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DIVERSITY AND DISTRIBUTION OF USEFUL AND HARMFUL INSECTS IN THE KARNATAK UNIVERSITY CAMPUS, DHARWAD

Entomology

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ABSTRACT

The present study was undertaken to survey the useful and harmful insect diversity & distribution in the Karnatak University Campus, Dharwad. Survey was undertaken by using different insect collection methods like Hand picking, Pitfall trap method, Aerial net method etc for period of three months. During the survey process, multiple photographs were taken for identification & categorization of insects. A total number of 41 insect species belonging to 18 families under 08 orders were recorded. Further, the analysis of the data revealed that Order Hymenoptera was the dominant order representing with 30 species belonging to 09 families followed by order Hemiptera and Coleoptera orders 03 and 02 families respectively representing 03 species each. Orders Zygentoma, Mantodea, Orthoptera, Neuroptera and Diptera were recorded with only 01 species each. Among 41 species witnessed, 26 species were identified as useful insects, 11 species were identified as harmful insects and 04 species were recorded as both useful and harmful insects in the present survey work.

KEYWORDS

Diversity, Distribution, Useful and Harmful insects, Karnatak University Campus, Dharwad.

INTRODUCTION:

Insects are the small creatures often winged, which belongs to Phylum: Arthropoda. They are the largest animal group belonging to the Class-Insecta, there are over one million insect species known so far living in every possible environment from glaciers to the volcanoes. Insects are the essential part of our nature and are vital to all life forms on the earth. Usually, majority of the insects are useful, while few are harmful or some acts as both.

Insects play an important role in supporting and providing livelihoods for numerous people from silk trade to bee keeping, pollination of most of our fruits and wide range of other agricultural products. The description of insects and their colorful body patterns have initiated prominent contributions to our art, literature, culture and offer great educational tools.[1] Another important application of insects is in Integrated Pest Management (IPM). Insect predators are known to be more efficient than that of many chemicals or in controlling economically damaging insects.[2] Because of their pesticides conspicuousness and susceptibility to environmental factors, many insect taxa are often used as bioindicators.[3,4] Butterfly population dynamics are used as indicators of species richness for pollinators, structural and floristic diversity of habitats, as indicators of global climate change and for analysis of ecological parameters and landscape distinctiveness.[5,6,7,8]

Further, insects fulfill key ecosystem functions and interactions with different vegetations, this includes various types of herbivorous links, but also includes many mutual relationships like pollination, seed dispersal or predator defence in exchange for shelter.[9] Floral diversity provides key habitat parameters for many insect species ranging from their shelter to breeding sites. Plants-insect interactions have direct effect/impact on storage and cycling of carbon and nutrients, as well as influencing on succession and competition patterns in plant communities and food web interactions.[10,11]

Majority of insects are considered as useful or beneficial insects that perform value added services, which plays critical role in ecosystem function such as pollinating plants, seed dispersal, decomposition, nutrient recycling, soil structure and fertility, controlling population of other organisms and provide a major food source for other taxa.[12]

Some insects are considered as harmful because of their bite or sting, some transmits pathogens causing dreadful diseases and many of them are pests, can cause much damage to plants by feeding on them. Some insects are household pests, which are most annoying insects to humans, feeding on stored food, paper, books, fabrics, carpets, woods. These are not only unsanitary but also destructive. Some insects are both useful and harmful like *Xylocopa* species, *Paratrechina longicornis, Tetraponera rufonigra, Dermestes lardarius,* etc.

Therefore, it is necessary to survey all kinds of insets, present in a particular region or area to know their importance in nature. Hence, the present study was undertaken to survey diversity and contribution both useful and harmful insects in the Karnatak University Campus, Dharwad for further detailed study of individual insects species.

MATERIALS AND METHODS:

I) Study Area:

Karnatak University Campus, Dharwad is generally known as "Chotta Mahabaleshwar" i located at an elevation of 698.97m above MSL (15° 26' 24" N and 74° 59'3"E) (Figure-1). The campus is spread over an area of 750 acres have lush greenery with undulating region and presence of various species of flora. It is rich in dry deciduous vegetation, endowed with more than 150 plant families. It has a pleasant environment throughout the year with temperature ranging from 16°C to 38°C and an average annual rainfall of about 800mm.

