The Pharma Innovation Journal 2023; 12(7): 685-688

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(7): 685-688

www.thepharmajournal.com
Received: 26-05-2023
Accepted: 30-06-2023

Nivedita Shah
Department of Agricultural Entomology, Sant Kabir College of Agriculture and Research Station, Kawardha, Chhattisgarh, India

Chunni Kumari
Department of Agricultural Entomology, College of Agriculture and Research Station, Marra Patan, Chhattisgarh, India

Jayalaxmi Ganguli
Department of Agricultural Entomology, Pt. Shiv Kumar Shastri College of Agriculture and Research Station, Surgi, Rajnandgaon, Chhattisgarh, India

Corresponding Author:
Nivedita Shah
Department of Agricultural Entomology, Sant Kabir College of Agriculture and Research Station, Kawardha, Chhattisgarh, India

Record of naturally existing species of Braconidae from Raipur (C.G.)

Nivedita Shah, Chunni Kumari and Jayalaxmi Ganguli

Abstract
Survey work has been done at different crop ecosystems from the Raipur region during *Kharif- Rabi*, 2019-20 and 2020-21. Rice meal moth, *Corcyra cephalonica* was used to trap Braconids on a few cereals (paddy and maize), legumes (mung bean and chickpea), vegetables (brinjal, tomato, cabbage and okra), and fruits (ber, guava, sapota and mango) ecosystem and the collected species was studied for their respective characters at the Biological control laboratory, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. Many species of braconid wasps that have been observed during the survey are believed to have the potential parasitoids of insect pests.

Keywords: Braconidae, biological control, pests, rice meal moth

Introduction
Braconid parasitoids are well-known among the several categories of biocontrol agents for the management of various insect pests (Bakr *et al*., 2014) [3]. Braconinae is one of the largest subfamilies, with more than 185 genera and 2,800 validly documented species (Yu *et al*., 2012) [13]. The braconid wasps are extremely diverse, gregarious and idiobiont ectoparasitoids of concealed larvae of many Coleoptera, Diptera, Lepidoptera and Hymenoptera species (Shaw & Huddleston 1991; Yu *et al.*, 2012) [12-13]. This parasitoid prefers to parasitize the last stages of its host's larvae, paralyzing them with venom and laying eggs on the surface of the paralyzed host (Akinkurolere *et al.*, 2009) [2]. The female wasps normally paralyze numerous larvae before returning to oviposit on some of them. As a result, they paralyze more hosts than are required for oviposition at any given time but only a small percentage of parasitoid larvae have actual eggs deposited on them in normal conditions. Since the damage caused by the pests and the methods to control them involves massive spraying of insecticides which led to several environmental hazards, it is important to search for new tools that can be used to manage insect pests. In this aspect, the adoption of natural parasitoids represents an important avenue of investigation (Shah *et al*., 2021) [11]. Therefore the present studies were designed to collect some braconidae species from different crop ecosystems.

Material and Methods
A survey of braconidae species has been done on a few cereals (paddy and maize), legumes (Mung bean and chickpea), vegetables (brinjal, tomato, cabbage and okra) and fruits (ber, guava, sapota and mango) ecosystem. In these ecosystems, Braconid species were collected by placing five fifth instar larvae of the rice meal moth, *Corcyra cephalonica* Stainton in a small plastic container (100 ml) and covered with a piece of muslin cloth and secured tightly with a rubber band (sandwich method) at various places under different crop ecosystems. After 48 hours of exposure, the containers were brought back to the laboratory and looked for the emergence of parasitoid species. Different *Bracon* spp. thus trapped were collected at monthly intervals in the Kharif and Rabi seasons of 2019-20 and 2020-2021 and preserved in vials containing 70% alcohol for identification.
The collection of Braconid species was also done by the sweep net method. For this, a sweep net with very fine nylon mesh was used. Twenty sweeps were done from various crop ecosystems. The collections were sorted for Braconid species which were also sent for identification.

