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Studies on Parasitic Fauna (Parasitica: Hymenoptera) of Kalvarayan Hills

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ABSTRACT: An attempt was made to survey the possible parasitic fauna of Kalvarayan hills premises with more emphasis on parasitic Hymenoptera in various agro ecosystem during 2013-2014. Two collection methods like yellow pan trap and sweep net were utilised. Yellow pan trap recorded 4521 number of parasitoids, whereas net sweep recorded 286 numbers of parasitoids respectively. Parasitic fauna and their biocontrol potential discussed.

Key words: Hymenoptera, ecosystem, Kalvarayan hills.

I. 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. Two decades of such indiscriminate pesticide use resulted in an ecological disaster. Many target and non target pests became genetically resistant, and some pesticides lost their effectiveness. Contamination of soil and water by long-lived pesticides affected wildlife populations, with some species nearing extinction. Public concerns were aroused over potential health risks in food. Biological control is one of the component which is used to manage these pests which is eco-friendly, safe persistent and permanent and will not cause any deleterious effect to the environment. Parasitic Hymenoptera (Apocrita: Parasitica)are the most important group of entomophagous insects which are utilized in various biological control programmes against insect pest. Among the parasitoids used in insect management, the parasitic Hymenoptera have been the most successful (Noyes 1985) [10]. They are extremely abundant in most terrestrial habitats (Goulet and Huber, 1993) [5]. The Kalvarayan hills are a major range of hills situated in the eastern ghats of the southern Indian state of Tamil Nadu. Crop management and farming systems have also been shown to have major effects on biological control species composition, abundance, and distribution in Agro ecosystems (Bengtsson *et al.,* 2005; Booji and Noorlander, 1992; Carcamo, 1995) [1, 2,4].

II. MATERIALS AND METHODS

A. Study area &Methodology

The Kalvarayan hills are a major range of hills situated in the eastern ghats of the southern Indian state of Tamil Nadu. The hills range in height from 2000 feet to 3000 feet and extend over as area of 1095 square kilometres. It lies between 11° 20/-120 05/ N and 78° 28/-790 05/ E Longitude. The vegetation types of Kalvarayan hills are srub jungles of altitude 400m deciduous forests between 800 to 1300 m and shoals at the sheltered pockets on the plateau. Collection was mainly carried out in the following three places. i) Kalvarayan hills., Velli malai village, villupuram districts. Mainly collected in forest, rice and weed ecosystem ii) Thumbai village, villupuram districts. Mainly collected in forest, rice and weed ecosystem and iii) Mullakaadu village, villupuram districts. Mainly collected in for forest, rice and weed ecosystem.

Parasitoids were collected by net sweep and yellow pan trap during September, 2013- February 2015 in Kalvarayan hills, Tamil Nadu. Among the two methods yellow pan trap gave good results of other methods like Net sweep. This is an excellent method of collecting parasitoids notably small insect as well as other groups of insects. It works on that principle the many insects attracted to yellow colours. The traps were placed in a suitable habitat, such as grassland, a forest or even on forest leaf litter.

The trap is filled with water (plus a few drops of detergent to break the surface tension) or with saturated salt solution or with a 50/50 mix of ethylene glycol and water. At least 50 traps were placed in a locality for effective sampling and kept for two days in a place and then shifted to a new area. pan trap were emptied every 24 or 48 hrs, by carefully filtering through fine mesh sieve 10-15cm. The sieve specimens over a petri plate containing and sorted out under a stereo zoom microscope to recover only parasitoids. The sorted out families were diagnosed up to generic level principally using keys provided by Boucek (1988) [3], Narendran (1989) [9] for Chalcididae, and Lin *et al*. (2007) [8] for Mymaridae and Hayat (1998) [6] for Aphelinidae and Hayat (2006) for Encyrtidae [7], Kumar & Khan (2010)[12] and Kumar *et al.* 2011 for Eulophidae [13].

III. RESULTS AND DISCUSSION

Among the collection methods, Yellow Pan trap yielded more parasitoids compared to other method of net sweep. Yellow pan trap recorded 4521 number of parasitoids, whereas net sweep recorded 286 numbers of parasitoids respectively.

Altogether, 95 per cent of parasitoids were collected by Yellow Pan trap method and remaining only 5 per cent were collected by other the methods, and which indicated the superiority of the collection method by Yellow Pan trap method. This is an excellent method of collecting chalcids, notably mymarids and encyrtids, as well as other groups of insects as indicated by Noyes, 1985. Species that are rarely swept or collected in Malaise traps can often be collected by this technique which is based on the principle that many insects are attracted to yellow colours. Among the locations, Thumbai recorded the highest number of parasitoids under yellow pan trap method followed by Mullakadu location. Even though sweep net method is effective methods in recovering chalcidparasitoids, their efficiency was less as compared to yellow pan trap in recovering chalcids throughout the study.

Table 1: List of parasitoids from Kalvarayan hills in different ecosystem using different methods.

