Variations in the Butterfly fauna around three Irrigation Reservoirs in the semi arid zone of Central Gujarat

Nirjara Gandhi, Chandni Patel and Geeta Padate

Department Of Zoology, Faculty of Science

The M.S.University of Baroda, Vadodara 390002

INTRODUCTION

- Wetlands – most diverse of all the ecosytems
- The second most productive ecosystems in the world next to the Tropical forests.
- Wetlands support a great variety of biodiversity.
- Most of the studies focuses on the Avian biodiversity in the wetland Ecosystem and very few information is available regarding the other fauna mainly insects.
- Insects - able to adapt to each and every possible habitat present on Earth.
- Lepidopterans have often gathered attraction due to their beautiful colours and their larger size
- As the butterflies are easy to monitor, a study of the butterfly fauna around three wetlands in the semi arid zone of the Central Gujarat was carried out from March 2009-February 2010.

AIM

§ To find out the habitat use by the butterfly fauna around the three Irrigation Reservoirs in the semi arid zone of Central Gujarat.

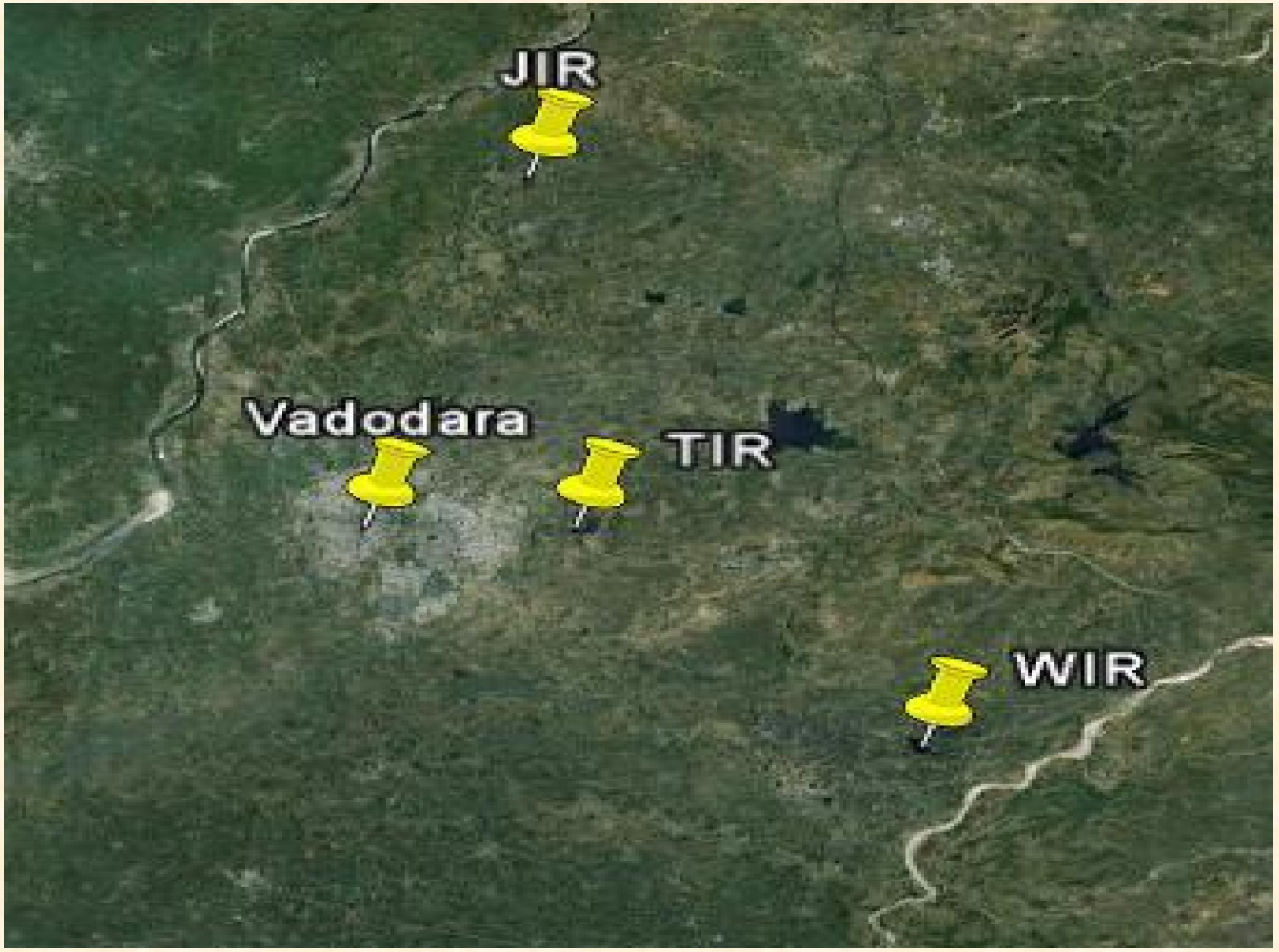
STUDY AREA

- The study on the butterfly fauna was conducted at three Irrigation Reservoirs in the semi arid zone of Central Gujarat. These Reservoirs are:
  - § Timbi Irrigation Reservoir
  - § Jawla Irrigation Reservoir
  - § Wadhwana Irrigation Reservoir

  All the three reservoir are different in size having different type of agricultural matrix and human movements.

