Inventum Biologicum

Journal homepage: www.worldbiologica.com/ib

Research paper

Species Diversity of Butterflies in Some Districts of Kashmir

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ARTICLE INFO

Article history

Received 29 October 2021
Revised 16 November 2021
Accepted 18 November 2021
Published 02 December 2021

Keywords

Butterflies
Lepidoptera
Diversity
Insect families
Kashmir

ABSTRACT

Butterflies are regarded as the emblem of magnificence and elegance, because of their diurnal environment they are known as superlative insects. The butterflies are light in color and having amusing figure and their well-designed flights give enjoyment to everyone. Butterflies form a significant part of biodiversity; however, these beautiful living beings are in a existent risk because of numerous progressive actions towards the development protuberant to habitation alterations. Hence, the study was steered to come across the species diversity of butterfly fauna of some districts in Kashmir (J&K UT) from March to August, 2013 taken on the varied territories like parks, upper areas, parks, highlands, jungles, orchids, areas which are rich in vegetation, exposed fields, areas of farming and other cultivated places in different districts selected for the study. Rich diversity of butterflies was found in the localities of some districts where very dense vegetation, flowering plants and higher tress are present. Throughout the study time 44 types of butterflies with seven families having 38 genera were found. From the results it was found that Family Nymphalidae contributed utmost number of butterfly species.

1. Introduction

Biodiversity, is the term used to express the multiplicity of existence found on earth and all of the innate processes. This includes ecological unit, hereditary and cultural multiplicity, and the links among these and all species. Butterflies come under the order Lepidoptera and are the large group of insects with the moths. There are about 12 families of butterflies. The Jammu and Kashmir has witnessed diverse flora and fauna because of its exceptional position and climatic circumstances.

Owen (1971) reported that butterflies are present in more or less number in every region of the world that is diverse in flowering plants. Heppner (1998) has revealed that 19,238 species of butterflies

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DOI https://doi.org/10.5281/zenodo.5805008

have been found all over the globe by sources of different studies as of 18th century. Gooden et al. (1977) suggested that this number is not regular because of constant discovery of novel butterflies. Hassan (1997) documented that in Arctic and Antarctic mountains one cannot found butterflies as these mountains are covered with snow and glaciers. Heppner (1998) revealed that butterflies have been scientifically studied throughout the globe as of the early 18thcentury and 19,238 species of butterflies have been reported.

Kunte et al. (1999) reported that India possesses 1501 species of butterflies among which from the northeastern part 962 species of these creatures have been reported. Alfred et al. (2002), Majumder et al. (2011) and Myers et al. (2000) reported that a rich occupancy of butterflies and plentiful other insect fauna were found in north-eastern region of India, as there exists a great richness of flora in that region and the north- eastern region is familiar among the 25 biodiversity hotspots worldwide.

Bonebrake et al. (2010) have reported that to a prodigious quantity butterflies (being as pollinator mediators) put in to the rise and extension and allowance of vegetation in the tropical areas where these insects elucidate outstanding profusion and multiplicity of species. Khan et al. (2003) have reported that, butterflies are famous because of their attractive colors and elegant flights and these creatures are the most munificent group of insects on the earth. Sathe et al. (2004) have documented that butterflies are one of the momentous food chain modules of plentiful creatures and acts as superior indicators of environmental superiority.

The Kashmir Himalayan belt which is known for one of the ironic biodiversity sections is often denoted as biodiversity hot spots. Evans (1932) has reported that out of 1501 species of butterflies found in India 962 species have been reported from the north-eastern part. Wynter Blyth (1957) reported that 97 species of butterflies have been found from the Kashmir Himalayas.

Willot et al. (2000) has documented that the protection of a biological diversifying tropical forest ecosystem is under danger throughout south East Asia owing to a variety of human related problems. Hill et al. (2001) have reported that due to illegal sorting and shifting cultivation, caused forest trouble, leading to open up awning and forest fragmentations and canopy directness of the forest environment which confine the change of the micro-climatic situation of the forest floor and impoverishes the soils, resulting in alteration of population compositions and species structures of the butterfly fauna in a particular region.

