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Mayuresh Ravindra Dev
Department of Zoology, Gogate Jogalekar College, Advocate N. V. Joshi Marg, Near Ratnagiri Court, Ratnagiri, Maharashtra, India

Kashmira Ravindra Raut
Department of Zoology, Gogate Jogalekar College, Advocate N. V. Joshi Marg, Near Ratnagiri Court, Ratnagiri, Maharashtra, India

Dr. Madhura Deepak Mukadam
Head and Associate Professor, Department of Zoology, Gogate Jogalekar College, Advocate N. V. Joshi Marg, Near Ratnagiri Court, Ratnagiri, Maharashtra, India

Corresponding Author:
Mayuresh Ravindra Dev
Department of Zoology, Gogate Jogalekar College, Advocate N. V. Joshi Marg, Near Ratnagiri Court, Ratnagiri, Maharashtra, India

A report on butterfly diversity of Gogate Jogalekar college campus Ratnagiri, Maharashtra

Mayuresh Ravindra Dev, Kashmira Ravindra Raut and Dr. Madhura Deepak Mukadam

Abstract
Butterflies are beautiful creatures of nature. They play crucial role in the ecosystem, as an important component of a food chain. The present study was undertaken to check the diversity of butterflies in the Gogate Jogalekar college campus, Ratnagiri. Different butterflies found, were recorded using digital camera and mobile phones by random observation method. Total 34 species of butterflies from 22 genera were found belonging to 6 different families. Family Nymphalidae consisted a maximum number of species *i.e.*18 species found, belonging to 11 respective genera. This was followed by family Papilionidae (6 species, 3 genera), Lycaenidae (4 species, 4 genera) Pieridae (3 species, 2 genera), Riodinidae (2 species, 1 genus) and lastly by Hesperiidae (1 species, 1 genus). Habitat destruction because of interference of human in nature is a major threat to diversity of butterflies. Therefore, present work was undertaken from the perspective of their conservation.

Keywords: Gogate college, ratnagiri, butterfly diversity, conservation

1. Introduction
Butterflies are beautiful creatures of nature. They are members of the class Insecta (Phylum-Arthropoda) which are not only known for adaptability to habitats, but also for magnificent colors and patterns on their wings [1]. Over 1 million species of insects have been recorded till now. Five major orders of class Insecta stand out for their high species richness; those are Coleoptera, Diptera, Hymenoptera, Lepidoptera and Hemiptera. Butterflies belong to order Lepidoptera which is one of the major insect orders which include butterflies along with moths with some 160,000 described species.

Butterflies feed on nutritious liquids like nectar, honeydew; and seepages from plants. Butterflies are always active during day time. They play crucial role in ecosystem, as an important component of a food chain. Butterflies are important for pollination of flowers. They are involved in nutrient recycling, maintenance of both plant and animal community structure and composition. Their presence and diversity is considered to be a sign of good condition of any terrestrial biotope [2].They also react quickly to any kind of disturbance and changes in the habitat quality making a good indicator to study changes in the habitat and landscape structure variations [3]. But with the shrinking of greenery and increase in pollution, butterflies, birds and all our wildlife are fast disappearing [4].

There is need to study community structure and dynamic group of Lepidopterran's with respect to different regions of our country to know the impact of changing natural habitats on diversity and distribution of butterflies [5]. By taking into consideration importance of butterflies in ecosystem the present study was undertaken to check the diversity of butterflies. Under this study the butterfly species found, were recorded. The main objective of this study was conservation of species of butterflies found, in the area chosen for the study.

Ratnagiri district is situated in the southwestern part of Maharashtra. Ratnagiri city is positioned along the coastline formed by the Arabian Sea. The city has tropical climate. Ratnagiri district is completely innervated by ranges of Sahyadri Mountains and has sufficient vegetation. Gogate Jogalekar college is located at the prime location of Ratnagiri city which has 16.98^0N 73.3^0E coordinates. The college campus has a well maintained, groomed garden with more than 60 species of plants, including number of flowering plants and other ornamental shrubs.

The geographical conditions and vegetation surrounding the college campus is also favorable to maintain the diversity of butterflies. As the number of butterflies and their diversity depends on availability of host plants, the college campus therefore, provides a suitable microenvironment for many butterflies.