Timbi Irrigation Reservoir (TIR) (22°18' N 73°16' E)	Jawla Irrigation Reservoir (JIR) (22º 34’ 20” N and 73º 19’ 24” E)	Wadhwana Irrigation Reservoir (WIR) (22º 10′ N, 73º 30′ E)
Located about 12 kms East of Vadodara city in Central Gujarat.	Located about 40 kms North of Vadodara city in Central Gujarat.	Located about 50 kms. south-east of Vadodara city in Central Gujarat.
Periphery of approximately 3 kms. and spreads in 100.5 acres.	Earthen dam of 2 kms on its western boundary and spreads in an area of 192 acres	Earthen dam of 8.2 kms. with the periphery of 11.2 kms. and spreads in 1420 acres
Perennial reservoir inundated with the Narmada water	Seasonal reservoir solely depending on the rain water	Perennial reservoir inundated with the Narmada water
Urban-rural matrix	Rural Scrubland- agricultural matrix	Rural Agricultural matrix
Faces increasing anthropogenic pressures	Low anthropogenic pressures	No anthropogenic pressures

GOOGLE EARTH IMAGE OF ALL THE THREE RESERVOIRS



TIMBI IRRIGATION RESERVOIR

GOOGLE EARTH IMAGE

GOOGLE EARTH IMAGE

JAWLA IRRIGATION RESERVOIR

GOOGLE EARTH IMAGE

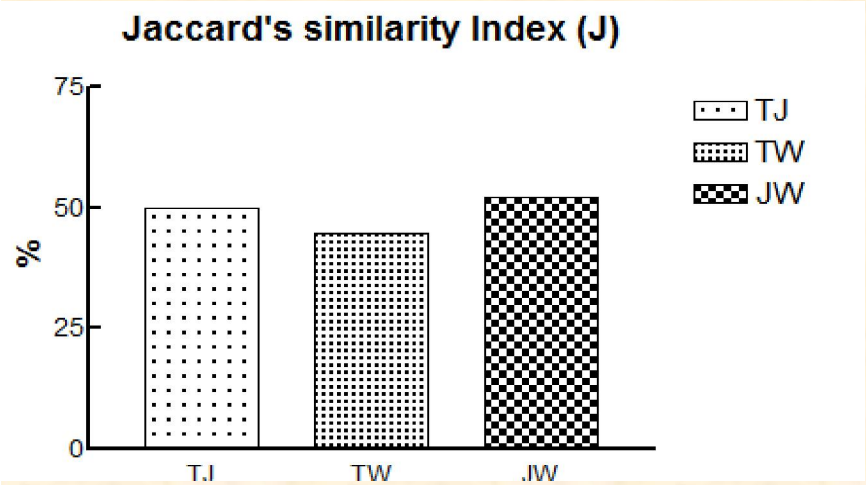
WADHWANA IRRIGATION RESERVOIR

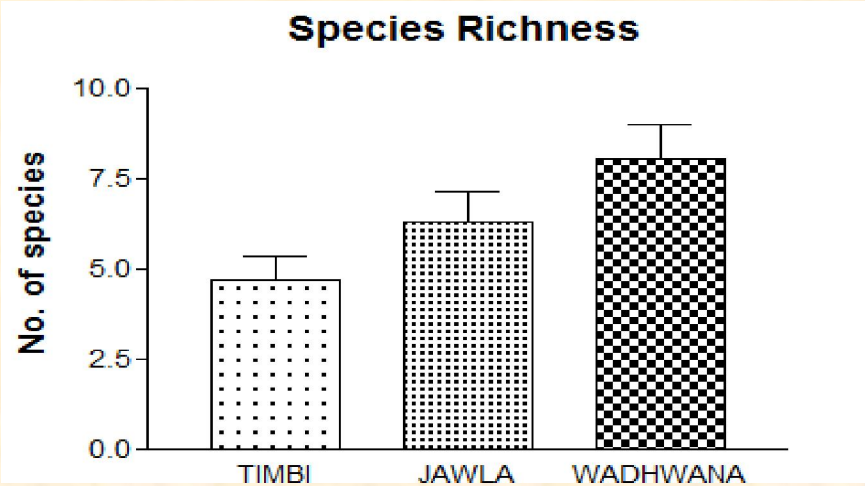
MATERIALS AND METHODS

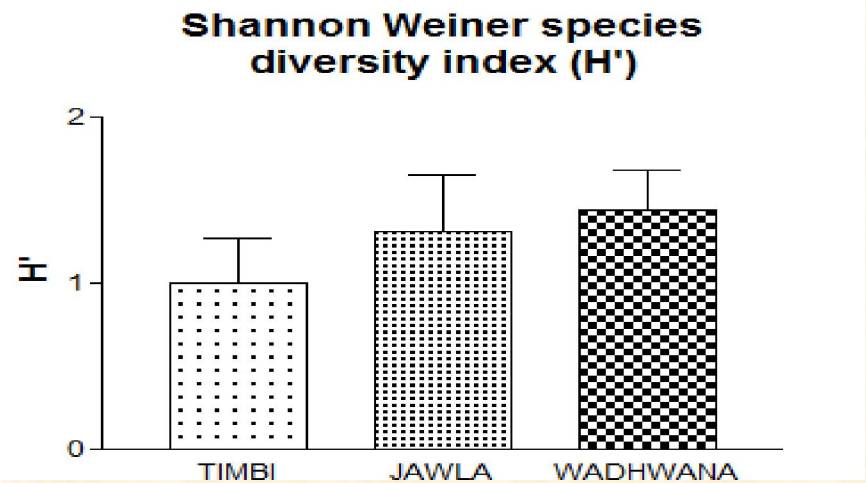
- All the three reservoirs were visited twice a month from March 2009 to February 2010.
- The butterfly fauna present was identified and counted by Transect count method.
- Butterflies identified belonged to 5 families
  - Papilionidae
  - Pieridae
  - Lycaenidae
  - Daniidae
  - Nymphalidae
- Species Richness, Shannon Weiner species Diversity Index (H') and Evenness (E) are given as Mean ± SEM
- Jaccard's similarity index is calculated.
- The differences in Species Richness, Species Diversity Index and Evenness with the seasonal variations are calculated.
- The percentage occurrence of butterfly families compared to the total butterfly population is calculated seasonally.
- One way ANOVA is carried out for species richness, species diversity and evenness to compare the seasonal differences at each site as well as between the three sites.

RESULTS

Fig. 1- Annual differences in the Jaccard's similarity index, Species Richness,Shannon weiner species diversity index (H') and Evenness (E) at the three sites







