Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2016; 4(4): 86-91
© 2016 JEZS
Received: 12-05-2016
Accepted: 13-06-2016

Alma E. Nacua, Ph.D.
(a) Universidad de Manila, 659-A Cecilia Muñoz St, Ermita, 1000 Manila, Philippines.
(b) Faculty of Arts and Letters, University of Santo Tomas, España Blvd., Sampaloc, 1015 Manila, Philippines

Correspondence
Alma E. Nacua, Ph.D.
(a) Universidad de Manila, 659-A Cecilia Muñoz St, Ermita, 1000 Manila, Philippines.
(b) Faculty of Arts and Letters, University of Santo Tomas, España Blvd., Sampaloc, 1015 Manila, Philippines

Occurrence of Butterflies in a mini-urban garden in Universidad de Manila (UDM) including short-distance migration analysis

Alma E. Nacua

Abstract
Butterflies are attracted to specific host plants and suitable nectarine plants, cuttings of different fruits, and moistened stones in the garden. The migration of butterflies from the Arroceros Park to the roof top garden of UDM was identified. This study focuses on the factors that influence the pattern of butterfly migration at UDM. Quantitative random sampling was utilized. Frequency of butterfly visits were recorded twice a month for one year from June 2015 to May 2016 between 9 am to 5 pm daily. Lux meter was used to measure the intensity of light. There were 22 species of butterflies identified, corresponding to certain groups of nectarine food plants and larval host plants. Migration of butterflies towards the roof top garden was generally influenced by the presence of host plants and nectarine plants in UDM garden. There is a need to maintain these plants throughout the year to conserve the butterfly species that have an identified occurrence in this particular urban garden.

Keywords: Host Plants, Nectarine Plants, Butterflies, Mini-Urban Garden

1. Introduction
Attracting butterflies by host plant cuttings collected at the Mehan garden were put in a pot and placed on the roof top garden. Nectarine pot plants are used to attract butterflies too, some are introduced plants, and others are originally from the Mehan garden. The garden was maintained and monetarily funded by the researcher herself and a collective projects of natural sciences students which was approved by the authorities of UDM. However, when Mehan garden were refurbished from August, 2015 up to April, 2016, the butterflies started to disappear due to the destruction of their habitats, the uprooting of host plants and nectarine plants, the absence of shades capable of protection from excessive heat coming from the sunlight and the influx of several visiting people. The absence of water from the soil, concrete pots and cements from the ground also contribute to butterfly disappearance. Butterflies are ecologically important in the ecosystem since it serves as indicator for a healthy environment. Without the butterflies and nectarine plant, the garden looks dull, gray and lifeless. The bees, butterflies and flowering plants provides ecological balance in the ecosystem. Economically, butterflies are important for medicinal, ornamental and food plants as well as plants with economically-important industrial uses. They are one of the agent for pollination to make plants visible all year round. Without these pollinators, plants may not be able to reproduce and eventually die a natural death. Plants are producers in the ecosystem and consumers that feed on plants will eventually have nothing to eat and, thus, altering the entire food chain.
The purpose of this study is to determine butterflies that occur in the mini-garden in UDM and short-distance migration patterns in these butterflies

Materials and Methods
Quantitative random sampling was utilized. Frequency of butterfly visits were recorded twice a month for one year from June 2015 to May 2016 between 9 am to 5 pm daily. Lux meter was used to measure the intensity of light. Photographs were taken to document the butterflies. Sweeping method was used to collect the difficult to identify species. Identification and classification of collected butterflies were referred to published books, journals and photographs of previously identified specimens at the natural museum Philippines. The references include the *Checklist of butterflies of the Philippine Islands* [1] and *An Inventory of*

Philippine Insects: Order Lepidoptera [2]. After identification, butterflies were released alive.

Biodiversity Pro Ver. 02 were used to determine the butterfly abundance and cluster analysis of butterflies every month for a period of one year. The abundance data were based on the frequency of butterfly visits for each month, thus abundance plot was also generated from the software. Likewise, similarity of these monthly data were subjected to Bray-Curtis cluster analysis. In addition, checklist of host plants and nectarine plants are provided (Table 1 and Table 2).

