TREE DIVERSITY AND COMPOSITION IN AN AREA BETWEEN UPPER HILL DIPTEROCARP FOREST AND LOWER MONTANE FOREST OF, JERAI FOREST RESERVE

MUHAMMAD ADZIM ARIFF BIN MOHD ARIFF

FH 2019 14

TREE DIVERSITY AND COMPOSITION IN AN AREA BETWEEN UPPER HILL DIPTEROCARP FOREST AND LOWER MONTANE FOREST OF, JERAI FOREST RESERVE

By

MUHAMMAD ADZIM ARIFF BIN MOHD ARIFF

A Project Report Submitted in Partial Fulfilment of the Requirements for the

Degree of Bachelor of Forestry Science in the

Faculty of Forestry

Universiti Putra Malaysia

2019

DEDICATION

For my beloved family:

Mohd Ariff Bin Che Mamat

Nahariah Ibrahim

My siblings.

My supervisor

Associate Professor Dr. Mohd Nazre Saleh

To all my best friends,

My team during data collection at Jerai FR.

My final year project's partner.

Thank you for your encouragements supports

And the sacrifices that you have given.

Thank you for everything. May Allah bless all of us.

ABSTRACT

The present study was conducted in an area located between a lower montane forest and upper hill dipterocarp forest at Jerai Forest Reserve, Kedah, Peninsular Malaysia. The purpose of the study was to determine the tree species composition, distribution, richness and diversity in this unique habitat by setting up one hectare plot. The unique structure of mixed forest between upper hill dipteropcarp forest with lower montane possessing numbers of admixture species. A total of 701 individuals belonging to 74 species, 61 genera and 41 families with diameter of 10cm and above were enumerated and identified. Importance value index (IVI) was calculated to show dominant species and the stand density also estimated. The highest IVI was recorded from family of Anacardiaceae with a total value of IVI 21.65%. Family Myrtaceae contributed the highest in stand density with a total of 125 individuals per hectare. Most of the species in Jerai FR stand dominated with the DBH classes of between 10cm to 24.9cm, a common size of trees in higher elevation forest. Shannon's index of diversity in Jerai FR gave a value of 3.68 indicating high diversity in Jerai FR. Tree composition at Jerai FR Is dominated by Myrtaceae with a total of 7 species from 2 genera. This is commonly seen for upper hill dipterocarp forest to lower montane forest in Malaysia with common genera such *Syzygium* and *Tristaniopsis*. At elevation of about 1000 to 1200m a.s.l (lower montane forest), the domination of dipterocarp species ends and replaced by species of oak (*Quercus* and *Lithocarpus* spp.) and chestnut (*Castanopsis)*. Other genera that are also prominent in the study area include include *Agathis*, *Dacrydium*, *Baeckea*, *Leptrospermum* and *Podocarpus*.

ABSTRAK

Kajian ini telah dijalankan di kawasan berhutan jenis bukit dipterokarpa atas dan hutan pergunungan bawah teretak di Hutan Simpan (HS) Jerai, Kedah, Semenanjung Malaysia. Tujuan kajian ini adalah untuk menentukan komposisi, kekayaan dan kepelbagaian spesies pokok di dalam plot bersaiz 1 hektar. Struktur hutan campuran menunjukkan bilangan spesies campuran yang unik dalam habitat ini. Sejumlah 701 individu yang terdiri daripada 74 spesies, 61 genus dan 41 famili pokok berdiameter 10cm dan keatas direkodkan. Indeks nilai penting (IVI) yang dikira menunjukkan nilai IVI tertinggi dari famili Anacardiaceae dengan IVI tertinggi dicatatkan dari keluarga Anacardiaceae dengan jumlah IVI 21.65%. Famili Myrtaceae menyumbang kepadatan ketinggian tertinggi dengan sejumlah 125 individu direkodkan dalam satu hektar kawasan. Kebanyakan spesies pokok di HS Jerai mempunyai kelas DBH di antara 10cm hingga 24.9cm. Ini adalah dijangkakan kerana saiz pokok sebegini adalah biasa di habitat pergunungan. Indeks kepelbagaian Shannon di HS Jerai memberikan nilai 3.68 yang menunjukkan kawasan hutan mempunyai kepelbagaian yang tinggi. Komposisi pokok di HS Jerai didominasi oleh famili Myrtaceae dengan sejumlah 7 spesies dari 2 genus. Hutan dipterokarpa bukit atas dan hutan pergunungan bawah juga kaya dengan genus yang biasa ditemui seperti *Syzygium* dan *Tristaniopsis*. Dominasi spesis dipterokarpa berakhir pada ketinggian kira-kira 1000 hingga 1200m a.s.l (hutan pergunungan bawah) dan digantikan oleh spesis Mempening (*Quercus* dan *Lithocarpus*) dan Berangan (*Castanopsis*). Genus lain yang agak mudah dijumpai termasuklah *Agathis, Dacrydium, Baeckea, Leptrospermum* dan *Podocarpus*.

