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Study of Diversity and Current Status of Butterflies (Rhopalocera) at Vasai Fort, Dist-Palghar, India

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Abstract

The great historical place Vasai fort is an ancient fort initiated by Bahadur Shah in 12th Century after that it was well established by Portuguese in the 15th Century and was later captured by Chimaji Appa in 17th Century. The area of study includes the entire Vasai fort, situated in Vasai (Bassein) Village and is inhabited by Fishermen. The area has floral biodiversity of trees, shrubs and wild plants and fauna includes insects, reptiles and aves. The present study was undertaken for a period of one year from June 2013 to July 2014 on Lepidopterans(butterflies species). The aim of this study was undertaken to explore the species richness and biodiversity of butterflies in and around Vasai fort. Butterflies are very sensitive to climate change and habitat degradation. They play an important role in the ecosystem as pollinators and are excellent indicator species. Butterflies were examined and photographed from the vicinity of Vasai fort. Butterflies belonging to five families and forty four species followed by Hesperiidae, Papilionidae, Pieridae, Lycaenidae and Nymphalidae were identified and recorded. Family Nymphalidae was the dominant family with 28 species which constituted 53.85% of the total butterflies recorded during the study period followed by Papilionidae(15.38%), Lycaenidae (13.46%) and Pieridae (11.54%), the least observed being from the Family Hesperiidae (5.77%).

Keywords: Vasai fort, biodiversity, species richness, Lepidopterans, indicator species.

Introduction

The Indian subcontinent bearing a diverse terrain, climate and vegetation hosts about 1,504 species of butterflies[1]. India is described as a "butterfly paradise" by Venkataramani[2]. Butterflies are well studied according to their taxonomical aspect with respect to continuous addition of new species of butterflies. As butterfly species play a vital role in pollination and mentioned as seasonal indicators in term of anthropogenic disturbance and habitat quality[3], they help in the sorting and preservation of habitats under threat. Butterflies are thus sensitive to habitat degradation and climatic change[4]. The factors influencing the butterfly species are of great importance to the ecologists. Lepidoptera (butterflies and moths) are the second largest order of arthropods and are most easily identified, making them particularly useful for biodiversity survey[5-8]. The species richness and relative abundance of individuals[9] are the noteworthy factors which develop the conservation status and enhance the biodiversity thus beneficial to the ecosystem.

Table-1
Scientific Classification

Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Lepidoptera
Suborder	Rhopalocera

