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Butterfly Diversity in Various Regions of Nizamabad District, Telangana, India

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Abstract: Butterflies are known to diversify in Nizamabad district in Telangana according to seasons and ecological conditions. In order to understand the species composition and quantity of butterflies in the area, the butterfly diversity in Nizamabad was examined. Three sampling locations were chosen including the Indalwai woodland, the Dichpally farms, and the Nizamabad cities. During the monsoon season (June to September), many species of butterflies can be observed in Nizamabad district. The rains bring about lush vegetation and abundant nectar sources, attracting variety of butterflies. Some common species seen during this time include *Eurema hecabe*, *Catopsilia pomona*, *Junonia lemonias*, *Papilio polytes*, *Delias eucharis*, *Tirumala limniace*, *Junonia atlites*. As the monsoon season transitions into winter (October to February), the butterfly diversity in Nizamabad district starts to reduce. The cooler temperatures and drier conditions limit the availability of nectar and reduce butterfly sightings. However, a few species like the *Papilio polymnestor*, *Papilio polytes*, *Pachliopta hector*, *Acraea terpsicore*, *Catopsilia pomona*, *Papilio demoleus*, *Cepora nerissa*, *Castalius rosimon*, *Tirumala septentrionis*, *Tarucus indica*. *Tirumala limniace* can still be spotted during this time. With the onset of spring (March to May), Nizamabad district witnesses a resurgence in butterfly diversity. The blooming of flowers and emergence of new foliage create favorable conditions for various butterfly species. Species such as *Euploea cora*, *Delias eucharis*, *Papilio demoleus*, *Pachliopta hector* can be commonly seen during this season. The changing seasons bring about fluctuations in butterfly populations, providing an ever-changing and fascinating sight for nature enthusiasts and researchers. The variety of butterflies was sampled using a standardized technique. Nizamabad has a high diversity of butterfly species, with a total of 50 species which belonged to various families, including the Nymphalidae, Lycaenidae, Pieridae, and Papilionidae.

Keywords: Butterfly diversity, Ecological conditions, Seasons, Correlation, Abundance

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Introduction

Butterflies are one of the most conspicuous species of Earth's biodiversity. Being extremely

responsive to any changes in their environment, namely, temperature, humidity, light, and rainfall

patterns (Murphy and Weiss, 1988; Sparrow *et al.*, 1994; Spitzer *et al.*, 1997; Bereton *et al.*, 2011), these insects are identified as useful bio-indicators. Butterflies are generally regarded as the best taxonomically studied groups of insects due to their great aesthetic value owing to bright colors, interesting behaviors and day time activity periods (Robbins and Opler, 1997). Food of butterfly plays an important role in determining their distribution, abundance and movement (Kunte, 2000). Butterflies are extremely important components of the bio-indicators (Chakravarthy *et al.*, 1997). It is often used as bio-indicators of ecosystem health and as surrogates for overall biodiversity (Saikia *et al.*, 2009) and are widely used as sensitive indicators of environmental change, temperature and humidity caused by disturbances in its habitats (Balmeer and Erhardt, 2000). Butterflies are highly reactive and respond to slightest changes in their habitat. Hence, the conservation of habitats and butterflies must be given priority (Sindhu, 2011). Butterflies are essential part of any natural ecosystem as pollinators and energy transferors from herbivore to the next trophic level (Shreekumar and Balakrishnan, 2001). The relationship between plants and butterflies is highly complex and co-evolved (Ehrlich and Raven, 1964). Butterflies are potential indicators of the ecosystem as they are sensitive to microclimate, temperature and solar radiation (Kunte, 1997). Butterflies are highly sensitive to environmental fluctuation like temperature, humidity, rainfall and light (Spitzer *et al.*, 1997) and are good pollinators of plants (Erhardt, 1985). In this study, the variety and distribution of butterflies in three distinct habitats and areas- the Indalwai forest, the Dichpally agricultural fields, and the Nizamabad urban areas were determined.

Materials and Methods

Study area:

Nizamabad district was chosen as the study's habitat (Fig. 1). The district has a total size of 4,288 square kilometres (1,656 sq mi), and its coordinates are 18°41' N 78°6' E (Kunte, 2000).