ACKNOWLEDGEMENTS

Alhamdulillah and thank to Allah S.W.T with all His Gracious and His Merciful for giving me strength and the ability to accomplish this project successfully. I would like to take the utmost opportunity to express my sincere and gratitude to my supervisor Assoc. Prof. Dr. Mohd Nazre Saleh, who is always giving me supports and guidance.

APPROVAL SHEET

I certify that this research project report entitled “Tree Diversity and Composition in An Area Between Upper Hill Dipterocarp Forest and Lower Montane Forest of, Jerai Forest Reserve ” by Muhammad Adzim Ariff Bin Mohd Ariff has been examined and approved as a partial fulfilment of the requirements for the Degree of Bachelor of Forestry Science in the Faculty of Forestry, Universiti Putra Malaysia.

_____

Assoc. Prof. Dr. Mohd Nazre Saleh
Faculty of Forestry
Universiti Putra Malaysia
(Supervisor)

_____

Prof. Dr. Mohamed Zakaria Bin Hussin
(Dean)
Faculty of Forestry
Universiti Putra Malaysia

Date: JANUARY 2019

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Sg.	Sungai
Bt.	Batu
FR	Forest Reserved
a.s.l l	Above sea level
sp.	Species
Ha	Hectare
M	Meter
H’	Shannon Index
1-D	Simpson’s Index
E	Species Evenness
IVi	Important Value index

CHAPTER 1

INTRODUCTION

1.1 Background

Tropical forests are the subject of several studies to better understand the role that they could play in sustainable development, climate change, and floristic biodiversity. According to Basnet (1992), tropical forests are classified as a high biodiversity forest and the indicator for high biodiversity forests are depends on the species richness and the abundance of, the individuals' tree in the forests. The diversity of the vegetation can integrate by several parameters such as the vegetation structure and dynamics (Koubouna et al., 1992). Understanding the composition of the vegetation and also the stand structure of each particular forest are necessary as the species composition and species population size can tell us the tolerance of prevailing environmental condition, amount of rainfall per year, soils structure and also the history of that forests.

Tropical forests are at the critical rate due to the overexploitation and deforestation. Needs of local people and their activities had affected the tropical forests (Sagar & Singh, 2003). FAO (2010) states that in between 1990 and 2005, 13 million hectares of tropical forests a year are lost due to deforestation and degradation of forest and it became the cause to species extinction. Tropical deforestation and degradation of forest had brought international concern over forest composition and tree species.

According to Gibbs et al. (2010), to determine the nature and distribution of biodiversity of the forests to be managed, biodiversity inventories are used. Using resource inventory as a basis of stand structure, species composition and dynamic is important for development of strategies for achieving sustainable forests management. Furthermore, in determining the degree of variability of tree species within a community or a region, species diversity is one of the analytical tools that will applied (Bello et al., 2013).

1.2 Problem Statement

Forest type in Malaysia can be divided by lowland dipterocarp forest, upper hill dipterocarp forest, montane forest, oak-laurel forest, mangrove forest, swamp forest, limestone forest and quartz ridges forest (Maniam & Singaravelloo, 2015). The different type of forests located at different elevation and in term of species richness and the composition of species, it is also show significant differences (Brown & Lugo, 1990). The mixed vegetation of upper hill dipterocarp forest and lower montane forest in the study area such as in Jerai Forest Reserve is an interesting place to study. Most studies for tree diversity in Peninsular Malaysia mainly done in hill and upper hill dipterocarp forest such as in Ulu Muda, Kedah. However, area between montane forest and upper hill dipterocarp is rarely studied. The number of species for Dipterocarpaceae will also decrease in higher elevation. The uniqueness of this mixed vegetation can provide the new data on the species composition and can be used for the sustainable management of that forest.

