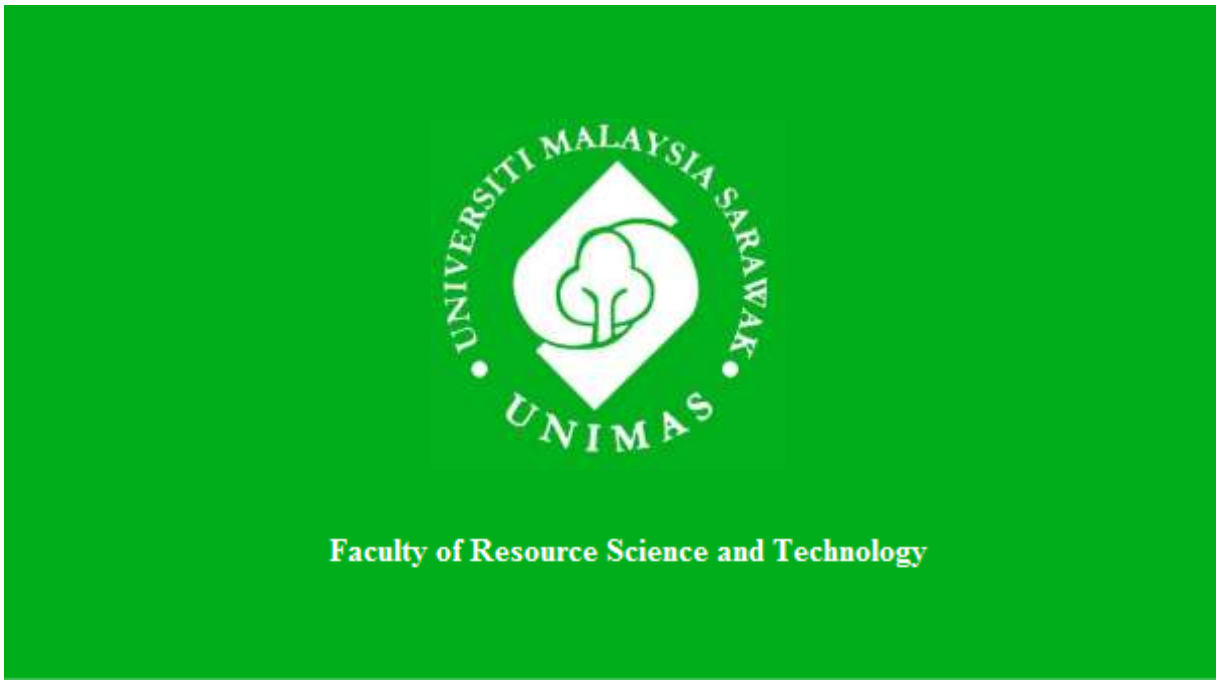

AN ETHNOBOTANICAL STUDY OF THE MEDICINAL PLANT USED BY THE MALAY COMMUNITY IN THE REMEDIES FOR DIABETES AT KOTA TINGGI, JOHOR

NURUL ATHIRAH BINTI YAZID

Bachelor of Science with Honours
(Plant Resource Science and Management)
2015

UNIVERSITI MALAYSIA SARAWAK

Grade: _____

Please tick (√)

Final Year Project Report [√]

Masters [ ]

PhD [ ]

DECLARATION OF ORIGINAL WORK

This declaration is made on the 24th day of June year 2015

Student's Declaration:

I NURUL ATHIRAH BT YAZID, 38203, FACULTY SCIENCE AND TECHNOLOGY

(PLEASE INDICATE NAME, MATRIC NO. AND FACULTY) hereby declare that the work entitled, An ethnobotanical study of medicinal plant by malay community for remedies of diabetes at Kota Tinggi, Johor is my original work. I have not copied from any other students' work or from any other sources with the exception where due reference or acknowledgement is made explicitly in the text, nor has any part of the work been written for me by another person.

