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Medicinal plants feeding insect fauna of district Karak, KP, Pakistan

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Abstract

Field surveys were carried out during March 2017-October 2017 to discover the insect fauna in brinjal, bitter gourd, ladies' fingers and tomato fields in Karak District Khyber Pakhtunkhwa, Pakistan. A total of 89 insect species under 16 genera, 16 families and 10 orders were observed in the brinjal, bitter gourd, ladies' fingers and tomato ecosystem. The order Lepidoptera was the most diverse (20 species) followed by hemiptera (17 species), coleoptera (15 species), hymenoptera (10 species), odonata (08 species), dermaptera (07 species), diptera (05 species), neuroptera (03 species), mantodea (02 species), orthoptera (02 species). The order Lepidoptera consists of a maximum (04 families) followed by hemiptera (3 families), coleoptera (02 families), dermaptera (01 family), diptera (01 family), hymenoptera (01 family), mantodea (01 family) neuroptera (01 family), odonata (01 family), Orthoptera (01 family).

Keywords: Insect fauna, brinjal, bitter gourd, ladies' fingers, tomato, Karak

1. Introduction

Vegetables are essential for a healthy human body, as they form a major component of human diet in every family ^[1]. Moreover, vegetables are vital sources of energy that are dependent upon by all levels of human as food supplements ^[2]. Because of poor hygienic practices related to plants, vegetables can become easily infected by insects Larva ^[3]. Insects are the most dominant organisms in the earth in terms of number of species and biomass. Insects play various roles in our society. Some are beneficial and some are harmful. The role of insects in agriculture is very important to man, because agriculture is the basic job of more than 50% of our population. Many insects cause serious damage to agricultural crops and reduce the yield. On the other hand, some insects are acting as natural enemies of these pests. In nature, there is a balance between the pest and natural enemy populations. These natural enemies help the farmers by keeping the harmful pests under check. Many agricultural scientists have emphasized that the presence of a variety of natural enemies of agro ecosystems would reduce the cost of cultivation by cutting down on the pesticide usage. Natural enemies build up their population by consuming their prey/hosts (pests) and regulate them ^[4]. Insects are undoubtedly the most adaptable form of life as their total numbers far exceed that of any other animal category. The preponderance of insect are openly chief to humans and the surroundings. For example, numerous insect species are predators or parasites of further damaging pests; others are pollinators, decomposers of organic substance or producers of expensive products such as honey or silk. Some can be used to manufacture pharmacologically energetic compounds such as venoms or antibodies. Less than 0.5 proportion of the total number of the known insect species is measured pests, and only a few of these can be a serious menace to people. Insect pests inflict damage to humans, farm animals and crops. Insect pests have been defined by Williams (1947) as any insect in the wrong place. Depending on the structure of the ecosystem in a given area and man's viewpoint, a certain insect might or might not be considered a pest. Some insects can constitute a major threat to entire countries or a group of nations. One prominent example is the tsetse fly that puts about 100 million people and 60 million head of cattle at risk in sub-Saharan Africa due to the transmission of trypanosomiasis ^[5]. In this paper an attempt has been made to provide the current status, and annotated checklist of insects associated with brinjal, bitter gourd, ladies' fingers and tomato.

2. Materials and Methods

2.1 Study period and study area

This study was undertaken during March 2017-October 2017 in brinjal, bitter gourd, ladies' fingers and tomato fields in Karak District Khyber Pakhtunkhwa, Pakistan. Insect sampling was done in Sabir Abad, Meta Khel, Kach Banda, and Chambi villages of Karak District. Natural enemies were collected from monoculture vegetable crops (Brinjal, Bitter gourd, Ladies' fingers and Tomato).

2.2 Collection of natural enemies

Specimens were collected by different instruments such as light trap, pitfall trap and sweeping net. They were also collected by hand picking method. The collected insects were killed by ethyl acetate vapor, sorted out into different orders and families and mounted in insect boxes. Small and soft body insects were preserved in 70% ethanol. Most insects were identified up to genus and species level with the help of biological experts. Insects were collected during the morning or evening hours.