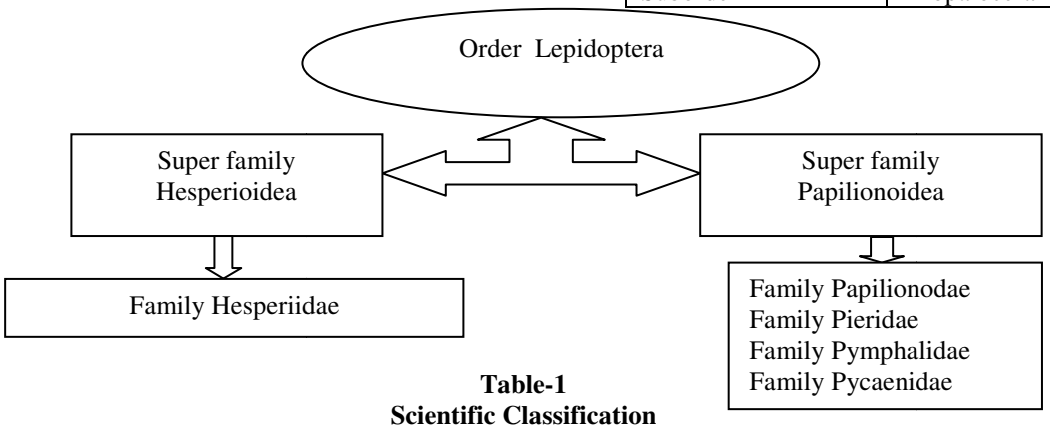


Table-1
Scientific Classification

Materials and Methods

Site Study: The study of Lepidopterans was carried out at Vasai Fort (Bassein Village) 19.3303°N, 72.8150°E, situated in Vasai locality, Thane District, Maharashtra State as shown in the Figure-1. Vasai which is historically known as Bassein road is a historical suburban town north of Mumbai in the Maharashtra state of India which forms a part of Vasai-Virar city. The overall climate is equable with high rainfall days and very few days of extreme temperatures. The temperature varies from 22–36°C (72–97°F). In winter, the temperature is between 12–25°C (54–77°F) while the summer temperature ranges from 36–41°C (97–106°F). Out of total rainfall, 80% rainfall is experienced during June to October. The average annual rainfall is 2,000–2,500 mm (79–98 in) and humidity is 61—86%, the driest days are in winter while the humid days are experienced in July.

Sampling Method: A modification of the line transect count [10] was used to determine species richness and abundance of butterfly communities in different habitats. Transect surveys were conducted for the sampling of the butterfly species. It took about an hour for each transect. Transects were counted once to twice daily. The data were recorded on daily basis for each transect.

Sampling of butterflies was conducted from June 2013 to July 2014. The findings presented here are based on random surveys carried out from. The total area was surveyed from morning till afternoon with the help of a binocular. Butterflies were photographed with a digital camera Cannon 600D from different angles as often as possible to obtain sufficient photographs with clear visual effects for appropriate identification of species. Butterflies were primarily identified directly in the field with the help of field guides followed by photography, and rarely by capture. Collection was restricted to those specimens that could not be identified directly. All scientific names followed in the present study are in accordance with Varshney[11] and common English names follow Wynter-Blyth[12.]

Results and Discussion

Around forty four species of butterflies representing five families of Order Lepidoptera have been recorded during the study period from June 2013 to July 2014. The checklists of the butterflies with their respective scientific names have been mentioned in the Table-1. The photographs of the observed butterfly species with captions have been given in Figure-2. The present study states that Family Nymphalidae was the dominant species showing species richness which constitute around 28 species with overall 53.85% followed by the families Papilionidae with 8 species constituting 15.38% , Lycaenidae with 7 species showing 13.46% and Pieridae with 6species depicting 11.54%. The least species were observed from the Family Hesperiidae which included 3 species indicating the lowest percentage 5.77% among the observed butterfly species in and around Vasai Fort. The percentage of variation in the occurrence of the butterflies belonging to the five respective families of Order Lepidoptera has been represented by bar diagram in Figure-3.

The present study highlights the role of Lepidopteran-butterfly species in biodiversity in relation with the complex habitat and plant diversity. Some researchers have reported 80 species of butterflies belonging to 9 families from Nanda Devi Biosphere Reserve, India.

Nymphalidae was the most dominant family with 21 species followed by Satyridae (21species), Lycaenidae (13species), Pieridae (11species), Papilionidae (8 species), Acraeidae, Erycinidae, and Danaidae (2 species each)[13]. Few research workers have reported 76 species of butterflies belonging to 15 families from district Nainital, Utttarakhand, India. Pieridae was the most dominant family with 22 species followed by Nymphalidae (18species), Noctuidae (7species), Papilionidae (6species), Danaidae and Lycaenidae (5species each), Satyridae (4species), Eupterotidae (2species), Hesperiidae, Geometridae, Pyrulidae, Crambidae, Lymantriidae, Acraeidae and Syntomidae (1 each)[14]. During a comparative study in wild and human-impacted areas in the campus of SGB, Amravati University, Amravati, Maharashtra, India a total of 52 species of butterflies belonging to Hesperiidae, Papillionidae, Pieridae, Lycaenidae and Nymphalidae have been reported[15].

