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Insect Diversity in the City Garden and Parks of Kolhapur, Maharashtra

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ABSTRACT: The class Insecta is a very diverse class. India has been reported to have approximately 75,000 species. The class Insecta is divided into 29 orders. Diptera, Hymenoptera, Lepidoptera, Coleoptera, and Hemiptera are the five insect orders that stand out in terms of species richness, with Lepidoptera being the most abundant in the studied area. Kolhapur is a city that has aesthetic significance in human life. The park's attractive plants must be safeguarded against insect infestations. The aforementioned study is being conducted to learn about insect variety, particularly pest insect diversity, and the status of pollination agents. A total of 24 bug species from six orders were observed in the study region. Because of the abundance of the order Lepidoptera, there is a high rate of pollination.

KEYWORDS: Kolhapur City Park; Insect order; Lepidoptera; Species richness.

I. INTRODUCTION

The word 'insecta' comes from Latin word 'insectum' meaning 'cut' into section. The class insecta is a highly diversified class from phylum arthropoda. Study of insect diversity is of almost important now a days. In class insecta there are about 1.5 million species representing nearly 90% of animal kingdom (Mani 1982). About 75,000 species are reported from India comprising nearly 10% of entire insect's fauna (State of Art Report Zoology, 1991). The members of class Insecta arranged in 29 orders (Grimaldi and Engel 2005, Arillo and Engel 2006). Five orders of insects stand out in their levels of species richness: Hymenoptera, Diptera, Coleoptera, Lepidoptera and Hemiptera. Lepidoptera is one of rich group of insecta, it is about 1,46,000 species (Bakowski & Doku Marfo, 2009).

Insects & other invertebrates still receive less attention than vertebrates or plants. Many insects are undescribed. For insect diversity conservation we require scientific identification of species. Conservation of habitat is equally important in case of insects. Many insects play important role in their ecosystem but some insects considered as agricultural pest. The insects originated on the Earth about 480 million years ago in the Ordovician period at about the same time terrestrial plants appeared. Global climate condition of earth changes several times during the history of Earth, along with it, diversity also changed. Most successful insect groups are Hymenoptera (Wasps, bees & ants), Lepidoptera (butterflies) as well as many types of Diptera (Flies) & Coleoptera (beetles). In an old estimate, Lefroy and Howlett (1909) in the monumental book "Indian insect life" reported 25,700 Indian species. Beeson (1961) estimated 40,000 and Menon (1965) 50,000 Indian species, of which about half remain yet to be studied. In recent estimate Varshney (1997) has reported 589 families and 51,450 species of insect from India. After 1997, 619 families and 59,353 species of insects were reported from India.

According to Atwal, 1976; Insects are supposed to be the most successful groups of animals, surviving on the earth and are significantly managed by the man for his needs as nutrition, medicine and economical products like silk, honey, wax, colour, etc. Aland *et al.*, (2010) analysed Hymenoptera, its diversity, and abundance and discovered 82 species distributed over 47 genera and belonging to 17 families from Amba Reserved Forest. The numbers of known species of order Orthoptera is over 20,000 species worldwide and about 1,750 species (it's 10 percent of the total worldwide known species) are recorded from India (Tandon and Hazra, 1998).



Kirby (1914) and Chopard (1969) are produces major work on Indian grasshopper whereas, 21 genera with 47 species of pyrgomorphids are listed by Shishodia et al (2010) from the India, which is very less as compare to other family Grasshoppers belong to order Orthoptera which is the sixth largest insect order after Hemiptera (Alfred, 2003). They are the most diversified fauna of the world having significant economic importance because of their damaging potential.

According to Resh and Carde,(2003). As a part of the largest group of the animal kingdom, insects are divided into 29 orders that are in turn broadly grouped into Apterygota or wingless (ex. Silverfish, springtail, etc.) and Pterygota or winged (ex. Bugs, butterflies, moths, beetles, flies etc.) forms. Kumari et al. (2016) provided a thorough taxonomic assessment on the diversity and families of butterflies, which was a preliminary study addressing the many stages and families of butterflies, place of order Lepidoptera, and brief remarks on the higher categorization of the latter.

