

Seasonal Diversity and Status of Butterfly Fauna in Sakoli Taluka of Bhandara District, Maharashtra, India

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ABSTRACT

Sakoli taluka lies in the basin of Chulbandh river and covered with dense forest and comprises agricultural fields and it is less highlighted for butterflies so the main aim of this study to show how these fields serve butterflies and prepare a checklist of that butterflies, which use these fields in their various activities. Total of 69 species of butterflies were recorded belonging to 47 genera and 5 families. The Nymphalidae family was dominant and consisting 25 species (36.24%); Lycaenidae 19 species (27.53%); Pieridae 13 species (18.84%); Hesperidae 8 species (11.59%) and only 4 species (5.80%) recorded from family Papilionidae, respectively. Maximum species richness reported from monsoon and post-monsoon season.

Key-words: Agricultural field, Agroecosystem, Butterfly fauna, River Seasonal diversity

INTRODUCTION

Agricultural fields are unique ecosystems that provide some butterflies to complete their life span. Butterflies are one of the most colorful, popular and easily recognized groups of insects belong to order Lepidoptera. They are potentially useful ecological indicators of urbanization because sensitive to changes in microclimate, temperature ^[1] and extremely important components of the bio-indicators of the world ^[2,3]. Butterflies serve as important plant pollinators in the local environment and help to pollinate more than 50 economically important plant crops ^[4]. Butterflies serve the ecosystem especially by recycling nutrients (N, P and K) essential for crops ^[5].

Their larvae release feces while feeding on the agrestals and provide required nutrients to the crops ^[6]. Certain butterfly species are believed to be necessary to pollination of various wild plants and crops on which human beings depend on for their livelihoods ^[7]. The influence of butterflies on agroecosystem is better studied in Europe than in Indian subcontinent ^[8]. In Vidarbha region, it was compiled and records of 167 species of butterflies belonging to 90 genera representing 5 families ^[9]. In the agricultural field of Gondia district was recorded 24 species of butterflies belonging to 20 genera and 5 families during winter and pre-monsoon season and 44 species 32 genera during monsoon and post-monsoon season respectively ^[10,11]. But little work did in the district Bhandara, Maharashtra. So, it is necessary to study about seasonal diversity and status of butterflies of this district especially agricultural field.

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MATERIALS AND METHODS

Study site- The present study has been carried out for a period of Jan 2016 to Dec 2017 and conducted in the sites from agricultural field of Sakoli, Bhandara district Maharashtra, India during the four different season i.e. month of winter (December to February), pre-monsoon (March to May), monsoon (June to August) and post-monsoon season (September to November). Butterfly watching and data recording have been done

once a week for each month. In monsoon and post-monsoon season, the agricultural crops grow regularly day by day. Regularly at least one visit in four trackway during a week.

Sakoli city of Bhandara district located at North latitude $21^{\circ}09'30''$ and East latitude $79^{\circ}40'00''$ and having 233 meters elevation above sea level. The district comprises was 185164.H.R agricultural area and the main crop was paddy in kharif crop and cereals in rabbi crop (Fig. 1).