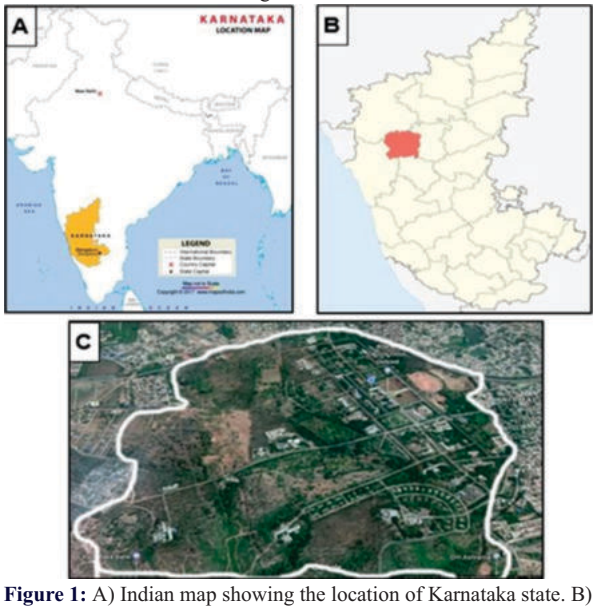


Figure 1: A) Indian map showing the location of Karnataka state. B) Karnataka map showing the location of Dharwad district. C) Google image depicting the study area (Karnatak University, Dharwad).

II)sampling Methods And Identification:
The present study was surveyed for a period of three months. The collection of insects was carried out by following methods-

i) Handpicking Method: Most of the species medium to large sized insects were picked up and collected by hand-picking method.

ii) Pitfall Trap Method: This method was used for the collection of ground dwelling insect species and even for ants. Plastic cups were buried in soil with dish wash water soap. Pitfall trap cups were placed in many places at Karnatak University Campus, Dharwad.

iii) Aerial Net: Some flying insects like bees and wasps were collected by using fine mesh type net around hoops fixed to a handle.

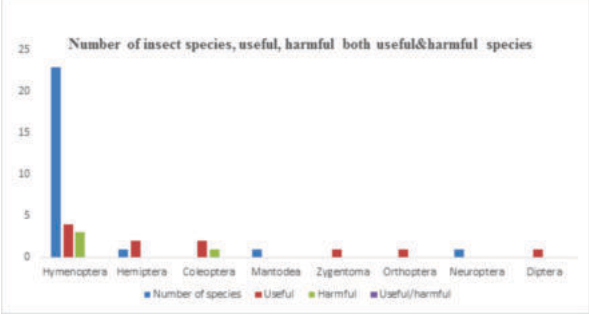
Soon after collecting insects by various methods, multiple photographs were taken in the field itself and then they were released back in the campus. These photographs were used for identification with the help of available literature and earlier documented research articles.[13,14,15,16] Further, unidentified insect photographs were sent to Department of Entomology, University of Agricultural Science (UAS), Dharwad for their proper correct identification by the Entomology experts.

RESULT:
In the present survey, a total number of 41 insect species belonging to 18 families under 08 different orders were recorded from the Karnatak University Campus, Dharwad. Order Hymenoptera is the dominant order with 30 insect species belonging to 09 families, followed by Order Hemiptera with 03 families and Order Coleoptera with 02 families having 03 species each. Orders like Zygentoma, Mantodea, Orthoptera, Neuroptera and Diptera were recorded with only one (01) species each.

Among the 41species of insect collected and identified, 26 species were useful, 11 species were harmful and 04 species were recorded as both useful and harmful insects based on their functions in the ecosystem.

Table 1: List Of Harmful And Useful Insect Species Recorded (with Common And Scientific Name) Under Different Families With Their Respective Orders Within Karnatak University Campus, Dharwad.

Sl. No.	Common Name	Scientific Name	Useful/ Harmful	Family	Order
01	Giant honey bee	*Apis dorsata*	Useful	Apidae	Hymenoptera
02	Large honey bee	*Apis florae*	Useful		
03	Dammer bee	*Tetragonula iridipennis*	Useful		
04	Carpenter bee	*Xylocopa*	Useful/ Harmful		
05	Emerald bee	*Ampulex compressa*	Useful	Chrysididae	
06	Cuckoo wasp	*Stilbum cyanurum*	Useful		
07	Carpenter Ant	*Camponotus americanus*	Useful	Formicidae	
08	Carpenter Ant	*Camponotus compresses*	Useful		
09	Western carpenter ant	*Camponotus modoc*	Useful		
10	Black carpenter ant	*Camponotus pensylvanicus*	Useful		
11	Golden black ant	*Camponotus sericeus*	Useful		
12	Labiates male	*Dorylus labiatus*	Useful		
13	Horse/Red wood ant	*Formica rufa*	Useful		
14	Jumping ant	*Harpegnathos saltator*	Useful		
15	Meat ant	*Iridomyrmex purpureus*	Harmful		
16	Little black ant	*Monomorium minimum*	Useful		
17	Weaver ant	*Oecophylla smargdina*	Useful		
18	Black crazy ant	*Paratrechina longicornis*	Useful/ Harmful		
19	Obscure thorax	*Pheidole obscurithorax*	Useful		
20	Fire ant	*Solenopsis germinate*	Useful		
21	Red imported ant	*Solenopsis invicta*	Harmful		
22	Odorous house ant	*Tapinoma sessile*	Harmful		
23	Pavement ant	*Tetramorium cespium*	Harmful		
24	Arboreal bicolor ant	*Tetraponera rufonigra*	Useful/ Harmful		
25	Red velvet ant	*Dasymutilla occidentalis*	Useful	Mutillidae	
26	Blue black spider	*Anoplius sp.*	Useful	Pompilidae	
27	Black orange wasp	*Cryptocheilus bicolor*	Useful		
28	Black flower wasp	*Scolia sp.*	Useful	Scoliidae	
29	Blue mud dauber wasp	*Chalybion sp.*	Useful	Sphecidae	
30	Potter wasp	*Delta conoideum*	Useful	Vespidae	
31	Shield bugs	*Nezara viridula*	Harmful	Pentatomidae	Hemiptera
32	Squash bug	*Anasa tristis*	Harmful	Coreidae	
33	Water strides	*Aquarius remigis*	Useful	Gerridae	
34	Beetle	*Batacera rufomaculata*	Harmful	Cerambycidae	Coleoptera
35	Longhorn beetle	*Batacera rufomaculata*	Harmful		
36	Larder beetle	*Dermestes lardarius*	Useful/ Harmful	Dermestidae	
37	Mantis	*Empusa pennata*	Useful	Empusidae	Mantodea
38	Silverfish	*Lepisma saccharinum*	Harmful	Lepismatidae	Zygentoma
39	Bush cricket	*Tettigoniidae*	Harmful	Tettigoniidae	Orthoptera
40	Antlion	*Myrmeleontidae*	Useful	Myrmeleontidae	Neuroptera
41	Hovers fly	*Volucella sp.*	Harmful	Syrphidae	Diptera



