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THE BUTTERFLY FAUNA OF THREE VARYING HABITATS IN SOUTH WESTERN NIGERIA

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ABSTRACT
Species diversity and abundance of butterflies were investigated at three (3) locations; Ajebo, Ogun State, Odongunyan Farm Settlement, Ikorodu and Hortico Gardens, Ipaja, Lagos using sweep nets and transects method of sampling. Biodiversity indices were calculated using Shannon-Wiener, Margalef, Simpson's and Equitability indices. A total of 1105 butterflies belonging to 11 genera and 4 families were identified from the 3 sampled sites. Butterflies belonging to the family Nymphalidae were the most abundant, accounting for 70.6% of the total butterflies collected in all locations and seasons. Four species *Danaus chrysippus*, *Acraea serena*, *Melanargia galathea* (Nymphalidae) and *Eurema sp.* (Pieridae) were found in the three sites. *Acraea* (200), Danaus (140), *Melanargia* (129) (all in the family Nymphalidae) were the most abundant butterfly genera found in the study sites. Ajebo had the least diversity of butterflies in all the two seasons, while Hortico Gardens, Ipaja had the highest. Odongunyan farm land was the most equitable (j = 1.09) of the three sampled sites.
Keywords: diversity, butterflies, Nymphalidae, transects, sweep nets

INTRODUCTION

Butterflies are very well known for their beauty as their wings are of various colour patterns. They are pollinators (Vane-Wright *et al.*, 1991), silk producers for textile products (Erhardt, 1985) and good indicators of the ecological quality of a habitat (Cleary, 2004). They are benign and aesthetically pleasing that they are greatly appreciated in ecotourism (Thomas *et al.*, 1992) and form important components of the food chain, particularly as larvae.

A remarkable decline in butterfly diversity is becoming increasingly evident (Konvicka *et al.*, 2006). Losses are largely caused by human activities (Hill *et al.*, 2002; Pullin, 2002; Pennisi, 2004). Indeed, concern for the status of the earth's biodiversity (to which butterflies are part) is on the increase (Okali, 2010) and arises from the observation that biodiversity is being rapidly depleted, seriously threatening the continued support that nature provides for human existence and development (Kehinde *et al.*, 2014).

Lepidoptera is the third most diverse insect order (following Coleoptera and Diptera) (Gullan and Cranston, 2000), with 70 families and 140,000 species; 20,000 of which are butterflies (Heppner, 1991). The diversity of butterfly communities has been studied in different parts of the world including Asia. Nigeria is said to have the largest diversity of butterfly in the world. A lot of work has been done (Medler (1980), Dike (1988), Corrnes *et al.* (1970)) but there is need for more studies on the diversity of butterflies in Nigeria. This study therefore seeks to explore the Lepidopteran fauna of three varying habitats in Southwestern Nigeria so as to update or provide new data on Nigerian butterfly fauna.

MATERIALS AND METHODS

Three sites were selected for this study: an area (Hortico Garden, Ipaja, Lagos, 003°15'21.96"E, 06°38'2.04"N) with a lot of

ornamental plants; a farmland (Odongunyan, Ikorodu, Lagos, 003°31'19.2"E, 06°39'30.24"N) and a camp site with bushes (Ajebo forest, Ogun State) 003°43'7.32"E, 07°7'57.6"N. All sites differed in vegetation density but had no obvious differences in terms of plant species. Walk-and-capture transects routes were surveyed for butterfly during the study. Each site was sampled 14 times. Butterflies encountered in each transect were collected with a sweep net, counted, snapped and released or taken to the laboratory, identified and recorded. All butterflies within a distance of 2.5m on both sides of transect were collected using a sweep net and released after identification (Hill *et al*., 1995; Pollard, 1977). Captured butterflies were put in specimen bottles containing ethyl acetate soaked in cotton wool and displayed on insect boxes. Butterflies collected were identified using the identification guides in Butterflies of West Africa (Larsen, 2005), Hogue and Gray (2004), Bernard (1982) and James (2002).