Field et al. (2006) have reported that butterflies act very quickly with changes in the surroundings or habitation than other living organisms as these species are very receptive to habitation disrepair, also the butterflies have the fast way of construction than other higher vertebrates. Sharma et al. (2006) results that the amount of butterflies was more in meek temperature but in June and September there were deterioration in the population of butterflies hence, the relationship between temperature and population of butterflies was positive, when study was completed at Punjab University new campus zone in the months of June to September and association among the temperature and humidity with the population of butterflies was taken in conjunction.

Therefore the present study was conducted in various districts of Kashmir division of Jammu and Kashmir (UT) in order to explore the butterfly fauna from the selected areas and to gain information about their habitual configuration.

2. Materials and Methods

The butterfly fauna of some of the districts *viz*, Anantnag, Baramulla, Budgam, Kupwara, Pulwama, Srinagar, Shopian, and Kulgam, in Kashmir division of Jammu and Kashmir (UT) was surveyed from April 2013 to July 2013. Sampling was led at sites with wide-ranging habitats like gardens, hilly areas, parks, highlands, forests, orchids, vegetative places, open fields, agricultural areas and other cultivated avenues in selected districts also sampling for butterflies was prepared along transects passing through various habitats of the selected districts within the vicinity of 5 kms each.

Bisects in each of the selected places were surveyed on foot, in every week one day is selected for the survey and every selected day survey was done between 0800 and 1700 hours for a time of 20 weeks. An insect collection net with a long telescopic handle containing of hard wire ring (diameter 30 cm) was used for the collection of butterflies (Figure 1).The collected butterflies were slayed by pinching the thorax with proper care or by killing the little specimen with the help of ethyl acetate and at the end these specimens were placed in an envelope made of paper. After the collection was done the specimens were positioned in hot air oven for about 1 hour at 40°C and later on transferred in a relaxing chamber for 24 hours containing wet absorbent cotton and some drops of phenol were used to avoid any fungal escalation. The specimens were pinned by using entomological pins of varied size and after that the specimens were placed on a stretching panel and there wings, abdomen and legs were relaxed.

After stretching the specimens they were transferred to the insect cabinets with proper labels. The side grooves of boxes were filled with ethyl acetate soaked cotton and naphthalene powder to poison the boxes. The specimens were well preserved in the insect cabinets by using standard preservation techniques. The specimens were identified by going through the various field guides and available literature, Bhaskaran and Eswaran (2005), Biswas et al. (2012), Feltwell (2001), Gay et al. (1992), Gunathilagaraj et al. (1998), Haribal (1992), Kaneria et al. (2013), Khan et al. (2011), Kir'Yanov and Balcazer (2007), Kunte (2000), Kunte (2006), Liseki and Vane-wright (2013), Pathania and Kumari (2009), Qureshi and Bhagat (2013), Qureshi et al. (2013), Rose and Sidhu (2001), Rose and Walia (2003), Singh and Koshta (1997), Thakur et al. (2006) and Uniyal (2007). Various districts *viz*, Anantnag, Baramulla, Budgam, Kupwara, Pulwama, Srinagar, Shopian, and Kulgam, which are located at different habitats and elevations ranging from 400 to 5500 m above msl having dense vegetation and encumbered diversity in floral wealth and diversity of agricultural crops were selected for the collection of butterflies.