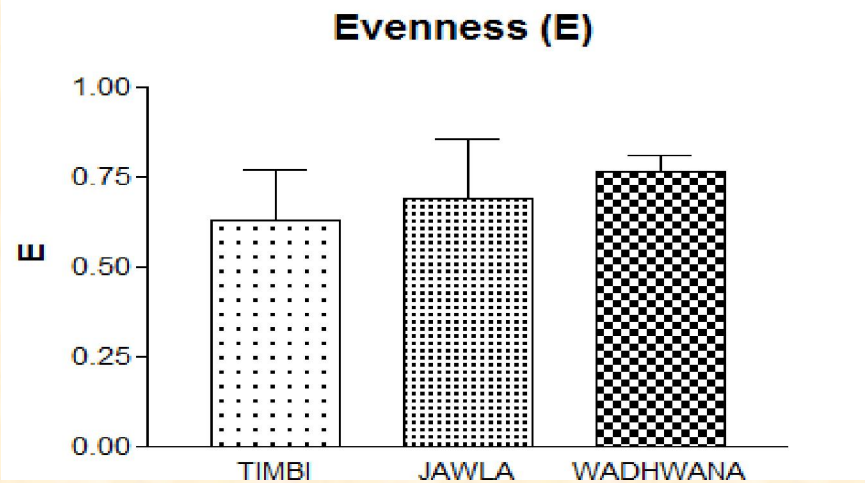
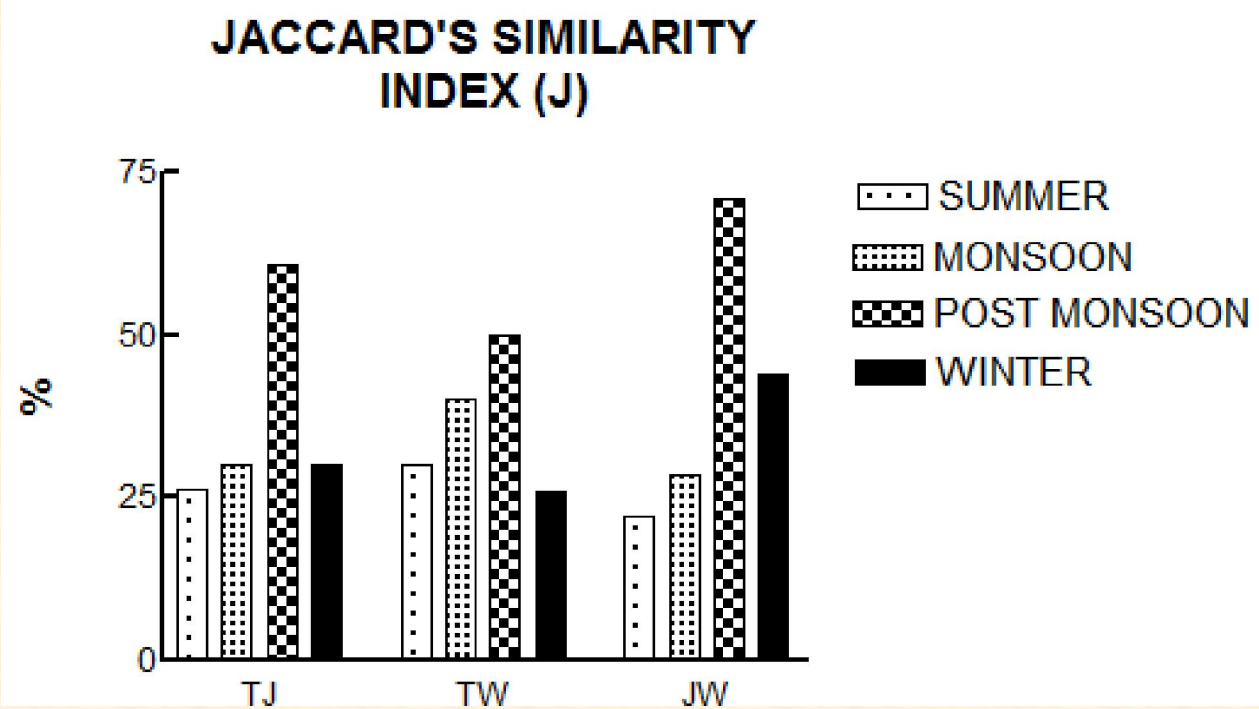
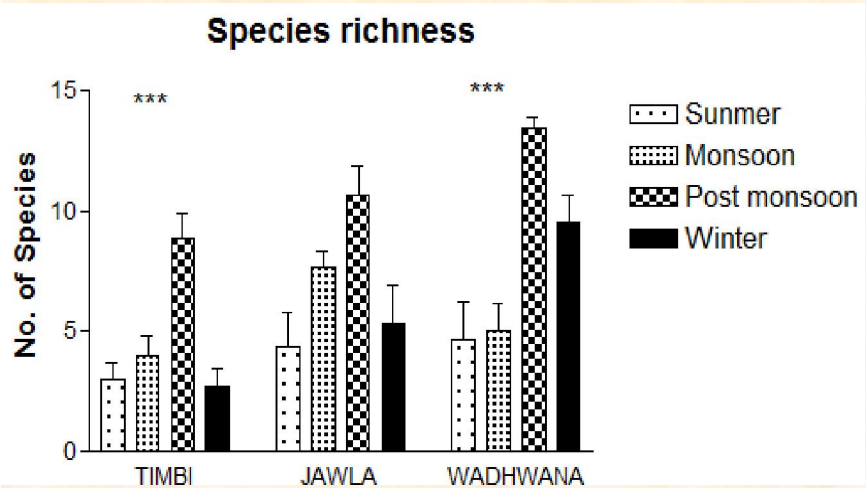


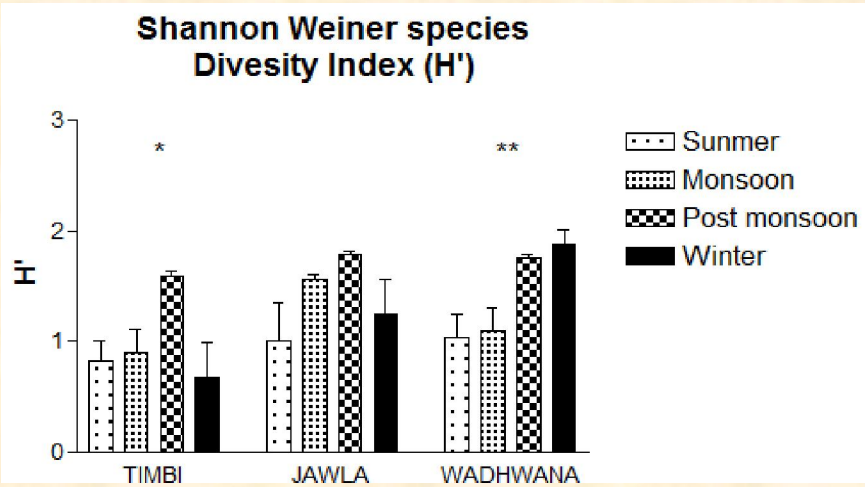
Fig. 2 – Seasonal variation in the Jaccard's similarity index (J).