All data collected during the sampling period were pooled and statistically analyzed using inferential statistics such as descriptive statistics, analysis of variance and standard deviation. Shannon-Wiener diversity index, Simpson's Dominance Index and Evenness indices were used to compare the diversity of butterflies in the sites.

RESULTS

Butterflies collected during rainy and dry seasons

A total of 1105 butterflies belonging to 11 genera and 4 families were identified during the rainy and wet seasons from the 3 sampled sites. Butterflies belonging to the family Nymphalidae were most abundant, accounting for 68% of the total butterflies collected in all locations and seasons. *Acraea, Danaus* , *Melanargia* (all in the family Nymphalidae) were the most abundant butterfly genera found in the study sites.

Four (4) families of butterflies (Nymphalidae, Papilionidae, Pieridae and Lycaenidae) were recorded in Hotico gardens, Ipaja during the wet and dry seasons while 2 families (Nymphalidae and Pieridae) were each recorded in the two seasons in both Odogunyan and Ajebo. The dominant group of butterflies was the nymphalids with 64, 75 and 85% in Ipaja, Odongunyan and Ajebo respectively during the wet season and 64, 73, 86% respectively in the dry season (Table 1).

Butterfly Species and Distribution in the three sites

The distribution of butterflies at Ipaja, Odongunyan and Ajebo during the wet and dry seasons is shown in Table 1. A total of 13, 8 and 6 species were recorded respectively in the three sampled areas. In the rainy season, *Erebia aethiops* (45), *Acraea serena* (70) and *Danaus chrysippus* (30) butterflies recorded the highest number of individuals in Ipaja, Odogunyan and Ajebo sites respectively while *Ascia buneae sublineata* (31), *Erebia aethiops* (30) and *Acraea serena* (20) were recorded respectively in the dry season. In all, there was no significant difference ($P>0.05$) between butterfly families found in both wet and dry seasons.

Comparison of Species Abundance and Biodiversity Indices of Butterflies in the Three Sites

The highest number of species and abundance of butterflies were recorded in Ipaja during the rainy season (13 and 336 respectively) and least number in Ajebo, during the dry season (6 and 95). Shannon –Wiener Index and Margalef Indices, were highest (2.5 and 2.06) in Ipaja followed by Odongunyan (1.8 and 1.07) and least in Ajebo (1.7 and 1.06), both in the rainy and dry seasons (1.8 and 1.1) (Table 2). In all, there was no significant difference ($P>0.05$) between Shannon –Wiener Index found in both wet and dry seasons.

Comparison of Equitability and Simpson's Dominance (C) across the Sampled Sites

The Equitability Index for Ajebo was highest (both in the rainy (0.99) and dry seasons (0.99) and least in Odogunyan (0.95) (rainy season) and Ipaja (0.96) (dry season). On the other hand, Simpson dominance was highest in Ipaja (11.5 and 11.0) and least in Ajebo (5.8 and 5.9) respectively, both in rainy and dry seasons (Table 2). In all, there was no significant difference ($P>0.05$) between Shannon –Wiener Index found in both wet and dry seasons.

Table 1: Butterfly Species in the three sites

Family	Species	Common Name	Hortico Gardens, Ipaja		Odogunyan		Ajebo		Total # of species	Species pecentage	Family percentage
			W S	D S	W S	D S	W S	DS			
Nymphalidae	*Hypolimnus misippus*	Egg Blue Pansy	24	18	17	10	-		69	6.2	70.6
	Erebia aethiops	Scotch Argus	45	30	-	-	-	-	75	6.7	
	Danaus chrysippus	African Monarch	22	16	35	20	30	17	140	12.7	
	Acraea serena	Small Orange Acraea	35	22	70	24	29	20	200	18.0	
	Junonia oenone	Dark Blue Pansy	21	12	-	-	19	14	66	5.9	
	Junonia sophia	Little Pansy	15	13	-	-	19	14	61	5.5	
	Bicyclus dorothea	Light Bush Brown	27	12	-	-	-	-	39	3.9	
	Melanargia galathea	Marbled white	26	12	29	21	25	16	129	11.7	
Pieridae	*Ascia buneae sublineata*	White Gilder	31	41	38	27	-	-	137	12.4	21.9
	Eurema spp	Grass Yellow	20	11	28	12	21	13	105	9.5	
Papilionidae	*Papilio nireus*	Green-banded Swallowtail	12	9	-	-	-	-	21	1.9	4.6
	Papillio demodocus	Citrus Swallowtail	19	11	-	-	-	-	30	2.7	
Lycaenidae	*Zizula hylax*	Tiny Grass Blue	19	14	-	-	-	-	33	2.9	2.9
4	**11**	**13**	**316**	**221**	**217**	**114**	**143**	**94**	**1105**	**100**	**100**