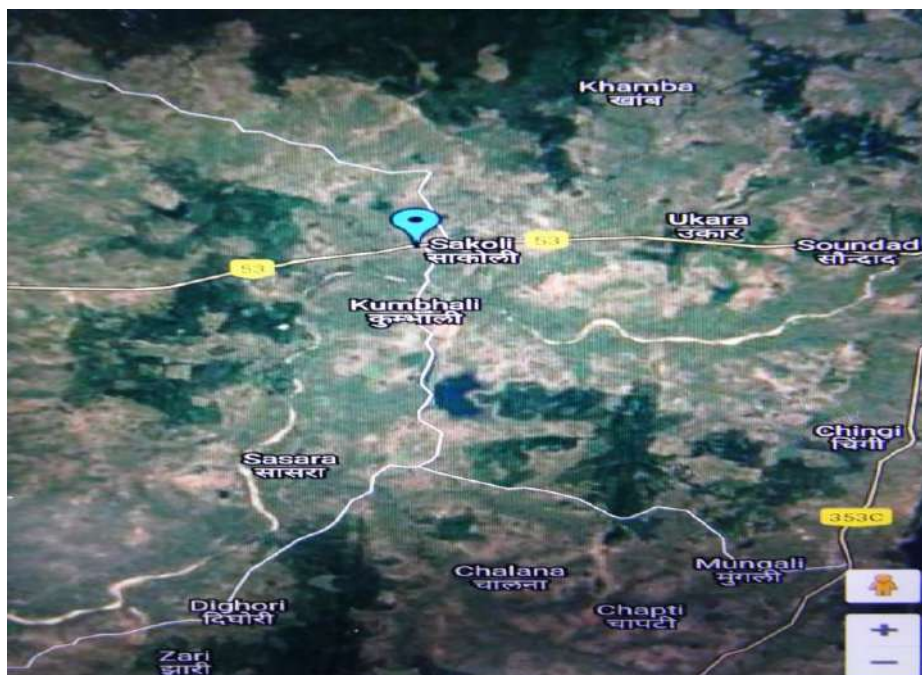


Fig. 1: Google map of Sakoli taluka of Bhandara district, Maharashtra, India

The observation was made through 4 line transects^[10,11] of 0.5 km to 0.7 km length with 2 m to 5 m on either side along with the agricultural field. The site was visited in morning and evening hours to note maximum species of butterflies. The observations were made with the help of binocular (Olympus 8-16X40) and capture photo by using digital cameras (Sony cyber-shot 16.2 megapixels, 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 of experts.

RESULTS

Seasonal diversity and status of butterfly's fauna were recorded and prepared a checklist during four different seasons (pre-monsoon, monsoon, winter, and post-monsoon) in and around agricultural sites of Sakoli

taluka and tabulated (Table 1). Total of 69 species of butterflies were recorded belonging to 47 genera (Table 2 & Fig. 2). The family Papilionidae comprises only 3 genera (6.38%) and 4 species (5.80%). Family Nymphalidae, Pieridae, Lycaenidae and Hesperidae consisted of 14 genera (29.79%) and 25 species (36.24%); 9 genera (19.15%) and 13 species (18.84%); 15 genera (31.91%) and 19 species (27.53%); and 6 genera (12.77%) and 8 species (11.59%), respectively (Table 2 & Fig. 3).

In the present study out of total 69 butterfly species, the population of Brush-footed butterflies like Tigers butterfly, Pansys and Tawny coster was higher followed by, white and yellow as well as Blues and Skippers (Fig. 4). The diversity and its status of butterfly contributed population of Swallowtails was recorded very low in and around agro-ecosystem during pre-monsoon season and maximum species richness were observed during winter and post-monsoon season in morning hours (Table 1).

Table 1: Checklist of butterflies recorded together with Status and period of occurrence from Sakoli taluka of Bhandara district, Maharashtra, India

S. No.	Common Name	Zoological Name	Photography Time	Status	Seasons
Papilionidae (Swallowtails) (04)					
1	Common mormon	<i>Papilio polytes</i> Linnaeus	M	C	PRM
2	Common rose	<i>Pachliopta aristolachiae</i> Cramer	M	C	PRM
3	Lime butterfly	<i>Papilio demoleus</i> Linnaeus	M	VC	MN, POM
4	Tailed joy	<i>Graphium chironides</i> (Honrath)	M	R	WR
Nymphalidae (Brush-footed) (25)					
5	Plain tiger	<i>Danaus chrysippus</i> Linnaeus	M	VC	WR, PRM, MN, POM
6	Stripped tiger	<i>Danaus genutia</i> Cramer	M	C	MN, POM
7	Common baron	<i>Euthalia aconthea</i> Cramer	M	C	MN, POM
8	Common crow	<i>Euploea core</i> Cramer	M	VC	WR, PRM, MN, POM
9	Danaid eggfly	<i>Hypolimnna</i> <i>misippus</i> Linnaeus	M	VC	WR, PRM, MN, POM
10	Great eggfly	<i>Hypolimnna bolina</i> Linnaeus	M	VC	WR, PRM, MN, POM
11	Blue tiger	<i>Tirumala limniace</i> Cramer	M	C	WR, PRM, MN, POM
12	Glassy tiger	<i>Parantica aplea</i> (Stoll)	M	NR	POM
13	Common leopard	<i>Phalanta phalanta</i>	M	VC	WR, PRM, MN, POM
14	Tawny coster	<i>Acraea violae</i> Fabricius	M	VC	WR, PRM, MN, POM
15	Baronet	<i>Euthalia nais</i> Forster	M	C	WR, PRM, MN
16	Blue pansy	<i>Junonia orithiya</i> Linnaeus	M	VC	WR, PRM, MN, POM
17	Peacock pansy	<i>Junonia almanac</i> Linnaeus	M	VC	WR, PRM, MN, POM
18	Lemon pansy	<i>Junonia lemonias</i> Linnaeus	M	VC	WR, PRM, MN, POM
19	Grey pansy	<i>Junonia atlites</i> Linnaeus	M	C	POM
20	Yellow pansy	<i>Junonia hierta</i> Fabricius	M	C	WR, PRM, MN, POM

