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Butterfly diversity of paddy growing area in winter and pre-monsoon season (Rabi crop) at Silezari site of Gondia district, Maharashtra, India

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ABSTRACT

A systematic survey was carried out on butterflies of agricultural field during winter and pre-monsoon season, Silezari, Vidarbha, India because it is now clear that agricultural fields particularly paddy field are unique ecosystems that provide some butterflies to complete their life span.. Total 24 species of butterflies were recorded belonging to 20 genera and 5 families. Nymphalidae family is consisting of maximum number of genera and species and only one species recorded from family Papilionidae. Maximum species richness reported from March and April month. The present study will encourage the conservation of a wide range of indigenous butterfly species in an area.

Keywords: Butterfly, Lepidoptera, Biodiversity, Paddy, winter and pre-monsoon.

Introduction:

Butterflies form an important component of biodiversity. Lepidoptera are regarded as one of the important component of biodiversity (New and Collins, 1991) and are the second largest order among insects made up of approximately 1, 50,000 species so far known to the literature. These include moth (Hetrocera) and butterflies

(Rhopalocera) of which 70,820 are butterflies according to more recent estimate (Shields, 1989).

In central India, about 177 species of butterflies were reported in the Central Provinces (Vidarbha, Madhya Pradesh and Chattisgarh) by D'Abreau (1931). Tiple (2011) recorded 167 species of butterflies belonging to 90 genera representing 5 families in Vidarbha region.

There is virtually has not been any published research works on agricultural butterflies ecology in India whereas, it is essential to have such data so far as the understanding of the butterfly biodiversity and conservation in agro ecosystem is concerned.

India is known for its rich heritage of biological diversity, having already documented over 89, 000 species of fauna (Alfred et al., 1997) and 45,000 species of flora (Mudgal and Hajra, 1999) in its 10 biogeographic regions.

Butterflies being important pollinating agents for wild and crop plants around the world, it has become expedient to those (Fitzherbert *et al*., 2006). It is required to make exhaustive studies on their foraging behaviors and temporal and spatial distribution in agricultural landscape (Kuefler *et al*., 2008). It is very clear that agricultural fields are containing several agrestals (Dwari and Mondal, 2011) with main crop which are attracted by butterflies for their various purposes.

According to Bliss (1962) the dimension, population size and diversity of the species are most significant biological elements of an ecosystem.

According to Kunte 2000 and Tiple *et al* 2006 among insects, butterflies perform prominent roles in pollination and herbivores bearing a history of long-term coevolution with plants (Ehrlich and Raven 1964). Adult butterflies are dependent on nectar and pollen as their food while the caterpillars are dependent on specific host plants for foliage (Nimbalkar et al 2011). Butterflies are considered as good indicators of the health of any specified terrestrial ecosystem (New 1991; Pollard and Yates 1993; Kunte 2000; Aluri and Rao 2002; Thomas 2005; Bonebrake *et al* 2010).

India is one among the twelve mega–diversity countries of the world. The Indian sub continent (CISC) has about 1439 species of butterflies out of which 100 species are endemic to it and at least 26 taxa are today globally threatened as per the IUCN (1990) Red List of threaten animals and insects (Singh and Pandey, 2004). According to

Gaonkar (1996) India hosts 1,501 species of butterflies, of which peninsular India hosts 350, and the Western Ghats, 331.

The flora and fauna that form today's biodiversity are a snapshot of the earth's 3.8 billion year history of life, representing just 0.1% of all the species that have lived on earth. Thus 99.9% or virtually all of life that has existed on earth has gone extinct (Raup, 1991). Thomas *et al*. (2004) compared species losses of British butterflies, birds, and plants and found that loss of butterfly species has been greater than that of birds and plants; current rates of species disappearance represent the sixth major extinction event through time. Butterflies are providing the best rapid indicators of habit quality and they are the sensitive indicators of climatic change (Venkata Ramana, 2010).

Heppner (1998) were documented about 19,238 species in the world. There were about 1,504 species of butterflies in Indian subcontinent (Gaonkar, 1996; Smetacek, 1992).

Silezari village belong to Arjuni/morgaon taluka of Gondia district and is well known for richness of the lake and dense forest as well as busy forest. Districts also famous as a rice producer district in Maharashtra. The farmers of the study site take both type of crop i.e. Kharip and Rabi paddy crop, mostly Rabi crop sowing during winter and harvest at the end of pre-monsoon season months. With the help of own irrigation source by wells and surface boar farmers give the first preference to cultivate the paddy. Due the irrigation facilities area makes always green having different types of flowering plant grown naturally. Due the presence of greenery the diversity of butterflies is well but not documented till date.

In spite of its global significance, studies of butterfly diversity during winter and pre-monsoon season of paddy growing area have not been recently undertaken. Since, the main objective of this study has been to conduct preliminary observation of butterflies and carried out the checklist, occurrence and richness in an agriculture field of Silezari.