The area with species richness must be protected in order to conserve the existing biodiversity and rare species from the verge of extinction. As reported by Kunte[16], an objective revision of the scheduled list is necessary in providing appropriate and adequate legal protection to Indian Butterflies. The rich diversity of butterflies correlates with the occurrence of larval host plants and adult nectar plants. The butterfly distribution are expected to reflect the distribution of their host plants even at scales and type of vegetation may reflect difference in the composition of butterfly species among habitats at the generic and family level[17,18].

The ever-increasing human population, loss of habitat, urbanization, industrialization, waste disposal are some of the factors that have an impact on the wildlife, thus proving a threat to the butterfly species. Human dominated landscape form a substantial and ever increasing amount of the earth's surface. These modified habitats often influence butterfly species and their dynamics[19,20]. The awareness of conservation of flora and fauna including a forestation must be enlightened among the humans enhancing the ecosystem with rich biodiversity.

Table-1
List of the butterflies arranged according to Family of Order Lepidoptera

Family	Common name	Genus	Species
Hesperiidae	Common Branded Awl	*Hasora*	*Chromus*
	Malabar Spotted Flat	*Celaenorrhinus*	*ambareesa*
	Tricoloured Pied Flat	*Coladenia*	*indrani*
Papilionidae	Common Blue bottle	*Graphium*	*sarpedon*
	Common Jay	*Graphium*	*doson*
	Tailed Jay	*Graphium*	*agememnon*
	Spot Swordtail	*Graphium*	*nomius*
	Common Mormon	*Papilio*	*polytes*
	Blue Mormon	*Papilio*	*polymnestor*
	Common Rose	*Atrophaneura*	*aristolochiae*
	Crimson Rose	*Atrophaneura*	*hector*
Pieridae	Psyche	*Leptosia*	*Nina*
	Common Gull	*Cepora*	*Nerissa*
	Common Wanderer	*Pareronia*	*Valeria*
	Small Salmon Arab	*Colotis*	*Amata*
	Great Orange tip	*Hebomoia*	*Glaucippe*
	Common Grass Yellow		
Lycaenidae	Yaamfly	*Loxura*	*Atymnus*
	Common Pierrot	*Castalius*	*rosimon*
	Common Cerulean	*Jamides*	*celeno*
	Dark Grass Blue	*Zizeeria*	*karsandra*
	Pale Grass Moon	*Pseudozizeeria*	*maha*
	Red Pierrot	*Talicoda*	*nyseus*
	Plum Judy	*Abisara*	*echerius*

Family	Common name	Genus	Species
Nymphalidae	Blue Tiger	*Tirumala*	*Limniaca*
	Stripped Tiger	*Danaus*	*genutia*
	Plain Tiger	*Danaus*	*chrysippus*
	Glassy Tiger	*Parantica*	*aglea*
	Double Banded Crow	*Euploea*	*sylvester*
	Brown King crow	*Euploea*	*klugii*
	Common crow	*Euploea*	*core*
	Common Nawab	*Polyura*	*athamas*
	Tawny Rajah	*Charaxes*	*bernardus*
	Common evening Brown	*Melanitis*	*leda*
	Common Palmfly	*Elymnias*	*hypermnestra*
	Common Bush Brown	*Mycalesis*	*perseus*
	Dark Band Bushbrown	*Mycalesis*	*mineus*
	Common fivering	*Ypthima*	*Baldus*
	Tawny coster	*Acraea*	*violae*
	Common Leopard	*Phalanta*	*phalanta*
	Commander	*Moduza*	*procris*
	Common Sailer	*Neptis*	*hylas*
	Common Castor	*Ariadne*	*Merione*
	Chocholate Pansy	*Junonia*	*iphita*
	Grey Pansy	*Junonia*	*allites*
	Peacock Pansy	*Junonia*	*almana*
	Lemon Pansy	*Junonia*	*lemonias*
	Danaid Egg Fly	*Hypolimnas*	*misippus*
	Blue Oak Leaf	*Kallima*	*horsfieldi*
	Great Eggfly	*Hypolimnas*	*Bolina*
	Common Baronet	*Euthalia*	*Nais*
	Common Baron	*Euthalia*	*Aconthea*

