International Journal of Fauna and Biological Studies
Available online at www.faunajournal.info

AkiNik

IJFBS

International Journal of Fauna And Biological Studies

ISSN 2347-2677
IJFBS 2014; 1 (3): 04-07

Received: 21-10-2013
Accepted: 23-11-2013

Hongayo Menelo C
Systematics Zoology (Zoo3B) 2013, Biology Section- Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University Tagbilaran City Bohol, Philippines.

Navales Camille P
Systematics Zoology (Zoo3B) 2013, Biology Section- Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University Tagbilaran City Bohol, Philippines.
E-mail: camillenavales@yahoo.com

Quieta Josefino Jr. D.
Systematics Zoology (Zoo3B) 2013, Biology Section- Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University Tagbilaran City Bohol, Philippines.
E-mail: baddash_007@yahoo.com

Signo Aileen Ruth D.
Systematics Zoology (Zoo3B) 2013, Biology Section- Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University Tagbilaran City Bohol, Philippines.
E-mail: seaclint94@yahoo.com

Correspondence:
Hongayo Menelo C
Systematics Zoology (Zoo3B) 2013, Biology Section- Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University Tagbilaran City Bohol, Philippines.
Email: menelo20022003@yahoo.com

Light attracted insect taxa in Songculan Lagoon, Songculan, Dauis, Bohol, Philippines

Hongayo Menelo C, Navales Camille P, Quieta Josefino Jr. D., Signo Aileen Ruth D.

ABSTRACT

Light attracted insect taxa are insects that are attracted to light including those artificial lights. This study aimed to identify light attracted insect taxa in Songculan Lagoon, Songculan Dauis, Bohol, Philippines; and compute and compare the relative abundance of the light attracted insect taxa. This study was limited to light attracted insect taxa identification up to order level. Sampling involved using of improvised white LED light traps that were randomly installed in four sampling stations around the lagoon. Ten insect taxa were identified namely: Lepidoptera, Hymenoptera, Coleoptera, Orthoptera, Hemiptera, Psocoptera, Neuroptera, Isoptera, Diptera, and Embiidina. The most abundant insect order during the whole sampling period was Order Diptera, which was composed of mosquitoes and flies due to the response of their visual stimuli.

Keywords: Light attracted insects, Diptera, Light traps, Songculan Lagoon.

1. Introduction

Insects are the diverse, dominant and abundant group of animals that contains approximately 1.1 million of known species [1, 2]. In the Philippines alone, there are nearly 21,000 known insect species and according to International, C. (2013) [3] this accounts to seventy percent of which are considered endemic. These organisms are bilaterally symmetric with elongated, cylindrical body and with six (6) legs in their adult stage. They possess an exoskeleton made of chitin, and a segmented body divided into three tagmata: head, thorax and abdomen. They also have jointed legs, compound eyes, and antennae [1, 4]. Insects are classified under class Insecta of subphylum Hexapoda [1] and consists of almost 30 different orders [4] including the five major orders namely: Coleoptera (beetles), Diptera (flies), Hymenoptera (bees, wasps and ants), Lepidoptera (butterflies and moths) and Hemiptera (bugs) [5].

In this study, it aimed to identify the insect taxa and determine the relative abundance in Songculan Lagoon, Songculan, Dauis, Bohol Philippines. Results of this study served as baseline data of light attracted insects since no previous study had been conducted and would increase the awareness of people in the presence and abundance of the insect taxa.

2. Materials and Methods

2.1 study Area

Songculan Lagoon (9°38'2"N 123°50'3"E) is located in the uppermost part to the town of Dauis, which is at the southwest part of Bohol, Philippines with an estimated area of 509,624 sq. meters. The lagoon has rich vegetation, including trees and shrubs, which is predominantly dominated by dense population of mangroves. Four randomly selected stations where the light traps were installed were chosen. Station 1 (9.631160582797884, 123.82799912906964), Station 2 (9.63753322226823, 123.8399910249084), Station 3 (9.634664529081508, 123.84007650403257) and Station 4 (9.635039377601531, 123.84056005016332).

