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Study on Winter Community of Butterflies in a Patch Forest near Garumara National Park, West Bengal

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Abstract:

Butterflies are crucial components of food chain. The eco-climatic factors affect the distribution pattern and seasonal community composition of butterflies as a good bio-indicator. The present study was carried out in the patch area of Tiabon forest (N26R°51.393', E088R°47.860' to N26R°51.577', E088R°48.249'). In early winter the butterflies face a problem of availability of suitable food stuffs for their caterpillars resulting in sharp decline in their number. Those who can adapt on feeding the dried less nutritious leaf blades are the ring population showing remarkable ability to produce dry season forms with distinct colorations. During the study period 21 winter species of butterflies were identified belonging to three families Nymphalidae, Pieridae and Lycaenidae. The most observed family is Nymphalidae (15 species) followed by Pieridae (03) and Lycaenidae (03). The present paper reflects the overall insight in connection with the dynamics of vegetation as a whole along with the competitive exclusion. The present study confirms sudden decrease in Lycaenidae in Winter community may be due to competitive exclusion. Much adapted butterflies are the large Nymphalids in accordance with wingspan or body size and the presence of representative species from Lycaenidae family is due to poor dispersal.

Key words: Winter community, butterflies, Nymphalidae, Pieridae, Lycaenidae, competitive exclusion

Introduction:

Butterflies are commonly referred to as “insects of the sun” with their eye catching colour and delicate charisma. They have been admired for centuries for their physical beauty and behavioral display. Approximately, 17,200 species of butterflies throughout the world (Kunte, 2000) and 1,504 species from the Indian subcontinent (Tiple, 2011) are known. Butterflies along with moths belong to the order Lepidoptera. The butterflies are divided into two super families viz., Papilionoidea constitutes 11,100 species and Hesperioidea constitutes 3,650 species in the world (Scott, 2001). Recent reports reveal that about 100 out of 1500 butterfly species occurring in India are on the verge of extinction (Solman Raju & Rao 2002). A number of colonies of butterflies have been exterminated by human activities, resulting in changes to habitats beyond the tolerance limit of the species.

Butterflies enable sustenance of ecosystem services through their role in pollination and serving as important food chain components. Being potential pollinating agents of their nectar plants as well as indicators of the health and quality of their host plants and the ecosystem as a whole, exploration of butterfly fauna thus becomes important in identifying and preserving potential habitats under threat. Butterflies and moths (order Lepidoptera) offer good opportunities for studies on population and community ecology (Pollard 1991). Many species are strictly seasonal, preferring only a particular set of habitats. In spite of this, butterflies have been generally neglected by community ecologists and there are very few studies available on their community structures, population dynamics and the eco-climatic factors which affect them. Being good indicators of climatic conditions as well as seasonal and ecological changes, they can serve in formulating strategies for conservation (Kunte, 1997).

Gorumara National Park is located in the foot hill of eastern Himalaya in West Bengal. Systemic survey revealed 170 species, 109 genera, 21 subfamilies and 5 Families. Nymphalidae and Lycaenidae are dominant, 54 and 50 species respectively, followed by Hesperidae (33), Pieridae (18) and Papilionidae (15). Maximum number of species recorded during Pre-monsoon (122 species), Post monsoon (89 species), Monsoon (75 species) and winter (41 species) (Das et.al. 2012).

The present study was started with a view to examine the butterfly population during winter. With quantitative data on butterfly populations gathered from a variety of habitats, what are the mechanisms and escape routes used by these insects to overcome their own inherent limitations or limitations imposed by the eco-climate?

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Materials methods:

The present study was carried out in the patch area of Tiabon forest (N26R°51.393',E088R°47.860' to N26R°51.577',E088R°48.249') located beside Gorumara National park, in Malbazar subdivision of the Jalpaiguri district of West Bengal, India. The entire study was conducted on Pollard walk Technique at early morning and midnoon for three days (Das et. al.2012). Photographs of respective specimens were taken on the spot with a Canon DLSR. No dead or living specimen were collected from the field. Track path was recorded in etrex20,GARMIN and represented 910m path on map (Fig 1). The butterflies are identified from literature and guide book (Kehimkar,2008, Singha,2011).

