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Impact of butterfly (Nymphalidae, lycaenidae, hesperiidae, pieridae, papilionidae and ridodinidae) occurrence on the fine ecosystem at La Yaung taw, nay pyi taw union territory

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Abstract

The big community of butterfly species occurrence is related to the sustainable fine ecosystem such as butterfly and host plant interaction, pollination, blossoming, environmental healthy indication, pure pollution, surrounding forest and flowing fresh water. The sign of disappearing butterfly in the environment is refer to the destruction habitats of ecosystem. The occurrence of several butterfly species leading to a fine ecosystem which lacks of constant insecticides application can be predicted. In this research, critical assessments of butterfly species occurrences at La Yaung Taw, Nay Pyi Taw Union Territory from June-November, 2019 were analyzed to evaluate the ecological health indication. Our results show that a total of butterfly 40 species belonging to the 29 genera and 6 families (Nymphalidae, Lycaenidae, Hesperiidae, Pieridae, Papilionidae and Ridodinidae) were observed from June-Novemer, 2019. Among them, the family Nymphalidae is dominant as 47.5% on the butterfly occurrence. Although the local reports recently show that there were destruction habitats of ecosystem in some agricultural sites of Myanmar because of extreme insecticides application, our research revealed that it has a fine ecosystem at La Yaung Taw, Nay Pyi Taw Union Territory by the evidence of several butterfly species occurrence with the high temperature weather condition and large community of living organisms.

Introduction

The healthier ecosystem in a region belongs to the butterflies' occurrence which is the wild indicators of ecosystem [1]. The successful pollination as hybridization is the main point while the butterflies are successful pollinators because of they find blossom to eat nectar [2]. For the fine ecosystem, it is depend on the global fresh water flow area through the sustainable ecosystem [3]. In turf landscapes, the needed research is to conserve the population of pollinators which balance to maintain healthy turf host plant [4].

The constant use of insecticides in the agriculture may worse ecosystem by decreasing the entire live organism including beneficial insects which the food supplies for many vertebrates such as butterflies, birds, frogs, lizards etc. [5]. The weather condition especially temperature have dominant effect on the occurrence of butterfly species with together other environmental factors (sunlight, soil composition, etc.) [6]. When Landscape configuration applied insect conservation and management, butterfly communities include in crucial role as individual species with different habitats [7].

Forest surrounding, semi-natural grasslands were as important factors for butterfly species richness which also landscape requirement [8, 9]. Maintaining traditional farming landscape also need to sustain a high functional diversity [10]. Habitat-based statistical methods may predict the spatial distribution of butterflies and day flying months [11]. The species distribution models were used to predict the occurrence and abundance of butterfly species related ecological system [12].

The ecological niche models (ENMs) was used to predict the accuracy based on the climate, land-use land-cover and ecosystem [13]. The butterfly species were identified by a computer vision method based on local binary pattern (LBP) and artificial neural network (ANN) by atomically identifying [14]. Identification of butterfly species by a single neural network system based on branch length similarity (BLS) model were conducted and calculated from the boundary pixels of the shape as the input neural network [15]. Butterfly species identification

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which is directly associated with crop plants, human and animal consumption were analyzed based on their shape by viewing different angles [16, 17].

