

Butterfly Diversity in Agroecosystem of Arjuni/Morgaon Taluka, Gondia, Maharashtra, India

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ABSTRACT- Butterflies are the important pollinating agent for wild and crop plants. Despite of its global significance, studies of butterfly diversity during monsoon and post-monsoon season in agroecosystem of Arjuni/Morgaon taluka of Maharashtra have not been recently undertaken. A survey was carried out on butterflies of agricultural field during monsoon and post-monsoon season, Arjuni/Morgaon, Maharashtra, India because it is now clear that in and around agricultural fields particularly paddy field are unique ecosystems that provide some butterflies to complete their life span. Total 44 species of butterflies were recorded belonging to 32 genera and 5 families. Nymphalidae family is consisting of maximum number of genera and species and only three species recorded from family Papilionidae. Maximum species richness reported from July to November month. The present study will encourage the conservation of a wide range of indigenous butterfly species in an area.

Key-words- Agricultural field, Butterfly, Diversity, Fauna, Monsoon, Post monsoon

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INTRODUCTION

Butterflies serve the ecosystem especially by recycling nutrients (N, P, and K) essential for crops. Butterflies are providing the best rapid indicators of habit quality and they are the sensitive indicators of climatic change^[1].

In central India, about 177 species of butterflies were reported in the Central Provinces (Vidarbha, Madhya Pradesh and Chattisgarh) by D'Abreu^[2]; Tiple^[3] 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 diversity and conservation in agro ecosystem is concerned.

Butterflies being important pollinating agents for wild and crop plants around the world, it has become expedient to Fitzherbert *et al.*^[4].

It is very clear that agricultural fields are containing several agrestals^[5] with main crop, which are attracted by butterflies for their various purposes.

According to Bliss^[6] the dimension, population size and diversity of the species are most significant biological elements of an ecosystem.

According to Kunte^[7]; Tiple *et al.*^[8] among insects, butterflies perform prominent roles in pollination and herbivores bearing a history of long-term coevolution with plants^[9]. Adult butterflies are dependent on nectar and pollen as their food while the caterpillars are dependent on specific host plants for foliage^[10]. Butterflies are considered as good indicators of the health of any specified terrestrial ecosystem^[7,11-15]

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^[16]. According to Gaonkar^[17] India hosts 1,501 species of butterflies, of which peninsular India hosts 350, and the Western Ghats, 331.

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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 [18]. Heppner [19] documented about 19,238 species in the world. There were about 1,504 species of butterflies in Indian subcontinent [17,20].

Arjuni/Morgaon taluka of Gondia districts are well known as richness of the lake and dense forest as well as busy forest. Elevation/Altitude: 327–245 meters above sea level.

It is too hot in summer, highest day temperature is in between 33 °C to 49 °C. Average temperatures of January is 21 °C, February is 26 °C, March is 31 °C, April is 35 °C, May is 39 °C. Gondia districts also famous as a rice producer district in Maharashtra.

In spite of its global significance, studies of butterfly diversity during monsoon season in and around agricultural field (paddy growing area) have not been recently undertaken. Since, the main objective of this study has been conduct preliminary observation of butterflies and carried out the checklist, occurrence and richness in an agriculture field of Arjuni/Morgaon taluka.

MATERIALS AND METHODS

Study Area

The present study conducted in the sites, agricultural field of Arjuni/Morgaon taluka of Gondia district Maharashtra, India. A Study was carried out during the month of monsoon and post-monsoon season; monsoon and post-monsoon climatic seasons could be considered as comprising of the months June to November. The present study had been carried out for a period of 15th June, 2016 to 30th November, 2016.

Butterflies watching and data recording have been done once a week of each month. In monsoon and post-monsoon season the agricultural crops grow regularly day by day (Sowing to Harvesting). Regularly at least one visit in four track way during a week.