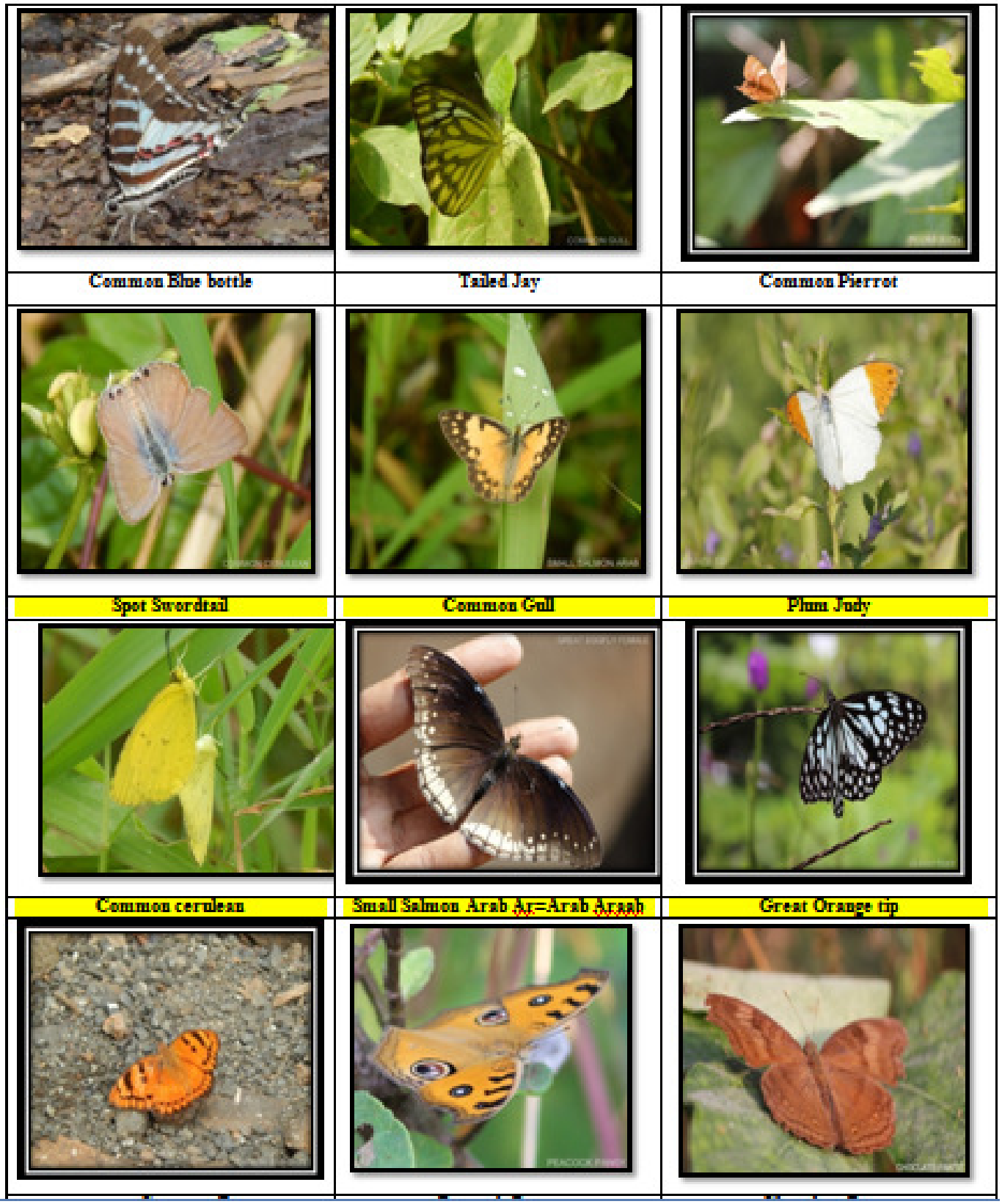
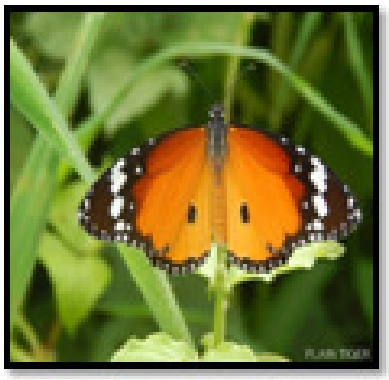
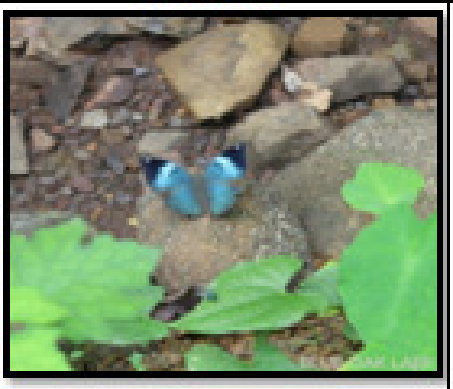
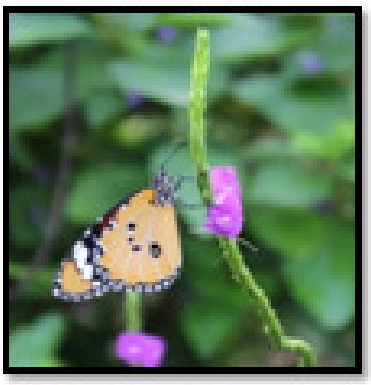
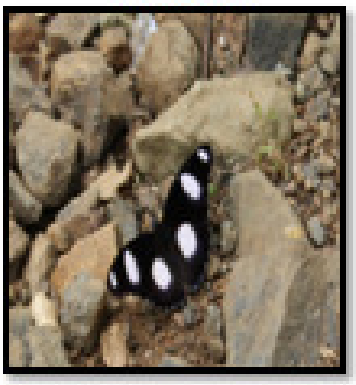
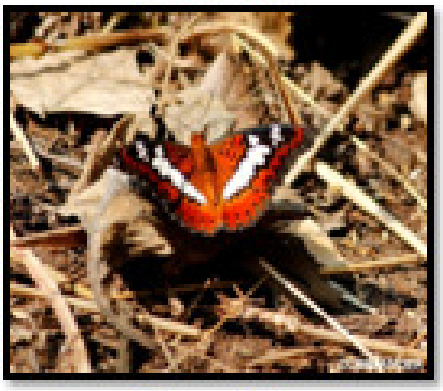