Bharmal et.al.(2018) worked on investigation on the insect herbivores reported 42 species of insects belonging to the orders Isoptera, Hemiptera, Thysanoptera, Lepidoptera, Diptera, Coleoptera and Hymenoptera from 24 families. Insects are known for their wide host range and also for absolute specificity with single plant species. Hemiptera are very important economically since they cause damage to agricultural and forest plants by sucking the cell sap and affecting growth and yield of the crops. Biodiversity of aphids have been studied in Western Ghats. In all 19 species of aphids have been reported belonging to the following important genera viz. Aphis, Myzus, Rhopalosiphum, Melanophis, Brevicoryne, Lipaphis, Dactynotus, Teratneura, Pentalonina, Greenidia and Toxoptera(Jadhav and Sathe, 2006).

Sathe et al. (2014) worked on biodiversity of jassids from agro-ecosystems of Kolhapur district, India. They reported 22 species of jassids. Sathe and Kamble (2015) also studied the impact of Environmental factors on population of *Idioscopus clypealis* (Hemiptera: Cicadellidae) on mango. Bharmal et.al.(2010). During the study period, 44 species of bugs belonging to 36 genera representing 09 families viz. Pentatomidae, Coreidae, Lygaeidae, Pyrrhocoridae, Gerridae, Nepidae, Belostomatidae, Ranatridae and Rhyparochoridae were recorded. Family Pentatomidae represented maximum 22 species.

II. STUDY AREA

Kolhapur in Maharashtra is a historic city. The temperature of the region ranges between 10oC to 35oC. Summer in Kolhapur is relatively cooler but much more humid than neighbouring inland cities. The city receives abundant rainfall from June to September due to its proximity to Western Ghat. There are 51 public gardens in Kolhapur. The corporation occupies garden area of 90 acre. Kolhapur Municipal Corporation is taking care of 1.5 Lakh trees currently in gardens. Conservation project for diversity is going on in 26 public gardens, some of them are Rankala garden, Chimasahab garden, Mahavir garden, Hutatma Park etc. All garden and Parks are with rich vegetation including plants species such as Rhoeo, Lilly, Caseabella, Delonix, Regia, Bottle Brush, Citrianus, Powder Puff etc. Conservation of habitat itself results in conservation of insect diversity.

III. MATERIAL AND METHOD

Photographs were taken with the help of NIKON COOLPIX P520 to identify insects accurately to generic & species level & to maintain visual record. The study was conducted at Rankala garden, Chimasahab garden, Mahavir garden and Hutatma garden Kolhapur. Duration of study was from August 2020 to December 2020 i.e. from late rainy season to winter season. Observations were made in park at morning and evening hours in the study period. Aerial insect observed using sweeping net. Quadrat method used for observation of slow moving insects (Quadrat : Sq. Size 1 x 1 Meter). The insects were identified with the help of available literature providing standard insect keys i.e. illustration, picture, guide, internet and literature etc. Insects were identified by consulting respective literature. Coleopteran identified by consulting *The biology of coleoptera*, R.A.Crowson (2013), Hemiptera identified by consulting Thirumalai & Sharma (2002 a&b) & Estop & Hill (1976), Hymenoptera identified by consulting *Arthropod collection & identification : field & laboratory* – Timothy & Gibb, C.Y. Oesto (2006), Lepidoptera identified by consulting *Butterflies of Indian region* – M.A.Wynter – Blyth(1995), Odonata identified by consulting Fraser (1933,34,36), Lahiri (1987), Silsby(2001), Orthoptera identified by consulting Tandon SK, Hazara (1998) *Faunal diversity of India*, Diptera identified by consulting bugguide.net, Blattoidea identified by consulting Chhotani O.B.(1997) *The fauna of India, Isoptera (Termites) Vol.II,XX+800*.

