

**A PLOT INVENTORY OF ETHNOBOTANICAL PLANTS USED BY THE DUSUN
COMMUNITY IN TRUS MADI FOREST RESERVE**

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UNIVERSITI MALAYSIA SABAH

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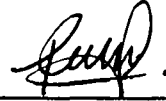
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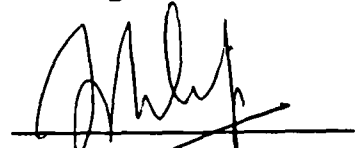
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ABSTRACT

This research was conducted to investigate the diversity of ethnobotanical plants used by the Dusun community in three types of vegetation at Trus Madi Forest Reserve. The three vegetation types were Lowland Mixed Dipterocarp Forest, Upland Mixed Dipterocarp Forest and Lower Montane Forest. Three 20m x 20m (0.12 ha) plots were set up at each type of vegetation. A total of 230 individual ethnobotanical plant species were enumerated, comprising 86 species in 46 different families. Shannon - Weiner Diversity Index (3.403) and Simpson Diversity Index (0.9724) indicated that Lowland Mixed Dipterocarp forest had more species richness and was more diversified compared to other types of vegetation. Each type of vegetation was dominant and diversified with different plant family and species. Altitude, temperature and human - caused disturbance may affect the diversity of ethnobotanical plants in Trus Madi Forest Reserve. The ethnobotanical plants can be classified eight usage categories; medicinal, construction, food, edible fruit, animal feed, handicraft, firewood and utensil. The study added 37 species as new records of ethnobotanical plants in Trus Madi Forest Reserve.

ABSTRAK

INVENTORI PLOT TUMBUHAN ETNOBOTANI YANG DIGUNAKAN OLEH MASYARAKAT DUSUN DI HUTAN SIMPAN TRUS MADI

Kajian ini telah dijalankan untuk mengkaji kepelbagaian tumbuh-tumbuhan etnobotani yang digunakan oleh masyarakat Dusun di tiga vegetasi yang berbeza di Hutan Simpan Trus Madi. Tiga jenis vegetasi tersebut ialah hutan dipterokarp tanah rendah, hutan dipterokarp tanah tinggi dan hutan pergunungan rendah. Tiga plot berkeluasan 20 m x 20 m (0.12 ha) telah dibina di setiap jenis vegetasi. Sebanyak 230 individu tumbuhan etnobotani telah direkodkan yang terdiri daripada 86 spesies dalam 46 famili. Indeks Kepelbagaian Shannon- Weiner (3.403) dan Indeks Simpson Kepelbagaian (0.9724) mencatatkan bahawa hutan dipterokarp tanah rendah mempunyai kekayaan spesies yang tinggi dan lebih pelbagai berbanding vegetasi yang lain. Setiap vegetasi didominasi oleh famili tumbuhan dan species yang berbeza. Ketinggian, suhu dan gangguan manusia berkemungkinan mempengaruhi kepelbagaian tumbuhan etnobotani di Hutan Simpan Trus Madi. Tumbuh-tumbuhan etnobotani yang dicatatkan di kawasan kajian telah dikategorikan kepada 8 kategori penggunaan iaitu tumbuhan ubatan, pembinaan, makanan, buah-buahan, makanan haiwan, kraftangan, kayu api dan perkakas. Sebanyak 37 spesies ditemui sebagai tumbuhan etnobotani di Hutan Simpan Trus Madi.

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LIST OF ABBREVIATIONS AND SYMBOLS

A.D.	Anno Domini
a.s.l.	Above sea level
B.C.	Before Christ
DBH	Diameter at breast height which is at height of 1.3- 1.5m above ground level
Dept	Department
<i>et al.</i>	<i>at alia</i> means " and other"
ha	Hectare
FMU	Forest Management Unit
FR	Forest Reserve
FRC	Forest Research Centre
GIS	Geographic Information System
GPS	Global Positioning System
E	East
ITBC	Institute for Tropical Biology & Conservation
LMDF	Lowland Mixed Dipterocarp Forest
LMF	Lower Montane Forest
UMDF	Upland Mixed Dipterocarp Forest
UKM	University Kebangsaan Malaysia
UNESCO	United Nations Education Scientific And Cultural Organization
WHO	World Health Organization
WWF	World Wildlife Fund
N	North
°C	Celcius

%	Percentage
x	Multiply by
π	Pi that equals to 3.142
d	Diameter of the circle
>	More than
&	And
Σ	Sum of all
°	Degrees, minutes, seconds of a coordinate

LIST OF UNITS

cm	centimeter
km	kilo meter
m	meter
m ²	meter square

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CHAPTER 1

INTRODUCTION

1.1 Background

A discussion on the human life on earth would not be complete without discussing the roles of plants. This is because plants have been an integral part of human beings since the start of civilization. The relationship between man and plants is as old as the history of mankind. This direct interaction between humans and plants through its culture is called ethnobotany. Ethnobotany is a scientific study on how a specific group of ethnic apply and utilize the plants for their needs (Oni, 2010) and on how the native people use the plants available in their surrounding as their daily resources (Martin, 1995).