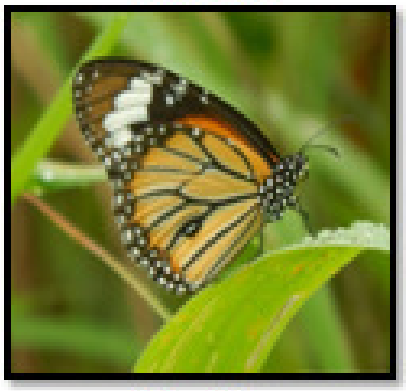
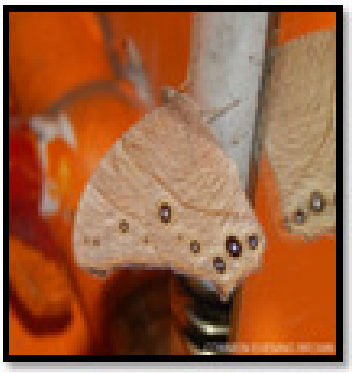
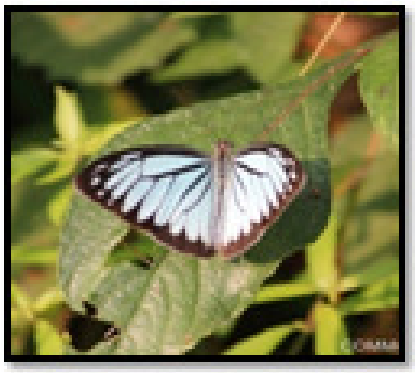
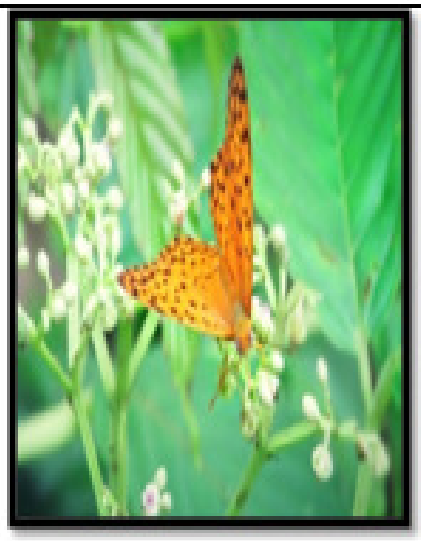
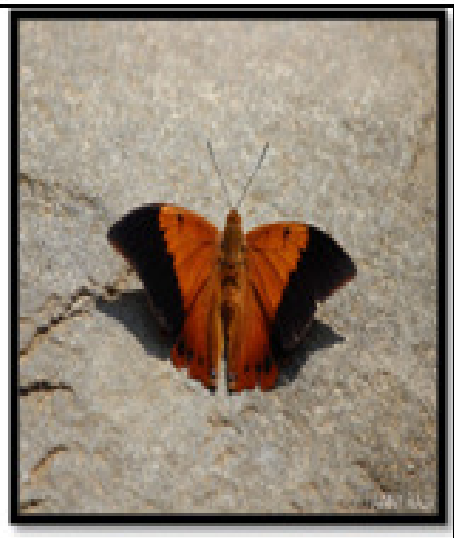