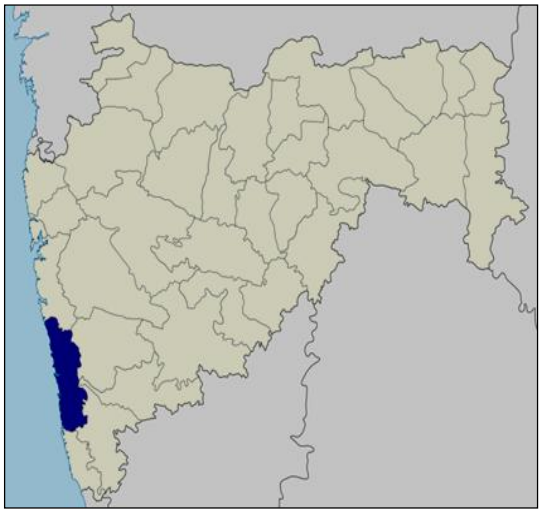

Fig 1: Geographical position of Ratnagiri District in Maharashtra

Fig 2: Satellite view of Gogate Jogalekar college campus, Ratnagiri

2. Materials and Methods

Butterfly species found in the campus were recorded by random observation method between the periods of October 2018 to October 2019 *i.e.* for the entire year. The observations were made once in a week for 3 hours from 9:00 am to 12:00 pm in the morning and 4:00 pm to 6:00 pm in the evening. These timings of observations were kept constant throughout the study but accidental sightings apart from these fixed timings were also recorded. The butterflies were observed and their pictures were captured using digital camera [Nikon SLR camera of 32 x zoom] and mobile phone [Redmi note 5 pro cool pad] as well, wherever possible. For identification of butterflies reference books [6] [7] and some authentic internet websites were used [8]. The total number of butterflies in selected area was counted and a list was prepared.

Table 1: List of Butterflies found in college campus

Family	Sr. No.	Common name	Scientific name
Nymphalidae	1	Blue tiger	*Tirumala limniace*
	2	Striped tiger	*Danaus genutia*
	3	Plain tiger	*Danaus chrysippus*
	4	Lemon pansy	*Junonia lemonias*
	5	Grey pansy	*Junonia atlites*
	6	Common crow	*Euploea core.*
	7	Brown king crow	*Euploea klugii*
	8	Common three ring	*Ypthima asterope*
	9	Common four ring	*Ypthima huebneri*
	10	Common five ring	*Ypthima baldus*
	11	Common bushbrown	*Mycalesis perseus*
	12	Glassy tiger	*Parantica aglea*
	13	Common evening brown	*Melanitis leda*
	14	Tawny coster	*Acraea terpsicore*
	15	Great eggfly	*Hypolimnas bolina*
	16	Danaid eggfly	*Hypolimnas misippus*
	17	Common sailer	*Neptis hylas*
	18	Chestnut-streaked sailer	*Neptis jumbah*
Papilionidae	19	Common jay	*Graphium doson*
	20	Common mime	*Papillio clytia*
	21	Common mormon	*Papilio polytes*
	22	Lime butterfly	*Papilio demoleus*
	23	Blue mormon	*Papilio polymnestor*
	24	Crimson rose	*Pachliopta hector*
Pieridae	25	Common jezebel	*Delias eucharis*
	26	Small grass yellow	*Eurema brigitta*
	27	Common grass yellow	*Eurema hecabe*
Lycaenidae	28	Tiny grass blue	*Zizula hylax*
	29	Dark grass blue	*Zizeeria karsandra*
	30	Common pierrot	*Castalius rosimon*
	31	Pea blue	*Lampides boeticus*
Riodinidae	32	Palm judy	*Abisara echerius*
	33	Double banded judy	*Abisara bifasciata*
Hesperiidae	34	Chestnut bob	*Lambrix salsala*

3. Results and Discussion

Availability of open place, flowering plants, sufficient sunlight, big trees for proper shade and wet surface is required for butterflies to complete their life cycle; and use of insecticides and pesticides in the garden should be avoided to maintain their diversity [9]. The college campus and garden is fulfilling nearly all above conditions, which supports diversity of butterflies in the campus. In current study, total 34 species of butterflies were found belonging to 22 different genera of 6 different families. Among these families, Nymphalidae consisted maximum number of species i.e. 18 species, belonging to 11 genera. This was followed by family Papilionidae (6 species, 3 genera), Lycaenidae (4 species, 4 genera) Pieridae (3 species, 2 genera) and Riodinidae (2 species, 1 genus). Lastly, the least number of butterflies was observed in family Hesperiidae with 1 species belonging to a single genus.

