Available online at www.easletters.com

ISSN No: 2349-2864 Entomology and Applied Science Letters, 2016, 3, 2:1-9

Diversity and Abundance of Insect Visitors to Flower of *Irvingia gabonensis* at Forestry and Environment Arboretum

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ABSTRACT

Field experiment was conducted at the Department of Forestry/Environment Aboretum, Rivers State University of Science and Technology Port Harcourt between March-May 2015 to investigate the diversity and abundance of insect visitors to flower of Irvingia gabonesensis. Simple sampling method was used in collecting the insects twice weekly using hand netting technique at interval between March 16th – May 27th, 2015. Results showed that Ricanidae (Ricania spp) of the Oder Lepidoptera was found to be the most abundant (30%) followed by the insect Oder; Odanata (Anisoptera spp) 15% and Coleoptera (Carabidae spp) 9%. This variation in abundance was observed within 10 weeks. This work is pioneering and identifies the roles of insects in plants pollinations/foraging pattern. There was no significant difference ($P \leq 0.05$) between the insect visitors to the flowers of Irvingia gabonesensis in the morning and afternoon.

Keywords: Aboretum, insect, pollinations and *Irvingia gabonesensis*

INTRODUCTION

Wild Mango (*Irvingia gabonensis*)
Irvingia gabonensis; Locally called dika nut but in English, sometimes called Wild mango, native mango, bush mango, bread tree, African mango tree with a general trade name dika nut. The Hausa call it Goron, Biri – the Yoruba call it Oro while the Igbo call it 'Ogbono'/'Ugiri' depending on the variety. It belongs to the *Irvingiaceae* family of plants. It attains a height of 15 – 40 meter, bole slightly buttressed. It has a dense compact crown, branchlets ending in a narrow curved, stipular sheath covering the leaf bud, bark grayish, smooth or very slightly scaly; slash yellowish-brown to light yellow. Two varieties of African bush mango were identified and these are *Irvingia gabonensis* and *Irvingia excels* [19].

A researcher [33] reported that many groups of insects were recognized today based on their Orders of classification, for example, the Blattodea, Coleoptera, Dermaptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera, Mantodea, Neuroptera, Odonata, Orthoptera, Phasmatodea, Psocoptera, Thysanoptera and Zoraptera. These insects are unique in their own way and have an important ecological role for the survival of life on earth. Great insect diversity is indeed an intrinsic part of the earth's ecosystem. They are what make the ecosystems tick remarked [25].

Many insects are valuable to humans, for example by their pollinating activities. Bees are of the most economically important groups of insects as a result of pollination of agricultural crops [1]. Furthermore, some of the insects also provide us honey, silk and other commercial value products. They serve as food for bird, fish and beneficial animals;

they perform valuable services as scavenger, and they have been useful in medicine and research. But some of them are harmful and become pests in agricultural crops and stored products, and some insects transmit diseases to human and other animals [32].

Wild bees [Hymenoptera] are one of the major pollinators of angiosperms [18,26,15] but their diversity and abundance is generally reduced in many regions [7,23,21]. There are many potential drivers which may affect wild pollinator abundance in particular. Among the most important ones are land use changes and fragmentation [10,38], environmental pollution and pesticides [13]. Alien species including both, plants and pollinators [31,28], climate change and decreased resource diversity [2]. This, however, applies more to the specialist species which require a particular habitat and depend on a selected range of floral choice and nesting requirements generally do well by switching to alternative resources.

An estimated 272 species of bees live in a variety of landscapes in the United Kingdom [3]. The majority of these are non-social, "solitary" species, or primitively ecosocial with no morphological differences between castes. However it is the social genera Bombus and Apis, which make up 10% of British bees diversity, upon which research has been most focused [10,6].Data from the other bees are fragmentary because of the lack of coordinated programme [23]. Analyzing records of native bees species from before and after 1980. [2] reported a 52% decline of solitary bees in United Kingdom, whilst data going back to the mid Nineteenth Century demonstrates that 11 solitary bees belonging to the genera Osmia, Nomada, being listed as targets for conservation action.

The diversity and abundance of insect-visitor to flowers of *Irvingia spp* in Rivers State University of Science and Technology School arboretum is carried out to identify the unique role of insects in plant pollination. Therefore, this study will help to investigate the various insect species and their diversity on the flower of *Irvingia spp*. in the school arboretum, thus providing baseline information of insect species that visits *Irvingia gabonensis*. This research is aimed at estimating percentage abundance of insect species, determine the insect species richness on flower of *Irvingia gabonensis* spp found in the school arboretum and to ascertain insect species diversity on flower of *Irvingia gabonensis*.