Material and Methods:

Study Area:

The present study conducted in the sites at Silezari of taluka Arjuni/Morgaon, District Gondia, Maharashtra. Study was carried out during the month of winter and pre-monsoon season; winter climatic seasons could be considered as comprising of the months of December, January and February as well as pre-monsoon comprising of the

month, March, April and May. The present study has been carried out from 15th December, 2015 to 23rd April, 2016.

Butterfly watching and data recording has been done on every Sunday of the each month of winter and pre-monsoon season at the paddy fields from Sowing to Harvesting. At least one visit in four transect lines during a week to follow Pollard walk method (Pollard, 1993; Caldas and Robbins, 2003) of 0.5 km to 0.7 km length with 2 m to 5 m on either side (Kishor G. Patil and Virendra A. Shende 2014). The site was visited in morning and evening hours to note maximum possible species of butterflies. The observations were made with the help of binocular and capture photo by using digital cameras (Sony cyber- shot 16.2 mega pixels, 16x optical zoom with 24mm wide-angle sony lens).

The recorded species are identified with the help of photographs by using reference books and available publications and article as well as with the help experts of Entomologist. Collection of specimen was avoided to the extent possible.

Results:

A checklist of butterflies during winter to pre-monsoon season of Paddy growing (Rabi rice crop) site at Silezari was recorded and tabulated (Table 1and 2; Photo plates 1-2 (Fig. 1-24). Total 24 species of butterflies were recorded belonging to 20 genera (Tables 2 Graph 1). The family Papilionidae comprises only one species (Table 1 and Fig 1-2). Family Nymphalidae, Pieridae, Lycaenidae and Hesperiidae were consisted of 8 genera and 12 species; 3 genera and 3 species; 5 genera and 5species, 1species; 3 genera and 3 speciesrespectively (Table 1 Plate 1-2 (Fig. 1-18).

A maximum number of species were belong to family- Nymphalidae (12) followed by Lycaenidae (05), Pieridae (03), Hesperiidae (03) and only one species was noted in family- Papilionidae.

In the present study out of total 24 butterfly species the population of Brush-footed butterflies like Plain tiger butterfly, Peacock pansy, Grey pansy, Lemon pansy, Blue pansy and Tawny coster was higher followed by Skippers, Blues, White and Yellows. The occurrence and contribution of population of Swallowtails was recorded very low around paddy field during winter and pre-monsoon season in the year 2016.

The maximum species richness is reported from March to April in Morning hours (Table 1)

Discussion:

In the present study, total 24 species of butterflies were recorded belonging to 20 genera of 5 families. Family- Nymphalidae was the largest family comprised of maximum number of genera (08) and species (12).

The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure (Beals *et al*, 1999).

According to Tiple and Khurad (2009) were recorded total 145 species of butterflies in and around Nagpur City at the eight study sites including agricultural land. The highest number of butterflies was recorded belonging to the Nymphalidae (51 species) followed by Lycaenidae (46 species), Hesperiidae (22 species), Pieridae (17 species) and Papilionidae (9 species). The study revealed that Nymphalidae was most dominating family with a highest number of species and most butterfly species were observed from the monsoon to early winter but thereafter declined in early summer (Kunte, 1997).

The 29 butterfly species from agricultural field of Howrah, West Bengal recorded in 5 families (Saurav Dwari and Amal kumar Mondal 2015) and most dominant family is Nymphalidae(11), followed by Lycaenidae (9), Pieridae (4), Hespiriidae (3) and Papilionidae (02) and only in rice field recorded 8 species from 4 families .

In Seshachalam Biosphere Reserve of Eastern Ghats Andhra Pradesh, India recorded a total of 50 species of butterflies belonging to 5 families (Guptha *et al.* 2012). The family Nymphalidae (20 species) was found dominant followed by Lycaenidae (12 species), Pieridae (11 species), Papilionidae (5 species) and Hesperiidae (2 species).

Murugesan and Muthusamy (2013) In eastern part of Western Ghats, surveyed 103 individual butterfly species belonging to 5 families namely Nymphalidae (32), Pieridae (23), Lycaenidae (19), Hesperiidae (15) and Papilionidae (14), which revealed that Nymphalidae and Pieridae were the rich dominant families, while Hesperiidae and Papilionidae were less dominant; similar to the present observations.

High incidences of butterfly population with wide distribution were observed during the months of March-April and which diminish during December-January. All the observations are similar with the present observations.

Table 1: List of butterflies recorded from paddy field together with period of occurrence.

