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Comparative study of butterfly between native vegetation and *Prosopis Juliflora* dominated area in Udaipur district, Rajasthan

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Abstract
Butterflies have been represented as an important indicator species by reason of littlest change in environmental factors. They are sensitive to environmental changes and pollution. Butterflies diversity and density has been recorded higher in Habitat-I comparison to Habitat-II. The most represented families were Nymphanidae and the majority of the species recorded were from the family of Nymphanidae, Lycaenidae, Pieridae, Papilionidae and Hasperlidae represents (37.50%), (25%), (20%), (15%) and (7.50%) respectively. The butterfly species categorized on the basis o frequency of sighting. 23 species belongs to very common (VC) categorized followed by 7 common, 6 less common and 4 species were rarely sighted in habitat-I. Habitat –II were recorded 7 species were very common, 7 less common, 2 common, 2 rare and 12 species are completely absent. The study showed maximum number of species and density present in native vegetation area as compare to *Prosopis juliflora* dominant area, due to availability of variety of nectars and flowers.

Keywords: Indicator species, sensitive, frequency, sighting, density, *Prosopis juliflora*.

1. Introduction
Udaipur region has a good biodiversity of flora and fauna, Udaipur wildlife division have four wildlife sanctuary Pulwari-ki naal, Kumbhalgardh, Jaisamand and Sitamata. The main vegetations are Timruc (*Zanthoxylum armatum*), Bor (*Ziziphus mauritia*), Dhavado (*Anogeissus latifolia*), Khair (*Senegalia catechu*), Bael (*Aegle marmelos*), Desi babool(*Acacia nilotica*), neem (*Azardirachta indica*), dudhi (*Euphoria hirta*), gular (*Ficus racemosa*), dhak (*Butea monosperma*), khajur (*Phoenix dactylifera*), mohua (*Madhuca longifolia*), and major invasive species are *Prosopis juliflora* and *Lantana camara*. The region holds a large number of butterflies, moth and insect species. Butterflies are good symbol of beauty and pollinating agents, they are playing major in food chain of ecosystem (Gay *et al*., 1992) [1]. India have been recorded 1500 butterfly species out of these south India have 310 species (Larsen, 1987, 1988; Wynter Blyth, 1957) [2, 4]. Butterflies pollinating plant show co-evolutionary mechanism and possess specific host specificity (P.R. Ehrlich and P.H. Raven, 1964) [5]. The species diversity are continue decline due to habitat loss, modification, pollution and extension of urban area and present condition of species face high risk of extension due to destruction of habitat (Blair R B and Launer 1997; Groombridge, 1992; John, 1997; Laurance and Bierregaard, 1997) [6, 7, 8]. Butterflies diversity also influenced by Habitat types and environmental conditions like- Temperature, Atmosphere and whether conditions (Kunte, 2000) [9]. The present condition of species face high risk of extinction due to habitat destruction, urbanization and Butterflies can survive in restricted terrestrial habitats and major fauna of forest ecosystem. Insect are play major role in population of crop and wild plant, almost 88.7% pollination are done by bees, beetles, moth and Butterflies and play major role in 35 % global crop production and maintained uncultivated floral diversity (Mangowi, 2014) [10].

Objective of Study
The work presented comparative and unique study of Butterflies species occurring in native and *Prosopis juliflora* domination area in Udaipur region.

Material and Method
The study was based on field work using quadrate method in different area and data collected from July 2017 to June 2018. The quadrate size was approximate 100 meter X 100 meter in length. Every habitat study were done in total four quadrate, out of four quadrate two were native vegetation and two were purely *Prosopis juliflora* dominant vegetation. To maximize observation of butterfly, 10 minutes stops were in every point and total numbers of point were five in each quadrate.

Data were collected in morning and evening hours of study periods and no specimen were collected of butterflies. Identification of butterflies was done by identification key and standard book- Butterflies of India, Nepal, Pakisthan, Bhutan, Bangladesh and Shrilanka (Wynter Blyth, 1957 [4] Haribal, 1992; Kunte [12], 2000 [9] Petersmeteck, photography done by Nikon P900 and Canon 6D, 50-200mm lens. The sighting of butterflies in selective quadrate areas was note down and classified according to number of repeated observation. Butterflies were more frequently sighted (> 40 times) are categorized in Very Common (VC) followed by (10-20) common (C) and (< 10 or more then 2) less common (LC) and sighted one or two times were categorized in Rare(R).