2.1 The Study site

Fig 1: Satellite over view map of the study: The red star marked, were the roof top butterfly garden of Universidad de Manila (UDM), Mehan Garden, Ermita Manila. The red arrow indicates the migration of butterflies coming from the Arroceros park passing by the roof top (UDM) and goes back again to the Arroceros park.

Fig 2: The description of the mini-urban garden on a rooftop of a concrete building. The choice of nectarine plants with huge amount of nectar were based on Nacua *et al*. (2014) [6]. Different kinds of fruits that were cut into small piece were also use as butterfly attractant to sips on it. Traces of bird droppings were also attracted to butterflies and cat manure and urine on the floor were also observed butterflies sipping on it. The idle roof top of UDM adjacent to the library, the floor area were calculated as 1.525 m (l) x 21.64 m (w), the average height was 6.096 m (20 ft.) from the floor to the garden.

2. Results and Discussion

The species accumulation curve in Figure 3 showed that butterfly abundance is most evident on the months of December, February, May and June, due to the relative abundance of host plants and nectarine plants. The light intensity range is from 27-32 lx. Abundance on butterflies were observed due to many young leaves of host plant during these months and most of the flowering plants are in bloom. Like verbenacea, apocynaceae and asteraceae nectarine plants for *Papilio demoleus libanius* Frustorfer 1908 and *Zizinia otis oriens (*Butler) 1883. However, during the months of March, April, August and December, lower butterfly diversities were found out due to erratic climate change and excessive heat (36-39 lx). Excessive sunlight can damage plant cells, especially the parts that manufacture food, and eventually destroy the habitat. The uprooting of tall trees in the nearby Mehan garden may also contributed to the lower diversity obtained. This implies that butterfly abundance can be used as an index of host plants and nectarine plants diversity. Butterflies act as biodiversity indicators for ecological balance due to their sensitivity to climate change, toxins and pesticide **[3].**

Dendrogram in Figure 4 indicated the butterfly species have 50% similarity index at the sunny area of UDM roof top,

three (3) clusters were formed. The first cluster, for the month of August and July butterflies were affected by huge rain on this is the month of monsoon. The temperature is 30-31 LX, some of the butterflies are not visible at this season of the year. Butterflies are less during monsoon period of the year [4]. The second cluster for the months of February, January, December, November, October, September are the cool dry months of the year. The light intensity ranged 29-30 lx. Host plants and nectarine plants were favorable for butterflies since all flowering plants are in bloom, most of the butterflies are very active patrolling in different nectarine plants. The third cluster for the month of April, March, May and June are the dry season months of the year. The light intensity ranged 36-39 lx. Many of these butterflies were actively searching for the right host plants for oviposition of eggs and hovering on suitable nectarine plants.

The observed and identified 22 species of butterflies at the concrete building of roof top garden (Table 1) are found nectarine, perching, sipping moist on the ground, and some ovipositing eggs on the host plants. *Graphium agamemnon* and *Graphium sarpedon* were commonly observed coming from the Pasig River creek side of the Arroceros Park (Fig. 1).

Butterflies are attracted to defensive chemicals and their physiological effects. The aromatic, fragrant, repulsive and nauseous plants are attractive to butterflies. For example, odorless volatile pyrolizidene alkaloid occurs in hairstreaks of Danaidae. These two organic substances found among adult species indicate the presence of alcohol, aldehyde, terpenes, ketones, pyrolizide, and alkaloids [5]. This is used by the butterflies as a defensive mechanism for against predators. At times, these are also used as a sex pheromone.

The butterflies visit the nectarine plants because of the nectar volume, shape of the flower for a better landing. The plant families Rubiaceae and Asteraceae contain greatest concentration of nectar confirming the preference of butterflies and plant relationships [6]. Rubiaceae, Asteraceae and Apocynaceae, Verbenacea, Moraceae contain sucrose, glucose and fructose that serve as attractant among butterfly species [6]. Small medium butterflies were attracted to Portalaceae which were known as medicinal plants. At the roof top garden, *Catharantus roseus* (L.) G.Don (Apocynaceae) and *Lantana camara* L (Verbenaceae,), *Ixora sp*. (Rubiaceae) were observed to be favorite nectarine plants of most small, medium and large butterflies, and also served as host plant to some butterflies.