IV. RESULTS

Table No. 1 contains the results. During survey research, 24 bug species were observed in the city. The number of species observed from 8 orders is 10, 8, 6, 4, 2, 2, 2, and 1. Hemiptera (8), Coleoptera (6), Orthoptera (4), Hymenoptera (2), Odonata (2), Diptera (2) and Blattodea (1). In the late rainy season, more bug species were detected than in the winter season. When compared to other orders studied in the park, the order Lepidoptera, Hemiptera, and Coleoptera had the most species observed.

V. DISCUSSION

Kolhapur City Garden and Park is home to a variety of habitats, including grassland, tree trunks, floral regions, and ant hills. Rhoec, Lilly, Casebella, Delonix, Regia, Bottle brush, Citrianus, Powder puff, and more flora can be found in the Garden. Ladybird beetles, bugs, dragonflies, termites, and ants were discovered. While working on this project and conducting research, we discovered a rich floral zone with an abundance of the order Lepidoptera (Butterflies and Moths). Because pollen grains and nectar are the primary food sources for the order Lepidoptera, city Park has an abundance of it. As a result, the majority of Lepidoptera species observed. Nature takes care of the majority of its biota in its own way, but humans must safeguard and conserve insect species in varied settings. In the case of insects, habitat conservation is equally vital. Studies on the role of insects in disease transmission, pest species, apiculture, and sericulture can all be beneficial. Insects can be small or large, but their contact with humans should not be overlooked.

VI. CONCLUSION

This research will aid in the protection of vital plant species in Kolhapur from insect pests. If pest control techniques will be implemented by the Kolhapur Municipal Corporation's GARDEN CONSERVATION COMMUNITY.

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Table 1.

Sr. No.	Order	Species
1	Coleoptera	06
2	Hemiptera	04
3	Hymenoptera	02
4	Lepidoptera	10
5	Odonata	05
6	Orthoptera	04
7	Diptera	02
8	Blattodea	01

Faunal species observed in study region: Order Lepidoptera



Fig.: Ariadne merione



Fig.: Euploea mulciber



Fig.: Papilio polymnestor



Fig.: Junonia lemonias



Fig.: Azanus ubaldus

Faunal species observed in study region: Order Lepidoptera



Fig.: Catopsilia pomona

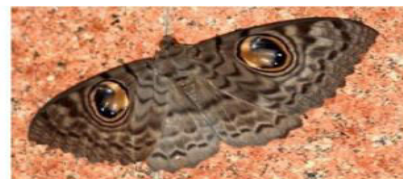


Fig.: Erebus macrops



Fig.: Euploea core



Fig.: Symphoedra nais



Fig.: Chrysodeixis chalcites

Faunal species observed in study region: Order Coleoptera



Fig.: Anoplophora glabripennis



Fig.: Phyllophaga sp



Fig.: Aspidomorpha milliaris



Fig.: Charidotella sp



Fig.: Sternocera ruficornis



Fig.: Illies cincata

Faunal species observed in study region: Order Diptera



Fig.: Culex quanquefasciatus



Fig.: Sarcophaga africa



Faunal species observed in study region: Order Odonata



Fig.: *Rhyothemis variegata*



Fig.: *Zyxomma petiolatum*



Fig.: *Trithemis festiva*



Fig.: *Pentalis flevescens*

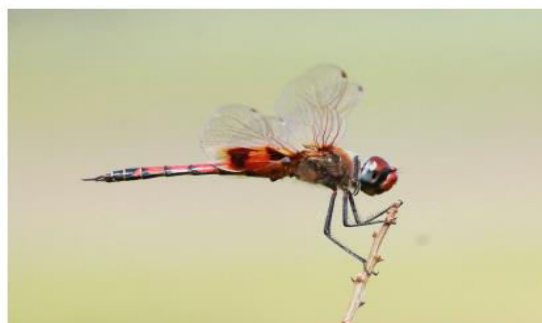


Fig.: *Tramia basilaris*

Faunal species observed in study region: Order Hemiptera



Fig.: *Halyomorpha halys*



Fig. : *Erthesino fullo*



Fig.: *Tessaratomia papillosa*



Fig.: *Gonopsis coccinea*



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