TJ- Timbi Jawla
TW – Timbi Wadhwana
JW – Jawla Wadhwana

Fig. 3 - Seasonal variations in the Species Richness, Shannon Weiner Species Diversity Index (H') and Evenness (E)





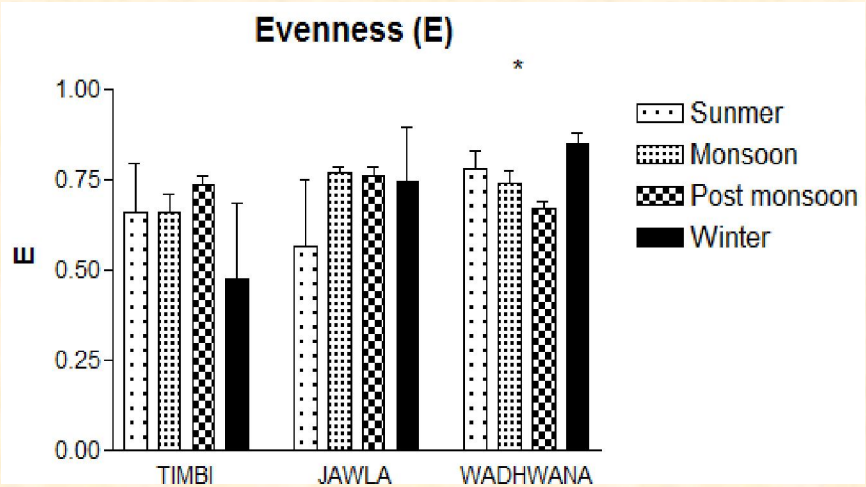


Figure 4: Annual Percentage Occurrence of the five families at the three reservoirs