2.2 Installation and Collection of light traps in the sampling

This study used hanging light traps adapted from Ramamurthy *et al.,* (2010) [6]. A total of four (4) light traps were randomly installed around the lagoon before evening and were collected during the morning of the next day in order to catch all possible light attracted insects. The collections were conducted for three sampling days of August 30, 2013, September 6, 2013 and September 20, 2013. The trapped insects were stored in screw cap vials and preserved in 70% alcohol.

Fig 1: Songculan Lagoon Map with the Plots of the Stations of the where the hanging light traps were installed.

2.3 Identification of Insect Taxa

Insect samples collected were brought to the Holy Name University Zoology Laboratory and were identified up to order level using pictorial keys of Key to Insect Orders, n.d. and dichotomous taxonomic keys of Triplehorn *et al*., 2005 [7].

2.4 Data Analysis

In this study, in determining the abundance, the formula of Smith and Smith, 2000 [8] was used

$$\text{Relative Abundance} = \frac{\text{Number of individuals in a given genus}}{\text{Total number of individuals of all genera}} \times 100$$

3. Results and Discussion

Ten (10) light attracted insect taxa orders were identified these include Lepidoptera, Hymenoptera, Coleoptera, Orthoptera, Hemiptera, Psocoptera, Neuroptera, Isoptera, Diptera, and Embiidina from 50 individuals collected. In the day 1, ten (10) insect taxa determined, which included Lepidoptera, Hymenoptera, Coleoptera, Orthoptera, Hemiptera, Psocoptera, Neuroptera, Isoptera, Diptera, and Embiidina, which have the highest number of individuals and taxa collected in Songculan Lagoon. For the day 2, four (4) taxa were determined namely Lepidoptera, Hymenoptera, Hemiptera, and Diptera, and for the last day, only two taxa were present namely Coleoptera and Diptera.

Among the insect, taxa identified only Diptera, Coleoptera, and Hemiptera where present among stations in Songculan Lagoon. The most abundant organism among sampling days and among stations belonged to Diptera as shown in Table 1.

Table 1: Relative abundance of insect taxa in Songculan Lagoon

ORDERS	Sampling Day 1						Sampling Day 2						Sampling Day 3						TOTAL	
	S-1	S-2	S-3	S-4	Abundance	%	S-1	S-2	S-3	S-4	Abundance	%	S-1	S-2	S-3	S-4	Abundance	%	Abundance	%
Lepidoptera	1	0	0	2	3	10	0	0	0	1	1	6	0	0	0	0	0	0	4	8
Hymenoptera	1	1	0	1	3	10	1	2	2	1	6	38	0	0	0	0	0	0	9	18
Coleoptera	1	1	1	0	3	10	0	0	0	0	0	0	0	0	0	2	2	33	3	6
Orthoptera	0	0	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Hemiptera	0	0	5	0	5	17	2	0	0	3	5	31	0	0	0	0	0	0	10	20
Psocoptera	1	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Neuroptera	1	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Isoptera	0	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Diptera	1	7	1	2	11	37	2	2	0	0	4	25	1	1	2	0	4	67	19	38
Embiidina	0	1	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	1	2
Total	6	11	8	5	30	100	5	4	2	5	16	100	1	1	2	2	6	100	50	100

The insects were identified using pictorial Key to Insect Orders, n.d. and dichotomous taxonomic keys of Triplehorn *et al*., 2005 [7]. Three (3) insects were identified under Lepidoptera for having two pairs of membranous and scaled wings, as exemplified in Fig. 1.1. Nine (9) narrow winged insects with an abdomen distinctly constricted at base and antennae with five segmented tarsi were classified under Order Hymenoptera just like in Fig. 1.2. Coleoptera included three (3) insects with two pairs of hardened wings whose front wings are opaque with no veins while the hind wings are narrow usually longer than the front wings, which can be seen in Fig 1.3. One (1) insect (Fig.1.4) was classified under Orthoptera for having one pair of membranous wings. Hemiptera included ten (10) insects (Fig. 1.5) which have a piercing or sucking mouthparts. An insect was (Fig.1.6) classified under