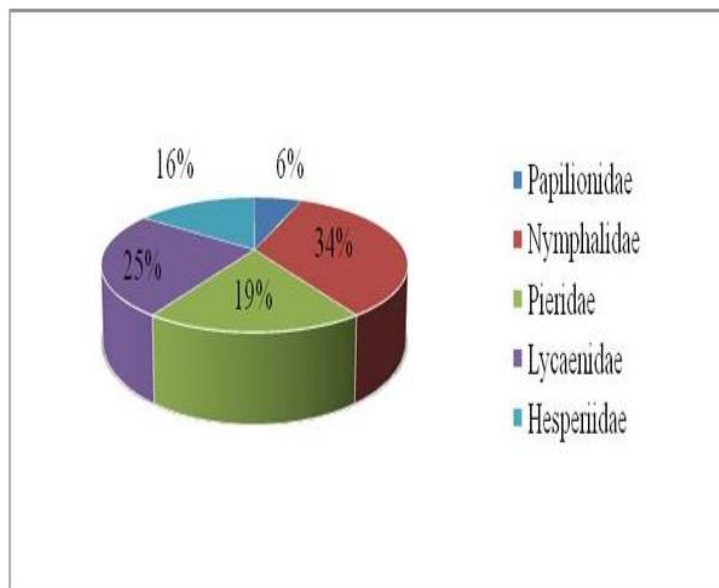
Observations were made through 4 line transects [21,22] of 0.5 km to 0.7 km long by 2 m to 5 m on either side. The site was visited in the morning and evening hours to note maximum possible species of butterflies. The observations were made with the help of binocular (Olympus 8–16x40) and capture photo by using digital cameras (Sony cyber-shot 16.2 mega pixels, 16x optical zoom with 24 mm wide-angle sony lens) and vivo Y51L.

The recorded species were identified with the help of photographs by using reference books and available publications and article as well as with the help of experts.

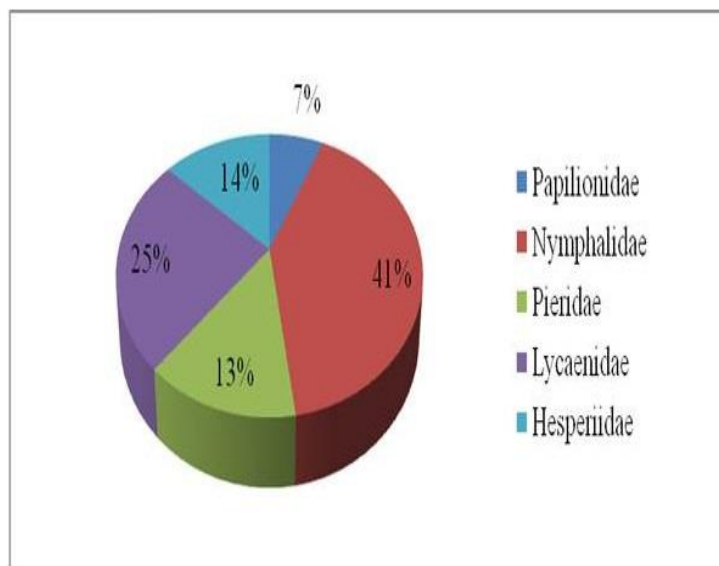
RESULTS AND DISCUSSION

The ability to quantify diversity in this way is an important tool for biologists trying to understand community structure [23].

A checklist of butterflies during monsoon and post- monsoon season of in and around agricultural sites was recorded and tabulated. Total 44 species of butterflies were recorded belonging to 32 genera Graph 1A). The family Papilionidae comprises only three species. Family Nymphalidae, Pieridae, Lycaenidae and Hesperidae were consisted of 11 genera and 18 species; 6 genera and 6 species; 8 genera and 11species and 5 genera and 6 species respectively (Table 1 & Table 2 and Fig. 1 & Fig. 2).