24/6/2015
Date submitted

NURUL ATHIRAH YAZID (38203)
Name of the student (Matric No.)

Supervisor's Declaration:

I, Jamliah bt Jamel (SUPERVISOR'S NAME), hereby certify that the work entitled, An ethnobotanical study of medicinal plant by malay community for remedies of diabetes at Kota Tinggi, Johor (TITLE) was prepared by the aforementioned or above mentioned student, and was submitted to the "FACULTY" as a * partial/full fulfillment for the conferment of ---------- (PLEASE INDICATE THE DEGREE TITLE), and the aforementioned work, to the best of my knowledge, is the said student's work

Received for examination by: _____
(Name of the supervisor)

Date: 24/JUNE/15

I declare this Project/Thesis is classified as (Please tick (√)):

☐ CONFIDENTIAL (Contains confidential information under the Official Secret Act 1972)*
☐ RESTRICTED (Contains restricted information as specified by the organisation where research was done)*
☒ OPEN ACCESS

I declare this Project/Thesis is to be submitted to the Centre for Academic Information Services (CAIS) and uploaded into UNIMAS Institutional Repository (UNIMAS IR) (Please tick (√)):

☒ YES
☐ NO

Validation of Project/Thesis

I hereby duly affirmed with free consent and willingness declared that this said Project/Thesis shall be placed officially in the Centre for Academic Information Services with the abide interest and rights as follows:

- This Project/Thesis is the sole legal property of Universiti Malaysia Sarawak (UNIMAS).
- The Centre for Academic Information Services has the lawful right to make copies of the Project/Thesis for academic and research purposes only and not for other purposes.
- The Centre for Academic Information Services has the lawful right to digitize the content to be uploaded into Local Content Database.
- The Centre for Academic Information Services has the lawful right to make copies of the Project/Thesis if required for nse by other parties for academic purposes or by other Higher Learning Institutes.
- No dispute or any claim shall arise from the student himself / herself neither a third party on this Project/Thesis once it becomes the sole property of UNIMAS.
- This Project/Thesis or any material, data and information related to it shall not be distributed, published or disclosed to any party by the student himself/herself without first obtaining approval from UNIMAS.

Student's signature _____ (Date) 24/6/2015

Supervisor's signature: _____ (Date)

Current Address: NO. 8 JALAN SS 8/3A TAMAN SRI SAUJANA, 81900 KOTA TINGGI JOHOR.

Notes: * If the Project/Thesis is **CONFIDENTIAL** or **RESTRICTED**, please attach together as annexure a letter from the organisation with the date of restriction indicated, and the reasons for the confidentiality and restriction.

[The instrument was prepared by The Centre for Academic Information Services]

An Ethnobotanical Study of the Medicinal Plant Used by the Malay Community in the Remedies for Diabetes at Kota Tinggi, Johor

Nurul Athirah binti Yazid

38203

This Project is submitted in partial fulfilment of the requirements for degree of Bachelor of Science with Honours

(Plant Resource Science and Management)

Plant Resources Science and Management

Department of Plant Science and Environmental Ecology

Faculty of Resource Science and Technology

Universiti Malaysia Sarawak

DECLARATION

I hereby declare that the Final Year Project 2015 is based on my original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been or concurrently submitted for any other Degree at UNIMAS or institutions of higher learning.

NURUL ATHIRAH BINTI YAZID
Plant Resource Science and Management Programme
Department of Plant Resource Science and Environmental Ecology
Faculty of Resource Science and Technology
Universiti Malaysia Sarawak (UNIMAS)

APPROVAL SHEET

Name of candidate : Nurul Athirah binti Yazid

Matric no. : 38203

Title of dissertation : An Ethnobotanical Study of the Medicinal Plant Used by the Malay Community in the Remedies for Diabetes at Kota Tinggi, Johor

…….