Nizamabad is bordered by the Maharashtra State districts of Kamareddy on the south, Jagtial and Rajanna Sircilla on the east, Nirmal district on the north, and Nanded district on the west. At Kandakurthi, the Godavari River enters Telangana from the Nizamabad district.

For the survey of butterflies "point counting" method and "Hand netting method" were employed during the survey from 7:00 am to 10.30 am and 4.00 pm to 5.00pm. To determine butterfly richness and abundance "Line transect method" was adopted by dividing the study area based on the vegetation and soil type (Kunte, 2000). After the observation and capturing, identification of Butterflies released them at the spot of capture only. A butterfly net is required for this purpose. Collecting live specimens was avoided during the study.

Results and Discussion

During the survey, 50 species of butterflies were identified. Their presence is attributed to the emergence of secondary vegetation, including *Lantana camera*, *Nerium*, *Tridax procumbens*, *Catharanthus roseus*, *Verticillaster*, *Ixora*, *Euphorbia milli*, *Bougainvillea glabra*, *Hibiscus rosa sinensis*, *Tecoma stans*, and *Callindia surinamensis*. *Calotropis*, *Tagetes patula*, *Cleome viscosa*, *Caesalpinia*, *Senna auriculata*, *Jatropha gossypifolia*, *Mesosphaerum suaveolens*, *Melochia corchorifolia*, *Duranta erecta*, *Senna obtusifolia*, *Acacia indica*, *Butea monosperma*, and *Delonix regia*.

From Nymphalidae family 21 species were identified. They are *Hypolimnasmisippus* (Danaid egg fly), *Junonia almanac* (Peacock pansy), *Acraea terpsicore* (Tawny coster), *Junonia lemonias* (Lemon pansy), *Euploea core* (Common crow butterfly), *Danaus plaxipus* (Monarch butterfly), *Danaus chrysipus* (The plain tiger), *Junonia orithya* (The blue pansy), *Tirumala limniace* (Blue tiger), *Danaus genutia* (The common tiger), *Melanitis leda* (Common evening brown), *Hypolimnas bolina* (Great Eggfly), *Asterocampa clyton* (Tawny emperor), *Bicyclus anynana* (Squinting bush