2.3 Identification of insects

The insects were grouped into families based on their

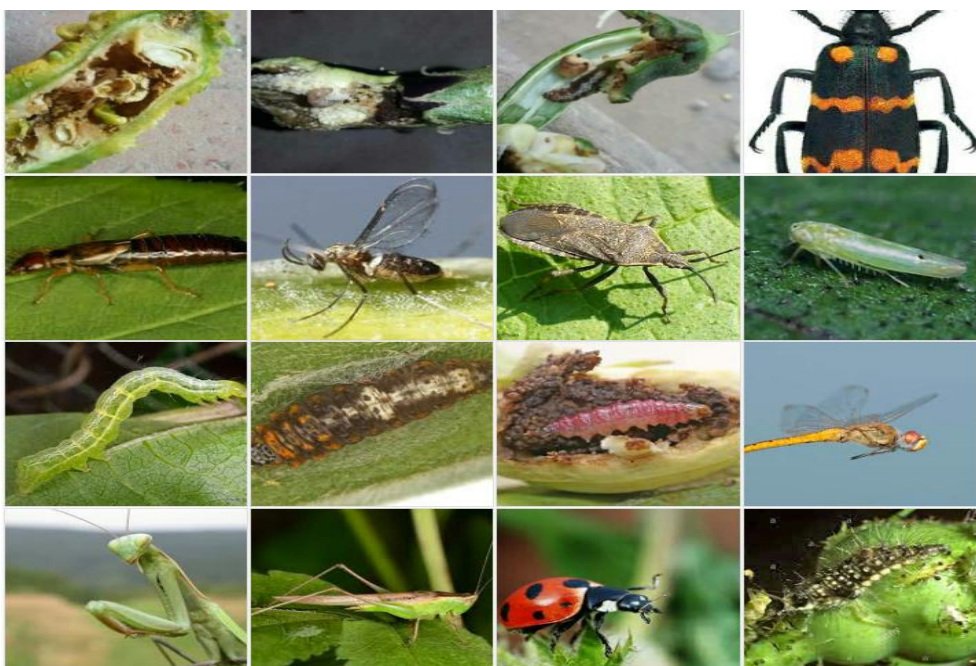
morphological characteristics using identification keys provided by Borror *et al.* [6], Bingham [7, 8] and Morley [9]. Some online sources were also used for identification.

3. Results

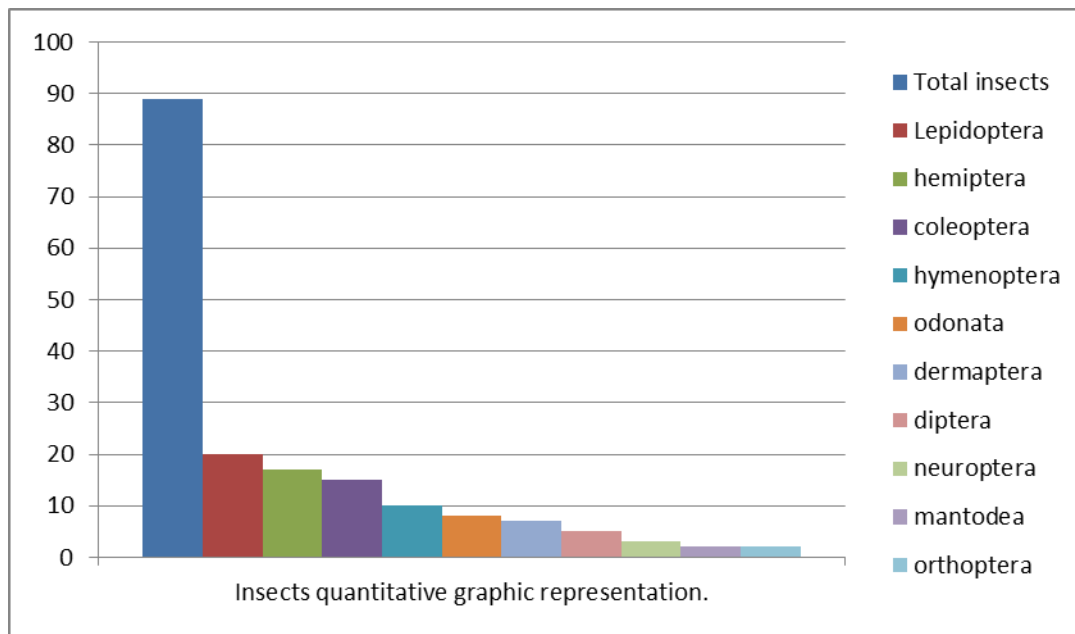
The selected sixteen species were belonged to one class, ten orders, sixteen family, sixteen genera and sixteen species as shown in detail in table 1. Of these sixteen species, four species of *T. ni*, *E. vittella*, *L. orbonalis* and *M. quinquemaculata* belongs to one order Lepidoptera with families Noctuidae, Nolidae, Crambidae, and Sphingidae. Three species belong to order Hemiptera, with families Coreidae, Cicadellidae and Aphididae. Two species belong to order Coleoptera with families Coccinellidae and Meloidae. One species belong to order Dermaptera with family Forficulidae. One species belong to order Diptera with family Cecidomyiidae. One species belong to order Hymenoptera with family Formicidae. One species belong to order Neuroptera with family Chrysopidae. One species belong to order Odonata with family Libellulidae. And one species belong to order Orthoptera with family Tettigoniidae.