A: Familywise distribution of Genes



A: Familywise distribution of Species

Fig. 1 (A, B): Family wise Genera and Species Recorded during Monsoon Period

Table 1: List of butterflies recorded from in and around of agricultural field together with period of occurrence during monsoon and post-monsoon season

S. No.	Common Name	Zoological Name	Photography Period	Period of occurrence
Papilionidae (Swallowtails) (03)				
1	Common mormon	<i>Papilio polytes</i> Linnaeus	M	Oct.
2	Common rose	<i>Pachliopta aristolachiae</i> Cramer	M	Oct, Nov.
3	Lime butterfly (Darkerground colour)	<i>Papilio demoleus</i> Linnaeus	M	July, Aug.
3a	Lime butterfly	<i>Papilio demoleus</i> Linnaeus	M	July, Aug, Sept.
Nymphalidae (Brush-footed) (18)				
4	Plain tiger	<i>Danaus chrysippus</i> Linnaeus	M	Aug to Nov.
5	Stripped tiger	<i>Danaus genutia</i> Cramer	M	July to Sept.
6	Common baron	<i>Euthalia aconthea</i> Cramer	M	Aug.
7	Common crow	<i>Euploea core</i> Cramer	M	Aug to Nov.
8	Danaid eggfly	<i>Hypolimnas misippus</i> Linnaeus	M	Aug to Nov.
9	Great eggfly	<i>Hypolimnas bolina</i> Linnaeus	M	Aug to Nov.
10	Blue tiger	<i>Tirumala limniace</i> Cramer	M	Aug to Nov.
11	Glassy tiger	<i>Parantica aglea</i> (Stoll)	M	Oct. Nov.
12	Common leopard	<i>Phalanta phalanta</i>	M	Aug, Oct.
13	Tawny coster	<i>Acraea violae</i> Fabricius	M	Aug. to Nov.
14	Baronet	<i>Euthalia nais</i> Forster	M	Aug. Sep.
15	Blue pansy	<i>Junonia orithiya</i> Linnaeus	M	Aug. to Nov.
16	Peacock pansy	<i>Junonia almanac</i> Linnaeus	M	Aug. to Nov.
17	Lemon pansy	<i>Junonia lemonias</i> Linnaeus	M	Aug. to Nov.
18	Grey pansy	<i>Junonia atlites</i> Linnaeus	M	November
19	Long brand bushbrown	<i>Mycalesis visala</i> Moore	M	Sept.
20	Common Bushbrown	<i>Mycalesis perseus</i> Fabricius	M	Aug. to Nov.
21	Common evening brown	<i>Melanitis leda</i> Linnaeus	E	Aug. to Nov.
Pieridae (Yellow and blues) (06)				
22	Striped albatross	<i>Appias libythea</i> Fabricius	M	Aug to Oct.
23	Common emigrant	<i>Catopsila Pomona</i> Fabricius	M	Aug. to Oct.
24	Common gull	<i>Cepora nerissa</i> Fabricius	M	Aug. to Oct.
25	Common jezebel	<i>Delias eucharis</i> Drury	M	Oct.
26	Painted Sawtooth (Outer side)	<i>Prioneris sita</i> Felder & Felder	M	Nov.
26a	Painted Sawtooth (Inner side)	<i>Prioneris sita</i> Felder & Felder	M	Nov.