(Mdm. Jamliah bt. Jamel)

Supervisor

……

(Dr. Rebicca Edward)

Coordinator of Plant Resource Science and Managament Programme

Department of Plant Resources Science and Environmental Ecology

Faculty of Resource Science and Technology

Universiti Malaysia Sarawak (UNIMAS)

ACKNOWLEDGEMENT

First of all, I would like to present my deepest gratitude and thankfulness to my principal supervisor, Mdm Jamliah bt Haji Jamel for this untiring and continuous guidance, kind assistance, supports, advices and constant encouragement throughout this project. Thankyou also dedicated the villages people who willingly be my respondents and give me very helpful information about my study.

Special thanks dedicated to my father, Yazid bin Hasnan for their countless sacrifice, love, support and continuous encouragement throughout the project. I would like to thank my friends especially Nurul Syafiqah binti Sapuan, Elmy Fazriena binti Md. Yusof and Huzaimah binti Mahdi for their kind support, valuable help and moral motivation. Thank you very much.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF PLATES

LIST OF TABLES

AN ETHNOBOTANICAL STUDY OF MEDICINAL PLANTS USED IN THE REMEDIES OF DIABETES BY MALAY COMMUNITY AT KOTA TINGGI, JOHOR

Nurul Athirah Binti Yazid

Plant Resource Science and Management Programme,
Faculty of Resource Science and Technology,
Universiti Malaysia Sarawak (UNIMAS)

Abstract

An ethnobotanical survey of plants which has medicinal value used in the remedies of Diabetes at Kota Tinggi, Johor were conducted between September until May, 2015. Ethnobotanical data were collected by oral interview and semi-structured questionnaire administered to forty (40) respondents made up of traditional medicinal practitioners, herb seller, civil servants, farmer and prevalence of diabetes. From the survey, approximately 50% of the Malay community aged between 41-50 years old, has knowledge about the ethno-botanical information and uses for the remedies of diabetes. A total of 40 plant species belonging to 26 families were found to be used useful in the remedies of diabetes. Recipes used in the remedies of diabetes were documented. *Orthosiphon stamineus* (Misai Kucing), *Mimordica charantia (*Peria katak), *Tinospora crispa* (Bakawali), *Swietenia macrophylla* (Tunjuk langit) and *Pithecellobium jiringa (*Jering) were frequent mentioned by respondents and useful in the remedies of diabetes. Survey revealed that leaves from the major part of the plants commonly used for herbal preparations. Decoction and ingestion were mostly used by the Malay community as the modes of consumption.

Keywords: Ethnobotany, Medicinal plant, Malay, Diabetes

Abstrak

Satu kajian etnobotani tumbuh-tumbuhan yang mempunyai nilai perubatan yang digunakan dalam rawatan Diabetes di Kota Tinggi, Johor telah dijalankan antara September sehingga Mei 2015 dilakukan. Data Etnobotani dikumpulkan melalui wawancara lisan dan soal selidik separa berstruktur untuk empat puluh (40) responden terdiri daripada pengamal perubatan tradisional, penjual herba, penjawat awam, petani dan penghidap diabetes. Daripada kajian itu, kira-kira 50% daripada masyarakat Melayu yang berumur antara 41-50 tahun, mempunyai pengetahuan mengenai maklumat etno-botani dan kegunaan untuk rawatan kencing manis. Sebanyak 40 spesies tumbuhan yang dimiliki oleh 26 keluarga telah didapati digunakan berguna dalam rawatan kencing manis. Resipi yang digunakan dalam rawatan penyakit kencing manis telah didokumenkan. Salah satunya adalah Orthosiphon stamineus (Misai Kucing), Momordica charantia (Peria katak), Tinospora crispa (Bakawali), Swietenia macrophylla (Tunjuk Langit) dan Pithecellobium jiringa (Jering). Spesies ini didapati sangat penting dan berguna dalam rawatan diabetes berdasarkan kekerapan kejadian dalam resipi diperolehi. Kajian menunjukkan bahawa daun dari sebahagian besar daripada tumbuh-tumbuhan digunakan untuk persediaan herba. Merebus dan pemakanan telah banyak digunakan oleh masyarakat Melayu sebagai cara penggunaan.