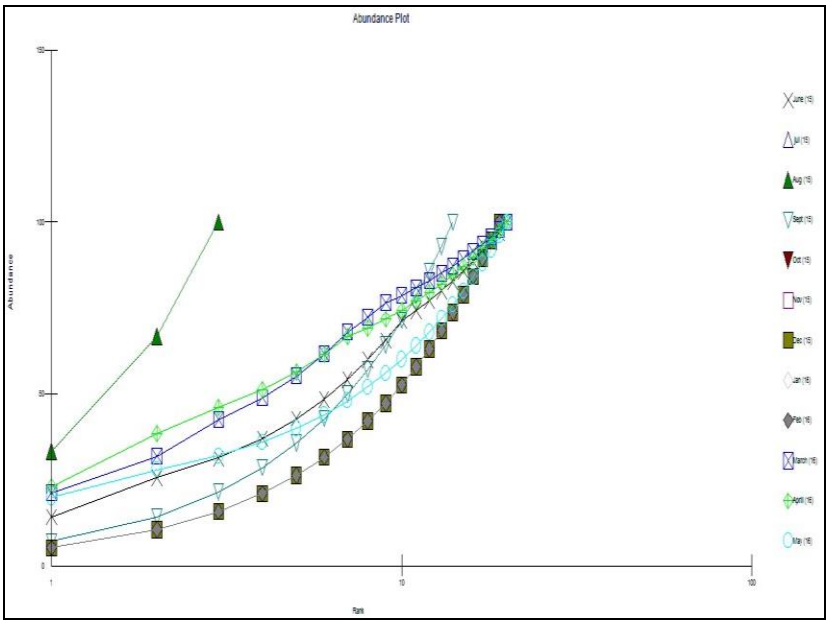

Fig 3: Abundance butterfly species at the roof top of UDM

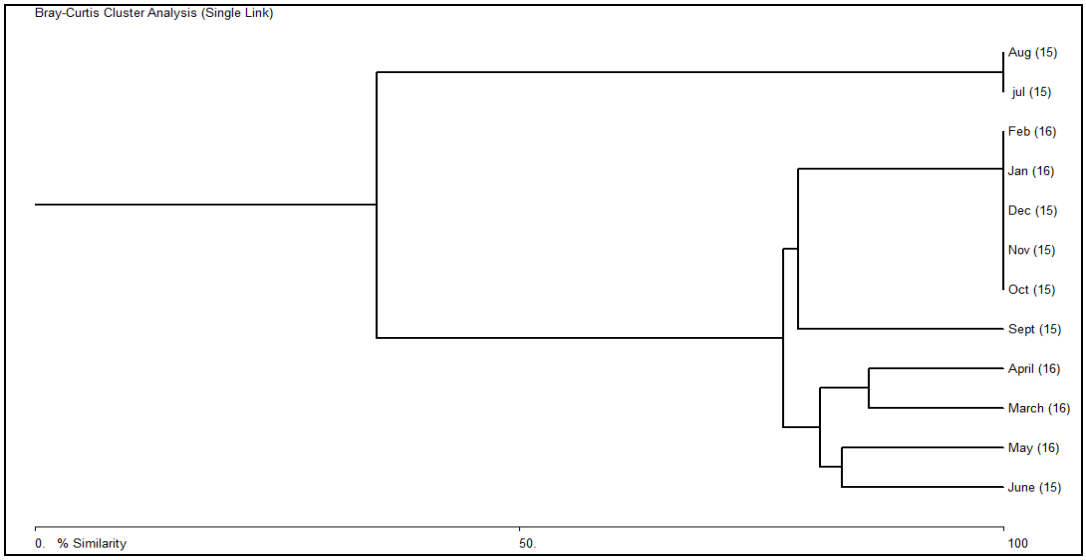

Fig 4: Cluster analysis using Bray Curtis

Table 1: Checklist of butterflies and Host Plants at the roof top garden of UDM

Butterflies		Host plants
I.	**Hesperidae**	
1	*Tagiades japetus titus* Plotz, 1884	*Dioscorea alata* L. (Dioscoraceae), *Catharantus roseus*
2.	*Telicota sp*	*Flagellaria indica L* (Flagellariaceae)
II.	**Lyceanidae**	
3.	*Rapala manea philippensis* Fruhstorfer (1912)	*Lantana camara* L.
4.	*Zizinia Otis* Oriens (Butler) 1883	*Indigofera spicata* Forssk. (Papilionaceae) *Leguminosae* , *Alysicarpus vaginalis* (Fabaceae),
III.	**Papilionidae**	
5.	*Graphium agamemnon agamemnon* Linnaeus	*Annona muricata* L. (Annonaceae), *Annona squamosal*, *Annona discolor*, (Annonaceae)
6.	*Graphium sarpedon* (Linnaeus)	Litsea engleriana (lauraceae),
7.	*Papilio demoleus* Libanius Frustorfer 1908	*Citrus microcarpa* Bunge (Rutaceae), *Citrus sp.* (Rutaceae)
8.	*Menelaides ledebouria polytes* Felder & Felder 1864	*Citrus nobilis* Andr. (Rutaceae), *Citrus sp.* (Rutaceae)
9.	*Menelaides deiphobus* Rumanzovia Escholtz 1821	*Citrus grandis* L. Osbeck (Rutaceae), *Citrus sp.* (Rutaceae)
10.	*Troides rhadamantus* Lucas 1835	*Aristolochia elegans* Mast. (Aristolochiaceae), *Aristolochia philippinensis* Warb. (Aristolochiaceae)
IV.	**Nymphalidae**	
11.	*Danaus chrysippus chrysippus* Linnaeus 1758	*Calotropis gigantea* (Willd) Dryand (Asclepiadaceae),
12.	*Hypolimnas bolina philippensis* (Butler) 1874	*Ipomoea aquatica* (L.) Poir. (Convolaceae), *Ipomoea batatas* (Convolvulaceae)
13.	*Idea leuconoe leuconoe* Erichson 1834	*Drega volubilis* (L.F.) Benth. (Asclepiadaceae), *Asclepias syriaca* Blanco. (Asclepiadaceae) *Asclepias curassavica* L. (Asclepiadaceae)
