DETERMINING DIVERSITY AND ABUNDANCE OF TERRESTIAL INSECTS SPECIES IN FARMLAND AND SETTLED AREA OF BUSITEMA UNIVERSITY, NAGONGERA CAMPUS, TORORO, UGANDA.

BY

CHEMAGET KIPLAG'AT OSCAR

BU/UP/2018/3388

A RESEARCH REPORT SUBMITTED TO THE DEPARTMENT OF BIOLOGY IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELORS DEGREE OF SCIENCE EDUCATION OF BUSITEMA UNIVERSITY.

MAY 2022

Abstract

A field survey was conducted in Farmland and Settled area of Nagongera Campus Busitema with the aim assessing the diversity and abundance of terrestrial insect species. Sampling was done after three days using pitfall, sweep net and quadrat. Insects collected were killed using 70% ethanol before pinning and dried in a cage. Representative samples were taken to the Biology laboratory for pinning and identification. A total of 399 insects spread across 10 orders and 20 families and were collected. The most dominant order was Orthoptera with a relative abundance of (27.32%) and, the least was Lepidoptera (0.50%). The most dominant insect family were Tetrigidae (17.54%) followed by Termitidae (16.54%) and Formicidae (10.78%). Families such as Pieridae and Nymphalidae (0.25%) each, Blattidae (0.75%) and Forficudidae (1.75%) had a small relative abundance. Species richness is based on number of individual insects measured. The highest species diversity was observed in the order Orthoptera (Shanon H'= 1.498) while, order Lepidoptera, Dictyoptera and Darmaptera have the least (H'= 0). However, the habitat with the highest species evenness was observed in the farmland (18.434). The geographical scope of the area needs to be expanded, and also the duration of the study.

DECLARATION

I, CHEMAGET KIPLAG'AT OSCAR hereby declare that this research proposal entitled **"Determining Diversity and abundance of terrestrial insect species in farmland and settled area of Busitema University, Nagongera Campus, Tororo, Uganda".** Is entirely original, genuinely done by myself and it has never be presented at any university or academic institution for any award.

Signed…….
Date…….

CHEMAGET KIPLAG'AT OSCAR

APPROVAL

This research proposal titled **"Determining Diversity and Abundance of terrestrial insect species in farmland and settled area of Busitema University, Nagongera Campus, Tororo, Uganda"** has been submitted with our approval as the students' University supervisors.

Signed……..
Data…….

Dr. EDWARD ANDAMA

Signed……..
Data……..

Ms. NAMUSANA HELLEN

TABLE OF CONTENTS

List of Figures

List of Table

List of Pictures

DEDICATION

This dissertation is dedicated to my mother Ms. Chelimo Gladys Andiema, Mr. John Masai and my sponsor HESFB for their efforts rendered to me towards completion of my course at Busitema University.

ACKNOWLEDGEMENT

I appreciate the Almighty God, Who rendered me life and blessed my studies. I also hereby express my sincere gratitude and appreciation for the assistance and encouragement I got from my supervisors Dr. Andama Edward and Ms. Namusana Hellen, lecturers Mr. Kifuko Richard, Mr. Wamboga Emma, laboratory technicians Mr. Olowo, Brothers and Sisters, Friends, and my sponser HESFB who made it possible for me to complete my research project. May the Almighty God bless them all!

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Insects are unique in their own way and play an important ecological role for survival of life on earth, their diversity is indeed an intrinsic part of the earth's ecosystem (Samways, 1994). The crucial functional roles insects ensure delivery of various ecosystem services (Berenbaum, 2006). According to (Assessment, 2003), ecosystem services are principally four types namely; provisioning services, such as production of fiber, clean water, and food; regulating services, obtained through ecosystem processes that regulate climate, water, and human diseases; cultural services, such as spiritual enrichment, cognitive development, reflection, recreation, aesthetics and finally, supporting services which include all other ecosystem processes, such as; soil formation, nutrient cycling, provisioning of habitat, production of biomass and atmospheric ox ygen.