MATERIALS AND METHODS

Study Area

The study was conducted in the Arboretum of Forestry and Environment, Rivers State University of Science and Technology, Port Harcourt situated in latitude 40,42' and 40,48'N and Longitude 60,15' and 7.250E [30].

Sample Collection and Preservation.

The insect loving flowers of Irvingia gabonenesis survey was conducted during 2015 between March-May, 2015.Collection of insects was done 8am in the morning and 5pm in the evening. Samples were collected twice in a week [3].

The method used in capturing the insect is hand netting [30min/plant survey] to avoid any biases in catching specific species. The sampling was done twice per week for the months of March/May and the population of insects was counted alongside the population size of individual insects estimated.

The sampling method is to ensure that rare species and species that are active over a short period are counted [17]. The 30 days of observation, the insect species that could not be identified in the field were collected in glass tubes and brought to the laboratory for identification using appropriate literature [32,14,5].

However, some of the insects were killed with Ethyl acetate and preserved in 10% formaldehyde for future reference at pathological laboratory.

Data Analysis

The data collected were subjected to the following descriptive statistics, analysis of variance (ANOVA) and Insect species diversity was quantified by Simpson's diversity index (D) as cited Magurran, (2004),

Formula, D = $\frac{\sum ni(ni-1)}{N(N-1)}$

Where,
ni = the total number of organisms of each individual species, of insects.
N=the total number of organisms of all species of insects.

And these species Richness Index (Menhinick's, 1964)

Index formula, R = $\frac{S}{\sqrt{N}}$

Where, R = Menhinick's (1964) insect species Index.
S = Number of insect species
N = Total number of Individuals insect.

Margalef Index D = $\frac{S-1}{\ln N}$

Where;
S = Number of Species
ln = Natural law
N = Total number of insect species

RESULTS AND DISCUSSION

The results on the percentage abundance of insect visitors to *Irvingia gabonensis* are shown in figures 1&2. The results indicate the presence of three different insect species in the arboretum, *Ricanidae* – 30%, *Anisoptera* 15% and *Carabidae* 9% respectively. Thus; *Ricanidae* spp. was found to be the most frequent and more abundant insect's species that visit the flower of *Irvingia gabonensis*.

The results on insect diversity to flowers of *Irvingia gabonensis* are shown in figures3&4. There was no significant difference ($P \leq 0.05$) in the diversity of insects collected. However, insects were captured during morning and evening hours. The results show that the three most frequently captured Orders in this study Lepidoptera, Odonata and Coleoptera were also reported in other studies as the most common flower visitors in Brassica crops [12, 24].This is consistent with the present findings. The abundance of these Orders was greater in the evening than in the morning, this justifies the opinion that some insects do not like cooled weather [16]. Therefore the abundance and diversity of the insect pollinators assemblage is not only important in seed production within crops [29,15] but also for viable pollen movement between crops [4,24].These reports agree with the present work.

Insects visitors to flowers play a vital role in the pollination of many fruit trees [36,15]. However, flower visitors may also contribute to undesirable gene movement among fruits cultivars and wild relatives [8].This is in consonance with the present findings.

A different insect species are likely to contribute differentially to this process. A wide variety of insect have been recorded as flower – visitors in Brassica crop, these include social bees [9]. Across all the taxa recorded as flower visitors of Brassica crops, *Bombus* spp. and *Apis mellifera* are considered key visitors in most regions of the world [37].