The research is mainly focus on a critical assessment of butterfly species occurrence for the impact on the ecological system at La Yaung Taw, Nay Pyi Taw Union Territory in Myanmar. Identification of butterfly species, the surveillance and dominant butterflies were examined and environmental health conditions were analyzed. Nay Pyi Taw, the capital city of Myanmar (Burma) is a new capital city which has a fine ecosystem with flower pollination, the environment healthy indicator, pure pollution, forest surrounding and fresh water flow area.
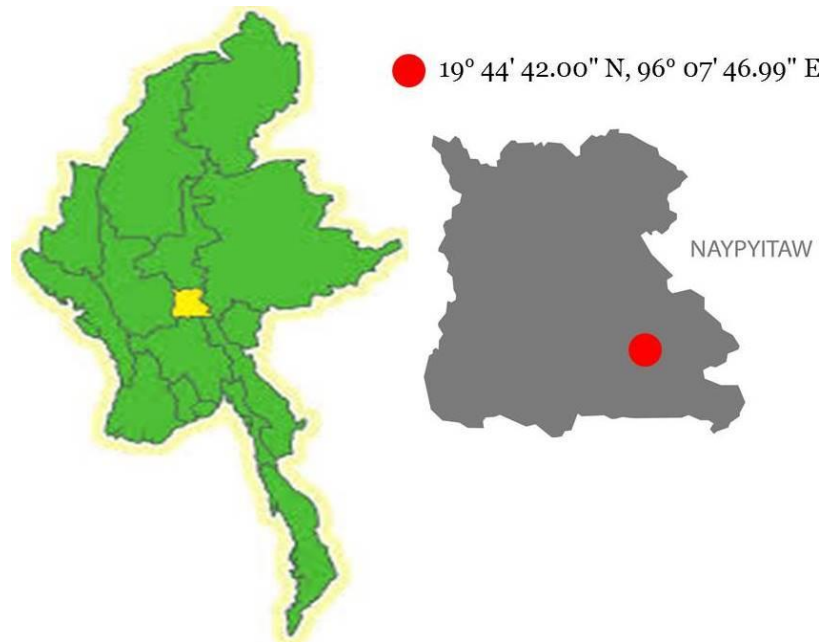
Materials and methods
Location of study site
The study area is La Yaung Taw farm, Daw Khin Kyi Foundation, Nay Pyi Taw Union Territory in Myanmar which is situated at latitude 19° 44' 42.00" N, longitude 96° 07' 46.99" E (Fig. 1). The location was selected based on the geographically important and abundance of natural host plants and landscaping site. The area of Nay Pyi Taw, Myanmar's capital city is 7,054.37 km2 (2,723.71 sq miles) and the population is 924,608. The nature of horticulture and small forest is always maintained by the sustainable development government system.

Fig 1: The location of study site (The green color represents the country of Myanmar formerly Burma, the yellow color represent the Nay Pyi Taw Union Territory is an administrate division in central Myanmar which contain capacity of Myanmar, the red color represents the study site of La Yaung Taw, Daw Khin Kyi foundation, Nay Pyi Taw Union Territory).

Butterfly survey
The research was conducted by cooperation of Biotechnology Research Department, Ministry of Education (Science and Technology), Kyauk-se, 05151, Myanmar and La Yaung Taw, Daw Khin Kyi foundation, Nay Pyi Taw Union Territory. The butterfly species were surveyed. The target specimens of butterfly species were captured by the long handle insect net from June-November, 2019. The captured specimens were brought to the laboratory by placing into the plastic container with the mild chloroform for further studies. Some butterfly species on the higher trees and flying butterfly species were documented by the digital camera Nikon D7000 with Sigma 120-400 mm lens. The specimen collections and recording high resolution images of butterfly species were analyzed. The specimens were captured during the day time between 6:00 AM to 7:00 PM.

Morphological identification
The captured butterfly species were identified by morphological characteristics based on the pattern of colors, shape, size, habitat and behaviors by using the documented

pictures of several different angles [14, 15, 16]. The butterfly species were scientifically classified and listed the family, genus and species. The species were subdivided on the same characteristics and all the species of butterflies were documented with scientific name.

The ecological indices on the occurrence of butterfly species such as the dominant family, the less occurrence family with different characteristics and ecological healthy indication were analyzed [17, 18].

Results
Morphological identification of butterfly species
The identification results with morphological characteristics by using the several different angles of high resolution pictures and all the species with the scientific name of butterflies found our research area were shown in Fig 2. The butterfly species were identified by step by step from kingdom, phylum, class, order, family, genus and species with the morphological characteristics and we discovered that all the species were the same in kingdom, phylum, class, order.

Fig 2. The original photographs of the butterfly (40 species) with the scientific name found at La Yaung Taw, Nay Pyi Taw Union Territory in Myanmar from June-November, 2019.