As members of the ecosystems, insects contribute all four types of services and the economic value of these ecological services provided by insects has been pegged to approximately $60 billion a year in the United States alone, and this is only a fraction of the value for all the services they provide (Vaogham, 2006). Insects have been used in landmark studies in biomechanics, climate change, developmental biology, ecology, evolution, genetics, paleolimnology, and physiology (Godfray, 2002).

The tropics have been reported to be home to about 70% of the global biodiversity (Bradshaw, 2009). Accordingly, Uganda is one of Africa's richest countries for biodiversity, ranking eighth of the 54 countries on the continent (Mongabay, 2016). Uganda is an afro-tropical country with her vegetation zones lying within the Congo forest Biodiversity Hotspots (Myers, 2000). It has also been identified as the region with the most severely threatened forests in the world and it is estimated to have lost about 55.7% of its primary forest mainly to anthropogenic activities (Organisation, 2005).

There is growing awareness on the need to understand and conserve bio-diversity has triggered the interest in evaluating insect richness and diversity in various habitats and ecosystems (Okrikata, 2016). However, most studies on composition and abundance of insects are largely on one or two insect orders and/or families (Okrikata and Yusuf, 2016) like order Lepidoptera. Therefore, this

Reference

Adelosi, C. G. (2014). Avian Parasitism in Makurdi Nigeria: Do Wild Birds Serve as Reservoir for Domestic Birds? *Nigerian Journal of Pure and Applied Science*, 11-15.

Assessment, M. E. (2003). *Ecosystems and Human Well-being: A Framework Assessment.* Washington. DC: Island press.

Berenbaum, P. B. (2006). Status of pollination in North America. *National Academic Journal of Entomological Study*, 307-312.

Bonebrake, I. P. (2010). More than just indicators; a review of tropical butterfly ecology and conservation. *Journal of Biological Conservation*, 18-22.

Bradshaw, N. S. (2009). Tropical turmoil abiodiversity stragedy in progress. *Front Ecol Environ*, 79-85.

Cranston, P. J. (2010). *The Insects: An Outline of Entomology.* Hoboken: Blackwell Publishing.

Dicke, M. (2017). Ecosystem Services of insectsI. In A. a. Van Huis, *Insects as Food and Feed From Production to Consumption* (pp. 61-67). Wageningen: Wageningen Academic Publishers.

Evans, T. D. (2011). Ants and termites Increase Crop Yield in Dry Climate. *Nature Communications*, 10 15.

Farwing, N. B. (2014). Decomposition Rate of Carrion Is Dependent on Composition Not Abundance of the Assemblages of Insect Scavengers. *Oecologia*, 25-34.

Godfray, H. C. (2002). Challenges for taxonomy. *Nature*, 9-17.

Hunt, J. B. (2007). A Comprehensive Phylogeny of Beetles Reveals the Evolutionary Origins of a Superradiation. *Science*, 1-5.

Hunter, M. D. (2001). Insects Population Dynamics Meets Ecosystem Ecology: Effects of Herbivory on Soil Nutrients Dynamics. *Agriculture and Forestry Entomology*, 77-88.

Howard, T. R. (2001). Protected Areas Planning in the Tropics: Uganda's National System of Forest Natue Reserves. *Conservation Biology*, 1-3.

James H. Marden, P. C. (1991). Aeial Pedation and Butterfly Design: How Palatability, Mimicry, and the Need for Evasive Flight Constrain Mass Allocation. *Chicago Journals*, 2-4.

Kehinde, B. A. (2014). Status of Insect Diversity Conservation in NIgeria: A Review. *Ife Jounal of Science*, 5-10.

Kevin J. Gaston, S. J.-S. (2008). The Ecological Performance of Protected Areas. *Annual Review of Ecology Evolution and Systematics*, 1-3.