Figure-2
List of the butterflies arranged according to Family of Order Lepidoptera

		
Grey Pansy	Lemon Pansy	Plain Tiger
		
Blue Oak leaf	Tawny coster	Danaid Egg fly
		
Commander	Stripped Tiger	Common Sailer
		



Common Leopard

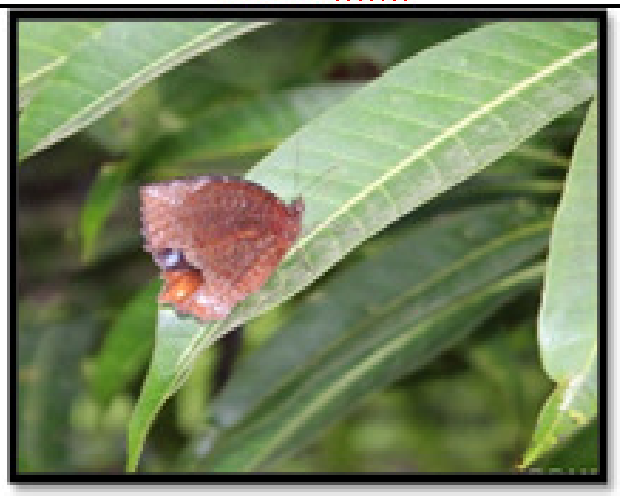


Tawny Rajah

Double Banded Crow

Common Nawab

Common Bush brown



Conclusion

The findings of the present study conclude that Vasai Fort is not only one of the historical monuments but also a habitat enriched with butterflies of Order Lepidoptera. The study area shows species richness with occurrence of different butterfly species. Apart from being one of the most prominent biodiversity indicators, butterflies act as our native gardener for their dependence on indigenous plants for completion of the life cycle. Therefore, an abundance of butterflies usually indicates a healthier ecosystem. In addition, it is necessary to identify the rare butterfly species and conserve them by providing conservation facilities and butterfly parks.