V.	**Pieridae**	
14.	*Appias albina* Semperi (Moore) 1905	*Capparis micracantha* D.C. (Capparidaceae), *Dryobalanops oblongifolia* (Deptherocapacea)
15.	*Appias olferna peducaea* Fruhstorfer 1910	Capparis miracantha DC (Capparaceae)
16.	*Catopsilia pomona pomona* Fabricius 1750	*Cassia alata* Linn (Fabaceae),
17.	*Catopsilia pyranthe pyranthe* (Linnaeus) 1758	*Crataeva sp.* (Capparidaceae), Cassia fistula (Fabaceae)
18.	*Catopsilia scylla asema* Staudinger 1885	*Cassia alata* Linn (Fabaceae)
19.	*Eurema alitha jalendra* Fruhstorfer 1910	*Albizia lebbeck* (Mimosaceae)
20.	*Eurema hecabe hecabe* (Linnaeus) 1758	*Leucaena leucocephala* (Lam.)
21.	*Leptosia nina georgi* Fruhstorfer 1910	*Cleome rutidosperma* DC. (Capparidaceae)
VI.	**Riodinidae**	
22.	*Abisara echerius laura* Fruhstorfer 1904	*Ardisia elliptica* Thunb (Myrsinaceae)

Table 2: Checklist of Dominant Nectarine plants and butterfly families observed at UDM roof top garden

Nectarine plants	Most Abundant species	Associated butterfly *initials					
Rubiaceae		Hes	Ly	Pap.	Nym	Pie	Rio
	Rosa rubigonosa L.	-	+	-	-	+	-
	Ixora sp.	+	+	+	+	+	+
	Carphalea kirondon BAIL	+	+	+	+	+	+
	Pentas lanceolate DEFLERS	+	-	+	+	+	+
	Tagetes patula L	-	-	+	+	+	-
Asteraceae							
	Cosmos sulphureus L.	+	+	+	+	+	+
	Helinathus annus L.	+	+	+	+	+	+
	Chromolaena odorata kING	+	+	+	+	+	+
	Zinia elegans JACQ.	+	-	+	+	+	+
	Synedrella nodiflora GAERTH.	+	+	-	+	+	+
Apocynaceae							
	Catharantus roseus (L.) G. Dan	+	+	+	+	+	+
	Plumeria obutosa L.	-	-	+	+	+	-
	Nerium oleande L	+	-	+	+	-	+
	Allamanda cathartica L	-	-	+	+	+	-
Verbenaceae	*Lantana camara* L	+	+	+	+	+	+
Nyctaginaceae							
	Boungavillea spectabilis	+	-	+	-	-	+
Portalaceae							
	Portulaca oleracea L	+	+	-	-	+	+