Graph-1: Total Number Of Insect Species, Useful, Harmful And Both Useful& Harmful Insect Species Recorded Under Different Orders In The Karnataka University Campus, Dharwad.

Results of the present survey also revealed that, the family Formicidae is the dominant family of insects(18) followed by Apidae (04), Chrysididae (02), Mutillidae (01), Pompilidae (01), Scoliidae (01),

Sphecidae (01), Syrphidae (01), Vespidae (02), Lepismatidae (01), Coreidae (02), Empusidae (01), Pentatomidae (01), Cerambycidae (01), Myrmeleontidae (01), Tetigoniidae (01) and Dermestide (01) among all the orders.

A total 41 insect species were recorded. Out of which 26 species were useful, 11 species were harmful and 04 were both in the present survey.

DISCUSSION:

The numbers of insects (41) observed were comparatively less than that of Daniel et al.[17] as they reported 77 insect species, out of which 53 were harmful and 24 species were beneficial surveyed in pigeon pea crop. This variation in diversity and distribution in different areas or regions may be due to change in the climatic conditions and vegetation cover and food availability in the survey area.

There are more than 60 species of arthropods were recorded as predators of *Helicoverpa armigera* in India.[18] The predators and parasitoids have been summarized for the key insect's pest in Pigeon pea such as *Helicoverpa armigera*.[19]

During the present study, Hymenoptera was the dominant order representing 30 species belonging to 09 families as compared to other orders, this may be because of Order -Hymenoptera is one of the most diversified Order, which includes over 1,15,000 described species representing 84 families. Hymenoptera is not only diversified group of insects in terms of structure, size and number of species, but are also diversified in their habits and life cycles, some of them are phytophagous (plant feeding), while others are herbivorous, predatory or even parasitic in nature. Many hymenopteran species are going to lead a solitary life style, while some of the bees, ants and wasps show highest degree of social organization in any of the animals group.

The rich diversity and distribution of insect fauna in the Karnatak University Campus, Dharwad is mainly due to diversed vegetation, which plays an important role for the existence of insect fauna in a community as it provides the main source of food for insects. The campus provides favorable habitat not only for insects but also for many animals as it is cultured with many flowering plants and trees with peaceful environment.

This study was an attempt to analyze some aspects of diversity & distribution of useful and harmful insects present in the Karnatak University Campus, Dharwad. Since, it is a preliminary study, a lot of research is necessary in this regard and further collections and survey of insects is essential for getting a detailed record of the faunal diversity of insects and their importance with conservation strategy is also necessary so as to protect these important insect species necessary for restoration of all ecosystems.

CONCLUSION:

The present survey work revealed that a total of 41 insects species belonging to 18 families under 08 different orders were recorded in the Karnatak University Campus, Dharwad, Out of which, Hymenopteran is the dominant Order with 30 insect species followed by Hemiptera and Coleoptera. Order Zygentoma, Mantodea, Orthoptera, Neuroptera and Diptera were recorded with only 01 species each. Among 41 insect species recorded, 26 species were useful, 11 species were harmful and 04 species were both useful and harmful insects based on their functions in the ecosystem.

Based on the present survey work, it can be concluded that Karnatak University Campus, Dharwad is having much insect diversity& distribution as because of rich vegetation and diversified flora, which plays an important role in the existence of insect fauna. The Karnatak University Campus also provides favorable habitat and good climatic conditions for survival of insects which helps in the restoration of all the ecosystems.

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