Note: WS = Wet Season; DS= Dry Season

Table 2: Diversity Indices of Butterflies at the three sites

INDICES	HORTICO GARDENS		ODOGUNYAN		AJEBO	
	RAINY SEASON	DRY SEASON	RAINY SEASON	DRY SEASON	RAINY SEASON	DRY SEASON
Total species diversity (S)	13	13	7	7	6	6
Total abundance (N)	316	221	217	114	143	94
Log of Species diversity (Log S)	2.565	2.565	1.946	1.946	1.792	1.792
Log of abundance (Log N)	5.817	5.352	5.591	4.970	4.970	4.554
Shannon-Wiener Index (Hs)	2.502	2.482	1.861	1.887	1.776	1.782
Margalef Index (d)	0.975	0.968	1.073	1.207	1.006	1.098
Equitability Index (j)			0.956	0.969	0.991	1.099
Simpson's Dominance Index (C)	11.511	11.006	5.944	6.303	5.812	5.879

DISCUSSION

A total of 1105 butterflies belonging to 11 genera and 4 families were identified during the rainy and wet seasons from the 3 sampled sites. Butterflies belonging to the family Nymphalidae were most abundant, accounting for 68% of the total butterflies collected in all locations and seasons. The Nymphalidae family constitutes a very diverse group and occupies a wide range of habitats (Larsen, 2005). The result is further corroborated by Hamit and Erol (2007) who reported more abundant Nymphalid species in a local distribution of butterfly in Northern Cyprus. However, in contrast, Nwosu and Iwu (2011) found Lycaenidae, Pieridae and Satyridae to be in abundance in protected and unprotected habitats of Okwu Ogbaku forest reserve in Mbaitoli, Nigeria.

The study recorded a relatively high diversity of butterfly species supported by Sundufu and Dumbuya (2008). Regarding species richness, the proportion of nymphalids was higher with that of piereids, while lycaenids and papilionids were least in the study. The observed variation in butterfly species richness among the sites surveyed can be attributed to the sampling effort and the physical and environmental factors (site size, altitude, number of plant species, forest disturbance, flowering plants, rainfall and temperature (Wood and Gillman, 1998; Cleary and Mooers, 2004). Our study shows that the Hortico gardens in Ipaja, Lagos had highest species richness compared to those of Ajebo, Ogun State and Odongunyan, Ikorodu, Lagos State. Factors such as isolation, presence of flowering plants in Hotico Gardens Ipaja could have influenced the butterfly species richness

in these areas (Cleary and Mooers, 2004). Indeed, many studies have shown that insect abundances are highly correlated with the abundance of floral nectar sources. Flower-rich field margins in agro-environment schemes also harbour more butterflies (Dover *et al.*, 1990, Pywell *et al.*, 2011, Kehinde *et al.*, 2014) or other pollinators (Kleijn *et al*., 2001; Westphal *et al*., 2003)

Most of these butterflies have been found in Nigeria. Seven species are yet to be identified and have been sent to Museum of Natural History for identification. Butterflies derive their heat from the sun and probably lose heat mainly by seeking shade. However, heat will tend to be lost whenever the temperature of the butterfly is above that of its surroundings (Owen, 1971). Thus it is suggested that the higher average temperature during the dry season may have been important in determining the low abundances recorded throughout this season in Ipaja, Odongunyan and Ajebo.

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