21	Chocolate pancy	<i>Junonia iphita</i> (Cramer)	M	C	WR, PRM, MN, POM
22	Long brand bushbrown	<i>Mycalesis visala</i> Moore	M	C	WR, PRM, MN, POM
23	Common Bushbrown	<i>Mycalesis perseus</i> Fabricius	M	VC	WR, PRM, MN, POM
24	Common evening brown	<i>Melanitis leda</i> Linnaeus	M,E	VC	WR, PRM, MN, POM
25	Great Evening Brown	<i>Melanitis zitenius</i> Herbst	M	C	MN, POM
26	Common nawab	<i>Polyura athamas</i> Drury	M	R	MN
27	Commander	<i>Moduza procris</i> Cramer	M	C	MN, POM
28	Leopard lacewing	<i>Cethosia cyane</i> Drury	M	R	POM
29	Short-banded Sailer	<i>Phaedyma</i> (<i>Neptis</i>) <i>columella</i> Cramer	M	NR	POM
Pieridae (Yellow and blues) (13)					
30	Striped albatross	<i>Appeas libythea</i> Fabricius	M	C	MN, POM
31	Common Albatross	<i>Appeas albina</i> Boisduval	M	C	MN, POM
32	Common emigrant	<i>Catopsila Pomona</i> Fabricius	M	VC	MN, POM
33	Mottled Emigrant	<i>Catopsilia pyranthe</i> Linnaeus	M	VC	WR, PRM, MN, POM
34	Common gull	<i>Cepora nerissa</i> Fabricius	M	VC	MN, POM
35	Common jezebel	<i>Delias eucharis</i> Drury	M	C	WR, PRM, MN, POM
36	Painted Sawtooth	<i>Prioneris sita</i> Felder & Felder	M	R	WR
37	Common grass yellow	<i>Eurema hecabe</i> Linnaeus	M	VC	WR, PRM, MN, POM
38	Spotless Grass Yellow	<i>Eurema laeta</i> (Boisduval)	M	VC	WR, PRM, MN, POM
39	One-Spot Grass Yellow	<i>Eurema andersoni</i> Moore	M	C	WR, PRM, MN, POM
40	Indian Cabbage White	<i>Pieris canidia</i> Linnaeus	M	C	WR, PRM, MN, POM
41	Pioneer	<i>Anaphaeis aurota</i> Fabricius	M	C	WR, PRM, MN, POM
42	Common Wanderer	<i>Pareronia valeria</i> Cramer	M	NR	WR