SN	Family	Common Name	Zoological Name	Photography Time	Period of occurrence
1	**Papilionidae (01)**	Lime butterfly	*Papilio demoleus* Linnaeus	M	April
2	**Nymphalidae(11)**	Blue pansy	*Junonia orithiya* Linnaeus	M	April
3		Plain tiger	*Danaus chrysippus* Linnaeus	M,E	Feb, March, April
4		Grey pansy	*Junonia atlites* Linnaeus	M	
5		Lemon pansy	*Junonia lemonias* Linnaeus	M	March, April
6		Tawny coster	*Acraea violae* Fabricius	M, E	March, April
7		Common crow	*Euploea core* Cramer	M	March, April
8		Danaid eggfly	*Hypolimnas misippus* Linnaeus	M	April
9		Peacock pansy	*Junonia almanac* Linnaeus	M	April
10		Blue tiger	*Tirumala limniace* Cramer	E	April
11		Long – brand bushbrown	*Mycalesis visala* Moore	M	March
12		Common Bushbrown	*Mycalesis* perseus Fabricius	M	March,
13		Common evening brown	*Melanitis leda* Linnaeus	M	April
14	**Pieridae (Yellow and blues) (03)**	Common grass yellow	*Eurema hecabe* Linnaeus	M	January
15		Common emigrant	*Catopsila pomona* Fabricius	M	April
16		Dark clouded yellow	*Colias fieldii* Menetries	M, E	April
17	**Lycaenidae (Blues)(05)**	Common pierrot	*Castalius rosimon* Fabricius	E	April
18		Rounded pierrot	*Tarucus nara* Kollar	E	April

19		Velvet spotted blue	*Azanus ubaldus*	E	April
20		Banded blue peirrot	*Discolampa ethion Westwood*	M	April
21		Pale grass blue	*Pseudozizeeria maha* Collar	M	April
22	**Hesperiidae (Skippers) (03)**	Rice swift	*Barbo cinnara*	M	April
23		Small branded swift	*Pelopidas mathias* Fabricius	M	April
24		Paintbrush swift	*Baoris farri* Moore	M	April

M: Morning hours; E: Evening hours

Table: 2 Distribution of genera and species of Butterflies in respective families.

Sr. No.	Family	Identified Genera & species	
		Genera	Species
1	Papilionidae	01	1
2	Nymphalidae	08	12
3	Pieridae	03	03
4	Lycaenidae	05	05
5	Hesperiidae	03	03
Total	**05**	**20**	**24**

Graph: 1 Family wise Genera and Species Recorded during Winter and Pre-Monsoon Period.

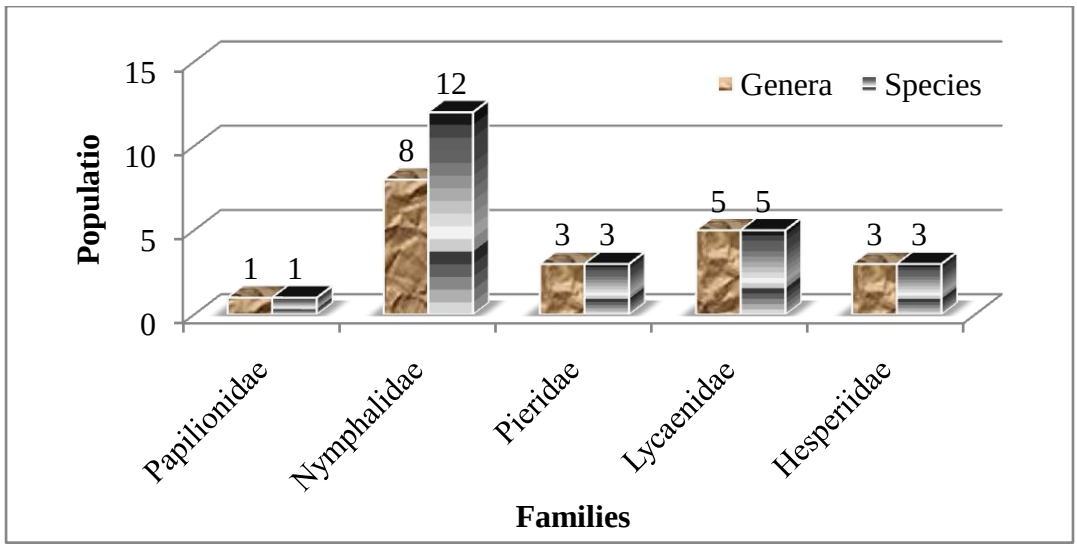

Plate: 1

Fig. 1, 1a Lime butterfly, 2, 2a Blue pansy, 3, 3a Plain tiger, 4, 4a Grey pansy, 5, 5a Leman pansy, 6, 6a Tawny coster and Fig. 7 Common crow (Scientific name see in Table 1)

Plate: 2 Fig. 8-8a Danaid eggfly, 9-9a Peacock pansy, 10-10a Blue tiger, 11Long- brand Bushbrown, 12 Commen Bushbrown ,13 Common evening brown, 14 Common grass yellow, 15 Common emigrant, 16 Dark clouded yellow,17Commo pierrot, 18 Rounded pierrot, 19-19a Velvet spotted blue, 20 Banded blue peirrot 21 Pale grass blue, 22 Rice swift, 23 Small branded swift and Fig. 24 Paintbrush Swift. (Scientific name see in Table 1).

Conclusion:

The butterfly diversity of agroecosystem of Gondia district is very high. The present research have concludes by systematically studied butterfly biodiversity first time in paddy growing areas during Rabi crop and prepared a checklists of the study area. Family-Nymphalidae carries the maximum number of species than remaining families. Species richness season of butterflies in Central part of India is different than that of eastern part of Western Ghats. This study would be useful to conserve wide range of indigenous butterfly species in an area.

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