Occurrence of butterfly species

A total of 40 species belonging 6 families as Nymphalidae (13 genera and 19 species), Lycaenidae (4 genera and 6 species), Hesperiidae (5 genera and 6 species), Pieridae (3 genera and 5 species), Papilionidae (3 genera and 3 species) and Ridodinidae (1 genera and 1 species) were occurred at La Yaung Taw farm, Nay Pyi Taw Union Territory in Myanmar.

All the species were observed on the same characteristic of scientific classification in the kingdom (Animalia), phylum (Arthropoda), class (Insecta) and order (Lepidoptera). The list of butterfly species occurrence at La Yaung Taw farm, Nay Pyi Taw Union Territory in Myanmar with the serial numbers, common name, scientific name, family, genus, and species were shown in Table 1.

Table 1: The list of butterfly species occurrence with 6 families (Nymphalidae, Lycaenidae, Hesperiidae, Pieridae, Papilionidae and Ridodinidae), 29 genera and 40 species at La Yaung Taw farm, Nay Pyi Taw Union Territory in Myanmar

No	Common Name	Scientific Name	Family	Genus	Species
1	Blue Pansy	*Junonia orithya wallacei*	Nymphalidae	Junonia	orithya
2	lemon pansy	*Junonia lemonias*	Nymphalidae	Junonia	lemonias
3	Yellow Pansy	*Junonia hierta*	Nymphalidae	Junonia	hierta
4	Gray Pansy	*Junonia atlites atlites*	Nymphalidae	Junonia	atlites
5	Lemon Pansy	*Junonia lemonias*	Nymphalidae	Junonia	lemonias
6	Peacock Pansy	*Junonia almana*	Nymphalidae	Junonia	almana
7	Dark Brand Bush Brown	*Mycalesis mineus macromalayana*	Nymphalidae	Mycalesis	mineus
8	Dinghy Bush Brown	*Mycalesis perseus cepheus*	Nymphalidae	Mycalesis	perseus
9	Tawny Coster	*Acraea terpsicore*	Nymphalidae	Acraea	terpsicore
10	Common Leopard	*Phalanta phalantha*	Nymphalidae	Phalanta	phalantha
11	Plain Tiger	*Danaus chrysippus chrysippus*	Nymphalidae	Danaus	chrysippus
12	Blue Glassy Tiger	*Ideopsis vulgaris macrina*	Nymphalidae	Ideopsis	vulgaris
13	Spotted Black Crow	*Euploea crameri bremeri*	Nymphalidae	Euploea	crameri
14	Bamboo treebrown	*Lethe europa*	Nymphalidae	Lethe	europa
15	Common Five Ring	*Ypthima baldus newboldi*	Nymphalidae	Ypthima	baldus
16	Great Egg Fly	*Hypolimnas bolina bolina*	Nymphalidae	Hypolimnas	bolina
17	Common Paln Fly	*Elymnias hypermnestra*	Nymphalidae	Elymnias	hypermnestra
18	Leopard Lacewing	*Cethosia cyane*	Nymphalidae	Cethosia	cyane
19	Common Sailor	*Neptis hylas*	Nymphalidae	Neptis	hylas
20	Lime Butterfly	*Papilio demoleus*	Lycaenidae	Castalius	demoleus
21	Common Pierrot	*Castalius fasciatus*	Lycaenidae	Castalius	fasciatus
22	Common Pierrot	*Castalius rosimon rosimon*	Lycaenidae	Castalius	rosimon
23	Common Caerulean	*Jamides celeno aelianus*	Lycaenidae	Jamides	celeno
24	Forget-me –not	*Catochrysops strabo strabo*	Lycaenidae	Catochrysops	strabo
25	Club Silverline	*Spindasis syama terana*	Lycaenidae	Cigaritis	syama
26	Grass Demon	*Udaspes folus*	Hesperiidae	Udaspes	folus
27	Common Redeye	*Matapa aria*	Hesperiidae	Matapa	aria
28	Yamfly	*Loxura atymnus fuconius*	Hesperiidae	Metapa	spra
29	Brown Awl	*Badamia exclamationis*	Hesperiidae	Badamia	exclamationis
30	Banded Demon	*Notocrypta paralysos varians*	Hesperiidae	Notocrypta	paralysos
31	Palm Dart	*Telicota augias augias*	Hesperiidae	Telicota	augias
32	Three Spot Grass Yellow	*Eurema blanda snelleni*	Pieridae	Eurema	blanda
33	Lemon Emigrant	*Catopsilia Pomona Pomona*	Pieridae	Catopsilia	pomona
34	Orange Emigrant	*Catopsilia Scylla cornelia*	Pieridae	Catopsilia	scylla
35	Mottled Emigrant	*Catopsilia pyranthe pyranthe*	Pieridae	Catopsilia	pyranthe
36	Striped Albatross	*Appias libythea olferna*	Pieridae	Appias	libythea
37	Common Rose	*Pachliopta aristolochiae asteris*	Papilionidae	Pachilopta	aristolochiae
38	Tailed Jay	*Graphium agamemnon*	Papilionidae	Graphium	agamemnon
39	Common Mormon	*Papilio polytes*	Papilionidae	Papilio	polytes
40	The Spotted Judy	*Abisara geza niya*	Ridodinidae	Abisara	gesa