Kata Kunci: Diabetes, Etnobotani, Melayu, Tumbuhan perubatan

1.0 INTRODUCTION

The unique biodiversity made most of the plant act as important source for medicine, food and industrial need. The term ethnobotany was devised in 1895 by a North American botany to describe studies of plants use by primitive and aboriginal people (Ballick and Cox, 1996). Ethnobotany is a multidisciplinary science which can be defined as the interaction between plants and people (Nashriyah *et al.,* 2011). It can be proved by certain activities that showed the relationship between human and plant. For example food source, shelter, clothing, health care, ornamentation, religious ceremony, beauty care, economy and medicine. Kadir, A, A. (1998) reported that there are well over 15 000 species of higher plants found in Malaysia. 1200 of these plants species have potential pharmaceutical value of which some are being used as herbal medicine (Soepadmo, 1991).

Malaysia is rich with varieties of medicinal plant to treat various ailments. Nowadays, the usage of medicinal plants are significantly increased because many of published studies shown their efficiency to treat ailments especially in diabetes mellitus. According to Marles & Farnsworth (1990), medicines plants give a lot of positive effects in reducing the level of blood glucose and its complications have been recognized. Meanwhile, Bahmani *et al.,* 2014) also said many plants have been used traditionally by the indigeneous people to improve diabetes according to the history. Besides that, medicinal plants are more preferable than synthetic antidiabetic agents because synthetic drug have limitation and less effective (Sekar *et al.,* 2014). Medicinal plants that are identify in ethnobotanical study are mostly natural origin and less side effects (Modak *et al.,* 2007).

Diabetes mellitus is prevalent ailment in Malaysia especially for adult when reach 30 to 40 years old. Diabetes is an ailment when glucose contained in the blood is high. Diabetes mellitus is a complex metabolic disorder resulting from either insulin insufficiency or insulin dysfunction. Through interpretation diabetes can be classified and categorized as Type 1 diabetes and type II diabetes. Type I diabetes known as insulin dependent diabetes mellitus (IDDM) (Naini *et al.*, 2013). Type I DM is caused by immunological destruction of pancreatic beta cells leading to insulin deficiency (Notkins, 2002). Meanwhile, type II diabetes known as non-insulin dependent diabetes mellitus (NIDDM). Type II DM results is a condition in which cells fails to use insulin properly (Yadav *et al.*, 2012). The overall national prevalence of diabetes among Malaysians aged 30 years and above had increased from 8.3% in 1996 to 14.9% in 2006. The world health organization (WHO) has estimated that in 2030, Malaysia would have a total number of 2.48 million diabetics patient compared to 0.94 million in 2000.

In Malaysia, the number of plant used in the remedies of diseases associated with physiological disorder such as diabetes is limited (Erasto *et al.*, 2005). As the number of prevalence increases, the demand toward antidiabetic drug is higher because this type of ailment make the prevalence depends their life with the medicines. The ethnobotanical research must be done by the researcher and paramedic to discover the plants that have capability to treat diabetes.

1.1 Problem statement

Medicinal plants were popular among traditional practitioners to congregate their healthcare needs. Nowadays, medicinal plant was gaining popularity both in developed and developing countries because of their beneficial function for the treatment of human body. Consuming medicinal plant give a lot of positive effects and the extractive compound present in each medicinal plant are suitable for human body and non-toxic. The problem is discovering of medicinal plants are still limited in diabetes mellitus. Therefore, this study focuses on defining the species of the plant and the mode of preparation for remedies of diabetes at study area.

1.2 Objectives

1. To identify plant species for the remedies of diabetes at selected villages in Kota Tinggi, Johor
2. To collect the medicinal plant(s) and document the botanical description of the plant(s), part used, mode of preparation and mode of consumption.

