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Subhi Bishnoi
Research Scholar in C.P.
University, Kota, Rajasthan,
India

Dr. Kusum Dang
Associate Prof., Department of
Zoology, Govt. College, Kota,
Rajasthan, India

Diversity of some hymenopteran insects in Kota, Rajasthan, India

Subhi Bishnoi and Dr. Kusum Dang

Abstract

Order Hymenoptera is an important group of insects as it includes ecologically and economically valuable species. Hymenopterans are ecological indicators. Studies on diversity and distribution of fauna are prerequisite of biodiversity conservation. In the present study attempt has been made to enlist Wasps and Bees in four different areas of Kota: Karani mata, C.V. garden, Bhitariya Kund and Yatayat Park. The study was conducted from September 2014 to August 2016. Present investigation revealed the presence of 17 species of Hymenoptera belonging to 5 families (Apidae, Xylocopidae, Sphecidae, Megachilidae, Halictidae). In the study area the most dominant family was Sphecidae (7 species) and Apidae (5 species) followed by Halictidae (2 species), Xylocopidae (2 species) and Megachilidae (1 species). The abundance of species was also recorded. Out of the 17 species recorded in 4 survey areas 6 species are abundant, 9 species are occasional and 2 species are rare in study site. The study indicates a rich and diverse fauna in the survey area.

Keywords: Diversity, hymenoptera, wasp, bees, Kota

Introduction

In terrestrial ecosystem insects play a vital function as herbivores, pollinators, predators and parasites, Weisser and saiemann ^[1]. Insects are considered to pollinate nearly 70% of crop plants worldwide and the loss of these pollination services would have an adverse effect on food production and no doubt for the maintenance of biodiversity, Klein *et al* ^[2]. Hymenoptera is one of the most diverse orders of Insects. Hymenopterans are important for the balancing and functioning of most ecosystems in the planet and beneficial for human economy. Some hymenopterans are phytophagous, whereas others are herbivorous, predatory or even parasitic. The main objective of this study was to collect, identify and observe diversity and abundance of hymenoptera in four different areas (Karani mata, C.V. Garden, Bhitariya Kund, Yatayat Park) of Kota.

2. Materials and Methods

2.1 Study area

The district Kota of Rajasthan is located at 25.18°N & 75.83°E and has an average elevation of 271 metres (889 ft). Kota come under semiarid region with summer temperature 25° c -42° c and winter temperature 12° c -26° c. Four areas of Kota are surveyed for the study of Wasps and Bees namely Karani mata, C.V. Garden, Bhitariya Kund and Yatayat Park. All the four areas have rich vegetation.

2.2 Sampling and identification of hymenoptera

The hymenopterans were surveyed and collected every week from September 2014 to August 2016. All the survey was conducted during the day time between 6.30AM and 6.30PM. Aerial net, Sweep net and hand picking was used for insect collection. The insects collected by the above method were transferred to killing bottles, killed and preserved. Large winged hymenopterans were put to dry preservation by pinning them in insect boxes, while smaller insects were preserved in 70% alcohol. The insects were preserved according to the standard methods. (Singh and Sachan ^[3], Srivastava ^[4]). Hard bodied hymenoptera insects were pinned directly by piercing entomological pin through the body and care was taken to choose the correct size and number of pin to avoid damage. The goal of identification was achieved by presenting subsequent appropriate diagnostic characters in a series of alternative choices with the help of the standard keys and available literature. Specimens were identified and confirmed

Correspondence
Subhi Bishnoi
Research Scholar in C.P.
University, Kota, Rajasthan,
India

By comparing the specimens of section of Entomology, Department of IARI Delhi and specimens were arranged in a systematic manner. Percent distribution of different species in the survey area was calculated by the following formula

$$\text{Percent distribution} = \frac{\text{No. of species}}{\text{total no of species}} \times 100$$

3. Result and Discussion

In the present study, hymenopteran insects belonging to 5 families, 14 genera and 17 species (table1) were reported. On the basis of observations and specimens collected insects were divided into three categories –abundant, occasional and rare. Abundant-which are commonly distributed in the area,

Occasional-distributed in some of the pockets, Rare- few in number. Out of the 17 species recorded in 4 survey areas 6 species are abundant, 9 species are occasional and 2 species are rare as shown in table: (2) and figure (1). Out of the 17 species recorded in the survey area- the family Sphecidae was dominant with 7 species followed by Apidae with 5 species, Halictidae with 2 species, Xylocopidae with 2 species and Megachilidae with one species. Biodiversity of Wasps and Bees of Kota city are not explored much even today. Hymenoptera being an important group as its role in pollination and as biological control agent required biodiversity studies in the survey area.