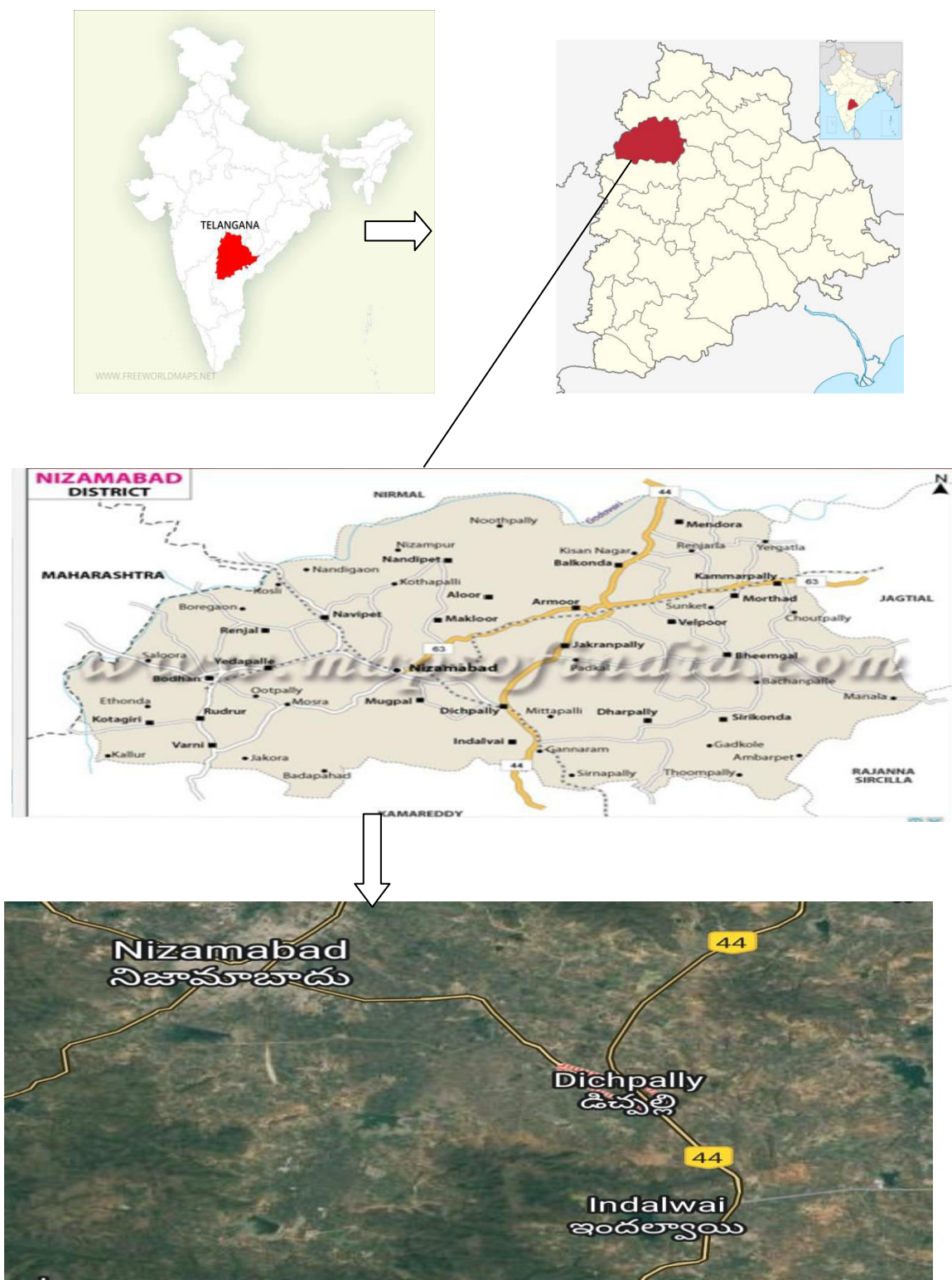


Fig. 1: Study areas- Nizamabad, Dichpally and Indalwai.

Table 1: Butterfly Species abundance according to weather conditions during January 2019-May 2019 and January 2022 –May 2022

Month	Temperature (°C)		Humidity (%)		Rainfall (mm)		Season	More abundant Butterfly species
	2019	2022	2019	2022	2019	2022		
JANUARY	30.19°C	29°C	38.56	69	6.2	5.5	Winter	<i>Tarucus indica</i> , <i>Papilio demoleus</i> , <i>Cepora nerissa</i> , <i>Castalius rosimon</i> , <i>Tirumala septentrionis</i>
FEBRUARY	33.5°C	33°C	31.50	55	0.7	0.5		
MARCH	37.9°C	37°C	29	47	20	21	Summer	<i>Euploea cora</i> , <i>Delius eucharis</i> , <i>Papilio demoleus</i> , <i>Pachliopta hector</i>
APRIL	41.53°C	40°C	24	42	31	32		
MAY	42.65°C	42°C	19.50	42	40	43		

Table 2: Butterfly Species abundance according to weather conditions during June 2019-September 2019 and June 2022 –September 2022

Month	Temperature (°C)		Humidity (%)		Rainfall (mm)		Season	More abundant Butterfly species
	2019	2022	2019	2022	2019	2022		
JUNE	37.2°C	36°C	55	62	60	65	South west monsoon	<i>Eurema hecabe</i> , <i>Catopsilia pomona</i> , <i>Junonia lemonias</i> , <i>Papilio polytes</i> , <i>Delias eucharis</i> , <i>Tirumala limniace</i> , <i>Junonia atlites</i>
JULY	28.97°C	29.5°C	82.50	86	68	74		
AUGUST	27.9°C	28°C	80.68	80	63	772		
SEPTEMBER	27.8°C	27.9°C	85.50	83	51	55		

Table 3: Butterfly Species abundance according to weather conditions during October 2019-December 2019 and October 2022 – December 2022

Month	Temperature (°C)		Humidity (%)		Rainfall (mm)		Season	More abundant Butterfly species
	2019	2022	2019	2022	2019	2022		
OCTOBER	28.29°C	27.22°C	85	76	10	8	Northeast monsoon	<i>Papilio polymnestor</i> , <i>Papilio polytes</i> , <i>Pachliopta hector</i> , <i>Acraea terpsicore</i> , <i>Catopsilia pomona</i>
NOVEMBER	28.8°C	26.66°C	73.50	64	1.6	1.2		
DECEMBER	27.16°C	27.77°C	71	65	1.5	1.1	Winter	<i>Papilio demoleus</i> , <i>Cepora nerissa</i> , <i>Castalius rosimon</i> , <i>Tirumala septentrionis</i> , <i>Tarucus indica</i> , <i>Tirumala limniace</i>