Results and Discussions

Sixteen species were collected from the Raipur region using the sandwich technology method of trapping, of which three species could not be identified, and *Uterus Anastrepha*, *Doryctobracon* spp., *Hololobus* spp., *Crinibracon Chromosome*, *Pycnocarpon* sp. *Indadesha* sp. are recorded for the first time from this region. The wasps was successfully identified belonging to the subfamily Braconinae (Family Braconidae). The morphological characteristics of Braconinae, as written by Achterberg (1993) [1], are mesopleuron without wide opening, usually completely flat; length of vein 1-M of the hind wing at least 1.5 times vein M+CU and usually more or less widened basally; ventral part of clypeus depressed, forming dorsal part of hypoclypeal depression. The species were identified based on taxonomic characteristics as *Doryctobracon* spp. (Marinho *et al*. (2017)) [8]; *Pycnocarpon* sp. (Donald *et al*. (2011) [4]; *Glyptapanteles* spp. (Gupta *et al*. (2016)) [5, 6]; *Crinibracon chromosome* (Gupta *et al*. (2016) [5, 6]; *Utetes anastrephae* (Marinho *et al*. (2018)) [9]; *Microplitis demolitor*, Gupta (2013) [7]; *Cotesia* species (Rousse and Gupta (2013)) [10]; *Bracon hebetor* Say (Zuki and Yaakop (2013) [14]. *Bracon* spp., *Habrobracon brevicornis*, *Chelonus* sp., *Apanteles* sp., *Hololobus* spp. and *Indadesha* sp. were also identified using identification keys.

The maximum number of parasitoids were recorded from the vegetable crops, followed by fruit crops, pulse crop, and cereal crops. In general, the wasps of the mentioned Braconid families are considered to be one of the most important groups of larval parasitoids that have a significant role in the biological control of many economically important agricultural pests. The most dominant parasitoids in decreasing order were *Bracon* spp. (27.1%), *Cotesia* spp. (25.0%), *Utetes anastrephae* (Viereck) (6.3%), *Habrobracon brevicornis* (Wesmael) (6.3%), *Apanteles* spp. (6.3%), *Doryctobracon* spp. (4.2%), *Bracon hebetor* Say (4.2%), *Hololobus* spp. (4.2%), *Glyptapanteles* sp. (2.1%), *Chelonus* sp. (2.1%), *Crinibracon Chromosome* (Gupta and Van Achterberg) (2.1%), *Pycnocarpon* sp. (2.1%), *Indadesha* sp. (2.1%), Unidentified NE 2 (2.1%), Unidentified NE 4 (2.1%) and Unidentified NE 6 (2.1%) from Raipur region. (Fig: 1)