Psocoptera for having mandibulate mouthparts, large compound eyes and filiform antennae. One (1) insect (Fig. 1.7) was identified under Neuroptera for having a pair of membranous wings, a soft body, antennae shorter than the body and five segmented tarsi. Fig. 1.8 is an insect under Isoptera for having two pairs of wings that are small, membranous, and narrow and are similar in size. Nineteen (19) insects (Fig. 1.9) with a single pair of narrow and membranous wings, with hindwings, which were reduced to halters, with five segmented tarsi and with mouthparts adapted for sponging or sucking, were identified under Diptera. One (1) Embiidina (Fig. 1.10) was identified for having two pairs of wings that are small, membranous and narrow whose hindwings are shorter than the forewings and three segmented tarsi.

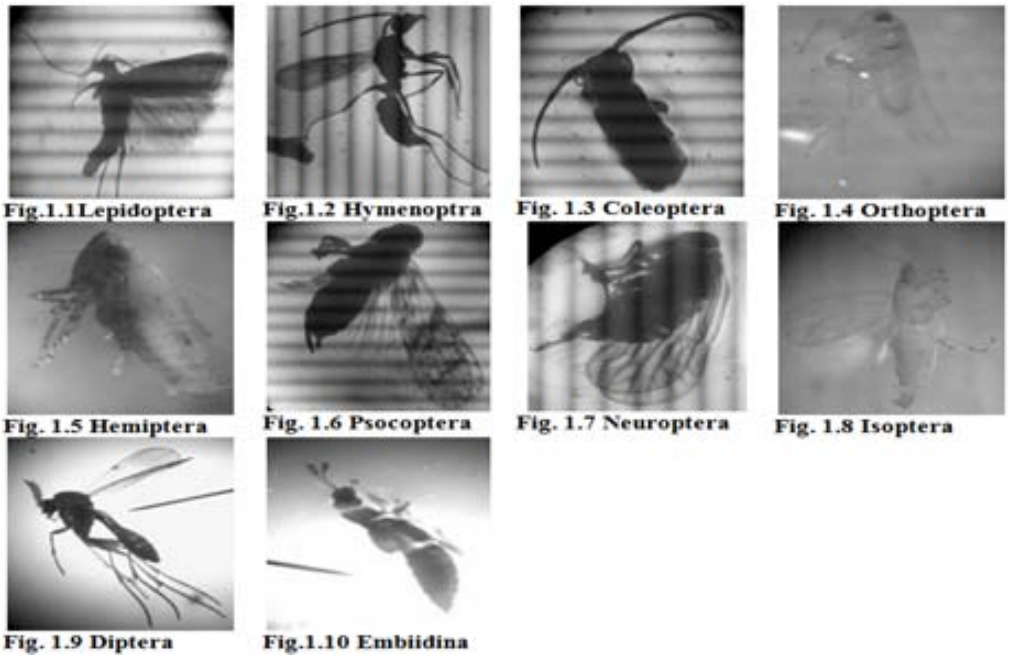

Fig 1: Insect taxa collected samples in the selected stations in songculan lagoon

The aforementioned results could be due to its response to its visual stimuli according to Ali *et al.* (1989) [9]. It has been accounted that insects are attracted due to many factors these include the following. As stated by Cruz and Lindner (2011) [10], insects using light as a navigational orientation cue are sensitive to a broad spectrum of light ranging from ultraviolet (UV) to red when exposed to light, may go toward or away from it, may increase or decrease the rate of activity and may change their posture or move only a part of their body. Furthermore, artificial lights serve as directional cues to insects like the moonlight in which some insects are adapted some specialized structures in their body that use these factors in navigating during flight or returning after foraging [10]. As the nocturnal insects fly towards an artificial light, the flight-to-light response occurs [11] and this could be to their attraction to light may be carried out from a shift of response from moonlight to artificial lights [10] this could explain the to trapped insects collected and identified during this study.