27	Common grass yellow (Inner side)	<i>Eurema hecabe</i> Linnaeus	M	July to Nov.
27a	Common grass yellow (Outer side)	<i>Eurema hecabe</i> Linnaeus	M	July to Nov.
Lycaenidae (Blues) (11)				
28	Dark pierrot	<i>Tarucus ananda</i>	M	Oct. Nov.
29	Common pierrot	<i>Castalius rosimon</i> Fabricius	M,E	Aug. to Nov.
30	Striped pierrot (Inner side)	<i>Tarucus extricatus</i>	M	Sept.
30a	Striped pierrot (Outer side)	<i>Tarucus extricatus</i>	M	Sept. Oct.
31	Rounded pierrot	<i>Tarucus nara</i> Kollar	M	Aug. to Nov.
32	Striped pierrot	<i>Tarucus theophrastus indica</i>	M, E	Nov.
33	Gram Blue	<i>Euchrysops cnejus</i> Fabricius	M,E	Nov.
34	Tiny Grass Blue	<i>Zizula hylax</i> Fabricius	M, E	Nov.
35	Lesser grass blue	<i>Zizina otis</i> Kollar	M, E	Oct. Nov.
36	Dark Grass Blue	<i>Zizeeria karsandra</i> Moore	M, E	Oct. Nov.
37	Pale Grass Blue	<i>Pseudozizeeria maha</i> Kollar	M, E	Oct. Nov.
38	Forget-Me-Not	<i>Catochrysops strabo</i> Fabricius	M	Nov.
Hesperiidae (Skippers) (06)				
39	Indian skipper	<i>Spialia galba</i> Fabricius	M	Sept.
40	Rice Swift	<i>Barbo cinnarai</i>	M	Sept.
41	Small Branded Swift	<i>Pelopidas mathias</i> Fabricius	M	Sept.
42	Blank Swift	<i>Caltois kumara</i>	M	Sept.
43	Large Branded Swift	<i>Pelopidas subochracea</i>	M	Sept. Nov.
44	Common Grass Dart	<i>Taractrocera maevius</i> Hewitson	M	Sept.

M: Morning hours; E: Evening hours

Table: 2 Distribution of genera and species of butterflies in respective families during monsoon season and post-monsoon season

S. No.	Family	Identified Genera & species (Numbers)		Percentage (%)	
		Genera	Species	Genera	Species
1	Papilionidae	02	03	6	7
2	Nymphalidae	11	18	34	41
3	Pieridae	06	06	19	13
4	Lycaenidae	08	11	25	25
5	Hesperiidae	05	06	16	14
Total	05	32	44	100	100