Table 4: Butterfly Species abundance according to weather conditions during January 2023-May 2023

Month	Temperature (°C)	Humidity (%)	Rainfall (mm)	Season	More abundant Butterfly species
	2023	2023	2023		
JANUARY	28.33°C	40	0.5	Winter	<i>Tarucus indica</i> , <i>Papilio demoleus</i> , <i>Cepora nerissa</i> , <i>Castalius rosimon</i> , <i>Tirumala septentrionis</i> , <i>Tirumala limniace</i>
FEBRUARY	31.11°C	37	0.7		
MARCH	32.22°C	35	20	Summer	<i>Euploea cora</i> , <i>Delius eucharis</i> , <i>Papilio demoleus</i> , <i>Pachliopta hector</i>
APRIL	34.44°C	34	32		
MAY	36.11°C	35	45		

brown), *Junonia atlites* (The grey pansy) , *Tirumala septentrionis*(The dark blue tiger) , *Byblia lithyia* (The spotted joker), *Ariadne ariadne* (Angled castor), *Euthalia nais* (Baronet), *Menelaus blue morpho* (Common blue morpho), and *Elymnias hypermnestra* (Common palmfly) .

There are 13 known species in the Lycaenidae family-- Common pierrot (*Castalius rosimoon*), Grass jewel (*Freyeria trochylus*), Pea blue butterfly (*Lampides boeticus*), Eastern grass jewel (*Freyeria putli*), Common cerulean (*Jamides celeno*), The gramme blue (*Euchrysops cnejus*), The Indian pierrot (*Tarucus indica*), The ceraunus blue (*Hemiargus ceraunus*), The plains cupid or cycad blue (*Luthrodes pandava*), Cassius blue or tropical striped blue (*Leptotes cassius*), Balkan pierrot or little tiger blue (*Tarucus balkanicus*), Dark grass blue (*Zizeeria karsandra*), and Silver Forget-me-not (*Catochrysops panormus*).

There were 11 species found in the Pieridae family. They are Lemon emigrant(*Catopsilia Pomona*), Common grass yellow (*Eurema hecabe*), Indian Jezebel (*Delias eucharis*), Mottled emigrant (*Catopsilia pyranthe*), Crimson tip (*Colotis danae*), Sulphur orange tip or plain orange tip (*Colotis aurora*), Cabbage white (*Pieris rapae*), The lyside sulphur or guayacan sulphur (*Kricogonia lyside*), Pioneer white (*Belenois aurota*), The common gull (*Cepora nerissa*), One-spot Grass yellow (*Eurema*

andersonii).

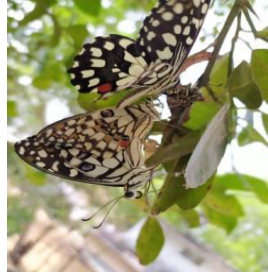
Five species of the Papilionidae family were identified. They are the Common Mormon (*Papilio polytes*), Lime Butterfly (*Papilio demoleus*), Blue Mormon (*Papilio polymnastor*), Crimson Rose (*Pachliopta hector*), and Citrus Swallowtail (*Papilio demodocus*).

The butterflies were observed perching and feeding on *Lantana camera*, *Nerium*, *Tridax procumbens*, *Catharanthus roseus*, *Verticillaster*, *Ixora*, *Euphorbia milli*, *Bougainvillea glabra*, *Hibiscus rosa sinensis*, *Tecoma stans*, *Guava*, *Callindra surinamensis*, *Tagetes patula*, *Cleome viscosa*, *Calotropis*, *Caesalpinia*, *Duranta erecta*, *Senna obtusifolia*, *Acacia indica*, *Butea monosperma*, *Delonix regia*, *Senna auriculata*, *Jatropha gossypifolia*, *Mesosphaerum suaveolens*, and *Melochia corchorifolia*.

