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POPULATION ABUNDANCE OF SOIL INHABITING HYMENOPTERA IN DIFFERENT HABITATS OF PAKHAL WILDLIFE SANCTUARY, WARANGAL

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ABSTRACT

A survey of population abundance of hymenoptera was conducted in different habitats of Pakhal Wildlife Sanctuary, Warangal for one year. The hymenoptera were collected by using standard trapping methods from two selected areas on basis of their specific habitat differences (Gist, CS and Crossley, D.A., 1973). The percentages of hymenoptera in two vegetational covers were recorded in natural forest area 61.14% and in teak plantation area 38.85%. The soil inhabiting hymenoptera belongs to family Formicidae were identified four species Paratrichena *sp*, Componatus *sp*, Monomorium *sp* and Pachycondyla *sp* in two habitats. However, Paratrichena *sp* being recorded higher 13.03% in natural forest and Pachycondyla sp was 11.02% in teak plantation areas.

KEYWORDS: Hymenoptera, population abundance, different habitats, Pakhal wildlife sanctuary.

INTRODUCTION

Hymenoptera is one of the largest order of insects and includes many species of bees, wasps, sawflies and ants. They are found in terrestrial habitat occurs in soil, leaf litter. More over 1, 30,000 species are recognised. The American association of poison control centres database recorded over 8000 stings and bites attributed to these insects in 2010. Hymenoptera are stinging insects. The sting apparatus is a modifying the egg laying appendages fundamental to 911 hymenoptera (Norman F Johnson, 2013). Female wasps can sting the males of some species are extraordinarily adopt at mimicking both the structure and behaviour of females. In females, the ovipositor is composed of two pairs of gonacophyses /ovipositor valves, associated with the 7th and 8th abdominal segments. The ovipositor is a key organ where the eggs are well protected (Donald IJ Quicke). Behaviour among hymenopterans species is extremely diverse. It varies from species to species. Some are solitary and others are highly social, forming large colonies. Many species have intermediate levels of social behaviour in which the parent cares for its offsprings (Roger D Acre, Hal C, Reed, 2002). The age of chemical communication is very important in maintaining colony cohesion and activities in the societies of most social hymenoptera. Taxonomically, the hymenoptera are divided into the suborders and subphyla. Hymenoptera are important for understanding entamophagous habits because they are numerically large and biologically diverse with all forms of phytophagy, predation and parasitism expressed within each lineage (K S Hagen et al, 1999). Hagen (1987) lists the families of hymenoptera in which predation have been reported life cycle of hymenopterans is complete, which varies slightly depend on the species. The study has been made on the diversity of hymenoptera in different habitats of Pakhal Wildlife Sanctuary, Warangal, Telangana state.

MATERIALS AND METHODS

Study area: Two habitats with different types of vegetation covers such as the natural forest and teak plantation areas were selected in Pakhal Wildlife Sanctuary, Warangal. This sanctuary located between (Altitude 17 42.5 and 18 10 North and between Longitude 79 55 and 80 10 East) forest ecosystem in Telangana State, India. In the Natural forest area trees Terninalia *tomentosa*, Anogeissus *latifolia*, Pteracarpus *marsupium*, Lagerstroemia *parviflora*, Cleistanthus *collinus*, Adina *cordifolia*, Diospyros *melanoxylon* and Emblica *officinalis* sp were predominant. Herbs; Aegle marmelos (L) Correa, Costus *speciousus*(Koen.ex Retz) Smith, Curcuma pseudomontana, (Grahm), Drosira indica(L), Glonosa *superba*(L), Merremia *turpenthum*(L), Pueraria *tuberose*(Wild)DC, Rauvolfia *serpentine* (L) and Trichosanthes *cucumarina* (L) were found. Shrubs; Buchnania *lanzan*(Spreng), Colycopteris *floribunda* (Roxb), were dominant. In teak plantation area only one tree species Tectona *grandis* L and Shrubs; Butea *superb* Roxb, Casia *auriculata* and Shrum sp were found. The vegetation in Natural forest area and Teak plantation area were dried up to the heat of summer. The litter was thick layer due to the accumulation of the leaves.