2.0 LITERATURE REVIEW

2.1 Ethnobotanical Study

Ethno refers to people, a culture's collective body of belief's, aesthetic, language, knowledge and practice. Meanwhile, botany is study of plant, all types of plant including the wild plant and the domesticated species. Plants are optimally produce us such as food, fibers, medicine, materials and more. Thus, ethnobotanical is the interaction between plants and human. The relationship between plants and human cultures is not limited due the functions of plants that give many benefits and as a source of human to carry out their lives.

Ethnobotanical knowledge covers both wild and domesticated species and have traditional ways of knowing which are done by survey the villagers or local community. These knowledge evolves over time, and is therefore always changing and adding new discoveries, originality. The study about the plant medicines have been done since 19th centuries and it developed into science and become the pharmaceutical research until now.

2.2 Malay community in Malaysia

Malaysia is multi-ethnic country made up Malays, Chinese, Indians and a number of other ethnic groups scattered around the country. The majority groups are the Malays or Bumiputra (sons of the soil), who for more than one thousand years lived in a rural environment, not interfered with the outside of the world. The Malays until the mid-part of the 20th century lived a simple rural life tendering paddy fields, growing vegetables and fruits, gathering forest products, and fishing.

Life in kampong (villages) was completely self-sufficient as there was no access to outside medicinal assistance, make the Malay's learnt and built up a knowledge base about the medicinal efficacies of the native flora available in their local areas. The herbs from the

garden and forest were their only method of maintaining good health. The Malay diet was a very healthy one base on rice, ulam, fruits and fish. The traditional medicine discovered by the Malay community developed from the village on what plant available, relying on knowledge being passed down from generation for hundred years.

The Malays also believed in mystical powers. Some elders in villages took on the role of Bomoh (wise man, mystic, medicine man all rolled into one) taking up partly the practice of medicine by medicinal plant and mixing it with mysticism. Still today, many Malays particularly in the rural areas are inclined to consult Bomoh before trained medical doctors and rely on herbs for cures. Thus, all of these are the basis from which the traditional medicine developed. It shows the valuable of medicinal plant and danger of losing as much of its acquired knowledge.

2.3 Medicinal Plants in Malaysia

Medicinal plant plays important roles to treat diabetes in many developing countries and rural areas of over the world. The uses of plant medicines by the community had been increase year by year because the medicines proved are effective, less side effect and zero chemical. Day, (1998) said, public interest and awareness of natural medicines have led the pharmaceutical industry and academic research to pay more attention to medicinal plants.

Plant medicines refer to the use of whole plant remedies for the promotion of healing and maintenance of health (Sekar *et al.,* 2014). Chaudry *et al.,* (2008) reported that people in Rajasthan, India use yams (*Dioscorea*) as medicines to cure various ailments. The corms infuse from *Dioscorea hispida* can decrease the blood glucose (Sunarsih *et al.,* 2007). The de-toxicated tubers of *Dioscorea hispida* were first boiled with water, and then the water can

be used diabetes medicine. Atal (1983) said natural medicines are safe because they are more harmonious with biological system.

For Malay community, they learnt and built up a knowledge base about the medicinal values of the native flora available in their local areas. Hunter, M. (2011) reported there are some Malaysian herbs that have medicinal properties such *Alpinia galanga* rhizome is used as spice in cooking food for treatment of diabetes, *Centella asiatica* leaves can be used as an ulam (vegetable) in the Malay diet as an appetiser, *Andrographis paniculata* (Hempedu bumi) was also used to treat diabetes, ripe fruit of *Morinda citrifolia* (Mengkudu) were eaten for aid to diabetes and the leaves of *Orthosiphon stamineus* were boiling, sometimes with other herb, as a tea.