The temperature ranging between maximum of 43.5°C and a minimum of 28.5°C during summer season. Winter season begins generally from November to February. Winter

season with maximum temperature increasing up to 25.6°C and minimum 6.3°C temperature were recorded (RCA Udaipur, 2018). The area is specifying by three noticeable season summer (March-June), monsoon (July-Octobers) and winter (November-February) while mean annual rainfall is 554mm (RCA Udaipur, 2018).

Result and Disscussion

Abundance and species richness of butterflies are reflected through types of vegetation and availability of preferred food, these insect select their habitat in relation to their food and host plants (Manoj R. Borkar and Neelam komarpant, 2004) [13]. Higher abundance and species of butterflies associated with food plants and availability of nectars, although Raju and Reddy (1955) [14] observed great diversity of butterflies on exotic plant species *Lantana camara* in Visakhapatnam. Butterflies species richness and abundance were recorded higher in native vegetation area as compare to *Prosopis juliflora* dominant area due to availability of food and diverse vegetation in native area.

During the study period from July 2107 to June 2018, a total of 40 species of butterflies were observed belonging to 5 families. Out of which 6 species belong to papilionidae, 8species belong to family pieridae, 10 species belong to family lycaenidae, 15 species belong to family nymphalidae and 3 species from family hasperidae were recorded. Studies on the butterfly abundance and sighting were classified into very common (VC), common(C), less common (LC), rare (R) and absent (A). The diversity and density of butterflies record the concern of the food resources availability in the study area for their continuity. The species lives of butterflies associated with two habitats have been shown (Table-1). Different sites were classified according to number of repeated observation; they are habitat-I (Native vegetation area) and Habitat-II (*Prosopis juliflora* dominant area). The species richness as calculated was recorded to be the highest for native habitat. Habitat-I(Native vegetation area) butterflies were identified as their frequent sighted out of 40 butterfly species recorded about 23 species were very common, 7 species common, 6 species less common and 4 species were rarely sighted in native habitat. While Habitat-II (*Prosopis juliflora* dominant area) out of 40 butterfly's species 7 butterfly species were very common followed by 7 butterfly species less common, 12 species rare, 2 butterfly species common and 12 species of butterflies were not sighted in *Prosopis juliflora* dominant area.

The relative diversity (RDi) of families was calculated with the help of following formula (Torre-Cuadros *et al*., 2007) [15].

RDi= (Number of butterfly species in the family/ total number of species) X 100

Analysis of relative diversity in study area revealed that Nymphallidae was most abundant family (RDi= 35) followed by Lycanidae (RDi= 25), Pieridae (RDi= 17.5), Papilionidae (10) and Hespiridae poorly abundant in study area.

The butterflies diversity and density decline with habitat destruction and industrializations (Sree Kumar *et al*., 2001; Thomas 2005). Butterflies preferred more nature habitat as compared to other habitat and modified habitat (Tiple *et al*., 2007; Khurad *et al*., 2009) [18, 19].

Table 1: Butterflies species recorded in Native habitat and Prosopis juliflora dominant area during study period, Udaipur

