetor* produced higher number of adults on *C.cephalonica* as compared to other host. This variation in number of larvae, pupae and adult formation may be due to venom selectivity that may required higher levels of venom to effectively paralyze the host or other physiological response may be decreased. *B.hebetor* preferred *C.cephalonica* over other host species results agree with Dabhi *et al* 2011 who reported that *B.hebetor* preferred *C.cephalonica*. Nikam Pawar 1993 also reported that *B.hebetor* Say population can be increased naturally on *C. cephalonica Stainton*. *B.hebetor* effectively parasitized *E.zinckenella* under laboratory conditions

Conclusion

The findings of the present study revealed that *B. hebetor* parasitizes *Corcyra cephalonica E. zinckenella, M. vitrata and E. Vittella. B. hebetor* proved effective parasitoid of *E. zinckenella* further need to be tested for its efficacy in field conditions. If it proves effective biocontrol agent it will reduce the threat of damage to many crops like pigeopea cowpea Green gram Redgram and Greenpeas. Corcyra cephalonica is the most suitable host for laboratory rearing of *B. hebetor.*

References

1. Abdoodhnabi Bagheri, Majeed Aksari Seyahooei, Yaghoub Fathipour, Maryam Famil, Fatemeh Koohpayma, Akhtar Mohammadi-Rad, Shabhnam Parichehreh. Ecofriendly managing of *Helicoverpa armigera* in tomato field by releasing *Trichogramma evanescence* and *Habrobracon hebetor*. J Crop Prot,2019:8(1):11-19.
2. Adashkevich BP, Saidova E, Takanave AA. Migration of *Habrobracon*. Zashchita Rastenil,1986:7:35-36.
3. Ba NM, Baoua IB, Kabore A, Amadou L, Oumarou N, Dabire Binso CL, Sanon A. Augmentative on-farm delivery methods for the parasitoid *Habrobracon hebetor* Say (Hymenoptera: Braconidae) to control the millet head miner *Heliocheilus albipunctella* (Lepidoptera: Noctuidae) in Burkina Faso and Niger. Biocontrol,2014:59(6):689-696.
4. Baoua IB, Amadou L, Oumarou N, Payne W, Roberts JD, Stefanova K, Nasen C. Estimating effect of augmentative biological control on grain yields from individual pearl millet heads. J Appl Entomol,2013:138:281-288.
5. Dhabi MR, Korat DM, Vaishnav PR. Comparative biology of *Bracon hebetor* Say on different lepidopteran hosts. Karnataka J Agric Sci,2011:24(4):549-550.
6. Ghimire MN, Phillips TW. Suitability of different lepidopteran host species for development of *Bracon hebetor* (Hymenoptera: Braconidae). Environ Entomol,2010:39:449-458.
7. Baoua IB, Ba MN, Amadou L, Kabore A, Dabire-Binso CL, Muniappan R. Field dispersal of the parasitoid wasp *Habrobracon hebetor* (Hymenoptera: Braconidae) following augmentative release against the millet head miner *Heliocheilus albipunctella* (Lepidoptera:

Noctuidae) in the Sahel. Biocontrol Sci Technol,2018:108:64-69.
8. Kumbhar TT, Kokate AS, Dumbre AD. Studies on the varietal resistance in okra, *Abelmoschus* L. (Moench) to shoot and fruit borer, *Earias* spp. Maharashtra J Hortic,1991:5:78-82.
9. Landge SA, Wankhede SM, Gangurde SM. Comparative biology of *Bracon hebetor* Say on *Corcyra cephalonica* Stainton and *Opisina arenosella* Walker. Int J Plant Prot,2009:2(2):278-280.
10. Amadou L, Ba MN, Baoua IB, Muniappan R. Timing of releases of the parasitoid *Habrobracon hebetor* and numbers needed in augmentative biological control against the millet head miner *Heliocheilus albipunctella*. Biocontrol,2019:5:573-581.
11. Nazarpoar L, Yarahmadi F, Rajabpour A, Saber M. Efficacy of staged augmentative release of *Habrobracon hebetor* Say (Hymenoptera: Braconidae) for biological control of *Helicoverpa armigera* (Lepidoptera: Noctuidae).
12. Goudiaby MF, Sarr I, Ba MN, Sembene M, Muniappan R. Efficacy of augmentative release of the parasitoid wasp *Bracon hebetor* against the pearl head miner. J Biol Control,2019:33:185-192.
13. Mansion H, Kumar A, Jeengar D. Insect pests of okra and their management. Vigyan Varta,2022:3(12):71-78.
14. Ghimire MN, Philips TW. Suitability of different lepidopteran host species for development of *Bracon hebetor* (Hymenoptera: Braconidae). Environ Entomol,2010:39(2):449-458.
15. Singh D, Singh H, Brar HS. Effect of spotted bollworm, *Earias* spp., infestation on yield and quality of okra seeds. Indian J Ecol,1985:12:100-103.
16. Vyas SH, Patel JR. Relative susceptibility of some lady's finger cultivars to *Earias vittella* (Fabricius). Indian J Plant Prot,1990:18:115-118.