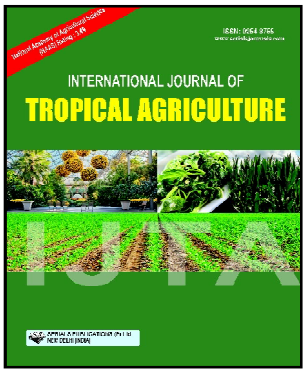

INTERNATIONAL JOURNAL OF TROPICAL AGRICULTURE

ISSN : 0254-8755

available at http: www.serialsjournals.com

Volume 36 • Number 3 • 2018

Diversity of Pupal Parasitoid *Brachymeria* (Hymenoptera: Chalcididae) by Using Different Collection Methods in Various Ecosystem

R. Kanagarajan, L.N. Nisha and R. Kanagaraj

Department of Entomology, Faculty of Agriculture, Annamalai University, Annamalainagar, Tamilnadu- 608 002
E-mail: krkanagarajan@yahoo.com

Abstract: Parasitic Hymenoptera are viable alternatives for chemical pest control. Among the parasitic Hymenoptera, Chalcidoidea is one of the promising superfamilies which offers a variety of parasitoids to use in Integrated Pest management. Within the Chalcidoidea, the Chalcidids are one of the most important groups of entomophagous insects utilized in the biological control of insect pests. In the present study, a survey was conducted on various ecosystems from the selected districts of Tamilnadu by using different methods of collection like Net sweep, Yellow pan trap and Malaise trap. The results revealed that a total of 288 *Brachymeria* were collected. Within the genus *Brachymeria,* 13 species were identified from the present collection. *B Brachymeriaminuta* was recovered only from forest and weed ecosystems. While *B.podagrica, B.jambolana, B.excarinata* and *B.lasus* were recorded from rice ecosystem alone. Because of the availability of lepidopteran pupal hosts like *Scirpophaga incertulas, Pelopidas mathias* etc. The findings of the research highlight the availability of natural enemies in various ecosystems so as to enable them to control the insect pests.

Key words: Chalcidoidea, Pupal parasitoids, Ecosystem diversity, collection methods

INTRODUCTION

The favourite method for insect pest control for farmers is still the application of chemical insecticide, which not only causes severe environmental pollution and the resurgence of herbivores but also reduces populations of the natural enemies of herbivores. The harm full effects of pesticides has always been a serious matter of discussion since a very long time much has been said and done in the name of protecting our environment from pesticide. The common insecticides used in routine early season sprays are usually highly toxic to these predators and parasitoids and thus

destroy the ecosystem services they would provide (Heong, 2011). To control insect pests safely, effectively and sustainably, strategies encouraging biological control are currently demanded. Future pest management will depend strongly on biological control because it is the most sustainable, cheapest and environmentally safest system of pest management. Parasitic Hymenoptera are viable alternatives for chemical pest control. Among the parasitic Hymenoptera, Chalcidoidea is one of the promising superfamilies which offers a variety of parasitoids to use in Integrated Pest Management. They occur in all parts of the world and parasitize nearly every group of insects, some of which are injurious to agriculture also. Within the Chalcidoidea, the chalcidids are one of the most important groups of entomophagous insects utilized in the biological control of insect pests. These chalcidids are generally solitary polyphagous pupal parasitoids with slight gregariousness, which destroy the pupal stages of many economically important crop pests, thus acting as an important group of biological control agents.

MATERIALS AND METHODS

Survey was conducted on various ecosystems from the selected districts of Tamilnadu like Virudhunagar (Rajapalayam, Kelavan kovil), Tiruchirappalli (Thuraiyur, Nagalapuram), Coimbatore (P.N. Puthur, Vadavalli, Perur), Madurai (Melur, Alagar kovil), Thirunelveli (Seranmahadevi), Cuddalore (Chidambaram, Srimusnam, Kavarapattu, Sivapuri, South mangudi, MGR Thittu), Vellore (Kalavai), Salem (Attur), Kanyakumari (Pechiparai) and the other places covered were West Godawari and Hyderabad districts of Andhra Pradesh, Aligarh of Uttar Pradesh, Kasargod, Calicut of Kerala and Karaikal of Pudhucherry.