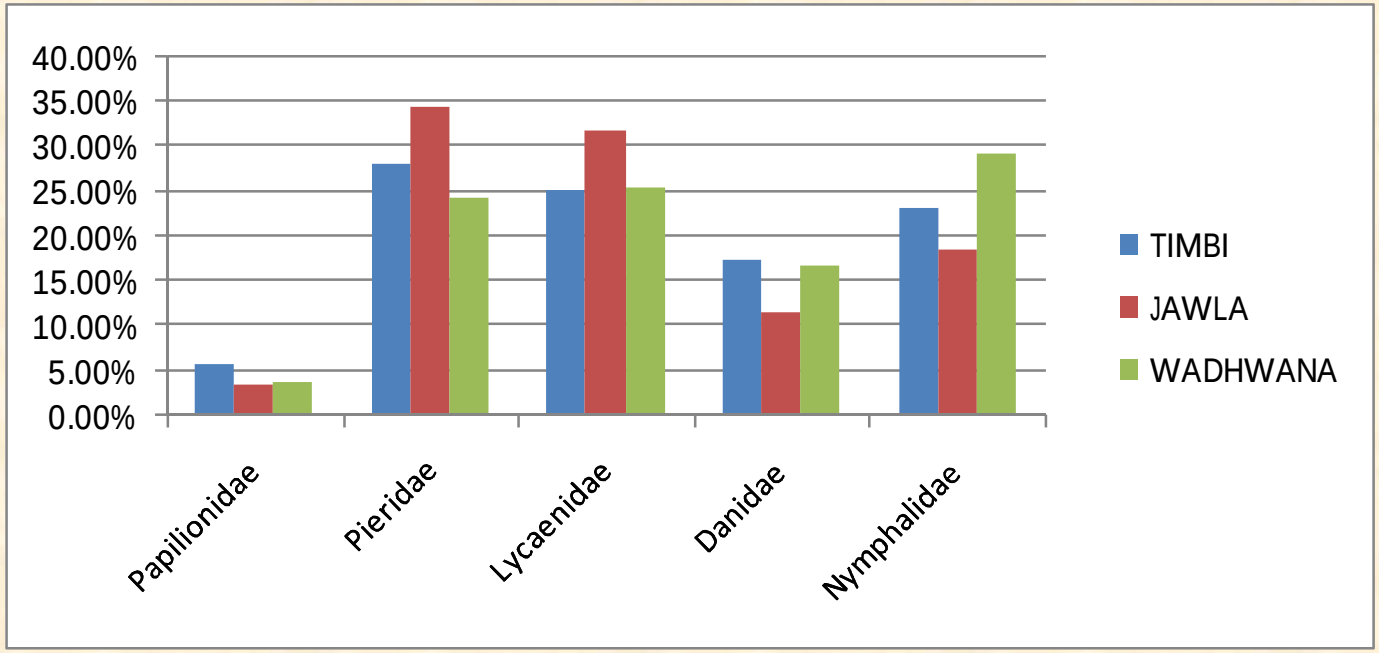
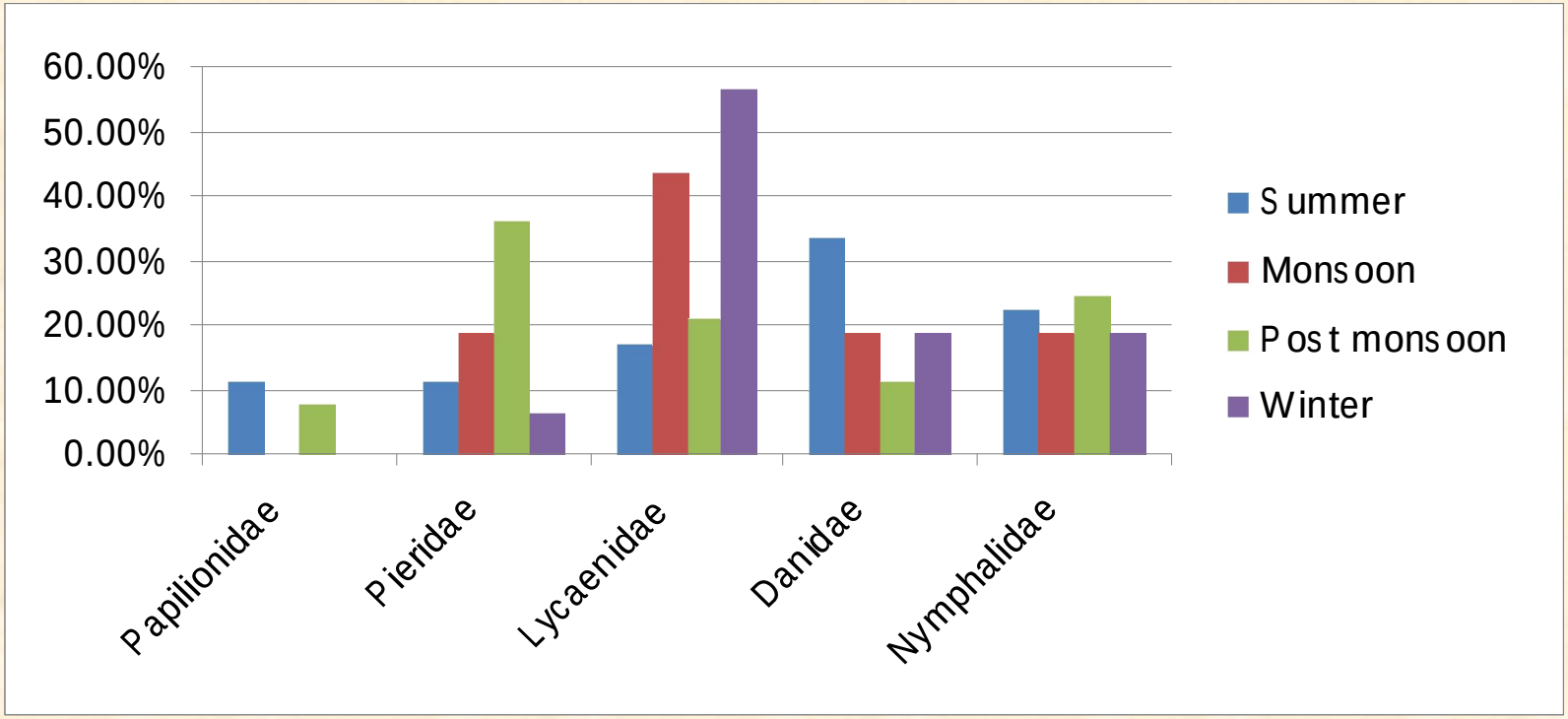
