INDIAN JOURNAL OF FORESTRY Vol. 21(2) : 150-155, 1998

DIVERSITY OF BUTTERFLIES IN THE GREAT HIMALAYAN NATIONAL PARK, WESTERN HIMALAYA

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Abstract

About 50 species of butterflies belonging to 5 families and 13 subfamilies were recorded in this study. Habitat preference of various families were also studied in different forest types, viz., broad leaved, conifer, mixed conifer and alpine area of Sainj sub-watershed of the Great Himalayan National Park.

Introduction

The role of insects in maintaining the cycling of nutrients, soil regeneration and protection, pollination of phanerogamic plants as well as natural regulation of pest outbreaks has been well documented. Among different insect groups, the butterflies play an important role in helping cross-pollination of flowering plants. Adults generally feed on nectar and larvae feed on foliage and larvae are the primary herbivores in the ecosystem.

Butterflies show distinct pattern of habitat utilization. The nature of vegetation is the important factor which determines the dependence and survival of a species on a particular habitat. Being highly sensitive to change in the environment, they are easily affected by even relatively minor perturbations in the habitat so much so they have been considered as indicator of environmental quality (Rosenberg *et al.*, 1986), and also treated as indicator of the health of an ecosystem. The presence of butterflies emphasize availability of the larval food plants in great abundance. As stated earlier, most butterflies have specific habitat requirements, females usually tend to lay eggs only on selective food plants occurring in the area. Although adult butterflies are also selective in their choice of flowers for feeding, most species never feed on some flowers as they become available. There is an intimate association between butterflies and plants and their lives are exceptionally interlinked (Feltwell. 1986). The distribution of butterflies was thus exclusively dependent upon the availability of their food plants. Family Nymphalidae is the large and widely distributed and richly represented in Himalayan region. Total 14 subfamilies were recorded of which 10 are found in Indian region. Of the total number of butterflies in the world one third are Nymphalidae (Haribal, 1992).

Although enough work has been carried out on the butterflies of different regions but studies on the basis of Protected Areas (PAs) are almost lacking. Studies on butterflies of the Silent Valley National Park by Mathew (1993), entomological studies particularly Pleurostic Scarabaeid of the Great Himalayan National Park (GHNP) by Chandra and Uniyal (1996), and a few records of butterflies of GHNP by Uniyal (1996), Uniyal and Mehra (1996) have only been documented. Uniyal and Singh (1996) provides the ecological relationships between flowering plants and bees in GHNP. Hence, the present insect survey was undertaken to assess insect diversity vis-a-vis different forest types in GHNP. The insect fauna of this park shows varied zoogeographical links with the fauna of other regions. The altitudinal variation seems to act as a limiting factor for the zonation of species.

Study Area

This study was undertaken in the Great Himalayan National Park (GHNP). The park is located at

Lat. 31° 38' 15" and 30° 56' 41" North and Long. 77° 20' to 77° and 77° 52' 11" East in Kullu District of Himachal Pradesh. The park area is characterised by high ridges, deep gorges, rocky craggy and narrow valleys; and makes catchment of sub-watersheds of Tirthan, Sainj, Jiwa and Parbati rivers, which together form the major upper catchment of river Beas (Uniyal and Mathur, 1996). The Beas watershed was considered as the main watershed and that of the rivulets draining into it was considered as sub-watershed.

The area of watershed is generally determined from the topographic or watershed divide. The divide represents the highest elevation points along the watershed perimeters. Watershed can be divided in the order of first, second, third, and other higher order. The first order watershed is one in which drainage flows from the watershed in a single unbranched stream channel. Second order watershed is one where two first order channels meet to form a second order channel, and so forth.

Sainj sub-watershed of GHNP was undertaken for the present study and four broad forest communities, *viz.*, broad leaved, conifer, mixed conifer and alpine areas were surveyed within this watershed. The elevation ranges between 1630 to 3820 m above mean sea level, and the survey was undertaken during February to August, 1996. The ambient temperature ranged between -4° to 30°C during the study period.