The dominant family of butterfly at La Yaung Taw

The occurrence percentages of family butterfly at La Yaung Taw farm, Nay Pyi Taw Union Territory in Myanmar were shown in Fig 3. Among them, the family of Nymphalidae which is mostly populated at high temperature and less pollution is dominant as 47% while the lowest occurrence of family Ridodinidae is just 3%.
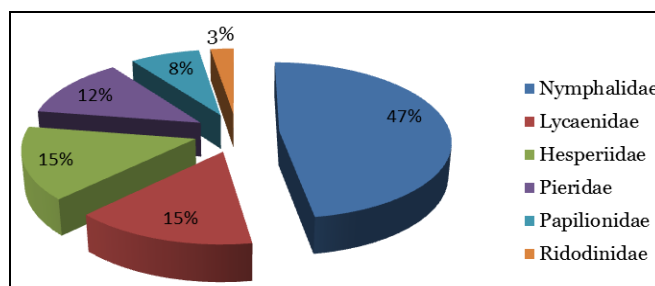

Fig 3: The occurrence percentage of butterfly families at La Yaung Taw, Nay Pyi Taw Union Territory in Myanmar during June-November, 2019.

Discussion

A total of 7 families and 23 genera and 25 species in both dry and wet weather condition were recorded as the dominant family Pieridae (34.78%), Lyceanidae (18.84%), Danaidae (11.59%), Nymphalidae (8.70%), Hespiridae (4.35%) and Papilionidae (4.35%) respectively in lipa city, batangas, Philippines [19]. 15 genera and 16 species of Lycaenidae butterflies were recorded from selected site of Tamil Nadu, India [20]. 5 families (Hesperiidae, Papilionidae, Pieridae, Lycaenidae and Nymphalidae) with the total of 55 species were observed in Bhopal, Madhya Pradesh, India [21]. 112 butterfly species with the total 1703 individuals of Papilionoidae (except Lycaenidae) were observed in National park of South Vietnam [22]. In here, a total of 40 butterfly species belonging to 6 families (Nymphalidae-47%, Lycaenidae-15%, Hesperiidae-15%, Pieridae-12%, Papiliondae-8% and Ridodinidae-3%) and 29 genera were observed during 6 months survey from June-November, 2019 at La Yaung Taw farm, Nay Pyi Taw Union Territory in Myanmar.

Family Nymphalidae were record as the most common with 7 species with 41.2% of the total species and 26.7% of total number of individuals collected. 17 species, 5 families with the 337 total individuals were observed while family Nymphalidae was the most common population in Benue state, Nigeria [23]. Our results indicated that Nigeria and Myanmar have high temperature and less pollution because the same family Nymphalidae was observed as the dominant family 47.5% at La Yaung Taw, Nay Pyi Taw Union Territory in Myanmar.