Sr.no.	Common name and families	Zoological names	Native habitat	*Prosopis juliflora* dominant habitat
	Papilionidae			
1	Common Rose	*Pachliopta aristolochiae (fabricus, 1775)*	LC	A
2	Lime butterfly	*Papiliodemo demoleus (Linnaeus, 1758)*	*VC*	*LC*
3	Common Mormon	*Papilio polytes (Linnaeus, 1758)*	*VC*	*R*
4	Tailed Jay	*Graphium Agamemnon (Lathy,1907)*	R	A
	Pieridae			
5	Common Emigrant	*Catopsilia pomona (Fabricius,1775)*	*VC*	*VC*
6	Small Grass Yellow	*Eurema brigitta (Linnaeus, 1758)*	VC	VC
7	Mottled Emigrant	*Catopsilia pyranthe (Linnaeus, 1758)*	*VC*	*VC*
8	Common grass yellow	*Eurema hecabe (Linnaeus, 1758)*	*VC*	*VC*
9	Common Jezebel	*Delias eucharis (Drury, 1773)*	*R*	*A*
10	Yellow orange tip	*Ixias pyrena (Linnaeus,1764)*	*C*	*A*
11	Spotless grass yellow	*Eurema laeta (Boisduval, 1836)*	VC	VC
12	Psyche	*Leptosia nina (Fabricius, 1793)*	*VC*	*LC*
	Lycaenidae			
13	Common silver lime	*Spindasis vulcans fusca (moore,1881)*	*VC*	*LC*
14	Pale grass blue	*Pseudozizeeria maha (kollar, 1844)*	*VC*	*C*
15	Dark grass blue	*Zizeeria karsandra (moore, 1865)*	*VC*	*C*
16	Lesser grass blue	*Zizinaotis otis (fabricius,1787)*	*VC*	*LC*
17	Lime blue	*Chilades lajus (Cramer, 1782)*	*VC*	*VC*
18	Zebra blue	*Leptotes plinius (Fabricus, 1793)*	*C*	*R*
19	Slate ftash	*Rapala manea (Hewitson, 1863)*	*VC*	*R*
20	Gram blue	*Euchrysops cnejus (fabricus, 1798)*	*VC*	*R*
21	Tiny grass lime	*Zizula hylax (fabricius, 1775)*	*VC*	*R*
22	Dark Cerulean	*Jamides bochus (Stoll,1782)*	*LC*	*A*
	Nymphalidae			
23	Panted lady	*Vanessa cardui (Linnaeus, 1758)*	C	R
24	Grey pansy	*Junonia atlites (Linnaeus, 1763)*	*VC*	*LC*
25	Common evening brow	*Melanitis leda (Linnaeus, 1758)*	*VC*	*R*
26	Blue pansy	*Junonia orithya (Linnaeus, 1758)*	*R*	*A*
27	Great eggfly	*Hypolimnas bolina (Linnaeus, 1758)*	*C*	*A*

28	Glassy Tiger	*Parantica aglea melanoides (moore,1883)*	*C*	*R*
29	Blue Tiger	*Tirumala limniace leopardus(Butler, 1866)*	*C*	*R*
30	Danid Eggfly	*Hypolimnas misippus (Linnaeus, 1764)*	*C*	*A*
31	Plan tiger	*Danaus chrysippus (Linnaeus, 1758)*	*VC*	*LC*
32	Peacock pansy	*Junonia almana (Linnaeus, 1758)*	*VC*	*R*
33	Yellow pansy	*Junonia hierta (fabricius, 1798)*	*C*	*R*
34	Lemon pansy	*Junoia lemonias (Linnaeus, 1758).*	*VC*	*VC*
35	Common sailor	*Neptis hylas (Andamana moore, 1877)*	*LC*	*A*
36	Common four ring	*Ypthima huebneri Kirby, 1871*	*LC*	*A*
37	common crow	*Euploea core (Cramer, 1780)*	*VC*	*LC*
	Hesperlidae			
38	Brow awl	*Badamia exclamationis (Fabricius, 1775)*	*LC*	*R*
39	Indian skipper palepalm dart	*Spialia galba(Fabricius, 1793)*	*R*	*A*
40	Spotted Small flat	*Sarangesa purendra (Moore, 1865)*	*LC*	*A*

Note: VC= Very common, C= Common, LC = Less common, R= Rare, A= Absent

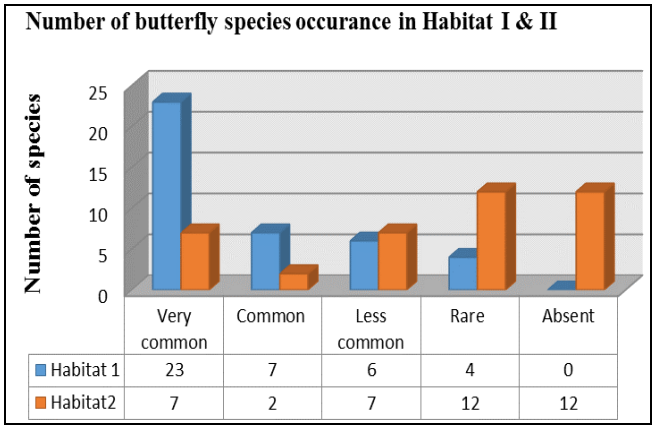

Fig 1: Number of butterfly species according to sighting in Habitat-I (Native vegetation area) and Habitat-II (*Prosopis juliflora* dominant area).

Habitat-I (Native vegetation area)

Habitat-II *(Prosopis Juliflora* dominant area)

Danaid Egg fly female

Peacock pansy

Molted Emigrant

Sugar apple

Danaid Egg fly

Great Egg fly

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