Methods

The butterflies were collected with the help of hand net or photographed in different areas in Sainj sub-watershed. The collected specimens were preserved (pinned) and subsequently identified. All identified collection is housed in GHNP Research Base camp.

Observations

About 50 species with 34 genera representing 13 subfamilies within 5 families were recorded in the present study. Of these, the identity of 40 species could be confirmed so far (Appendix 1). Other are in the process of identification.

Maximum number of species recorded belonged to the families Nymphalidae and Pieridae. An equal representation of families Papilionidae and Lycanidae was recorded. The least representation was in the case of family Hesperidae (Fig.1).

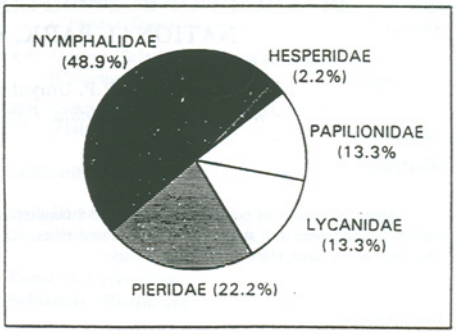


Fig. 1. Family wise represenation

The study revealed that the maximum number of nymphalid species prefer both the type of forest vegetation. They do not fly to high elevation and are mostly confined to broad leaved and conifer forests. Only few species like *Vanesa indica indica,* and *Issoria lathonia issae* are mostly confined to conifer forests and *Childrena childreni childreni* and *Apatura* spp. preferred the vegetation of alpine region and found up to the elevation of 3,770 m. There was a good representation of butterflies of each family in broad leaved and conifer forest types. The dominant plant species in both the communities are *Viburnum nervosum, V. grandiflorum, Berberis lycium, Prinsepia utilis, Desmodium* spp., *Indigofera heterantha, Rosa microphylla, Rubus ellipticus* and *Strobilanthes* sp. Only *Colias fieldi* of family Pieridae was recorded in all types of forest communities except alpine, and *Prioneris thestylis thestylis* confined only to the mixed conifer forests. Most of the members of this family are sun loving and generally found in large congregation on river or stream bed where they were seen sucking moisture and salt and were observed only up to 2900 m elevation. The dominant herb species of conifer forest were *Clematis buchananiana, C. connata, Inula grandiflora, Polygonum amplexicaule* and *Aster thomsoni.*

Members of family Lycanidae also observed between two forest categories, i.e., broad leaved and conifer. Only *Heliophorus androcles moorei* and *Aricia agestis* confined to conifer between the elevation of 2300-2870 m, and *Abisara fylla* to broad leaved vegetation. Family Papilionidae was recorded at higher elevation areas up to 3820 m (*Papilio machaon*) and *Parnassius hardwickii virdicans* from 3770 m elevation with food preferences of high altitudinal flowering plants. The dominant plant species of alpine region were *Fritillaria roylei, F. cirrhosa, Aconitum violaceum, A. hetrophylla, Potentilla fruticosa, Delphinium cashmeriana, Adonis chrysocyathus, Anemone tetrasepala, Mecnopsis aculeata, Corydalis cashmeriana, Aquilegia pubiflora, Aster diplostephioides, Nepeta govaniana, N. connata, Potentilla atrosanguinea, P. nepalensis* and *Pedicularis oederi*. (Identification through Polunin and Stainton, 1988). Only representation of family Hesperidae (*Celaenorrhinus leucocera*) was observed from the conifer forests (Fig.2).

Discussion

The study has indicated that butterfly fauna of Saijn Sub-watershed in GHNP is rich and diversified because of specialised and very complex ecological conditions, produced as a result of interaction between its unique topographical features. The butterflies diversity shows their restricted range of food preference within broad leaved and conifer forest patches only. Maximum representation of butterflies from each family was within these two forest types. The occurrence of a rich, diverse butterflies is largely due to larval food preferences of those vegetation communities occurring in the study area (Fig. 3, A,B,C,D).