Population studies utilized a trap using light traps for insects that have been widely used as mentioned in the studies of Triplehorn and Johnson, 2005 [7], García-López *et al*., 2010 [12], Weinzierl *et al*., 2005 and Ramamurthy (2010). Varying degrees of its demands from its specification of the traps and the chosen color spectra provides significant information to the diversity of nocturnal insects and to understand and could predict how populations function. In Weinzierl *et al*., 2005 [13] and White, 1983 [14] papers that most of the non-pest species of insects like the moths and species such as beetles, flies and others are said to be attracted to artificial lights these were also collected from this study as shown in Fig 1.

4. Conclusion

Fifty (50) light attracted insects were identified under ten (10) insect orders namely; Lepidoptera, Hymenoptera, Coleoptera, Orthoptera, Hemiptera, Psocoptera, Neuroptera, Isoptera, Diptera, and Embiidina present among stations in Songculan Lagoon, Songculan Dauis Bohol Philippines.

5. Acknowledgment

Mathematics and Natural Sciences Department, College of Arts and Sciences, Holy Name University, Tagbilaran City Bohol Philippines, LGU-Songculan Dauis Bohol, Philippines, and MCH CO.

6. Reference

1. Hickman, C., Roberts, L., Keen, S., Larson, A. Integrated Principles of Zoology. 14th Edition. United States of America: McGraw Hill Higher Education, 2008, 441-468.
2. Elizinga, R. J. Fundamentals of Entomology, 6th Ed. Upper Saddle River, NJ: Pearson Prentice Hall; 2004.
3. International, C. Biological diversity in the Philippines. 2013. Retrieved from <http://www.eoearth.org/view/article/150648>
4. Ashfaq, M., Khan, R, Khan, A. Rasheed, F., Hafeez. S. Insect Orientation to Various Color Lights in thec Agricultural Biomes of Faisalabad. Faisalabad. Pakistan Entomologist. Pakistan 2005; 27 (1): 49-52.
5. Gullan P. J., Cranston, P. S. The Insects An Outline of Entomology. United States of America: Blackwell Publishing, 2005; 2-3, 23, 201
6. Ramamurthy, V. V., Akhtar, M. S. Patankar, N. V. Menon, P. Kumar, R. Singh, S. K. Ayri, S. Parveen, S. and V. Mittal. Efficiency of different light sources in light traps in monitoring

insect diversity, Munis Entom. & Zoo 2010; 5 (1):109-114.
7. Triplehorn, C., Johnson, N. Borror & De Long's Introduction to the Study of Insects. 7th Edition. United States of America: Thomson Brooke/Cole, 2005, 15-54.
8. Smith, R. L., Smith, T. M. Elements of Ecology. 4th edition. Addison Wesley Longman Inc., USA, 1998, 450.
9. Ali, A.,. Nayar, J. K., Knight, J. W., Stanley, B. H. Attraction of Florida Mosquitoes (Diptera: Colicidae) To Artificial Light To The Field. University of Florida. USA, 1989, 82-87
10. Cruz, M. S., Lindner, R. Insect vision: ultraviolet, color, and LED light, 2011, 1-6.
11. Bellrichard, M. Insect attraction to different colored lights near Lake Itasca State Park, 2009 <http://conservancy.umn.edu/bitstream/99529/1/Bellrichard.pd>
12. García-López, A., Micó, E., Zumbado, M.A., Galante, E. Sampling scarab beetles in tropical forests: The Effect of Light Source and Night Sampling Periods. Journal of Insect Science, 2010; 11 (95): 1-14.
13. Weinzierl, R., Henn, Koehler, T., Tucker, C. Insect Attractants and Traps. University of Florida IFS Extension, 2005, 2-8. <http://edis.ifas.ufl.edu/pdffiles/IN/IN08000.pdf>.
14. White, E. Peterson Field Guides Beetles. United States of America: Houghton Mifflin Company, 1983.