Pit –fall trap method: The soil surface Hymenoptera fauna of both forest area and Teak plantation areas were sampled by pit- fall trap method. In pit- fall trap method wide mouth bottles of 24 cm length and 5 cm mouth diameter with 100ml of 5% formalin solution were placed as pit fall traps by digging into the ground randomly at ten places, the distance between two traps being 20 feet in each habitat. A flat stone kept over each traps allowing a minimum distance of 2 cm, between the mouth of the trap and the under surface of the stone to protect the trap from rain and dust. These bottles were collected monthly during the study period. Besides, the traps were inspected more frequently to avoid complete evaporation of formalin from the bottle due to the sun heat. The traps after collection from the fields, were tightly capped and brought to the laboratory for calculation and analysed the data of Arachnids.

RESULTS AND DISCUSSIONS

Population abundance of the total hymenoptera in natural forest area presented in Table-1. It shows that maximum number of hymenopterans were recorded in the month of June, 2019 respectively about 25.5±1.79 and gradually decreased from July to September, 2019. Again their number has been increased during the month of October and decreased in the month of November, 2019. Their number increased from December to February 2020. But they were low in number during the month of March, 2020 respectively about 5.9±0.93 and slightly increased in the month of April and May 2020. The population abundance of total hymenoptera in the teak plantation area in the Pakhal wildlife sanctuary presented in the Table, 2. It shows that more number of Hymenoptera were recorded in the month of June, 2019representing about 6.7±0.95 and decreased to 6.0±2. 0.8 In July. Their number suddenly increased in the month of August, 2019 and slightly decreased in October month. In the month of November they decreased to 4.7±0.67. They were increased again in the month of December, 2019 to April, 2020. However, they increased slightly in May, 2020. Table, 3 shows that tatal formicidae was higher percentage comprised 61.14% in forest area followed by 38.85% in teak plantation area.

The total hymenoptera including *Paratrichena sp*, *Monomoriul sp* and *Pachycondyla sp* being the predators were recorded more in natural forest area due to presence of more litter than teak plantation area (GonzaksG., Seastelt T.A.2000) only *Camponatus species* recorded more in number in teak plantation area increased population was due to availability of more amount of food material in natural forest area when compared to teak plantation area (Reddyet al, 1990, Nair and Mathew,1993, Hulfman and Harding, 1980) recorded six species of Formicidae. Moeed and Meeds (1985) recorded similar number species of Formicidae in three habitats and reported that mixed low land forest area was the most suitable for hymenopterans.

Table 1: Monthly wise total population abundance of hymenoptera in the natural forest area during June, 2018-May, 2019.

Month	Population abundance
June 2019	25.6±1.79
July	17.2±0.68
August	7.5±0.92
September	6.0±0.40
October	18.2±0.90
November	5.4±0.38
December	6.3±1.94
January,2020	8.1±0.66
February	9.2±0.31
March	5.9±0.48
April	6.1±0.86
May	7.6±0.72

Table 2: Monthly wise total population abundance of Hymenoptera in Teak plantation area during June, 2018- May, 2019.

Month	Population abundance
June 2019	6.7±0.84
July	6.0±1.64
August	11.0 ±1.28
September	7.4± 2.16
October	9.2±0.99
November	5.0±1.04
December	8.5±2.08
January,2020	8.7±1.06
February	6.9±0.84
March	5.7±1.09
April	5.1±0.61
May	6.2±0.67

Table 3: Total abundance of hymenoptera (Formicidae) recorded during the study period in natural forest area and teak plantation area of the sanctuary.

Taxa	Natural forest area		Teak plantation area	
Hymenoptera	**Total population/individuals**	**%**	**Total population/individuals**	**%**
Formicidae	2496	61.14	1586	38.85
Paratrichena sp	532	13.03	411	10.06
Componatus sp	260	6.36	315	7.71
Monomorium sp	391	9.57	324	7.93
Pachycondyla sp	825	20.21	450	11.02
Simpsons' Index	**0.82**		**0.78**	

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