Kim, K. C. (1993). Biodiversity, Conservation and Inventory: Why Insects Matter. *Biodiversity and Conservation*, 1-5.

Kim, M. S. (1994). *Insect conservation.* London: Chapman and Hall.

Macfadyen, S. K. (2015). Temporal Change in Vegetation Production in Grain Production Landscape: Linking Landscape Complexity with Pest and Natural Enemy Communities. *Ecological Entomology*, 30 42.

Merritt, R. A. (2015). Arthropod Communities in Terrestrial Environments. In M. T. Benbow, *Carrion Ecology Evolution and Their Aapplications* (pp. 61-93). Boca Raton: CRC Press.

Metcalfe, G. P. (2014). Herbivory Makes Major Contributions to Ecosystem Carbon and Nutrient Cycling in Tropical Forests. *Ecology Letters*, 4-9.

Munyuli, M. B. (2012). *Butterfly Diversity from Farmlands of Central Uganda.* Kampala, Uganda: Hindawi Publishers Corporation.

Myers, A. R. (2000). Biodiversity hotsports for conservation priorities. *Nature*, 2-4.

Naeem, E. J. (2012). The Functions of Biological Diversity in an Age of Extinction. *Science*, 2-7.

Nichols, E. S. (2008). Ecological Functions and Ecosystem Services Provided by Scarabaeinae Dung Beetles. *Biological Conservation*, 5-9.

Organisation, F. a. (2005). *Towards sustainable forest management.*

Raphael Proulx, L. P. (2008). *Measures of structural complexity in digital images for monitoring the ecological signature of an old-growth forest ecosystem* . Montreal, Que, Canada: Elsevier Ltd.

Samways, M. (1994). *Insect conservation biology.* London: Chapman and Hall.

Samways, M. J. (1993). Insects in Biodiversity Conservation: Some Perspectives and Directives. *Biodiversity and Conservation*, 18-23.

Samways, M. J. (2005). *Insect Diversity Conservation.* New York: Cambridge University Press.

Scholtz, C. a. (2009). Insects Biology in Afrotropical Region. In R. a. Foottit, *Insect Biodiversity: Science and Society* (pp. 69-82). Hoboken: Blackwell Publishing.

Schoonhoven, J. V. (2005). *Insect - Plant Biology.* Oxford: Oxford University Press.

Oxiford UK.

Simpson, E. H. (1949). Measurement of biodiversity. *Nature*, 23-27.

Slade, G. E. (2000). Insect Herbivory Accelerates Nutrient Cycling and Increases Plant Production. *Proceedings of the National Academy of Sciences of the United States of America*, 24.

Stork, J. M. (2015). New Approaches Narrow Global Species Estimates for Beedles, Insects,and Terrestrial Arthropods. *Proceedings of the National Academy of Science of the United State of America*, 4-7.

Swaay, E. C.-K.-F.-P. (2015). *Guidelines for Standardized Global Butterfly Monitoring.* Leipzig, Germany: Group on Eath Observations Biodiversity Observation Network (GEO BON).

Tako Itioka, K. T.-i. (2014). Chronosequential changes in species richness of foest-edge-dwelling butterflies during forest restoration after swidden cultivation in humid tropical rainforest region in Berneo. *Journal of Forest Research*, 2-4.

Tschamtke, R. B. (2007). Cnservation biological control and enemy diversity on a landscape. *Biological Control*, 6-10.

Van Lenteren, J. (2012). *Internet Book of Biological Control.* Zurich: International Organization for Biological Control.

Vaogham, J. E. (2006). The Economic Value of Ecological Services Provided by Insects. *Bioscience*, 311-323.

Wong, B. B. (2015). Behavioral responsesto changing environments. *Behavioral Ecology*, 1-10.

Zhang, Z. Q. (2011). Animal Biodiversity: An Introduction to Higher-Level Classification and Taxonomy Richness. *Zootaxa*, 7-12.