In the Himalayan region, 80 per cent of the butterflies have been recorded as forest species, of which almost 60 per cent of the butterflies occur within the forests below the elevation of 3,000 m. The remaining species occur above the elevation of about 4,000 m. In extreme elevations > 5,500 m

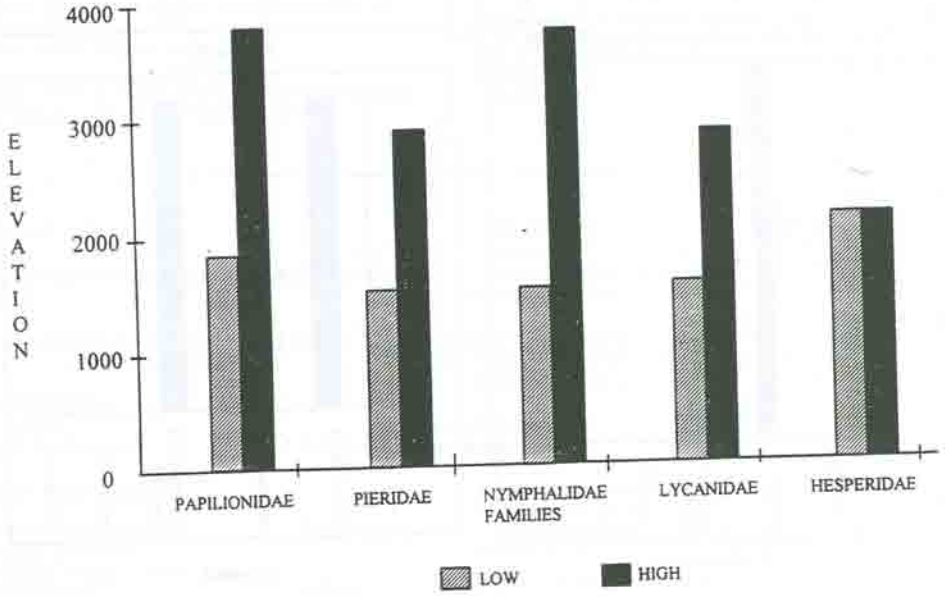
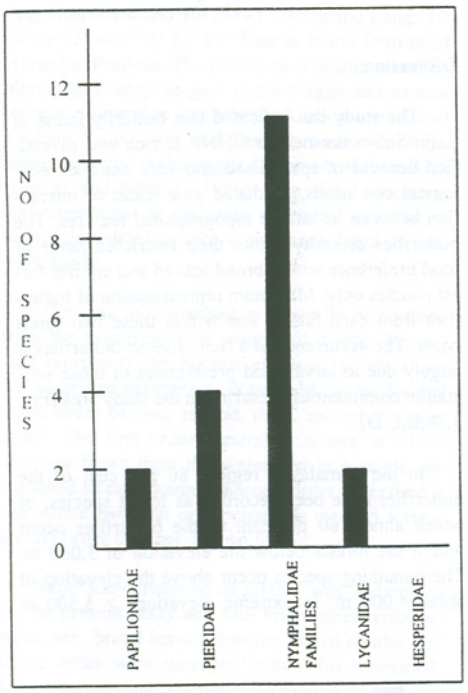
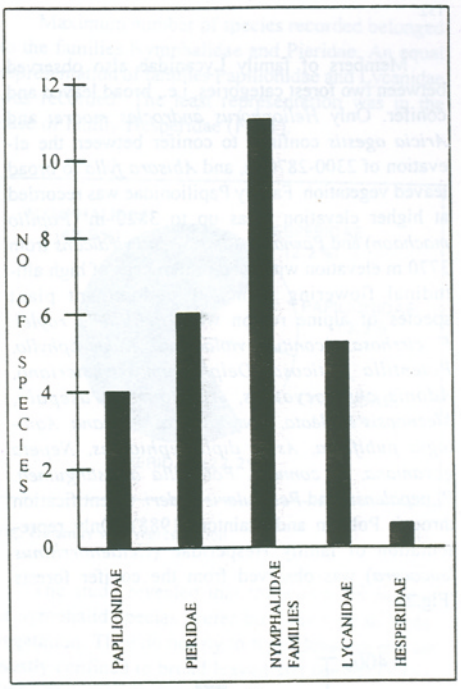