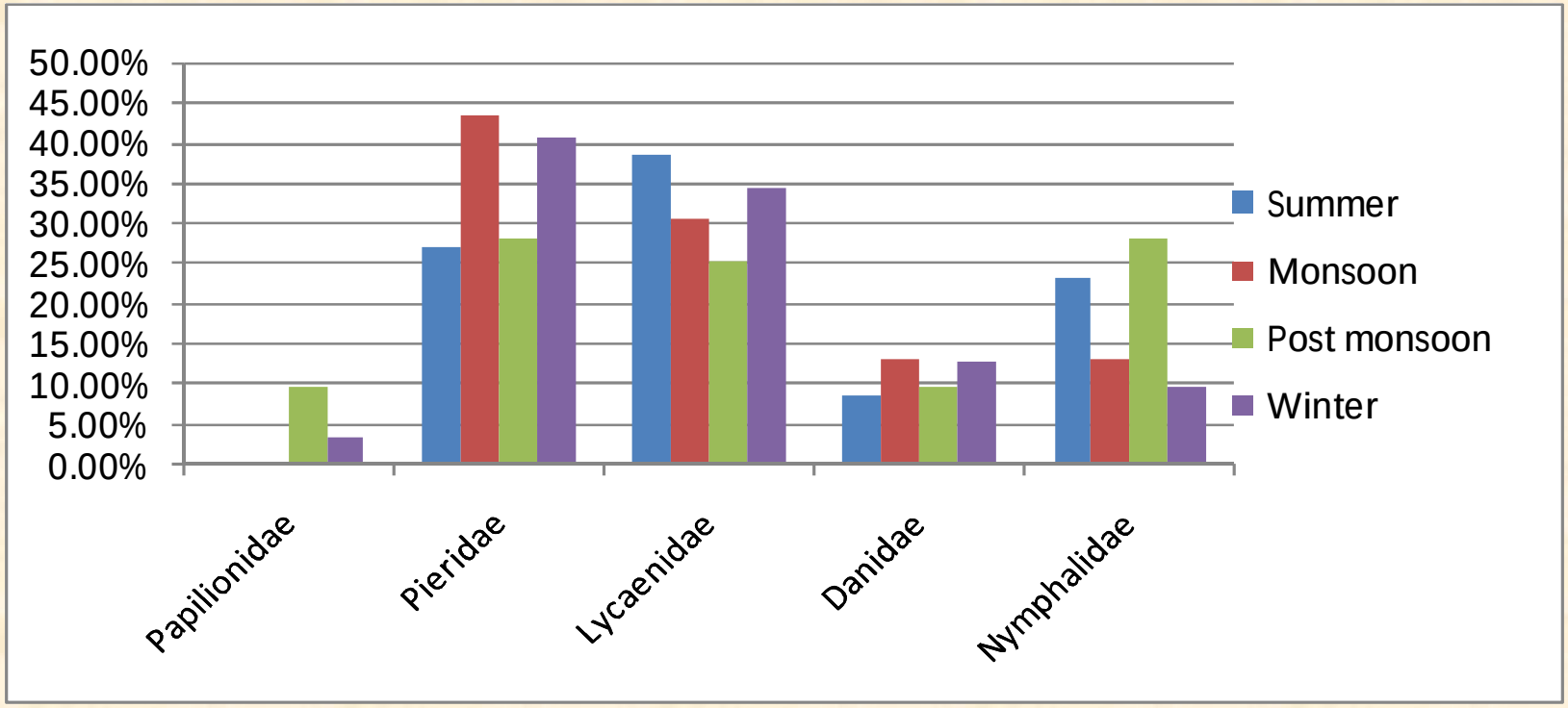