Lycaenidae (Blues) (19)					
43	Two-spot Plum Judy	<i>Abisara bifasciata</i> Moore	M	R	POM
44	Dark pierrot	<i>Tarucus ananda</i>	M	NR	POM
45	Common pierrot	<i>Castalius rosimon</i> Fabricius	M,E	VC	WR, PRM, MN, POM
46	Striped pierrot	<i>Tarucus extricatus</i>	M	C	WR, PRM, MN, POM
47	Rounded pierrot	<i>Tarucus nara</i> Kollar	M	C	WR, PRM, POM
48	Striped pierrot	<i>Tarucus</i> <i>theophrastus indica</i>	M, E	C	POM, WR
49	Dark Cerulean	<i>Jamides bochus</i> Stoll	M	R	POM
50	Common Cerulean	<i>Jamides celeno</i> Cramer	M	C	WR, PRM, POM
51	Common Silverline	<i>Spindasis vulcanus</i> Fabricius	M	C	WR, PRM, POM
52	Purple Leaf Blue	<i>Amblypodia anita</i> Hewitson	M,E	C	WR, PRM, MN, POM
53	Gram Blue	<i>Euchrysops cnejus</i> Fabricius	M,E	C	WR, POM
54	Pea Blue	<i>Lampides boeticus</i> Linnaeus	M	VC	WR
55	Tiny Grass Blue	<i>Zizula hylax</i> Fabricius	M, E	VC	WR
56	Lesser grass blue	<i>Zizina otis</i> Kollar	M, E	VC	WR
57	Dark Grass Blue	<i>Zizeeria karsandra</i> Moore	M, E	VC	WR
58	Pale Grass Blue	<i>Pseudozizeeria</i> <i>maha</i> Kollar	M, E	C	POM, WR
59	Forget-Me-Not	<i>Catochrysops strabo</i> Fabricius	M	VC	POM, WR
60	Silver Forget-Me-Not	<i>Catachrysops</i> <i>panormus</i> C. Felder	M	VC	POM, WR
61	Indian Cupid	<i>Everes lacturnus</i> Godart	M	C	WR, POM
Hesperiidae (Skippers) (08)					
62	Indian skipper	<i>Spialia galba</i> Fabricius	M	C	POM
63	Rice Swift	<i>Barbo cinnarai</i>	M	C	WR, PRM, MN, POM
64	Small Branded Swift	<i>Pelopidas mathias</i> Fabricius	M	VC	WR, PRM, MN, POM
65	Blank Swift	<i>Caltoris kumara</i>	M	C	POM
66	Large Branded Swift	<i>Pelopidas</i> <i>subochracea</i>	M	C	POM

67	Grass Demon	<i>Udaspes folus</i> Cramer	M	NR	WR, PRM, MN,
68	Conjoined Swift	<i>Pelopidas conjuncta</i> Herrich-Schäffer	M	VC	WR, PRM, MN, POM
69	Brown Awl	<i>Badamia</i> <i>exclamationis</i> Fabricius	M	C	WR, PRM, MN,

Photography time- M: Morning hour; E: Evening hour

Status- VC- very common (seen > 50 visits); C- common (seen 25-50 visit); NTR- not rare (seen 10-25 visits); R- rare (1-5 visit); NR- not recorded.

Seasons: WR: Winter season; PRM: Pre-Monsoon season; MN: Monsoon season and POM: Post-Monsoon season

Table 2: Family wise Distribution of genera and species of butterflies during pre-monsoon, monsoon, winter and post-monsoon season

S. No.	Identified Genera & species (Numbers)			Percentage (%)	
	Family	Genera	Species	Genera	Species
1	Papilionidae	03	04	6.38	5.80
2	Nymphalidae	14	25	29.79	36.24
3	Pieridae	09	13	19.15	18.84
4	Lycaenidae	15	19	31.91	27.53
5	Hesperiidae	06	08	12.77	11.59
Total	05	47	69	100	100