Result:

During the study period 21 winter species of butterflies were identified presented in Table 1. Out of the five known families of butterflies we have observed only three families Nymphalidae, Pieridae and Lycaenidae. The most observed family is Nymphalidae (15 species) followed by Pieridae(03) and Lycaenidae (03) (Fig 2). Three species of Nymphalidae (Common bush brown, Long brand bush Brown and Dark evening Brown) and two species of Pieridae (One spot Grass yellow and Chocolate Grass Yellow) have dry and wet season specific forms. Nine species are recorded from open grass land and ten species are recorded from forest.

Among the observed butterflies 'Rare' are Chocolate Grass Yellow, Peal's Palm fly, Yellow Sailer and Eastern Five Ring and 'Not Rare' are One spot grass yellow and Dark evening brown.

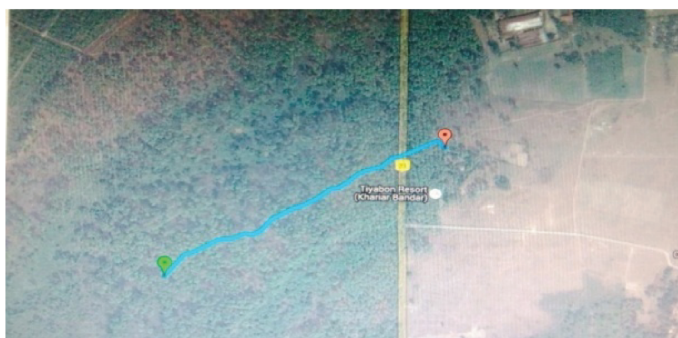


Fig 1: Map showing Tracking path of study area in Google Map

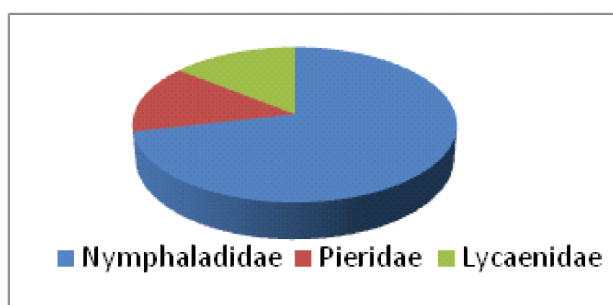


Fig 2: Pie diagram showing winter community of different families of butterflies

Discussion:

In early winter the newly emerged butterflies had to face the problem of availability of suitable foodstuff for their caterpillars. As a result the population sharply reduced. Most of the ring population was in the larval stage during late winter when the grass was drying. This generation of rings did not find fresh larval food plant in sufficient quantity in the spring. However, the population did not vanish completely. This is probably due to the remarkable ability of rings to produce dry season forms (Wynter Blyth 1956). As a rule, butterfly caterpillars feed on fresh leaves only. However, the rings are unique in that their caterpillars can also feed on old or drying, less nutritious grass blades. Butterflies which develop from these caterpillars have distinct coloration and are known as dry season forms (Kunte,1997).

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Grass yellows (*Eurema* spp., family Pieridae) had high population. They also show some differentiation in dry and wet season wing patterns. Their occurrence all round the year would perhaps be attributable to their polyphagous nature. However, the fact that their dry season forms were almost as numerous as the wet season forms, is unique. This may be one of their evolutionary advantages which makes them among the commonest butterflies in the world (Larsen 1987)

The outcome was the presence of Pale grass blues, Common gem, Chocolate pansy and Psyche. Mainly larval food plants of all these species are small herbs (Bell 1909 to 1927). Butterflies such as common evening brown, grass yellow, Chocolate pansy are found in ecologically isolated patch forest owing to poor dispersal abilities after human disturbance and cold climatic condition.

