International Journal of Entomology Research
www.entomologyjournals.com
ISSN: 2455-4758
Received: 04-01-2023, Accepted: 20-01-2023, Published: 06-02-2023
Volume 8, Issue 2, 2023, Page No. 18-21

A study of butterfly diversity in medicinal garden of Indira institute of pharmacy in devrukh tehsil district of Ratnagiri

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Abstract
Butterflies are charming creatures of nature. As they are important indicator of environmental conditions, the quality of ecosystem can assesses based on presence of butterflies. The Konkan region is well explored area for tourism because of huge biodiversity of flora and fauna. Beyond this, it is well known for its beautiful beaches, coconut trees, mountains as well as waterfalls. Thus, present study was started with aim to assess diversities of butterfly in medicinal plant garden of Indira Institute of Pharmacy, Sadavali situated in Sangameshwar taluka, Ratnagiri district of Maharashtra. Total 35 species of butterflies belong to 6 families were found at study area. The butterflies Nymphalidae family was the richest amongst families that comprised (53.12%) of the total species of butterfly. The percent butterflies of family Lycaenidae (9.37%), Pieridae (18.75%) Papilioninae (12.5%) and lowest of Riodinidae as well as Hesperiidae (3.12%). The selected area showed great diversity. However further study survey needs to conduct for documentation on butterfly diversity and its conservation.

Keywords: butterfly diversity, Ratnagiri district, Sadavali, medicinal plant garden

Introduction

Butterflies are insects of order Lepidoptera in phylum Arthropod. Lepidoptera word derived from Greek word *lepido* means "scale" and *ptera* means "wings" which is prominent feature of adult butterflies having tiny scales covering wings. Butterflies have great diversity in colour, shape and size [1]. Butterflies breed and live in diverse environmental conditions such as the lowland forested areas, mangroves, salt marshes, mountain area, wetlands, as well as in grasslands. Butterflies are environment specific because specific species only found in specific area such as mountain zones [2].

These insects are key indicator of environmental conditions and ecological changes; thus, they can serve as way for conservation of nature [3]. Butterflies are key marker of healthy ecosystem because these creators provide a picture of ecosystem health [4]. These are very sensitive to environmental change like climate change and habitat destruction. The little decline in ecosystem due to deforestation and pollution can leads to migration of butterflies to healthy habitat which eventually leads to sudden decline in the butterfly's population. Caterpillars and butterflies like monarch also play a key role in reduction of air pollution by absorption of carbon dioxide from the atmosphere. Butterflies are served as environment friendly pest control. The larvae of butterfly species Hoverfly eat aphids which attack the plants [5].

As key marker of heathy ecosystem, the conservation of butterfly is need of the modern era. The butterfly is specific towards host plant for example host plant of Malabar banded peacock is *Zanthoxylum rhetsa*. The *Zanthoxylum rhetsa* is endemic to Western ghat in India. Thus, Malabar banded peacock breads at Western ghat [6]. The plantation of host plant is essential for conservation of butterflies [7]. Recently to create awareness towards butterfly conservation the few states took remarkable steps by adopting 'State Butterfly'. Maharashtra was the first state in India which has declared 'state butterfly' in 2015. The state butterfly of Maharashtra is Blue Mormon. The state butterfly of Kerala is Malabar banded peacock. The state butterfly of Karnataka is Southern birdwing [8].

Ratnagiri district is situated in the southwestern part of state and innervated by Sahyadri Mountain ranges. Indira Institute of Pharmacy is leading pharmacy institute in Konkan region situated at Sadavali village of Sangameshwar taluka, Ratnagiri district of Maharashtra. The institute campus has groomed and well maintain garden with more than 50 species of ornamental shrubs and flowering plants. The institute has also established decorative pharmacognosy garden having more than 50 medicinal plants. The clean pollution free environment and geographical conditions of the institute is favorable to for butterfly diversity. Thus, campus of the institute was selected as study area for assessment of butterfly diversity.

Materials and methods

Sadavali is village situated between the Devrukh-Sangameshwar Maharashtra State highway. The village is located at 17.0883°N 73.6085°E. It has an average elevation of 125 metres. The most of the region of the village has surrounded by mountainous. The survey on butterflies was carried out for the period of five months from June and October 2022 by observations during walking through the selected study area. During the survey, photographs of the butterflies were captured using camera (Canon Rebel T6, 75-300 mm telephoto lens) for identification purpose [9]. Figure 1 highlight map of study area.

Identification of butterfly species

The captured photographs of butterflies were used for the identification butterfly species. Shape, design, colour and size were used as parameters for the identification of the butterfly species with the help of expert [10].