Table 1: Diversity of Wasps and Bees in Kota, Rajasthan

S. NO	Family	Name	Common Name
1	Sphecidae	Ampulex novarae sauss	Cockroach Wasps
		Sphex argentatus fabricius	Digger Wasp
		Sceliphron madraspatanum fabricius	Mud Wasp
		Prionyx viduatus christ	Sphecid Wasp
		Notogonia sp	Thread Waisted Wasp
		Cerceris sp	
		Bembex borrei hnl	Sand Wasp
2	Apidae	Apis dorsata fabricius	Giant Honey Bee
		Thyreus sp	Chequered Cuckoo Bee
		Apis florea fabricius	Dwarf Honey Bee
		Ceratina smaragdula fabricius	Small Carpenter Bee
		Ceratina hieroglyphica smith	
3	Halictidae	Lassioglossum sp	Sweat Bee
		Pseudapis sp	
4	Megachilidae	Megachile disjuncta fabricius	Mason Bee
5	Xylocopidae	Xylocopa amethystine fabricius	Carpenter Bee
		Xylocopa fenestrata fabricius	

Table-2: Distribution pattern of Wasp and Bees in Kota district

Family	Abundant	Occasional	Rare
Sphecidae	√	√√√√	√√
Apidae	√√	√√√	
Halictidae	√	√	
Megachilidae		√	
Xylocopidae	√√		
Total	6 Species	9 Species	2 Species

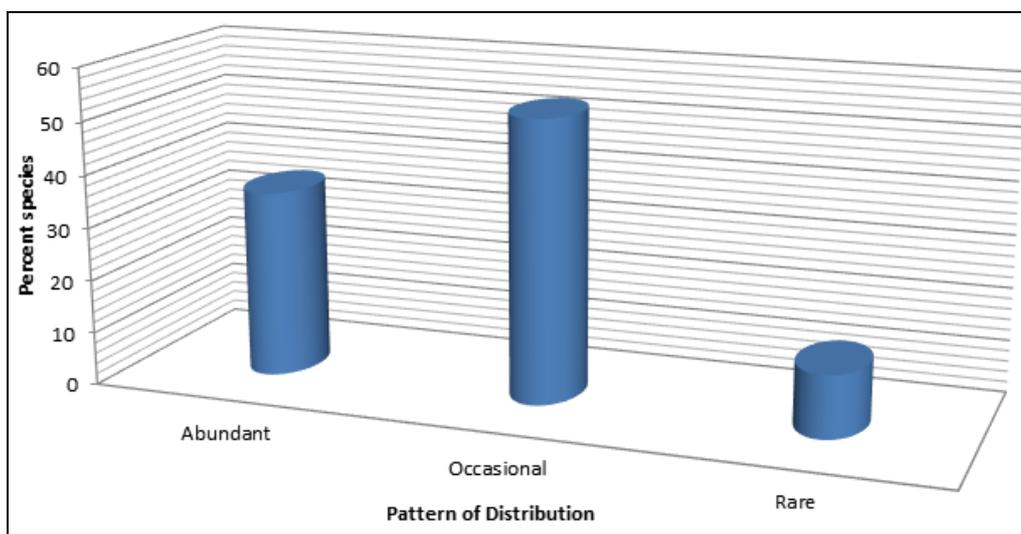


Fig 1: Percent Species distribution of Hymenoptera insects in Kota, Rajasthan

Aland *et.al.* [5]. Reported 82 species of 47 genera and 17 families of Hymenoptera in Amba reserve Forest of Kolhapur

district, Western Ghats, Maharashtra. Naidu and Kumar (6) have conducted three year survey at Vadodara of Gujarat and

documented 47 species of bees and wasps belonging to 29 genera from 15 families. Raj Kumar *et.al.* [7]. Reported 50 species of Hymenoptera from Jorhat district of Assam, India, out of which 14 species were abundant and 28 species were reported occasional, 8 species were rare in study site. Anita Kannagi *et al* [8]. Investigated Hymenoptera diversity in a deciduous forest from South India. They reported 38 species of Hymenoptera. The dominant families include Vespidae, Alididae, Formicidae, Sphecidae and Megachilidae. Anbalagan *et.al* [9]. Reported presence of 100 species and 37 families of Hymenoptera in Tiruvallur district of Tamil Nadu. R. Hiremath and C.b. Ganesh [10] reported 30 hymenopterans species, out of which 18 species were wasps, followed by 8 species of bees and 4 species of ants. Muhammad Arsalan *et al* [11] reported 24 species of wasps from district Karak of Pakistan. All the collected species belong to 3 family's vespidae, Pompilidae, Ichneumonidae and 11 genera of wasps were reported.

In general vegetation is the main substrate for founding social wasp colonies. Therefore rich vegetation in survey area is one of the causes of enriched fauna of wasps in Kota. The abundance of apidae members noticed in the present study might be due to the availability of flowers that trigger foraging behavior of bees and nesting activities.

In present investigation 7 species of wasps and 10 species of bees are reported. Present study indicates that the diversity of hymenoptera is in a good state in Kota. As this study covered only few areas of Kota, further faunistic survey of Kota is recommended to discover its rich hymenoptera diversity.

4. Conclusion

Overall study shows dominance of family Sphecidae with 7 species, followed by Apidae with 5 species, Hali ctidae with 2 species, Xylocopidae with 2 species and Megachilidae with one species. In the present study 7 species of wasps and 10 species of bees are reported. All the species of wasp belong to family Sphecidae. Bees reported belong to family Apidae, Hali ctidae, Megachilidae and Xylocopidae. Hymenopterans reported in the present investigation show their ecological role from predator to pollinator and parasitoid. Thick Vegetation appears to favour the wasps, presence of flowering trees for construction of hives in the peaceful environment might be favouring the bees in the survey area. From the above study, it was concluded that Kota have rich insect fauna, climatic factors of Kota are suitable for hymenopteran fauna. Further studies would be necessary in order to get comprehensive information. The present study revealed that the order Hymenoptera is highly diverse and abundant in Kota. This is an indication of healthy climatic conditions and availability of rich natural resources necessary for Hymenopteran life processes and existence.

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