*Hespiridae=Hes, Lyceanidae=Ly, Papilionidae: pap, Nymphalidae: Nym, Pieridae: Pi, Riodinidae: Rio

Tagiades japetus titus Plotz, 1884

Telicota sp

Rapala manea philippensis Fruhstorfer (1912)

Zizinia Otis oriens (Butler) 1883

Graphium agamemnon agamemnon Linnaeus

Graphium sarpedon (Linnaeus)

Papilio demoleus libanius Frustorfer 1908

Menelaides ledebouria polytes Felder & Felder 1864

Menelaides deiphobus rumanzovia ESCHOLTZ 1821

Troides rhadamantus LUCAS 1835

Danaus chrysippus chrysippus Linnaeus 1758

Hypolimnas bolina philippensis (BUTLER) 1874

Idea leuconoe leuconoe ERICHSON 1834

Appias albina SEMPERI (MOORE) 1905

Appias olferna *peducaea* FRUHSTORFER *1910*

Catopsilia pomona pomona FABRICIUS 1750

Catopsilia pyranthe pyranthe (LINNAEUS)

Catopsilia scylla asema Staudinger 1885

Eurema alitha jalendra Fruhstorfer 1910

Eurema hecabe hecabe (Linnaeus) 1758

Leptosia nina georgi FRUSHTORFER 1910

Abisara echerius laura Fruhstorfer 1904

Egg, Zizinia Otis Oriens (BUTLER) 1883

Eggs, Catopsilia pyranthe pyranthe (Linnaeus) 1758

Larva, *Catopsilia pyranthe* pyranthe (Linnaeus) 1758

Larva, *Catopsilia pomona pomona* FabriciusS1750

Pupa, Catopsilia pyranthe pyranthe (Linnaeus) *1758*

Plate 1: Butterflies at the roof top garden of Universidad de Manila (UDM), Philippines

4. Conclusion and Recommendation

The findings of migration of butterflies towards the roof top garden were influence by the intensity of light between 27-39 Lx and the manmade habitat with presence of host plants and the suitable nectarine plants that are regularly watered at this concreate roof top garden. The results are the first in the city of Manila that will serve as reference of information, for future attempts in understanding the complex nature of mutualistic interaction between butterflies and flowering plants that is essential for ecosystem equilibrium. There is a need to maintain the availability of plants throughout the year to conserve the butterfly species identified at the Universidad de Manila. An appropriate funded-project might also be necessary to continue on a more comprehensive study relative to the information generated from this study.

6. Acknowledgement

The author is grateful to UDM president Atty. Ernesto P Maceda Jr., UDM Vice President for Academic Affairs Dr. Ronald Herrera, UDM library Staffs, Ken Joseph E. Clemente of UST Graduate School, and Dr. Gerard Q. De Guzman of Adamson University.

5. References

1. Treadaway CG. Checklist of the butterflies of the Philippine Islands (Lepidoptera: Rhopalocera). Entomologisch Apollo. 1995 Retrieved on October 28, 2014 from http://goo.gl/E3yskw
2. Baltazar CR. An inventory of Philippine Insects: Order Lepidoptera. NAST-Department of Entomology: UPLB. 1987.
3. Cayabyab BF. Butterflies and Butterfly House Kulisap. Insect Society of the Philippines. UPLB 1990.
4. Tiple AD, Khurad AM. Butterfly species diversity, habitats and seasonal distribution in and around Nagpur city, central India. World Journal of Zoology. 2009; 4(3):153-162.
5. Brower L. Chemical defense in butterflies. Academic Press. London 1984.
6. Nacua AE, de Guzman GQ, Alejandro GJD. The Preference of Butterflies for Nectarine Food Plants ISSN: 2320 – 7051 Int. J. Pure App. Biosci. 2014; 2(5):246-250.