1.3 Objectives

The objectives of this study are:

1. To determine the tree composition, diversity and species richness at the area between lower montane forest and upper hill dipterocarp forest of Gunung Jerai Forest Reserve.
2. To study the forest structure at the area between lower montane forest and upper hill dipterocarp forest of Gunung Jerai Forest Reserve.

REFERENCES

Basnet, K. (1992). Effect of Topography on the Pattern of Trees in Tabonuco (Dacryodes excelsa) Dominated Rain Forest of Puerto Rico. *Luquillo Critical Zone Observatory,* 24(1), 31-42.

Bellefontaine, R., Gaston, A., & Petrucci, Y. (2000). *Management of natural forests of dry tropical zones.* Rome: Food and Agrculture Organization of United Nation.

Bello, A.G., Isah, A.D., & Ahmad, B. (2013). Tree Species Diersity Analysis of KOGO Forest Reserve in North-Nigeria. *International Journal of Plant, Animal and Environmental Sciences,* 3(3), 189-196.

Brown, S., & Lugo, A. E. (1990). Tropical Secondary Forests. *Journal of Tropical Ecology,* 6(1), 1-32.

FAO. (2010). *Global Forest Resources Assessment*. Rome: FAO.

Heng, R.K., Mang, N.G., Huat, O.K., Sait, M., Sam, S., Empin, G.B., et al. (2017). Tree Diversity at Payeh Maga Montane Forest, Sarawak, Borneo. *Journal of Tropical Ecology,* 14, 125-150.

Faridah-Hanum, Mohd Nazre S., Kamziah, A.K., Ibrahim, Ghollasimood & Sholeh (2011). Tree Species Composition and Structureofa Coastal Hill Forest in Pulau Pangkor, Malaysia. *Journal of Agricultural Science*, 3(4), 172-187.

Gibbs, H.K., Ruesch, A.S., Achard, F., & Clayton, M.K., Holmgren, P., Ramankutty, N., & Foley, J.A. (2010). Tropical Forests Were the Primary Sources of New Agricultural Land in the 1980s and 1990s. *Proceeding of the National Academy of Sciences of The United States of America,* 107(38), 16732-16737.

Koubouana, F., Ifo, S.A., Moutsambote, J.M., & Modzali-Lenguiya, R. (2016). Floristic Diversity of Forests of the Northwest Republic of the Congo. *Open Journal of Forestry,* 6, 386-403.

Mardan, M.N., Hakeem, K.R., Faridah-Hanum, I., & Saari, N.S. (2013). Tree Species Composition and Diversity in One Ha Forest, Ulu Muda Forest Reserve, Kedah. *Sains Malaysiana*, 42(10), 1409-1424.

Mamo, M. (2013). Soil Genesis and Development, Lesson 5 – Soil Classification and Geography. *Soil Resources, 153, Fall*, 23.

Maniam, A., & Singaravelloo, K. (2015). Impediments to Linking Forest Islands to Central Forest Spine in Johor, Malaysia. *International Journal of Social Science and Humanity,* 5(1), 22-28.

Mueller-Dombois, D., & Ellenberg, H. (1995). *Aims and Methodes of Vegetation Ecology*. New York: John Wiley & Sons.

Ostertag, R., Mrin-Spiotta, E., Silver, W.L., & Schulten, J. (2008). Litterfall and Decomposition in Relation to Soil Carbon Pools Along a Secondary Forest Chronosequence in Puerto Rico. *Ecosystems,* 11*,* 701-714.

Richards, P.W. (1996). An Ecology Study, Second Edition. *The Tropical Study*, 13(5), 775-776.

Sagar, R., Raghubanshi, A.S., & Singh, J.S. (2013). Tree Species Composition, Dispersion and Diversity Along a Disturbance Gradient in a Dry Tropical Forest Region of India. *Forest Ecology and Management,* 186(1-3), 61-71.

Young, R.A., & Giese, R.L. (1990). *Introduction to Forest Science*. New York: John Wiley & Sons.