METHODS OF COLLECTION

Active method like net sweeping and the passive methods like Malaise trap, Yellow pan trap. After that, the collected insects were killed by using a small piece of absorbent cotton wetted with few drops of killing agent ethyl acetate was slightly away from the parasitoids (recovered from sweep net) or the collected parasitoids from sweep net using aspirator were directly released into a cavity block containing 70 per cent ethyl alcohol to kill the parasitoids. The collected parasitoids were preserved in 70 per cent ethyl alcohol in small plastic vials and maintained at sub zero temperature. Before the preserved specimens were card mounted, the specimens were removed from alcohol and dehydrated with 100 per cent ethyl alcohol; otherwise the specimens were critical point dried and relaxed using Hexamethyldisilazane (HMDS) as given below (Brown, 1993). Card mounted parasitoids were provided with locality label (Name of the country, name of the state, name of the locality from which the specimens were collected, the altitude, latitude of the location, name of the collector, date of collection, name of the host) and these were also provided with detector label after identification. The collected specimens were sorted out at family Chalcididae level. The sorted out specimens were diagnosed upto generic level principally with using keys provided by Boucek (1988). The diagnosed genera were further identified upto species level mainly by key provided by Narendran (1989). Representative identified specimens were reconfirmed by Dr. T. C. Narendran, Department of Zoology, University of Calicut. Kerala. All the identified specimens were preserved in insect boxes with naphthalene balls and deposited with Parasitoid Taxonomy and Biocontrol Laboratory, Department of Entomology, Faculty of Agriculture, Annamalai University.

RESULTS AND DISCUSSION

Survey was conducted on various ecosystems from the selected districts of Tamilnadu by using the different mehods of collection like Net sweep, Yellow pan trap and Malaise trap (Table 1&2). The results revealed that a total of 288 *Brachymeria* were collected. Within the genus *Brachymeria* 13 species were identified

from the present collection (Fig.1). *B.minuta* was recovered only from forest and weed ecosystems and this might be due to the association of this chalcidids with the forest and dense vegetation ecosystem. *B.podagrica, B.jambolana, B.excarinata, B.lasus* was recorded from rice ecosystem alone. This might be due to the availability of lepidopteran pupal hosts like *Scirpophaga incertulas, Pelopidas mathias* etc. Ecosystem wise collection of chalcidids revealed that weed ecosystem supported maximum chalcidids followed by Rice ecosystem. Under rice ecosystem, incidence of *Brachymeria* is more than any other ecosystem indicating the preference of these beneficial insects in rice, which can be effectively used for pest control programmes of Rice. Difference in the presence of these bio control agents give a clear indication that how the biological pest control program may be designed for making it more effective.

Table 1
Species of *Brachymeria* collected from different ecosystems

S.No	*Chalcidids*	*Numbers collection in Ecosystems*						
		Rice	*Cotton*	*Sunflower*	*Sugarcane*	*Vegetables*	*Forest*	*Weed*
1	*Brachymeria podagrica*	16	-	3	2	7	7	23
2	*Brachymeria jambolana*	10	2	2	1	6	8	11
3	*Brachymeria excarinata*	12	-	-	1	3	7	3
4	*Brachymeria lasus*	12	-	-	-	5	1	6
5	*Brachymeria phya*	8	3	1	2	3	4	73
6	*Brachymeria hearseyi*	2	2	4	-	2	1	3
7	*Brachymeria minuta*	-	-	-	-	-	5	3
8	*Brachymeria albicrus*	1	-	-	-	-	-	1
9	*Brachymeria apicicornis*	2	1	-	1	2	-	1
10	*Brachymeria megaspila*	-	-	-	-	-	-	3
11	*Brachymeria bengalensis*	-	-	-	-	-	1	-
12	*Brachymeria carbonaria*	-	-	-	-	-	-	-
13	*Brachymeria albotibialis*	-	-	-	-	-	-	-