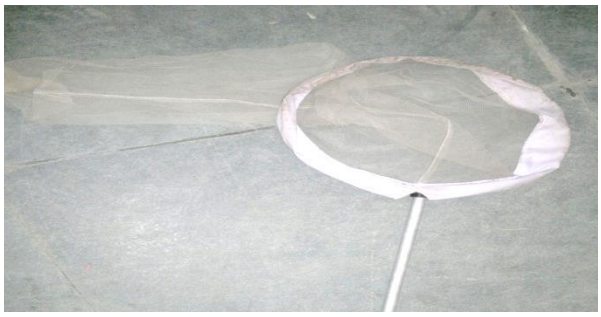

Figure 1. Insect collecting net with a long telescopic handle used for catching the butterflies during the study

3. Results and Discussion

A region having emerged biodiversity is of prodigious reputation for conservation. Butterflies are one of the important constituents of biodiversity. They play an important role in pollination and hence, are among the good pollinators. As butterflies are extremely subtle to any environmental alterations and are elusive creatures, they act as good bio-indicators of the healthiness of a habitation. However, these creatures are under an actual danger due to numerous developmental activities leading to habitat variations.

From the study it was resulted that high trees provide less favorable habitat to the butterflies as it was observed that in the areas where dense population of high tress are present there are very less flowering plants, however, localities which capitulate the higher diversity like some places of district Baramulla, Anantnag ,Pulwama and Shopian have very intense vegetation and plentiful flowering plants and better quality trees which provide very decent habitat to the butterflies. Their larvae can effortlessly find the host plant and the intense vegetation provide admirable protection to the adult.

Throughout the study period that is from March to August 2013, 44 species of butterflies (Table 1) belonging to 7 families were found. It was observed that the family Nymphalidae contributed the greatest number of the species (27) followed by, Papilionidae (7), Lycaenidae (7), Danaidae (4), Libytheidae (1) and Hesperiidae (1).

All through the present investigation it was observed that the butterfly diversity alters throughout the study period this may be because of the availability of proper vegetation and flowering

plants and different environmental conditions, these observations coincide with the observation of (Hill et al., 2001) who reported that due to illegal logging and irregular cultivation, caused forest commotion, leading to open up a canopy and forest fragmentations and canopy openness of the forest habitat modifies the micro-climatic circumstances of the forest floor and impoverishes the soils, resulting in the transformation of butterfly community, makeup and species structures. Hassan (1997) revealed that the butterflies in the Arctic and Antarctic mountains were not present because these mountains are covered with snow and glaciers. Whole species diversity in the selected study range was found to be very small; this is due to the regular climatic conditions which is commonly cold, moderate and dry. Also, it was observed that due to developmental activities by humans like construction of buildings, roads and vehicular movement can disturb and alter the habituation of butterflies resulting in the habitat change, these observations coincide with the observations of Field et al. (2006) who reported that as the butterflies have much receptive to change in an environment also the channel of a generation is much speedy than other higher vertebrates, thus the butterflies react very quickly to little changes if little disturbance taken place in their environment than other animals. This is quite uncooperative of prodigious butterfly range. Thus, the absence of butterfly diversity is not solely because of the climate, but is further straightly as a result of short multiplicity of vegetation upon which to support superior diversity of butterflies.

During the study it was found that the family Libytheidae was seen only one time in some areas of district Srinagar located at an altitudinal distribution ranging from 1500-1950 m above msl and this family of the butterfly has not been noticed from other collection sites. It is very challenging to guess whether any species are buttressed by the rich flora or species are at the edge of extermination.

Therefore, it is recommended that the area under a study needed to be frequently observed to note the alterations in the diversity of butterflies because the variations in the diversity can merely be perceived through constant monitoring and associating the data of every year.

Table 1. List of butterflies found in selected districts of Kashmir (India) with common names and scientific names.