There is a strong relationship between ethnobotanical plants and tropical rain forests because the tropical rainforest are believed to be the source of a large proportion of the world's recognized useful plants, although the fallow areas and village periphery are also important sources (Hugo, 2002). Malaysia is one of the world's richest and most varied biophysical resources and it ranks as one of the 12 'mega-diverse' countries hosting some 185,000 species of fauna and about 12,500 species of flowering plants or flora (Premillia, 2002). Sabah is Malaysia's second largest state and half of the lands are forest areas with rich biodiversity especially with ethnobotanical plants (Kulip, 2003). There are 1,200 medicinal plants which are used by the indigenous people in Sabah (Kulip, 2004).



The indigenous population in Sabah is made up of more than 36 groups of native people (Kulip, 2003). Out of these 36 groups, Dusun make up the largest group population (Dept. Statistics 2010). Dusun people have great knowledge of the forest as a source for food, medicine, construction, handicraft, firewood and more.

Ethnobotanical plants are ecologically diverse and contain a great range and variety of ethnobotanical plants which inhabit different vegetation and altitude. Trus Madi Forest Reserve (FR) consists of five types of vegetation and each type of vegetation is rich with useful plants that are used by the Dusun community (Kulip, 2006). Each type of vegetation is located at different altitude and may contain a diversity of the ethnobotanical plants.

There are effective and standard methods that were applied for the inventory of the ethnobotany such as plot, anthropology and more (Martin, 1995). Inventory in plots means the study of vegetation in a standardized area where the plots are set up (Martin, 1995). This is a standard technique in most ethnobotanical work that has been used in most of the forest vegetation to determine the population size of one or more species in a community.

Basically, this study focused on assessing the ethnobotanical plants used by the Dusun community in Trus Madi FR in three types of vegetation; Lowland Mixed Dipterocarp Forest (LMDF), Upland Mixed Dipterocarp Forest (UMDF) and Lower Montane Forest (LMF). The plot method was used in this study to analyse the diversity and inventory of the ethnobotanical plants in Trus Madi FR.

1.2 Justification

The study of local knowledge especially in natural resources is becoming an important component in defining the strategies to conserve biodiversity in Sabah, Malaysia. There are many research methods which have been conducted in the inventory of ethnobotany such as: interviews, questionnaires and combination of

interview and questionnaires. However, the plot inventory method is rarely used to evaluate the knowledge of ethnobotany (Patrick *et al.*, 2001). In addition, there has been few published research on plot method in ethnobotany. Therefore, the plot method in this study will be able to evaluate the diversity of ethnobotanical plants in the study site. This study will provide an update on the usage of the plants by the Dusun people. Besides that, this study will provide a comparative information the ethnobotanical plants between different vegetation types at Trus Madi FR.

1.3 Objectives

- I. To compare the diversity of ethnobotanical plants between the three types of vegetation: Lowland Mixed Dipterocarp Forest (500 m- 600 m a.s.l), Upland Mixed Dipterocarp Forest (900 m - 1000 m a.s.l) and Lower Montane Forest (1,700 m - 1,800 m a.s.l).
- II. To document plant utilization among the Dusun community.
- III. To update the checklist of Dusun's ethnobotanical plants in Trus Madi FR.

1.4 Scope of the Study

- I. All shrubs, herbs, climbers and trees (DBH> 5 cm) of ethnobotanical value plants will be collected and recorded scientifically.
- II. Only ethnobotanical plants used by the Dusun community will be collected in the plots in three different types of vegetation.

CHAPTER 2

LITERATURE REVIEW

2.1 Ethnobotany

The term ethnobotany derived from the word ethnoecology. Ethnoecology is increasingly used to encompass all studies which describes local people's interaction with the natural environment, making it the parent of sub discipline for ethnobotany (Martin, 1995). The prefix 'ethno' refers to people and 'botany' refers to plants. Therefore, it brings the meaning of "the perception or view by the indigenous group people on the plants'. There are many kinds of definition for ethnobotany. It changes from author to author and from time to time. Nonetheless, all the definitions are still centers on two main key points, people and plants. According to Oni (2010), ethnobotany is a study of how a specific group of ethnic applies and utilizes the plants for their needs such as medicine, food, fodder, fiber, and goods required for their material culture and amenities. Furthermore, the term ethnobotany also refers to all studies that are related to the reciprocal relationship between plants and traditional peoples (Cotton, 1996). According to Alcorn (1995), the aims of ethnobotany are twofold: to describe roles and processes in plant use and to document facts about plant use and management. In practice, ethnobotany is largely defined by its methodology, which emphasizes the utilization of culturally meaningful questions in order to understand the system of underlying rules and hierarchies used by a culture to structure experience (Martin, 1995). A related methodological development in ethnobotany has been the integration of more quantitative



approaches. Several ethnobotanists have adapted ecological and forestry techniques for conducting ethnobotanical inventories (Martin, 2004).