Fig. 2. Altitudinal distribution

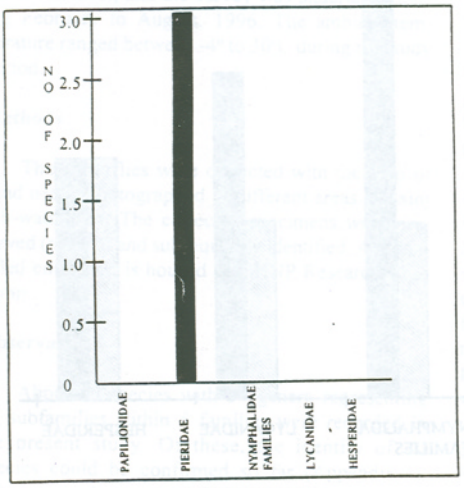


A- broad leaved

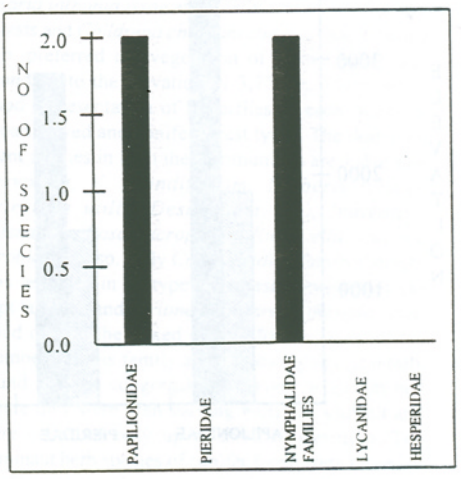


C- Conifer

Fig. 3. Forest types representation



B- Mixed conifer



D- Alpine

only 5 per cent species have been recorded (Mani, 1986). There are few records of family Nymphalidae and Pieridae species, they are associated with the grasslands including grassy clearings in wood, open grassland habitats of GHNP (Uniyal and Mehra, 1996).

Acknowledgements

The authors are thankful to Shri S.K. Mukherjee Director, Wildlife Institute of India, Dehra Dun, and Shri N. Guleria Director, Great Himalayan National Park, Shamshi, Kullu, for providing necessary facilities and permission to carry out this study.

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Annexure-1

LIST OF BUTTERFLIES RECORDED IN SAINJ SUB-WATERSHED

GREAT HIMALAYAN NATIONAL PARK SYSTEMATIC ACCOUNT

Order : Lepidoptera
Class : Insecta

Family 1. Papilionidae	Distribution (M)
Subfamily : Papilioninae	
i. *Papilio machaon* (Moore) (Yellow Swallotail)	3100-3820
ii. *Princeps arcturus arcturus* (Westwood) (Blue Peacock)	2030-2420
iii. *P. polytes romulus* (Cramer) (Common Mormon)	2010-2080
iv. *Princeps* sp.	2100
v. *Graphium cloanthus* (Westwood) (Glassy Blue Bottle)	1630
Subfamily : Parnassinae	
vi. *Parnassius hardwickii virdicans* Fabricius (Common Blue Apollo)	3770
Family 2. Pieridae	
Subfamily : Pierinae	
i. *Pieris canidia indica* Evans (Indian Cabbage White)	2080
ii. *P. dubernardi chumbiensis* (De Niceville) (Chumbi White)	1630
iii. *Anapheis aurota aurota* (Fabricius) (Pioneer)	1630