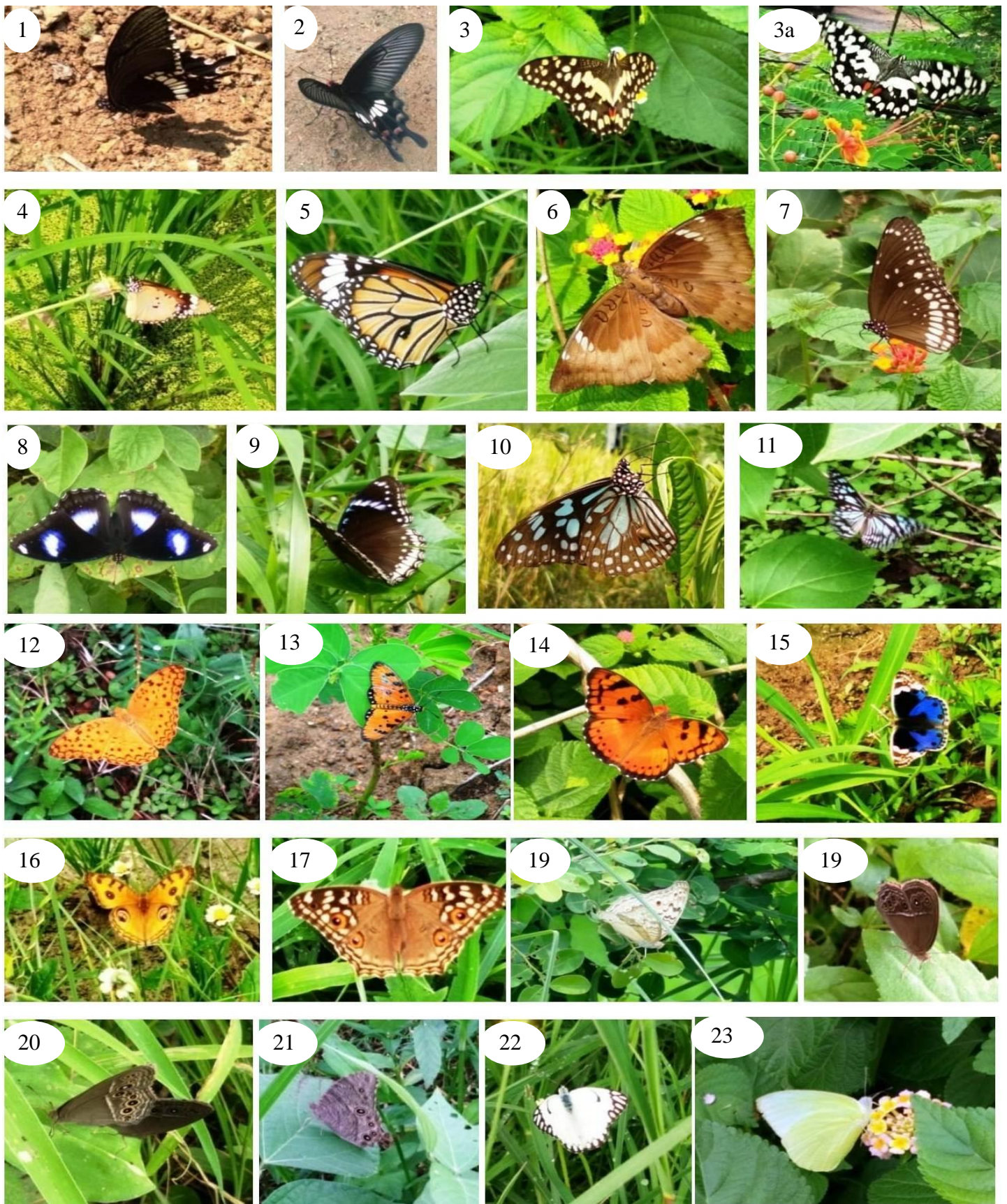


Fig. 2: Scientific and common name of butterfly mentioned in theTable 1 (1 to 23)