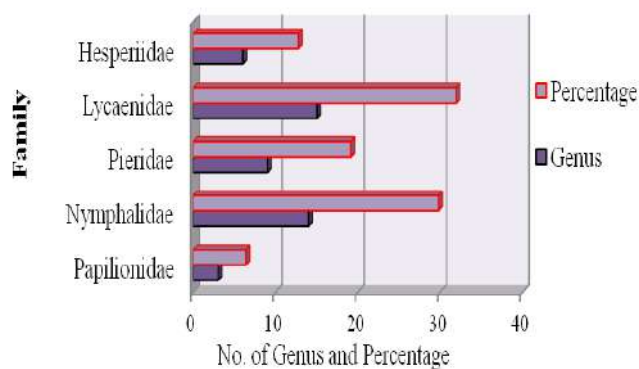


Fig. 2: Family wise distribution of genus of butterfly

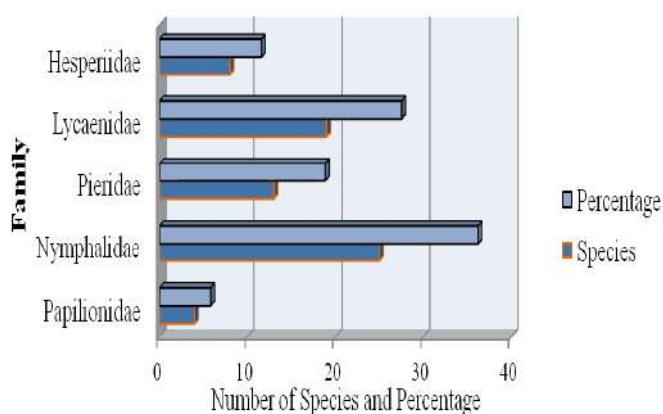


Fig. 3: Family wise distribution of butterfly species

DISCUSSION

In the present study, a total of 69 species of butterflies were recorded belonging to 47 genera and 5 families. Family Nymphalidae was the largest family comprised of maximum number of species 22 (36.24%). The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure [12]. Earlier was documented the most dominant family was Nymphalidae followed by Lycaenidae, Pieridae, Hespriidae and Papillionidae [11,13-19]. The 29 butterfly species from agricultural field of Howrah, West Bengal recorded in 5 families [13] and most dominant family was Nymphalidae (11) followed by Lycaenidae (9), Pieridae (4), Hespriidae (3) and Papillionidae (2) and only in rice field recorded 8 species from 4 families.

Total 145 species of butterflies were recorded in and around Nagpur City including agricultural land [14]. The highest number of butterflies was recorded belonging to the Nymphalidae (51 species) and least number of butterflies belong to family Papilionidae (9 species).

The study revealed that most butterfly species were observed from the monsoon to early winter and contribute Nymphalidae was most dominating family comprised highest number of species but thereafter declined in early summer ^[15].

Total of 50 species of butterflies belonging to 5 families was recorded in Seshachalam Biosphere Reserve of Eastern Ghats Andhra Pradesh, India ^[16]. The family Nymphalidae (20 species) was found dominant followed by Lycaenidae (12 species), Pieridae (11 species), Papilionidae (5 species) and Hesperidae (2 species).

In the eastern part of Western Ghats ^[17], survey 103 individual butterfly species. Family belonging Nymphalidae contributed the highest number of butterflies (32 species) followed by family Pieridae (23 species), which revealed that Nymphalidae and Pieridae were rich dominant families, while Hesperidae (15 species) and Papilionidae (14 species) were less dominant; similar to the present observations.

Earlier ^[10,11] was recorded least population of butterflies during winter and pre-monsoon season it was total of 24 species of butterflies belonging to 20 genera and increases species population during monsoon and post-monsoon season. In Jnandweepa, VPM campus, Thane, Maharashtra was recorded 52 butterfly's species ^[18]. Family Nymphalidae showed 22 species which was maximum species diversity dominance followed by family Pieridae and Lycaenidae represents 10 species each and family Papilionidae and Hesperidae having least number of species diversity it was 7 and 3 species respectively.

Total 92 species of butterflies was expressed belong to 59 genera and 5 families from Gorewada International Bio-Park Nagpur, Central India ^[19]. High incidence of butterfly population with wide distribution was observed during the month of March-April and monsoon season (September-November) which diminish during December-January. All the observation was similar with the present observation.



Plaintiger



Baronet



Common jezebel



Common emigrant



Blue pansy



Great eggfly



Tailed Joy



Lime Butterfly



Common rose



Broun Awl



Common evening brown



Common crow



Common pierot



Dark grass blue



Gram blue



Lemon pansy



Grass demon



Common grass yellow



Pale grass blue



Forget me-not



Two spot plum judy



Spotless grass yellow



Indian Skipper



Towny coster

Fig. 4: Common butterflies from Sakoli, Bhandara study area

CONCLUSIONS

The butterfly diversity and status of Agroecosystem of Sakoli, Bhandara district is mostly high. The present work has concluded that systematically studied butterfly diversity first time in and around the agricultural field and prepared a checklist in the study site. Family-Nymphalidae carries the maximum number of species 25 (36.24%) than remaining families. This study would be useful to conserve the seasonal diversity of indigenous butterfly species in the study area.

Butterflies play an important role during the ripening stage of paddy crop for better pollination and another crop also for harvest quantity and quantity crop; therefore it needs to conserve food plant of butterfly larvae in the target area.

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CONTRIBUTION OF AUTHORS

Authors have planned the valuable work on survey of butterflies in an around agricultural field with respect to seasonal diversity and its status of Sakoli taluka of Bhandara district were ampule number of butterfly species found in different season. Data were collected from different sites and different season of the target area analyzed data and finally prepare a checklist. Butterflies were identified with the help of available literature and experts. After the completion of all findings, we decided to publish this work for future references.

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