Abundance of butterflies during different seasons has been depicted in tables 1-4. Photographs of some butterflies are shown in Figure 2. The Indian pierrot (*Tarucus indica*), lime butterfly (*Papilio demoleus*), common gull (*Cepora nerissa*), common pierrot (*Castalius rosimon*), and dark blue tiger (*Tirumala septentrionis*) were the butterfly species that were more prevalent during the winter season. The common crow butterfly (*Euploea cora*), the Indian jezebel (*Delius eucharis*), the lime butterfly (*Papilio demoleus*),



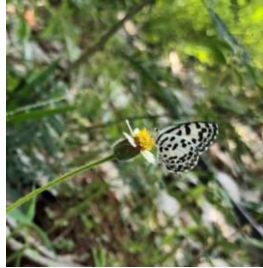
Tarucus indica



Papilio demoleus



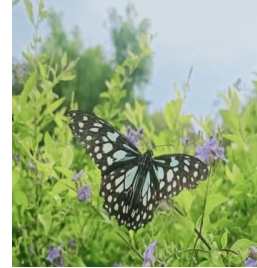
Cepora nerissa



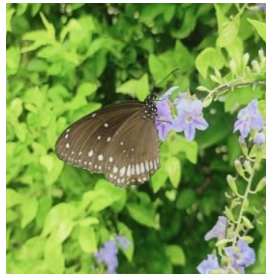
Castalius rosimoon



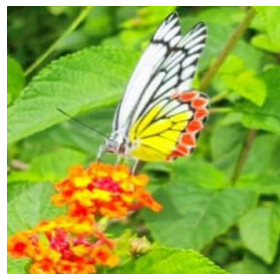
Tirumala septentrionis



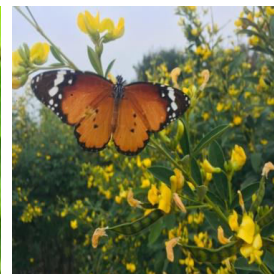
Tirumala limniace



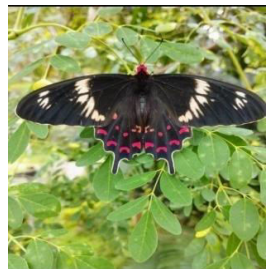
Euploea core



Delias eucharis



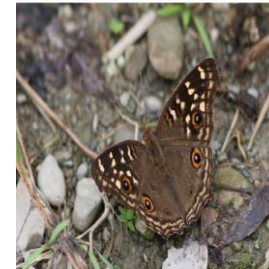
Danaus chrysipus



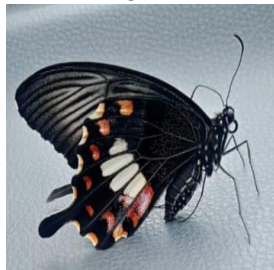
Pachliopta hector



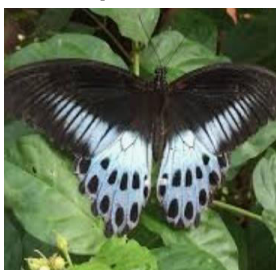
Catopsilia Pomona



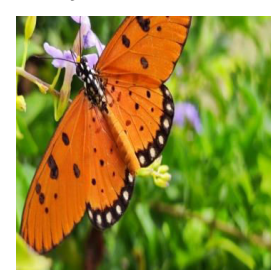
Junonia lemonias



Papilio polytes



Papilio polymnastor



Acraea terpsicore

Fig. 2: Photographs of some abundant butterflies.

and the crimson rose (*Pachliopta hector*) were the butterfly species that were more prevalent during the summer. Common crow butterflies (*Eurema hecabe*), lemon emigrant butterflies (*Catopsilia pomona*), lemon pansies (*Junonia lemonias*), common mormon butterflies (*Papilio polytes*), Indian jezebel butterflies (*Delias eucharis*), blue tiger butterflies (*Tirumala limniace*), and grey pansies (*Junonia atlites*) were among the more numerous butterfly species during the south west monsoon. More prevalent butterfly species during the Northeast monsoon included the common crow butterfly (*Eurema hecabe*), the lemon emigrant (*Catopsilia pomona*), the lemon pansy (*Junonia lemonias*), the common mormon (*Papilio polytes*), the Indian jezebel (*Delias eucharis*), the dark blue tiger (*Tirumala limniace*), and the grey pansy (*Junonia atlites*).

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