Figure 5: Seasonal Variations in the percentage occurrence of the butterfly families at the three reservoirs.

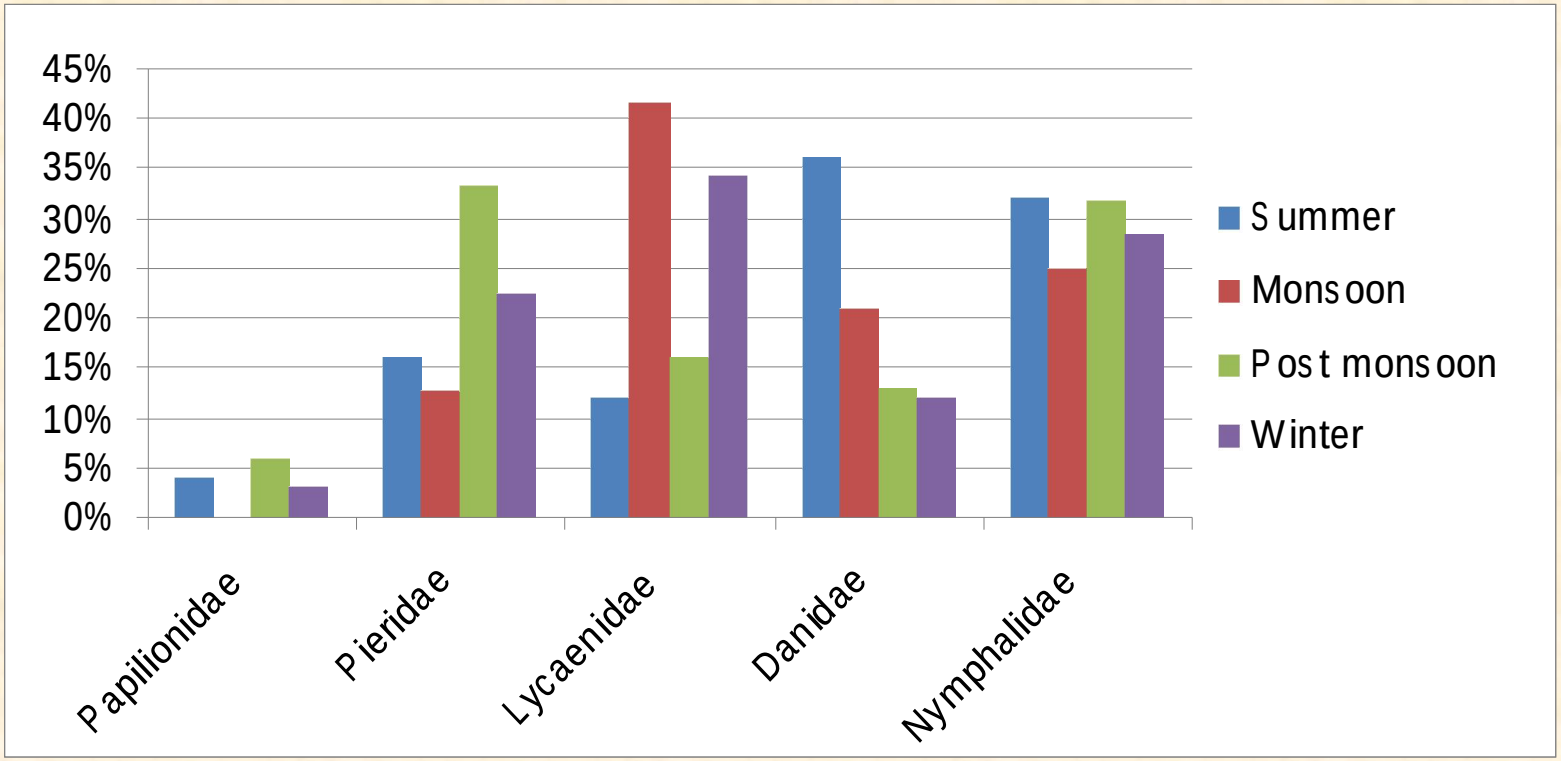
Timbi Irrigation Reservoir



Jawla Irrigation Reservoir



Wadhwana Irrigation Reservoir



DISCUSSION

- The variation in the number of species found at the three reservoirs may be attributed to the surrounding environment.
  - Ø TIR has got the rural-urban gradient and faces more local as well as vehicular disturbance hence species composition resembles to that of the Urban gardens.
  - Ø JIR has rural matrix and is surrounded by the lush green agricultural fields with less of the human disturbances and hence more number of the species.
  - Ø WIR is a comparatively very large reservoir and is surrounded by the agricultural field from all sides and is under rural influence that results in the largest number of species observed.
- Almost 50% of the species are common at all the three sites mainly comprising the common species (Plate I) such as Common Grass Yellow, Mottled Emigrant, Common Emigrant, Common Jezbel, White Orange tip, Lesser Grass blue, Gram blue, Plain Tiger, Blue Pansy, Peacock Pansy, Danaid eggfly and Tawny Coster.
- Maximum species Richness, H' and E at WIR may be attributed to its larger size, low human interferences and the surrounding agricultural matrix.
- The low diversity observed at TIR may be due to cattle grazing and related man-made activities which affect larval food plants.

- When the seasonal differences are considered, all the parameters were higher during Post monsoon when the temperature is favourable, rains have stopped and the surrounding has thick vegetation due to the preceding monsoon.
- When the differences between three sites are considered it was observed that :
  - **Lycaenids** prefer to fly in sunshine, usually close to the ground and are normally found in the open grasses. Due to their these preferences, they are found during sunny days at all the three sites.