Sekar *et al.,* (2014) reported that *Andrographis paniculata* (Hempedu bumi), *Gynura procumbens* (Sambung nyawa), *Ficus deltoidea* (Mas cotek), *Cosmos caudatus* (Ulam raja), *Phyllanthus niruri* (Dukung anak), *Anacardium occidentale* (Gajus), *Averrhoa bilimbi* (Belimbing buluh), *Hibiscus rosa-sinensis* (Pokok bunga raya), *Orthosiphon stamineus* (Misai kucing) and *Piper sormentosum* (Sireh) were commonly available medicinal plants in Malaysia for the treatment of diabetes. According to Kadir, A. A, (1998), the type of medicinal plants used in diabetes treatment is quite common in this country such as *Orthosiphon stamineus* (Misai kucing). But, the mode of application of the medicinal plants are diverse because every people has different belief and medicinal knowledge.

2.4 Modern Diabetes Medicine in Malaysia

Modern medicines is the field of applied science toward medicinal plant related to the healing process for the various ailments. Saul, A. (2009) said that modern medicines may well be defined as the experimental study of what happens when poisonous chemical are placed into the malnourished human body. Modern medicines can be consumed by people in the form of capsule, powder, cream and etc.

Malaysia is one of the developing countries in Asia were used modern medicines in their daily life. The public interest towards modern medicines has driven the increases of modern medicines in industry. Nowadays, the demands toward modern medicines had been increased year by year because of the modern healing practices Based on study carried by Jantan, I. (2004), the great public interests in the use of herbal medicines have led to the new emphasis and drive in the medicinal plant research. Recently, the medicinal plant research has carried out to develop herbal medicines to the modern medicines which are chemical free and safe for human depletion.

As the way of consuming fast and instant compared to the traditional medicines make the consumer prefer to consume modern medicines such as insulin and SGLT2. Insulin is hormones made from our pancreas and is used to convert glucose into energy by feeding it to our cells. SGLT2 is a protein that regulates the re-absorption of 90% of glucose in the kidneys. Developments in diabetes treatment have given rise to a SGLT2 inhibitor that acts to prevent the reabsorption of glucose in the kidneys, causing the glucose to pass through the urine. Insulin and SGLT2 tablets can be taken orally meanwhile, insulin pens that work as portable syringes can manually inject ourselves with it.

According to Patel *et al.*, (2012), they present review provides profiles of plants (65 species) with hypoglycaemic properties, available through literature source from various database with proper categorization having insulin mimetics activity. From the review it was suggested that, plant showing hypoglycemic potential mainly belongs to the family Leguminoseae, Lamiaceae, Liliaceae, Cucurbitaceae, Asteraceae, Moraceae, Rosaceae and Araliaceae. Researchers from Merck and the University of Cincinnati report that small-molecule insulin mimetics are able to increase insulin sensitivity. Thus, it show there are insulin hormone available in plants that are have been developed in tablets form and can be modern medicines.

Supplement is one of the alternatives to treat diabetes and become a popular product consuming by the prevalence of diabetes like "Vivix shaklee", "Kacip emas" and "Jussulin" that are mostly formulated from the medicinal plants. Vivix Shaklee contain *polyganum cuspidatum* (knotweed), *Sambucus nigra* (Elderberry), purple carrot and muscadine grape. Meanwhile, Kacip Emas was labelled that are formulated 100% natural juices of vegetables, flowers and herbs.

Besides that, some of the supplement not only comprise plants as the main ingredients, its mix with other compounds that are proven by the clinical test, safe to consume. For example, product of dr Betes by Dr Romzey consists of White kidney bean, Vitamin C, Slevia leaf, magnesium, L-lysine and Brokin which could activate pancreatic cell to produce insulin which can maintain the blood glucose. The most important thing is, most of the local product in Malaysia are safe for consume as it has been certified by Kementerian Kesihatan Malaysia (KKM).