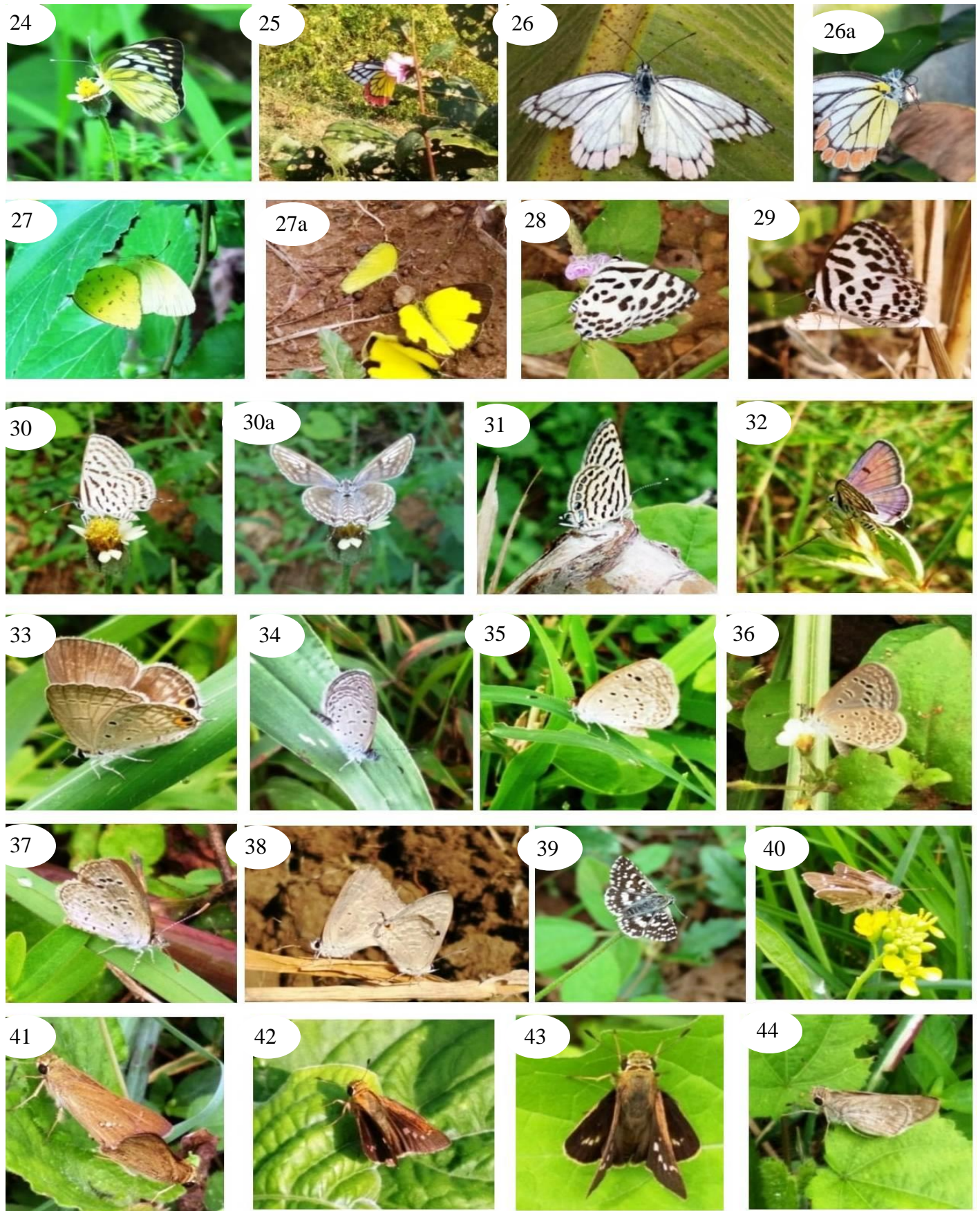


Fig. 3: Scientific and common name of butterfly mentioned in the Table 1 (24 to 44)

The 29 butterfly species from agricultural field of Howrah, West Bengal recorded in 5 families^[24] and most dominant family is Nymphalidae (11) followed by Lycaenidae (9), Pieridae (4), Hesperidae (3) and Papilionidae (2) and only in rice field recorded 8 species from 4 families.

Tiple *et al.*^[25] 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), Hesperidae (22 species), Pieridae (17 species) and Papilionidae (9 species). The study revealed that Nymphalidae was most dominating family with a higher number of species and most butterfly species were observed from the monsoon in early winter but thereafter declined in early summer^[26].

In Seshachalam Biosphere Reserve of Eastern Ghats Andhra Pradesh, India recorded a total of 50 species of butterflies belonging to 5 families^[27]. The family Nymphalidae (20 species) were found dominant followed by Lycaenidae (12 species), Pieridae (11 species), Papilionidae (5 species) and Hesperidae (2 species).

In the eastern part of Western Ghats, surveyed 103 individual butterfly species belonging to 5 families, namely Nymphalidae (32), Pieridae (23), Lycaenidae (19), Hesperidae (15) and Papilionidae (14), which revealed that Nymphalidae and Pieridae were the rich dominant families, while Hesperidae and Papilionidae were less dominant; similar to the present observations^[28].

According to Ganvir *et al.*^[22], in Paddy growing (Rabi rice crop) during winter to the pre-monsoon and winter season at Silezari was recorded total 24 species of butterflies belonging to 20 genera. The family Papilionidae comprises only one species and Family Nymphalidae, Pieridae, Lycaenidae and Hesperidae were consisted of 8 genera and 12 species; 3 genera and 3 species; 5 genera and 5 species and 3 genera and 3 species respectively.

In this study, out of total 44 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 were recorded very low around paddy field during monsoon season in the year 2016. The maximum species richness is reported from July to November in Morning hours.

CONCLUSIONS

The butterfly diversity of agroecosystem of Arjuni/Morgaon, Gondia district is very high. Agricultural fields are a unique ecosystem that provided better habitat to butterfly. Their diversity in the fields also a good signal of health of agricultural crop. The present work has concluded that systematically studied butterfly diversity first time in and around agricultural field and prepared checklists in the study area. Family-Nymphalidae carries the maximum number of species than remaining families. This study would be useful to conserve the wide range of indigenous

butterfly species in an area.

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