  - **DaniIds** also called as Milk weed butterflies, are the common, conspicious and well known group. Plain Tiger of this family is the most common species among all the butterflies. These butterflies are distasteful due to their feeding habits and hence are not preyed upon. They are known to migrate and roost in large numbers in winter and summer hence their higher numbers were observed in summer.
  - Many **Nymphalids** are polyphagous in nature, which help them to live in all habitats. Hence a large number of Nymphalids are found at WIR.
  - **Pierids** consists principally of Whites and yellows, Yellows are the Sun worshippers, hence mostly out in the sun. Also the butterflies of this family are garden lovers and mostly observed in the areas where there is more greenery.
  - **Papillionidae** are the bright coloured distasteful butterflies normally found in forested areas and hence their numbers were very less around the three wetlands.

PLATE 1

Danaus chrysippus (Plain Tiger)

Delias eucharis (Common Jezbel

Ixias marianne (White Orange tip)

Eurema hecabe (Common Grass yellow)

Catopsilia pyranthe (Mottled Emigrant)

Catopsilia pomona (Common Emigrant

PLATE 1

Euchrysops cnejus (Gram Blue)

Zizina otis (Lesser Grass blue)

Acraea terpsicore (Tawny coster)

Junonia orithya (Blue Pansy)

Hypolimnas missipus (Danaid eggfly)

Junonia almana (Peacock Pansy)

CONCLUSION

- Post monsoon is the best season to explore the butterflies.
- Wadhwana Irrigation Reservoir is the best among the three sites for the butterflies.
- Rural habitat has more number of the butterfly species than the urban-rural habitat.
- Human disturbances are also responsible for the low diversity of the butterfly (TIR).
- Individual butterfly species may not be adequate ecological indicators by themselves, but a selected group together may constitute as the indicator for assessing habitat quality (Sparrow *et al., 1994).* In the present study Nymphalids were the most common at WIR while Pierids were common at TIR and JIR.
- As said by many Authors, butterflies are sensitive to changes in their surrounding environment and hence they are regarded as ecological indicators.

ACKNOWLEDGEMENT

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THANK YOU