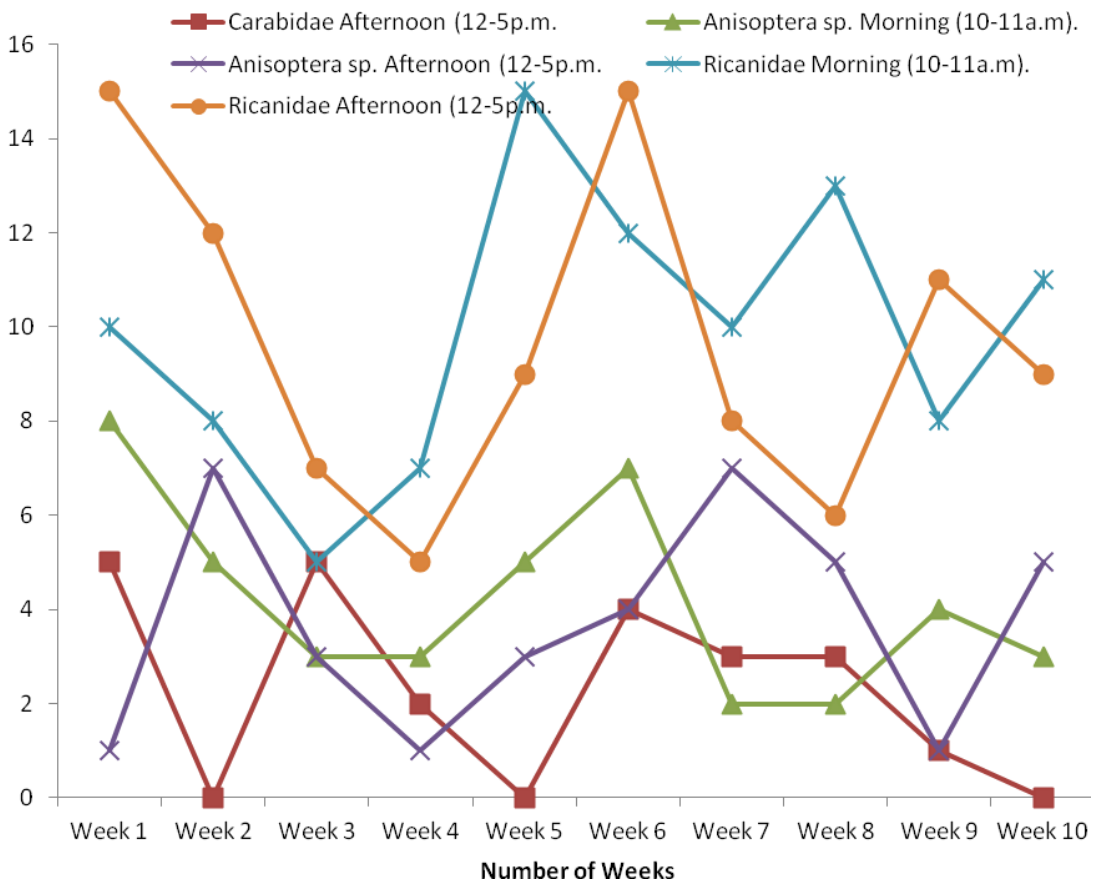

Figure 1: Frequency of insects in number of weeks

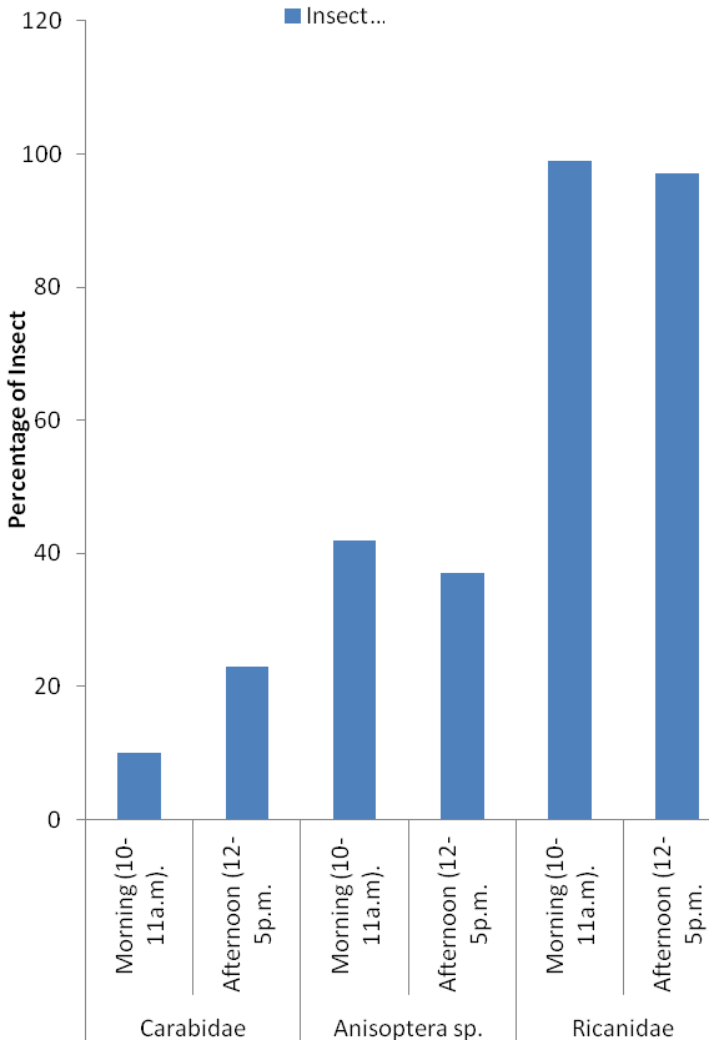

Figure 2: Percentage of insects in number of weeks

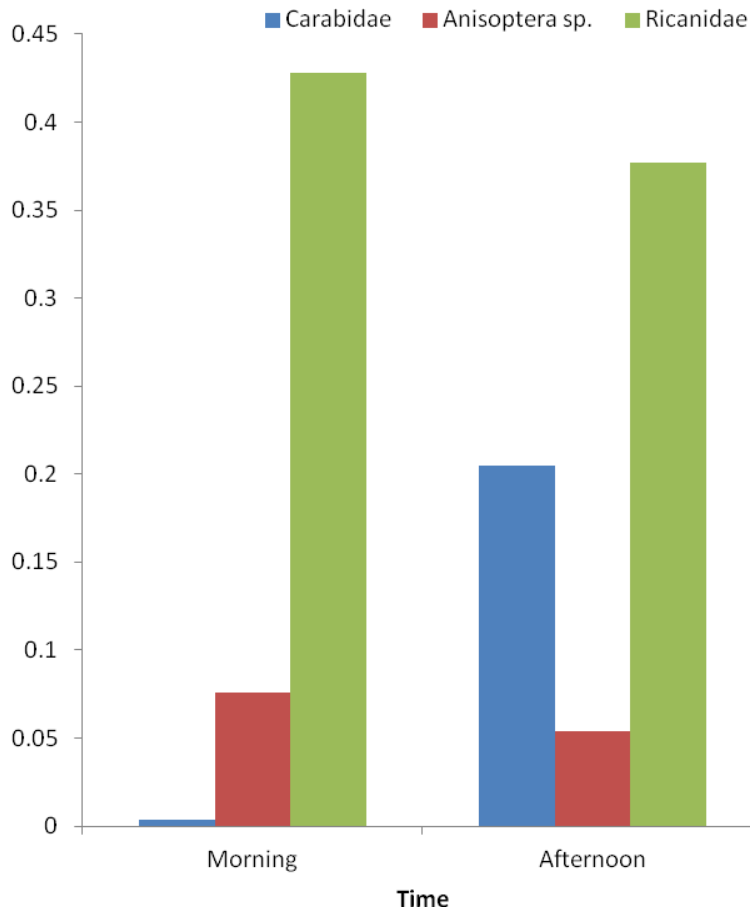

Figure 3: Simpson index of insect species in time

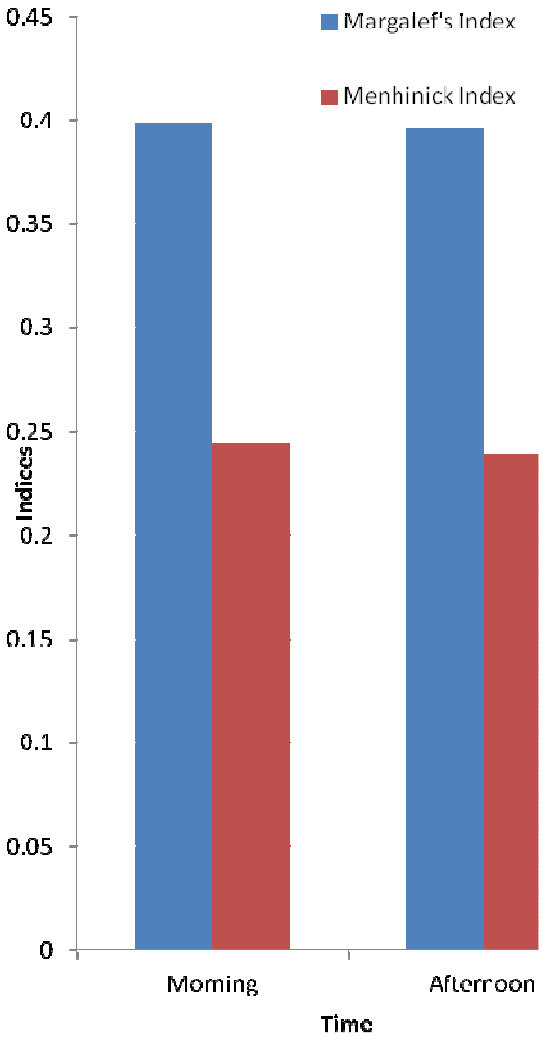

Figure 4: Indices of Margalef & Menhinick of insect species in time

CONCLUSION

In conclusion, some insects of *Irvingia gabonensis* of the Orders Lepidoptera, Odonata and Coleoptera are good pollinators of plants and its activities should be explored. However there was no significant difference ($P \leq 0.05$) between the insects that visits and forage in the morning to those captured in the afternoon. This may be attributed to the non-flowering period under review. More research study be conducted during fruiting period of *Irvingia gabonensis* to ascertain insects diversity occurrences.

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