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DIVERSITY OF BUTTERFLIES FROM GARDENS AND PARKS OF PUNE CITY

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Abstract:

Butterflies are "Insects of the Sun" and have glorious colours & delicate charisma. They are most efficient pollinators as well as some species are agricultural pests; hence are of economic importance. The gardens and parks are important as regards of maintaining diversity of insect population in urban habitats moreover keeps the pollution under control. The present work represents the account on diversity of butterflies from urban parks and gardens of Pune City, Maharashtra. The occurrence of butterflies depends on various factors like presence of indigenous flowering plants, levels of human disturbance and garden management practices. Up till now the diversity of butterflies from twenty big and small parks have been evaluated. A total 394 individuals pertaining to 43 species distributed over 5 families have been recorded till date. This species composition is 20% to that of species known from Maharashtra (214 species). Family Nymphalidae is the most dominant family with 48.83% of the total species, Pieridae is the second largest family accounted for 20.93% of the total diversity followed by Lycaenidae (16.27%), Papilionidae (11.62%) and Hesperiidae (2.32%). Further investigation will definitely add to species number qualitatively as well as quantitatively.

Keywords: Species richness**,** Diversity, Abundance, Butterflies, Pune, Maharashtra.

Introduction:

Insects are the most delightful creatures on the planet earth. They are specialized pollinators, hunters, parasites and predators forming basis for most of the terrestrial ecosystems. Among insects the butterflies are most charismatic ones. Their size ranges from the tiny jewels like blues, to the stunning Birdwings with a wing-span as great as eight inches. Gardens are discrete patches of human-managed habitat that are common in many urban areas. Man-made gardens and parks are inhibited by a variety of insects and other organisms. Insects play an important role in nutrient cycle, Organic matter decomposition, Pollination and soil aeration in urban ecosystem. Some insects visit park and gardens for nectar or other resources, while some reproduce and spend most of their lifespan in the gardens. Thus there has been a rising research to show the potential of small scattered habitats like domestic gardens, community gardens, green roofs and parks to support rich biodiversity, even in heavily populated urban areas. (Saha and Gaikwad, 2014).

Butterflies are commonly referred to as "insects of the sun" with their eye catching color and delicate charisma. They have been admired for centuries for their physical beauty and behavioral display [Arya and Chaudhari, 2014]. Among the insects, butterflies occupy a vital position in the ecosystem and their occurrence and diversity are considered as good indicators of the health of any given terrestrial biotope. Butterflies are also good indicators of environmental changes as they are sensitive to habitat degradation and climate change[Kunte, 2000]. The butterflies have fascinated peoples of all age group. That is why these are considered as the "fluttering jewels of nature" (Illustrated Encyclopaedia of Wildlife). The order Lepidoptera is the second largest order in the animal kingdom, coming under the class Insecta. The word Lepidoptera means `Scale wings`(Greek; Lepis- scale; Pteron-wing).

Butterflies are taxonomically well studied group of insects and receive reasonable amount of attention throughout world not only by the entomologists but also by laymen. Presently, butterflies are classified into two superfamilies, of which Hesperioidea has all the skippers, WhilePapilionoidea includes the rest, the 'true' butterflies. Hesperioidea consist of a single family of Hespeiidae, whereas papilionoidea has four families: Papilionidae(Swallowtails), Pieridae (White & Yellows), Nymphalidae (Brush- footed butterflies) and Lycaenidae(Blues). Out ofabout 25,000 species of butterflies recorded from all over the world, 1501 are from India (Gay et al., 1992). Pune, being one of the most urbanized, congested and polluted city, has been taken as the study site.PMC has already developed 111 big and small gardens and parks measuring upto 475acres [Corbet PS., 1999].

Materials and method:

The butterflies are very delicate in nature and hence their handling is also done with extreme care. Butterflies were collected by using aerial nets. The net consist of a strong, light handle with a length of 1m and at its end a 13" diameter ring is attached which is joined by the nylon cloth bag of 33" depth. The long handle allows the net to be used as far away from body

as possible, making sweeping over hanging bushes easier and extends the area of individual sweep.

The insect boxes are made of good quality wood and serve the purpose of keeping the collection away from moisture. It is also provided with a glass top to facilitate observation. Naphthalene balls are kept inside the box to prevent insect pest and fungal attack. On both the wings, a piece of paper strip is pinned so as to spread the wings. The collection was done on sunny days continuously for one year.

The present study was conducted during the period from August 2015 to February 2016. The study areas were monitored in every month during the study period with 7 to 10 days with minimum of 2 to 3 hours per day. The random method of sampling was used to collect the butterflies. The collections were done in four seasons comprising monsoon, and post monsoon. The collections were done in warm but not too hot condition especially in the morning from 7 am to 11 pm which is a peak time for butterfly activity and evening 4pm to 5.30 pm.

The soft bodied butterflies were gently removed from the bottom of the bag, after it becomes enclosed in the bag by a rapid twist of the handle. The butterflies are killed by pressing the thorax region gently by the hands. Since immediate pinning is not possible, these butterflies are kept in a piece of paper with wings folded and then edges of the paper are folded over to lock it inside. The butterflies are pinned through the centre of thorax or a little behind, between bases of the forewings on a piece of thermocol. It is then kept in insect box. The collected specimen was identified by following standard literature (Kehimkar 2008).