2.5 Availability of compound in Medicinal Plant

Every medicinal plant that is found has potential to treat diseases, act at least in part, through fibre, vitamin or mineral contents and some secondary metabolites. Some minerals found in medicinal plants have been reported to be cofactors for the action of insulin and key enzymes if glucose metabolism (Day, 1998). Hii, C. S. & Howell C. L. (1985) said that flavonoids such as querectin cause insulin secretion and are also considered as a strong inhibitor in sorbitol accumulation throughout the body for treating and managing diabetes. For example, *Acanthus ebracteatus* seeds found in Peninsular Malaysia are useful for treating diabetes and hypertension (Ong 2002). From the pharmaceutical approach that has been done by Setiawan Dalimartha (2001b), the plants contain flavone and amino acids.

Meanwhile, *Phyllanthus amarus* (Dukung anak) is a well-known herbs used by community to treat diabetes. It contains flavonoid and lignan compounds (Mursito, B. 2001). Papaya leaves were used to treat diabetes because the leaves contain phenolic compounds, caffeic acid, chlorogenic acid, quercetin and kaemprol that exhibit potent antioxidant effect (Marks, M. 2013). It also well-known for its effectiveness in eliminating stones in the kidney, bladder and gall bladder (Mursito, B. 2001). In other countries, this plant is planted for various other ailments including cough, fever, headache or migraine, malaria, mouth ulcer and poor eyesight. Papaya leaves also contain high in minerals like calcium, potassium, sodium, magnesium, iron and manganese. Besides that, *Catharanthus roseus* cultivated abundantly at Jeli, Kelantan yielded four known indole alkaloids, namely vindoline, vindolidine, vindolicine and vindolinine (Soon, et al., 2013). The most important thing is, the entire compound available in plant give the best reactions to the human body to maintain the blood glucose level.

3.0 MATERIALS AND METHOD

3.1 Study Area

The study were conducted in Malay community villages like Kampung Panti, Kampung Jawa and Kampung Kelantan at Kota Tinggi, Johor (Table 3.1). Kota Tinggi District is a district on the south-eastern part of Johor. It takes its name from the town of Kota Tinggi on the banks of the Johor River. Kota Tinggi District covers an area of 3489 square kilometres, making it the biggest district in the state. The district population (in year 2010) was 193, 210 people.

Table 3.1: The list of village covered at study area

LOCATION	VILLAGE
Kota Tinggi	Kampung Panti Kampung Kelantan Kampung Jawa

3.2 Field Methods

3.2.1 Interviews

The methods were used to gather information are oral-interview and open-ended questions. The target audiences were followed the specifications (Table 3.2) and have knowledge about the medicinal used for the remedies of diabetes. Approximately 50 respondents or more were selected according to their specification. The respondents are men and women at various age. The target specifications were given questions about their knowledge towards medicinal plant for remedies of diabetes. In conjunction, the casual discussion were conducted to obtain detailed about medicinal

plant for the treatment of diabetes. The open-ended questions in Appendix A consists about the species of plant used such as local's name, common name, parts of plant used and mode of herbal preparation.

Table 3.2: A list of target specifications for oral-interviews

No	*Target specification*
1	Farmer
2	Prevalence of diabetes
3	Herb seller
4	Traditional medicinal practitioners
5	Civil servants

3.2.2 Botanical Collection of Sample

The collection of the plant materials were collected and preserved. The information of medicinal plants consists of scientific name, locality and habitat, date of collection, name of collector, collection number and description about the plant. The collected plant thus pressed, mounted and properly numbered were identified with the help of local floras (Hooker, J. D., 1827-1924)

The criteria for the plant specimen to be select are the plants must be at maturity stage. The plants which are passing their juvenile stage have a complete structure of tree hence easy for make the herbarium specimen**.** The specimens were labelled and recorded. The specimens were immerses in dilute ethanol for three (3) days. The specimens were pressed and oven dried for three to five days. After drying complete, the specimens were gathered and mounted. Only one specimen should be put on one sheet of paper. The label full with description was glued together at right-hand corner.

3.3 Data Analysis

The ethnobotanical information were gathered and analyzed in the table form to obtain the species of the plant including family and common name, part used frequently and mode of preparation and mode of consumption