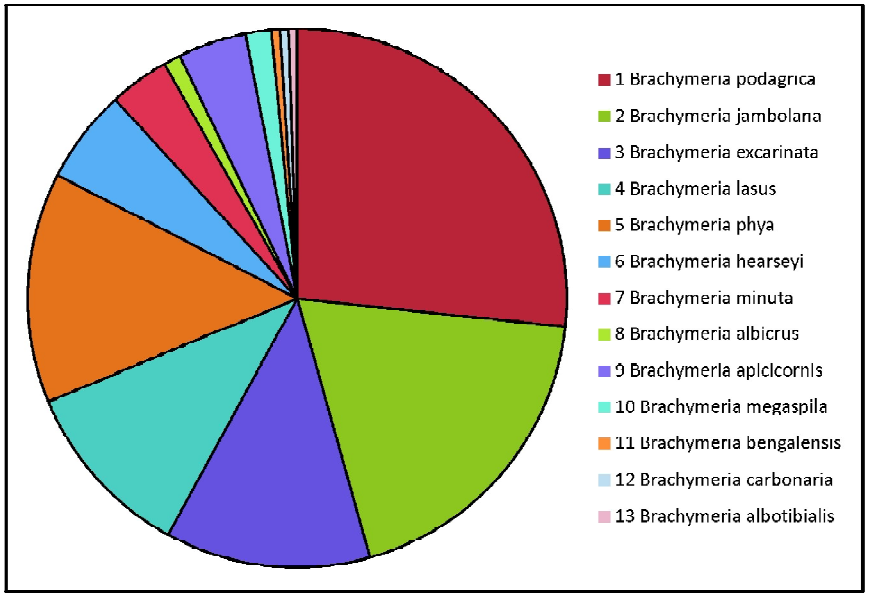

Figure 1: Species of *Brachymeria* collected from different ecosystems

Table 2
Species of Brachymeria collected from different ecosystems by three collection methods

S.No	*Chalcidids*	*Methods of collection*		
		Net sweep	*Yellow pan trap*	*Malaise trap*
1	*Brachymeria podagrica*	52	13	10
2	*Brachymeria jambolana*	37	15	7
3	*Brachymeria excarinata*	24	8	4
4	*Brachymeria lasus*	21	6	3
5	*Brachymeria phya*	27	11	3
6	*Brachymeria hearseyi*	11	4	2
7	*Brachymeria minuta*	7	1	-
8	*Brachymeria albicrus*	2	-	2
9	*Brachymeria apicicornis*	8	4	-
10	*Brachymeria megaspila*	3	-	-
11	*Brachymeria bengalensis*	1	-	-
12	*Brachymeria carbonaria*	1	-	-
13	*Brachymeria albotibialis*	1	-	-

CONCLUSION

The study showed that among the three methods of insect collection, net sweep trapped more chalcidids followed by yellow pan trap and malaise trap methods. Ecosystem wise collection of chalcidids revealed that weed ecosystem supported maximum chalcidids followed by Rice ecosystem. Under rice ecosystem, incidence of *Brachymeria* is more than any other ecosystem indicating the preference of these beneficial insects in rice, which can be effectively used for pest control programmes of Rice.

REFERENCES

Boucek Z. (1988). Australasian Chalcidoidea. C.A.B. International; 832.

Brown B V. (1993). A further chemical alternative to critical point drying for preparing small (or large) flies. Fly times. 7:10.

Heong, K. L. (2011). Ecological Engineering a strategy to restore biodiversity and ecosystem services for pest management in rice production. *Technical innovation brief*, 15 : 1-12

Narendran TC. (1989). Oriental Chalcididae (Hymenoptera: Chalcidoidea) Zoological Monograph Department of Zoology University of Calicut; p. 440.