Result and discussion:

Species Diversity Analysis:

The present diversity study on species of 5 families of butterflies from gardens and park of Pune municipal corporation enumerated a total of 655 examples pertaining to 65 species distributed over 48 genera and belonging to 14 subfamilies. Among these Five families, Nymphalidae is more species rich and dominant one with 23 species pertaining to 15 genera.Family Lycaenidae with 20 species under 17 genera, family Pieridae consists of 12 species to 9generafollowed by family Papilionidae having 6 species to 3 genera and family Hesperiidae shows very poor diversity. Two diversity indices were calculated with the help of PAST software version, 2.17C. Simpson's diversity index and Shannon-Weiner index were taken under consideration to analyze the diversity.

Biodiversity indices in the 15 Parks and Gardens of study area:

The biodiversity indices in the 15 sampling sites (Table: 2) indicates that most of the sampling sites were found to have moderate diversity. Among the 15 parks and gardens, site G1(Savitribaiphule university, Pune) records highest species diversity as well as abundance followed by site G2 (Empress garden) and site G3 (Sarasbaug). However, site G13, and G14 records lowest number of species diversity and site G15 having the very least number of individuals.

Table 1: Biodiversity indices in the 15 sampling sites

Collection Sites	No of species	Individuals	Simpson_1-D	Shannon_H
G1	56	154	0.9577	3.631
G2	5-	88	0.9675	3.683
G3	43	64	0.9688	3.627
G4	3-	46	0.949	3.208
G5	27	39	0.952	3.175
G6	27	31	0.9594	3.255
G7	25	28	0.9688	3.184
G8	22	37	0.935	2.932
G9	21	26	0.9467	2.992
G1-	21	43	0.9313	2.847
			1	

Following graph shows the percentage wise family abundance as, a total numberof 5 families have been studied from the collection sites.

Family: Nymphalidae,Family: Lycaenidae,Family:Pieridae,Family:Papilionidae ,Family: Hespiriidae

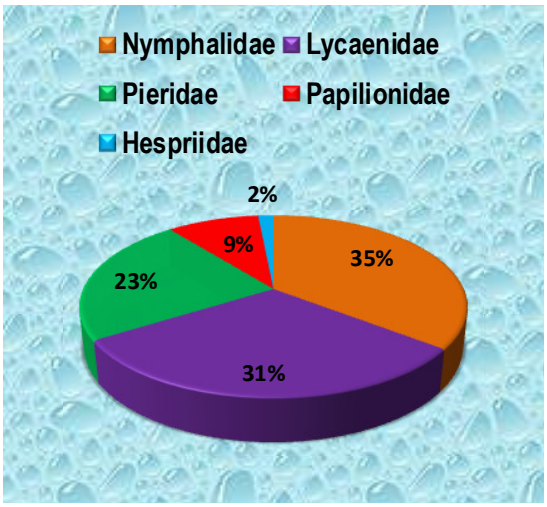

Figure. 1. The percentage wise family abundance

Discussion:

In 2014 S. Ankalgi and M. Jadesh recorded family Nymphalidae to be the most diverse from Ankalga village (Gulbarga District) Karnataka. Similarly the diversity stydy carried by H. A. Dhamke et al. in 2013 from Haveli and MavalTahasil of pune District, Pune, Maharashtra. Their result also shows the family Nymphalidae was the most dominant from this region. And also in 2014 P. Kumar and A. G. Murugesan recorded the relative abundance was high for family Nymphalidae among all other families. The present study also adheres earlier work of similar time by Ankalgi and jadesh (2014), Dhamke et al (2013) also P. Kumar (2014).

The composition of species of individual families shows similar results obtained by Kunte (2001), Arun (2002), Manoj et al. (2004), Kunte (2001), Kunte (2009), Singh (2010), Alagumurugan et al. (2011), MenasagiJyoti B. (2011), Nimbalkar et al. (2011), S Amala et al. (2011), Karve, et al. (2013), Abdul Hammed (2013), Kumar Ashok. (2013), Sharma et al. (2014), Arya et al. (2014), Bara Atanu et al. (2014), Kumar P. (2014), SahuUsha et al. (2014), Prabakaran S. et al. (2014), Kumar Ashok. (2014), Aishwarya et al. (2014), Ravindra.(2014) and Shiva Rama Krishna et al. (2014), Naikwadi et al. (2015), Naikwadi et al. (2016).

Conclusion:

Present work depicted the study from 15 gardens and parks of the city. Further exploration will unquestionably add to species number qualitatively as well as quantitatively.The present endeavor depicts the study of total 655 examples pertaining to 65 species distributed over 48 genera and belonging to 14 subfamilies under 5 families from 15 parks and gardens of Pune municipal corporation. Among 5 families studied, family Nymphalidae is foundto be dominant with respect to species quantity and quality, the genus *Junonia*is the largest with6 species. A species like *Euremahecabe, Euploea core* and *Catopsilapomona*they are mostdivers among all species studied. Further study on seasonal basis will definitely add one more dimension to the study.

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