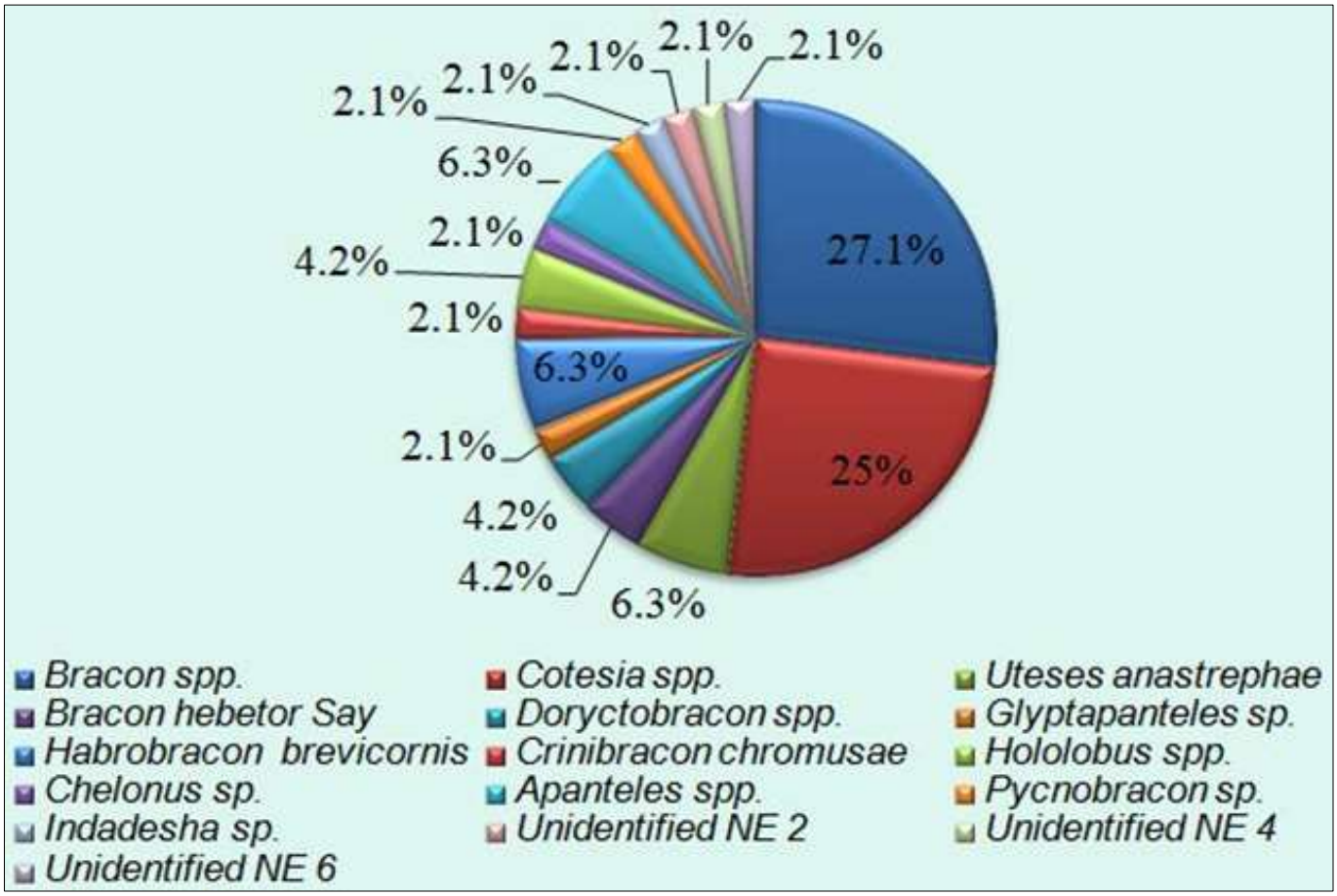

Fig 1: Distribution of different specimen of braconidae at Raipur

Four species that are new to the area and were reported for the first time from India were also identified named *Scutibracon fujianensis* Wang & Chen; *Bracon* (Asiabracon) sp.; *Aspidobracon flavithorax* Wang, Chen & He and *Crinibracon* cf. *malayensis* (Fig:2)

Scutibracon fujianensis Wang & Chen

Bracon (Asiabracon) sp.

Aspidobracon flavithorax Wang, Chen & He

Crinibracon cf. *malayensis*

Fig 2: Four new species of Braconidae

Conclusion

A survey of naturally occurring Braconid species should be done in different agroecosystems and natural ecosystems including forest areas as well as different warehouses to know the species richness. As the climatic and geographical conditions of the Raipur region have enriched fauna of insect parasitoids, it can be expected that more species can be added to the list. We suggest that the rearing of the host or pest species in the laboratory is the most appropriate task for verifying the pest and parasitoid relationship.

Acknowledgement

The authors are highly grateful to Dr. Ranjith, Research Associate, Insect Taxonomy and Conservation Laboratory, Ashoka Trust for Research in Ecology and the Environment, Bengaluru, Karnataka for the identification of the parasitoid and to the Department of Entomology and Plant Pathology, IGKV Raipur, for providing necessary laboratory facilities during the research work.