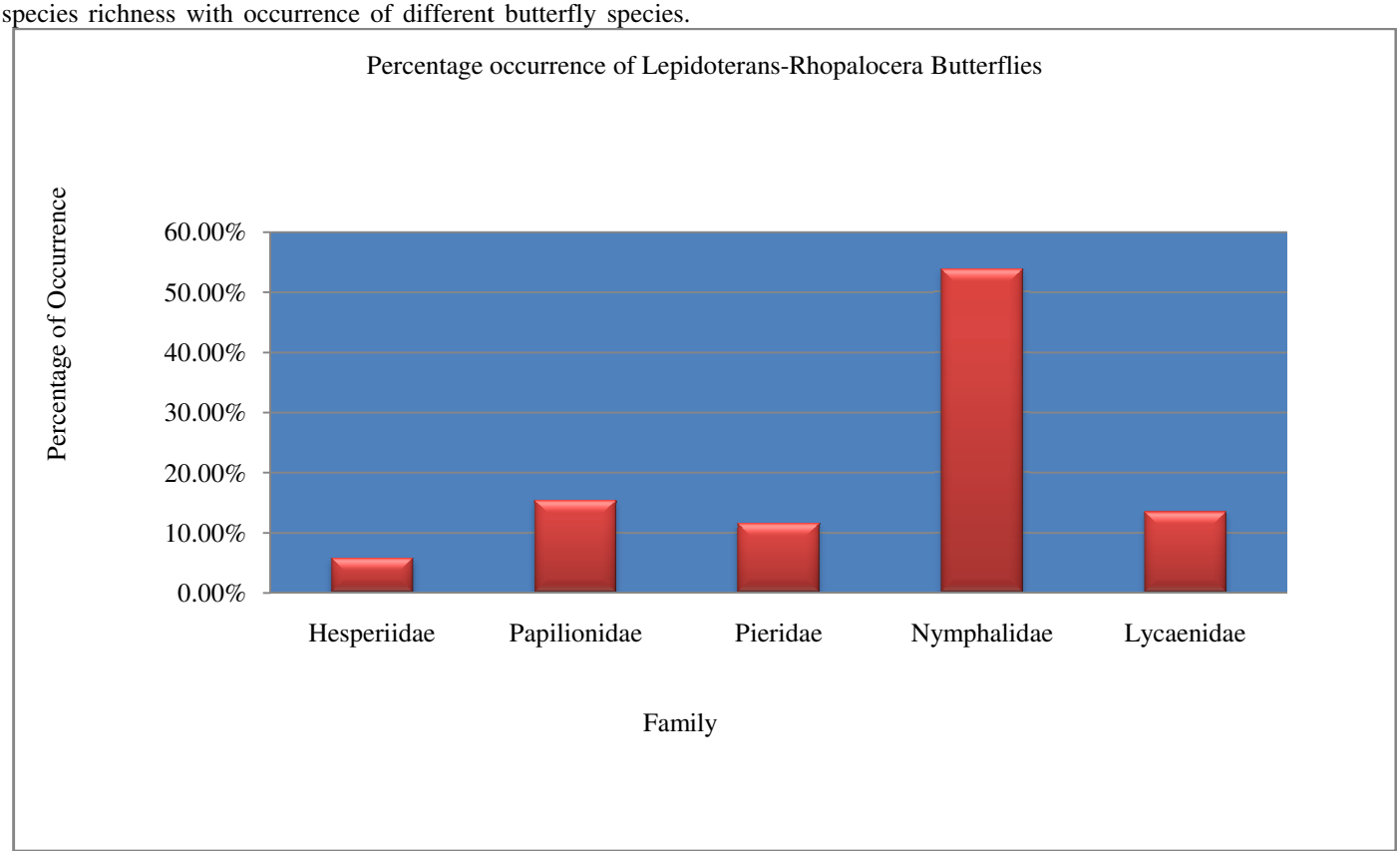


Figure-3
Family-wise Percentage Occurrence of the Butterflies-Lepidoptera-Rhopalocera

Acknowledgement

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