Table 1: Taxonomic classification of different plant feeding insects

S/N	Class	Order	Family	Genus	Species
1.	Insecta	Coleoptera	Coccinellidae	Coccinella	<i>C. magnifica</i>
2.	Insecta	Coleoptera	Meloidae	Mylabris	<i>M. pustulata</i>
3.	Insecta	Dermaptera	Forficulidae	Forficula	<i>F. auricularia</i>
4.	Insecta	Diptera	Cecidomyiidae	Lasioptera	<i>L. falcata</i>
5.	Insecta	Hemiptera	Coreidae	Anasa	<i>A. tristis</i>
6.	Insecta	Hemiptera	Cicadellidae	Amrasca	<i>A. biguttula</i>
7.	Insecta	Hemiptera	Aphididae	Aphis	<i>A. gossypii</i>
8.	Insecta	Hymenoptera	Formicidae	Tetraoponera	<i>T. rufonigra</i>
9.	Insecta	Lepidoptera	Noctuidae	Trichoplusia	<i>T. ni</i>
10.	Insecta	Lepidoptera	Nolidae	Earias	<i>E. vittella</i>
11.	Insecta	Lepidoptera	Crambidae	Leucinodes	<i>L. orbonalis</i>
12.	Insecta	Lepidoptera	Sphingidae	Manduca	<i>M. quinquemaculata</i>
13.	Insecta	Mantodea	Mantidae	Mantis	<i>M. religiosa</i>
14.	Insecta	Neuroptera	Chrysopidae	Chrysoperla	<i>C. carnea</i>
15.	Insecta	Odonata	Libellulidae	Pantala	<i>P. flavescens</i>
16.	Insecta	Orthoptera	Tettigoniidae	Conocephalus	<i>C. maculatus</i>



Digram shows different images of plant feeding insect.



Graph 1: Graphical representation the plant feeding insects

4. Discussion

During the current study in Sabir Abad, Meta Khel, Kach Banda, and Chambi villages of district Karak sixteen insect species were found up to the species level in the current study, sixteen species were found and their proper systematic classification is given in the table 1, respectively. The selected sixteen species were belonged to one class, ten orders, sixteen family, sixteen genera as shown in detail in table 1. A total of 89 species of predatory and parasitic insects was recorded from the study areas. All the natural enemies were grouped into ten different orders, namely Lepidoptera, hemiptera, coleoptera, hymenoptera, dermaptera, diptera, neuroptera, mantodea, odonata and orthoptera. Among the different orders, Lepidoptera contained the highest number of families and species. Among the predators, Coccinellidae recorded the highest number of species. In 2017, Coccinellidae formed the major family of occurrence from March to October in the vegetable fields; in this period the total number of individuals collected from all families was the highest. Latif *et al.* reported 20 species of pest insects and 10 families of predacious insects in the brinjal field [10]. Butani and Verma [11] recorded 20 species of insects in bhendi ecosystem. Hill and Waller [12] reported that bhendi was ravaged by spectrum of pests and ranged from lepidoptera, homoptera, coleoptera, orthoptera and thysanoptera. Gaurav Sharma, *et al.* prepared a checklist on lepidopteran insects associated with vegetables in India and identified 152 species under 25 families and 14 superfamilies [13]. Zaryab *et al* conducted study on Tanga dam district karak invertebrates fauna and recorded those species like *Pandinus imperator*, *Pterostichus melanarius*, *Solenopsis invicta* and *Hirudo medicinalis* were abundant in Tanga dam. So from the present study, it may be concluded that Tanga dam is suitable for the survival of both vertebrates and invertebrates. Hence our present study will provide useful information about the diversity of vertebrates and invertebrates in Tanga dam that could be later valuable in systematic and conservation [14]. Saqib *et al* conducted survey an invertebrates found in Khurum dam are *Sympetrum flaveolum*, *Pandinus imperator*, *Pterostichus melanarius*, *Anax junius*, *Solenopsis invicta*, *Hirudo medicinalis* and *Sceliphron caementarium* *Vespa velutina*, *Hirudo medicinalis*, *Pandinus imperator* are present in Muhabbat Khel dam. So

from the present study, it may be concluded that Khurum and Muhabbat Khel dams are very suitable for the growth of both vertebrates and invertebrates.

5. Conclusion

From the current results it may be concluded that the district Karak have rich insect fauna and will be helpful for entomologists in future for advance studies.

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