S.No.	Superfamily	Ecosystem																		TOTAL
		Vellimalai (v1)						Thumbai (v2)						Mullakadu(v3)						
		Forest		Weed				Forest		Weed				Forest		Weed				
		NT	YPT	NT	YPT	NT	YPT	NT	YPT	NT	YPT	NT	YPT	NT	YPT	NT	YPT	NT	YPT	
1.	Chalcidoidea	-	10	-	27	-	48	-	291	105	280	-	443	-	28	-	154	-	423	1809
2.	Platygastroidea	-	35	53	49	-	55	-	397	88	263	-	263	--	-	-	214	-	183	1600
3.	Ichneumonoidea	-	-	14	63	-	86	-	35	-	19	-	90	-	-	-	18	-	131	456
4.	Chrysidoidea	-	1	-	1	-	-	-	-	-	17	-	-	-	-	-	2	-	18	39
5.	Cynipoidea	-	-	-	-	-	-	-	-	11	1	-	31	-	-	-	2	-	9	54
6.	Diaphroidea	-	15	5	15	-	27	-	-	9	44	-	24	-	102	-	87	-	175	503
7.	Ceraphroidea	-	14	1	30	-	24	-	-	-	34	-	29	-	-	-	17	-	155	304
8.	Evanoidea	-	-	-	2	-	-	-	28	-	2	-	-	-		-	1	-	9	42
Total		-	75	20	187	-	237	-	751	213	660	-	880	-	130	-	495	-	1103	4807

Among the ecosystems, rice recorded highest number of parasitoids in all the three locations of Mullakadu, Thumbai and Vellimalai with 1103, 880 and 237 respectively (Fig. 1). In rice ecosystem, all the parasitoids were collected by yellow pan trap method only and no parasitoids recorded from the collection of collected net sweep method. This was followed by weed ecosystem and tree ecosystem respectively in all the three locations respectively. Among the superfamily Chalcidoidea recorded the highest number of parasitoids in rice ecosystem in Mullakadu and Thumbai location with 423 and 443 numbers respectively, whereas in Vellimalai the maximum number of parasitoids were observed with Ichneumonoidea superfamily with 86 numbers. Among the three ecosystem trees, rice, weed from thumbai recorded maximum number of all the families Chalcididae, Mymaridae, Aphelinidae, Encyrtidae, Trichogramatidae, Eulophidae, Eurytomidae, and Platygastridae, Diapriidae, Ceraphronidae, Evanidae, Cynipidae (Table 1). Suneel (2014) also reported 43 encrytids in rice ecosystem in Tamil Nadu. 162 mymarids were collected by yellow pan trap method indicating the superiority of this collection method [14]. This is in accordance with the earlier findings of Ramesh Kumar (2011), who reported that the mymarids catches were more in yellow pan trap [11].

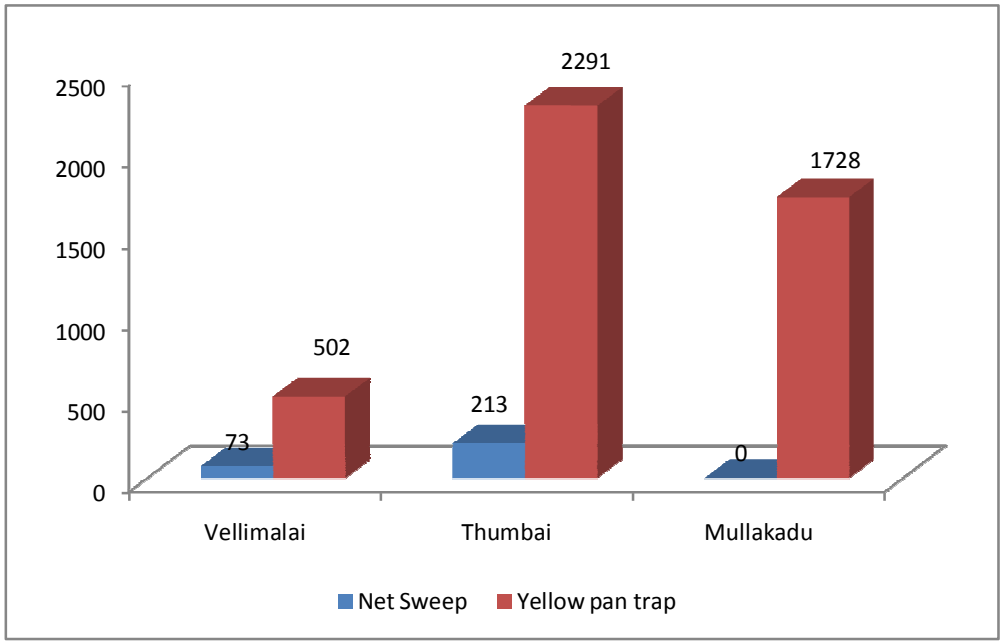

Fig. 1. List of parasitoids collected from different methods in different villages of Kalvarayan Hills.

IV. CONCLUSION

Since such a rich biodiversity of beneficial parasitic hymenoptera is available in nature, now it is upto the agricultural experts and farmers to suitably modify their plant protection schedule, so that their bio control potential is fully exploited.

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