References

1. Achterberg Van C. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). Zoologische Verhandelingen. 1993;283:1-189.
2. Akinkurolere RO, Boyer S, Chen H, Zhang H. Parasitism and host-location preference in *Habrobracon hebetor* (Hymenoptera: Braconidae): Role of refuge, choice, and host instar. Journal of Economic Entomology. 2009;102(2):610-615.
3. Bakr RFA, Mohamed AG, Guneidy NAM, Farag NAE, Ebeid AR, Elbehery HHA, *et al*. Biological studies on *Bracon brevicornis* (Hymenoptera: Braconidae) reared on different host larvae. Egyptian Academic Journal of Biological Science. 2014;7(2):89-95.
4. Donald L, Quicke J, Marshall Steve. Unusual host carrying by a parasitoid wasp (Hymenoptera, Braconidae, Braconinae, Pycnocarponoides). Journal of Hymenoptera Research. 2011;20(1):77-79.
5. Gupta Ankita, Achterberg Cornelis Van, Chitrala Malathi. A new species of *Crinibracon* Quicke (Hymenoptera: Braconidae) parasitic on pupae of *Hasora chromus* (Cramer) (Lepidoptera: Hesperiidae) from India. Zootaxa. 2016b;4158(2):281-291.
6. Gupta Ankita, Venkatesan Thiruvengadam, More Ravi P. Morphological and molecular characterization of reared parasitoid wasps of the genus Glyptapanteles Ashmead 1904 (Insecta: Hymenoptera: Braconidae: Microgastrinae) associated with Lepidoptera in India. Plos One; c2016a. DOI:10.1371/journal.pone.0150765.
7. Gupta Ankita. Revision of the Indian *Microplitis* Foerster (Hymenoptera: Braconidae: Microgastrinae), with a description of one new species. Zootaxa. 2013;3620(3):429-452.
8. Marinho CF, Consoli FL, Dias AMP, Zucchi RA. Description of two new species closely related to *Doryctobracon areolatus* (Szepligeti, 1911) (Hymenoptera, Braconidae) based on morphometric and molecular analyses. Zootaxa. 2017;4353(3):467-484.
9. Marinho CF, Costa VA, Zucchi RA. Annotated checklist and illustrated key to braconid parasitoids (Hymenoptera, Braconidae) of economically important fruit flies (Diptera, Tephritidae) in Brazil. Zootaxa. 2018;4527(1):021-036.

10. Rousse P, Gupta A. Microgastrinae (Hymenoptera: Braconidae) of Reunion Island: a catalog of the local species, including 18 new taxa and a key to species. Zootaxa. 2013;3616(6):501-547.
11. Shah Nivedita, Ganguli Jayalaxmi, Bhowmick AK, Jaiswal SK. Comparison of the Life Cycle Related Parameters of *Bracon hebetor* Say on *Helicoverpa armigera* Hubner Reared on different Hosts. Biological Forum-An International Journal. 2021;13(1):602-606.
12. Shaw MR, Huddleston T. Classification and biology of Braconid wasps (Hymenoptera: Braconidae). Royal Entomological Society of London. 1991;**7**(11):1-126.
13. Yu DS, Van Achterberg C, Horstmann K. World Ichneumonoidea 2011. Taxonomy, Biology, Morphology and Distribution. – Taxapad (Scientific Names for Information Management), Interactive Catalogue, Ottawa; c2012. Available on: www.taxapad.com. (Accessed May 14, 2014)
14. Zuki Ameyra Aman, Yaakop Salmah. *Bracon hebetor* Say, 1836 (Hymenoptera: Braconidae: Braconinae), a parasitoid of stored rice in Malaysia. Serangga. 2013;18(1):47-54.