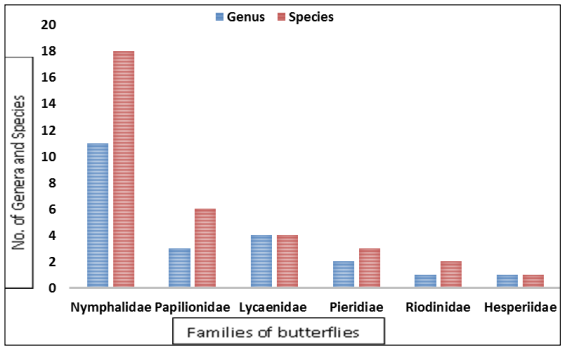

Fig 3: The graph showing number of genera and species belonging to different families of butterflies.

Monitoring and mapping biodiversity is the first step in systematic conservation and planning [10]. Sufficient documentation on butterflies is done and their diversity is measured in the various parts of Maharashtra. Diversity of butterflies is censused in Tamhini, northern Western Ghats across six seasons and five landscapes using line transect methods for two years and total 69 species of butterflies belonging to 52 genera of butterflies and five families were recorded [11]. The family Nymphalidae is well distributed in the Satara tehsil and during the course of study, 52 species of butterflies belonging to the family Nymphalidae were recorded which was proved to be dominant in terms of number of species [12].

Butterfly diversity was monitored during April 2015 to march 2016 in Rawanwadi and total of 84 species belonging to 5 families and 54 genera were recorded where family Nymphalidae found dominant in number of species which was then followed by family Lycaenidae, Pieridae, Hesperiidae and Papilionidae respectively [13]. Total 69 species of butterflies were recorded belonging to 47 genera and 5 families in Sakoli taluka of Bhandara district where also Nymphalidae family was dominant and consisting 25 species (36.24%); Lycaenidae 19 species (27.53%); Pieridae 13 species (18.84%); Hesperiidae 8 species (11.59%) and only 4 species (5.80%) recorded from family Papilionidae [14]. Butterfly survey was done across Maharashtra Nature Park, in Mumbai where total 72 species were recorded and families Nymphalidae and Lycaenidae found dominant [15]. Total 33 species of butterflies belonging to 24 genera and 05 families were recorded from different urbanized and less urbanized parts of Vita city Sangli, Maharashtra and family Nymphalidae was found abundant and family Papilionidae was found least abundant among all the families [16].

A survey was carried out on butterflies of agricultural field during monsoon and post-monsoon season, in Arjuni/Morgaon, Maharashtra. Total 44 species of butterflies were recorded belonging to 32 genera and 5 families. Nymphalidae family had maximum number of genera and species and only three species were recorded from the family Papilionidae [17].

Our findings and observations collected during this study are not similar with that of earlier findings made across Maharashtra except the fact that the maximum number of species of butterflies belonging to family Nymphalidae (18 species, 11 genera) was recorded. This number was followed by family Papilionidae (6 species, 3 genera), Lycaenidae (4 species, 4 genera) Pieridae (3 species, 2 genera) and Riodinidae (2 species, 1 genus). Least number of butterflies was found in family Hesperiidae with 1 species belonging to 1 genus. Therefore, in this study deviation in the number of species of butterflies was observed in comparison with findings of the earlier researchers. This deviation can be vindicated by the fact that the availability of the host plant is directly related to the butterfly diversity and their abundance as well as distribution is completely in the hands of climatic conditions like rainfall, temperature and humidity [18][19]. Our study site is situated below the Western ghat and has different vegetation as well as topographical conditions as compared to earlier sites studied through the same perspective across Maharashtra. Less number of host plants for butterflies of family Hesperiidae are available in and around the college campus; therefore, single butterfly species belonging to family Hesperiidae was recorded during the study period.

Grey pansy Common bushbrown Tawny coster

Danaid eggfly Common sailer Small grass yellow

Pea blue Palm judy Chestnut bob

Plate 1: Pictures of butterflies found in the college campus during study

4. Conclusion

The findings of the present study underline the importance of college campus as a preferred habitat for butterflies as butterflies belonging to all 6 families are found during the study. Loss of prime habitat is the major threat to all insects including butterflies. Human recreational, developmental activities and many factors affect the insect population. Although we cannot completely nullify the ill effects of urbanization and development, we can at least try to reduce them by planting endemic trees and plants supporting insect population which will be a great support for their conservation.

5. Acknowledgement

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