Fig 1: Satellite map highlighting study area in circle

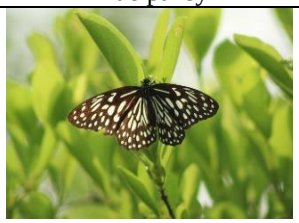
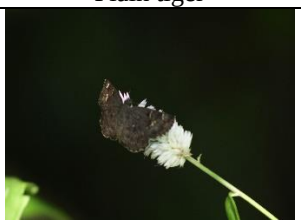
Results and discussion

The list of the observed butterflies of each family is highlighted in table 1 and 2. Total 35 species of butterflies belong to 6 families and were found at study area. The butterflies Nymphalidae family was the richest amongst families that comprised (53.12%) of the total species of butterfly. The percent butterflies of family Lycaenidae (9.37%), Pieridae (18.75%) Papilioninae (12.5%) and lowest of Riodinidae as well as Hesperiidae (3.12).

Table 1: Observations of identified butterflies in selected study area

Common name	Scientific name	Family	Category	Host plant	IUCN
Blue pansy	*Junonia orithya*	Nymphalidae	Brush footed butterfly	*Justicia procumbens*	
Peacock pansy	*Junonia almana*			*Justicia procumbens*	Least concern (IUCN Red List)
Lemon pansy	*Junonia Lemonias*			*Justicia procumbens*	
Chocolate pansy	*Junonia iphita*			*Eranthemum roseum*	
Grey pansy	*Tanaecia lepidea*			*Careya arborea*	
Blue tiger	*Tirumala limniace*			*Tylophora indica*	
Dark blue tiger	*Tirumala septentrionis*			*Vallaris dichotoma*	
Plain tiger	*Danaus chrysippus*			*Calotropis procera*	Least concern (IUCN Red List)
Stripped tiger	*Danaus genutia*			*Buhinia purpurea*	
Common leopard	*Phalanta phalantha*			*Mangifera indica*	
Palm fly	*Elymnias caudate*			*Cocos nucifera*	
Common crow	*Euploea core*			*Ficus religiosa*	Least conceren
Egg fly	*Hypolimnas bolina*			*Sida rhombifolia*	
Sailor	*Neptis hylas*			*Senna alata*	
Lascar	*Pantoporia hordonia*			*Acacia pennata*	
Baron	*Euthalia aconthea*			*Magnifera indica*	
Rustic	*Cupha erymenthis*			*Xylosma racemosa*	
Four ring	*Ypthima huebneri*			*Axonopus compressus*	
Five ring	*Ypthima baldus*			*Grass spp.*	
Bush brown	*Mycalesis perseus*			*Oryza sativa*	
Common grass yellow	*Eurema hecabe*	Pieridae	Whites and yellow	*Cassia alata*	
Common gull	*Capora nerissa*			*Capparis zeylanica*	
Psyche	*Leptosia nina*			*Justicia procumbens*	
Lemon emigrant	*Catopsilia pomana*			*Cassia alata*	
Wanderer	*Pareronia hippie*			*Capparis zeylanica*	Endangered (IUCN Red List)
Malabar banded peacock	*Papilio Buddha*	Papilionidae	Swallowtail butterfly	*Zanthoxylum rhetsa*	
Red helen	*Papilio helenus*			*Zanthoxylum rhetsa*	
Mormon	*papilio polytes*			*Zanthozylem rhetsa*	
Common Jay	*Graphium doson*			*Polyalthia longifolia*	
Lime butterfly	*Papilio demoleus*			*Citrus limon*	
Tiny grass blue	*Zizula hylax*	lycaenidae	Blues and Coppers	*lantana camara*	
Red pierrot	*Talicada nyseus*			*Kalanchoe pinnata*	
Plane cupid	*Chilades pandava*			*Cycas revoluta*	
Plum judy	*Abisara echerius*	Riodinidae	Judies and Punches	*Embelia ribes*	
Common small flat	*Sarangesa dasahara*	Hesperiidae	Skipper	*Blepharis asperrima*	

Table 2: Photographic representation of butterflies observed at selected study area

 Blue pansy	 Peacock pansy	 Lemon pansy	 Chocolate pansy
 Blue tiger	 Plain tiger	 Bush brown	 Common grass yellow
 Common gull	 Common small flat	 Eggfly	 Five ring
 Four ring	 Mormon	 Palmfly	 Plain cupid
 Plumjudy	 Psyche	 Sailor	 Tiny grass blue

Conclusion

The major outcome of present study is highlighting the importance of medicinal garden of the institute as a preferred habitat for butterflies. Total 35 species belong to all 6 families of butterflies are found during the study. Thus, selected study showed presence of healthy ecosystem. Deforestation due to urbanization is the major cause for the destruction of host plant. Which eventually affects the lifecycle of butterflies as they are very specific for their host plant. The baby steps like making home garden can contribute in potentiating butterfly population.

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