The wingspan ranges (Wynter Blyth 1956) of herb-feeding and non-herb-feeding butterflies vary. It can easily be seen that the herb-feeders have smaller wingspan ranges than the non-herb-feeders. Non-herb-feeders were mainly from forested habitats and herb-feeders were from open habitats (Kunte, 1997). However, at Tiaban both these groups were found to occur.

In forested habitats butterflies can choose the nectar-source from a variety of big and small plants and from different storey. As a result, much adapted Pierids, large Nymphalids and tiny Lycaenids, all compete for the same flowers. In general, when a butterfly finds a good source already occupied by another butterfly, it flutters and hovers over the feeder and drives it away. Small Lycaenids are hence ill adapted for this type of competition. The above seasonal pattern may hence be interpreted as an example of competitive exclusion among butterfly species which use same nectar sources, where the realized niches of herb-feeders and non-herb feeders might have been separated by the season, in accordance with wingspan or body size (Kunte, 1997).

It is difficult to test this hypothesis due to lack of basic natural history and ecological data. It is not known what nectar-sources these butterflies use; the yearly pattern of the nectar plants and their comparative importance from butterflies' point of view; degree of searching efficiency and time required for feeding etc. But present study confirms sudden decrease in Lycaenidae in Winter community may be due to competitive exclusion. Presence of representative species from Lycaenidae family is due to poor dispersal.

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Table: 1

Sl. No	Common Name	Scientific name	Family	Remark	Wing size(mm)
a.	Long Brand Bush Brown (UP)	<i>Mycalesis visala</i>	Nymphalidae	C	45-55
b.	Common sailor	<i>Neptis hylas</i>	Nymphalidae	C	50-60
c.	Common palm fly	<i>Elymnias hypermenstra</i>	Nymphalidae	C	60-80
d.	Common grass yellow	<i>Eurema hecabe</i>	Pieridae	NR	30-50
e.	Three spot grass yellow	<i>Eurema blanda</i>	Pieridae	R	40-45
f.	Common bush brown	<i>Mycalesis perseus</i>	Nymphalidae	C	38-55
g.	Common evening brown	<i>Melanitis ledda</i>	Nymphalidae	C	60-80
h.	Common beak	<i>Libythea lepita</i>	Nymphalidae	C	45-50
i.	Common Earl	<i>Tanaecia julii</i>	Nymphalidae	C	65-80
j.	Grey count	<i>Tanaecia lepidea</i>	Nymphalidae	C	65-80
k.	Common imperial	<i>Cheritra freja</i>	Lycaenidae	C	38-42
l.	Common gem	<i>Poritia hewitsoni</i>	Lycaenidae	NC	31-38
m.	Psyche	<i>Leptosia nina</i>	Pieridae	C	35-50
n.	Pale grass Blue	<i>Pseudozizeeria maha</i>	Lycaenidae	C	26-30
o.	Common Earl, female	<i>Tanaecia julii</i>	Nymphalidae	C	65-80
p.	Chocolate Pansy	<i>Junonia iphita</i>	Nymphalidae	C	55-80
q.	Dark Evening Brown	<i>Melanitis phedima</i>	Nymphalidae	NR	60-85
r.	Peal's Palm fly	<i>Elymnias peali</i>	Nymphalidae	R	60-85
s.	Yellow sailer	<i>Neptis ananta</i>	Nymphalidae	R	75-85
t.	Long Brand Bush Brown (UN)	<i>Mycalesis visala</i>	Nymphalidae	C	45-55
u.	Eastern five ring	<i>Ypthima similis</i>	Nymphalidae	R	45-60

R: Rare, NR: Not Rare, NC: Not Common, C: Common, UP: Upper, UN: Under

Plate 1: Photograph (a-n) showing winter abundant species of butterfly in Tiaban, a patch forest beside Garumara National park, West Bengal.

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Plate 1: Photograph (a-n) showing winter abundant species of butterfly in Tiaban, a patch forest beside Garumara National park, West Bengal.