Family/ Genera	Species name	Common name
Danais	*chrysippus* Linnaeus	Plain tiger
Papilionidae	*papilio demoleus* Linnaeus	Lime butterfly
Papilio	*machaon* (Linnaeus)	Yellow swallow tail
Parnassius	*charitonius* (Gray)	Regal appollo
Danaidae/Chortobius (Argynnis)	*pulchra* Guérin-Méneville	Dusky meadow brown
Danais (Salathura)	*genutia* Cramer	Striped or Common tiger
Pieridae / Anapheis	*aurota aurota* Fabricius	Pioneer or Caper white
Colias /Colias	*electocroceus* (Linnaeus) *fieldii* (Geoffroy)	Dark clouded yellow
Pieris	*brassicae* Linnaeus	Large cabbage white
Pieris	*napi* (Linnaeus)	Green veined white
Pieris	*canidia* Sparrman	Indian cabbage white
lxias	*pyrene* Linnaeus	Yellow orange tip
Eurema	*laeta* Boisduval	Spotless grass yellow
Eurema	*hecabe* Linnaeus	Large grass yellow
Eurema	*brigitta* Stoll	Small yellow or Small grass yellow
Eurema	*alitha* (C & R. Felder)	Scalloped grass yellow
Colias	*phiolodice* (Godart)	Common sulphur or clouded sulphur
Catopsila	*crocale* Cramer	Common emigrant
Argyreus	*hyperbius* (Linnaeus)	Indian fritillary
Pontia / Pieris	*daplidice* (Linnaeus)	Bath white
Aulocera	*padma* (Kollar)	Great saty
Boloria	*selene* (Devis & C Schiffermuller)	Small fritillary pearl bordered
Callerebia	*daksha* Moore	NA
Cepora	*nerissa* Fabricius	Common gul
Childrena	*childreni children* (Gray)	Large silver stripe
Aulocera	*padma* (Kollar)	Great satyr
Junonia	*almanae* (Linnaeus)	Peacock pans
Junonia	*lemonias* (Linnaeus)	Lemon pans
Issoria	*lathonia* (Linnaeus)	Queen of spain fritillary
Neptis	*hylas* Linnaeus	Common spotted sailor
Vanessa	*cardui* (Linnaeus)	Painted lady
Vanessa	*cashmirensis* (Kollar)	Indian tortoiseshell
Vanessa	*indica* Herbst	Indian red admiral
Lycaenidae	*epijarbas* Moore	Cornelian
Hesperiidae Tractrocer	*maevius* Fabricius	Common grass dart oriens
Lampides	*boeticus* (Linnaeus)	Pea blu
Lycaena	*phlaeas* (Linnaeus)	Common copper
Irachola/Deudorix	*isocrates* Fabricius	Common guava blue
Lycaenidae	*epijarbas* Moore	Cornelian
Papilio	*paris* Linnaeus	Paris peacock
Euploea	*core core* (Cramer)	Common Indian crow
Catopsila	*pomana* (Fabricius)	Lemon emigrant
Colias	*romanovi* Grum-Grshimai	NA
Ulocera	*padma* (Kollar)	Great satyr

4. Conclusion

The present study revealed that all the selected districts show richness in equally flora and fauna prosperity with butterflies. However, the species multiplicity alters from district to district and also in inside district locations this may be because of the presence of the quantity of vegetation and flowering plants. It is difficult to conclude that whether the butterfly fauna of these areas is elevating or declining. So these areas should need to and efforts should be made to record the flora and fauna of these areas including butterflies as the butterflies have numerous values such as Intrinsic value, Aesthetic value, Educational value, Scientific value, and Economic value etc.

44 species of butterflies within 7 families were documented. It was observed that family Nymphalidae was dominant having highest number of species as compared to Papilionidae Lycaenidae, Danaidae, Libytheidae and Hesperiidae. The butterfly fauna of these areas require be studying and conserving so that the butterfly biodiversity of these areas can be preserved and documented for further research.

Acknowledgements

The authors are highly thankful to the Dr. Poornima Sharma, Professor and Head, Department of Zoology, Bhagwant University, Ajmer, Rajasthan for providing the basic facilities and equipments. The authors are also highly thankful to Mr. Tariq Ahmad, Assistant Professor, Govt. Degree College Pulwama for the valuable help and support during the study.

Funding Information

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

Declaration of Conflict

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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