The ecological indices of butterfly species such as the Shannon diversity index between 4.49 and 4.59 and fisher alpha value between 20.88 and 22.92 showed that it has instigated further research on forest habitats. The six species of the same genus Junonia were observed and follow by the genus Papilio and Eurmema in India [24]. In the research, the same genus Junonia were observed with different 6 species. A Total 33 species of butterflies belonging to 24 genera and 5 families, namely, Hesperiidae, Lycaenidae, Nymphalidae, Papilionidae and Pieridae were recorded from different habitats in Sangli district, India [25]. A total of 545 butterflies from 90 species that belong to 6 families, were recorded in Southern Tanzania [26]. We indicated that the occurrence of butterfly with 6 families in Myanmar with the same in Southern Tanzania.

There was an evolutional relationship between butterfly species diversity and temperature but there was no correlation between the total number of species and physical factor [27]. There may be some significant correlations between landscape variables and butterfly species occurrence [28]. Human intervention effect on the abundance of flora and fauna of the study area [29]. The highest diversity butterflies in all types of habitats were found in riverside which present vegetation as food and host plants of butterflies [30]. In La Yaung Taw farm Nay Pyi Taw Union Terrritory, the perfect landscape sites, the host plants and butterfly interaction, fresh water flow and less pollution were established with the result of several butterfly species occurrence.

Danaus chrysippus and Junonia lemonias were observed as highest number and the lowest number was recorded from Junonia almana almanac was lowest number in Amarapura, Myanmar in 2014-2015 [31]. We also showed that the family Nymphalidae with the genus Junonia were most populated genus during June-November, 2019 at Nay Pyi Taw Union Territory. The family citizen science and urban ecology optimize the dynamic of contemporary engagement [32]. Natural conservation field and rich biological diversity were found in Popa resort, Myanmar by the occurrence of butterfly species [33]. The abundance of butterfly species in dry weather condition is greater than wet weather [34]. In La Yaung Taw, Nay Pyi Taw Union Territory, rich biological diversity in butterfly species, rich natural conservation field, the forest surrounding and fresh water flow were situated with the occurrence of several butterfly species occurrence.

The automatic identification method got the accuracy 98% by using 750 images of different views [35]. In here, we identified the specimens by using more than 400 images from different angles. There is a relationship between butterfly community structure and host plant species richness [36]. Because of a big community of butterfly species occurrence at La Yaung Taw Nay Pyi Taw Union Territory, there is a relationship with host plant species richness. Butterflies (flying flowers) displays the beautiful surrounding and these are wild indicator refer to heathier ecosystem [37]. Our research shows that La Yaung Taw, Nay Pyi Taw Union Territory possesses the healthier ecosystem.

Conclusion

Butterflies are effective pollinators even cross hybrid pollination by visiting the flowers to eat nectar. Butterflies are predators as biological control agent which feed on some harmful insects while the caterpillar's stage. Butterflies reduce air pollution by decreasing carbon dioxide absorbing host plant of butterfly and caterpillars. Butterflies give the host plant against disease and survival by genetic variation. Butterflies are flying flowers by their beautiful and delicate wings enhance the aesthetic values of the environment. Butterflies provide food for some animals such as birds, reptiles, amphibians, scorpion and ants. A big community of several butterfly species' occurrence achieves the fine ecosystem. The butterfly occurrences give the blossom surrounding with the host interaction. In addition, if there is a constant pesticide application, the butterflies will disappear or migrate. Therefore, our research revealed that La Yaung Taw, Nay Pyi Taw Union Territory possesses a fine ecosystem by the evidence of 40 species occurrence belonging 6 families (Nymphalidae, Lycaenidae, Hesperiidae, Pieridae, Papilionidae and Ridodinidae) with 29 genera and the dominance of family Nymphalidae.

Conflict of interest: All the authors declare no conflict of interest.

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