2.1.1 The History of Ethnobotany

The use of plants by human is not new. Plants life has existed on earth for hundreds million years before even human have existed. Ever since the beginning of civilization, people have used plants as medicine. The earliest recorded uses of plants for medicinal purpose were found in Babylon circa 1770 B.C in the Code of Hammurabi and in ancient Egypt circa 1550.B.C. In fact, ancient Egyptians believed medicinal plants to have utility even in the afterlife of their pharaohs (Choudhary *et al.*, 2008).

In AD 77, the Greek surgeon Dioscorides published "De Materia Medica", which was a book of about 600 plants in the Mediterranean. It also contained information on how the Greeks used the plants, especially for medicinal purposes. It described herbal contained information on how and when each plant was gathered, whether or not it was poisonous, it's actual use and whether or not it was edible. In 1542, Leonhart Fuchs, a Renaissance artist, published "De Historia Stirpium" cataloged 400 plants native to Germany and Austria. In 1753, Carl Linnaeus wrote "Species Plantarum", which included information on about 5,900 plants (Choudhary *et al.*, 2008). Linnaeus is famous for inventing the binomial method of nomenclature, in which all species get a two part name (genus, species).

The 19th century saw the peak of botanical exploration. Alexander von Humboldt collected data from the new world and the famous Captain Cook brought back information on plants from the South Pacific. At this time major botanical gardens were started, for instance the Royal Botanic Gardens, Kew. Edward Palmer collected artifacts and botanical specimens from peoples in the North American West and Mexico from the 1860s to the 1890s (Choudhary *et al.*, 2008). Once enough data existed, the field of "aboriginal botany" was founded. Aboriginal botany is the study of all forms of the vegetable world which aboriginal peoples use for food, medicine, textiles ornaments, and other uses.

The first individual to study the emic perspective of the plant world was a German physician working in Sarajevo at the end of 19th Century, Leopold Glueck. His published work on traditional medical uses of plants done by rural people in Bosnia (1896) has to be considered the first modern ethnobotanical work. The term "ethnobotany" was first used by a botanist named John W. Harshberger in 1895 while he was teaching at the University of Pennsylvania. He used the term to define the study of 'plants used by primitive people'. The term immediately gained acceptance by botanist and others who were interest in modern and prehistoric civilization uses for plants (Malla & Chhetri, 2009).

Eventhough the term was not used until 1895, practical interests in ethnobotany go back to the starting of civilization when people depend more on plants as a way of survival. A publication of the first number of Indigenous Knowledge and Development Monitor is important steps forward in the development and diversification of the ethnobotany (Martin, 1995). Indigenous Knowledge and Development Monitor was a journal that served the international development community and all scientists who shared a professional interest in indigenous knowledge system and practice. Beginning in the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation (Martin, 2004). From its modest beginnings, ethnobotany has grown in size and importance. Today scholars from many disciplines, such as botany, archaeology, geography, anthropology, linguistics, medicine, landscape architecture, and pharmacology are rekindling a new renaissance in ethnobotanical research. Each discipline brings its own perspective while at the same time, interdisciplinary research creates a stimulating and diverse field of study. Throughout the world, academic societies and non-governmental organizations devoted to ethnobotany (Ganapathy *et al.*, 2013).

2.1.2 Importance of Ethnobotany

Ethnobotany plays a vital role in economic growth and development, conservation of biodiversity, scientific research studies and most especially provision of medicine and healthcare (Simbo, 2010). Therefore, 'Peoples and Plants' Cooperation, World Wildlife Fund (WWF), United Nations Educational Scientific and Cultural Organization (UNESCO) and the Kew Royal Botanic Gardens are the creation and initiation of the 'Ethnobotany' in the world. According to the World Health Organization (WHO), almost 65-80% of the world's population has incorporated the value of plants as a methodology of medicinal agents into their primary modality of health care. It is often noted that 25% of all drugs prescribed today come from plants (Mesfin *et al.*, 2013).

Futhermore, ethnobotany plays important role in economic growth and development knowledge that can be used to help find a solution for pressing problems, such as increasing food production while improving agricultural sustainability, developing new medicines and finding environmental conservation strategies that are well articulated with new economic development and cultural survival (Ahmed *et al.*, 2013).

Moreover, ethnobotanical studies play an important role and focus on the indigenous people and the minorities. Ethnobotanical information plays an important role in the scientific research, particularly when the literature and fieldwork data have been properly evaluated. The documentation of indigenous knowledge on the utilization of local plant resources by different ethnic groups or communities is one of the main objectives of ethnobotanical research (Choudhary *et al.*, 2008). Indigenous people are the ones who were the original inhabitants of any place and live a life of their own which is of self-sufficient type with no foreign involvement (Wabe *et al.*, 2011). Indigenous knowledge systems are not only for the cultures from which they evolve, but also for scientists and planners striving to improve conditions in rural societies. The rural people have developed unique indigenous knowledge related to the uses of plant resources due to constant association with the forests. This existing

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