CHAPTER 1

1.0 INTRODUCTION

1.1 Background of study

1.1.1 Plant resource

One of the sets of target to ensuring environmental sustainability is by integrating the principles of sustainable development into country policies and programs and reverses the loss of environmental resource (UNDP, 2005). One of environmental resources component is plant biodiversity. Plants are the basis of life on earth and are central to people livelihood (Dahare and Jain, 2010). Plants are used for miscellaneous purposes that are crucial to human survival such as a food, medicines, constructions, livelihoods, handcraft and many other needs (Letsela *et al.*, 2003; Salleh *et al.*, unpublished). Plants not only are the basis of life on earth and central to people livelihoods, but also are a national treasure required in the future as genetic resources and as raw materials in pharmacological industry (Salleh *et al.*, unpublished). Demand for a wide variety of wild species of plant is increasing with the growth in human needs, numbers and commercial trade (Shcippmann *et al.*, 2002).

Modernization has lead to the loss of knowledge on many plant uses. Uses of many edible, medicinal, aromatic, and poisonous plants are forgotten by today's generation. The relationship between plants and local culture is being jeopardized. Factors that lead to the decreasing traditional knowledge of plants are migration (Letsela *et al.*, 2003), modernization (Ong *et al.*, 2011c; Salleh *et al.*, unpublished), and the demise of traditional healers, and habitat alteration (Amusa *et al.*, 2010). The decline of forest area can also contribute to the loss knowledge on plant resource use and benefits (Ballick and O'Brien, 2004; Amusa *et al.*, 2010; Salleh *et al.*, unpublished).

1.1.2 Documentation of plant resource

Documenting plant resource is essential to its knowledge interpretation and communication. An excerpt from Wright report stated that "in order to be able to interpret and communicate knowledge effectively, we must have detailed and accurate information about the objects in its collection" (CBG, 2012). Complete and proper documentation is important not only to the effectiveness of programs concerned with the conservation and management, it's also functional and useful in plant improvement research (Konzak and Dietz, 1968).

Documenting and supporting indigenous knowledge system are necessary in the conservation of the knowledge and resources (Martin, 1995; Sher *et al.*, 2011). These facilitate the conservation of genetic diversity of plants through living collections or gene banks. This will enable further scientific studies for wider usage plants especially in the area of pest and disease resistance and plant adaptation to various weather and soil conditions (Ong *et al.*, 2011c).

1.1.3 Valuation of plant resources

According to Katimah and Asmah (2006), resource are the elements of nature that give a value and importance to humans. Resources are needed to fulfill biological needs such as food, shelter and comfort to human and cultural requirements.

Although plants and plant products are considered as renewable resources, the ability to maintain them depends in great measure on how they are managed. Over-exploitation can leave certain species without commercial value or can even drive it to extinction (Martin, 1995).

Valuation of plant resources is an effort to place a value on useful plant. Some of the acclaimed valuations on plant resources have been done since the last 15 years. Valuation of plant resources is desirable, as this not only highlights the contribution of

biodiversity to society but also helps in developing an efficient conservation strategy for the precious natural resource. Valuation of plant resource can also help in devising a proper public policy for its conservation and sustainable use. In a nutshell, studies on valuation signify its economic importance and biodiversity (Kumar, 2004). Convention on Biological Diversity also noted the needs careful assessment, conservation and management of plant resources which is the main components to fulfill human needs (CBD, 1992).

1.1.4 Indigenous knowledge

Indigenous peoples have their own traditional knowledge about uses of plant resources. The knowledge and practice accumulated by them through a long series of observation from one generation to another are transmitted by oral communication (Dahare and Jain, 2010). The lack of documentation of the knowledge will eventually lead to its disappearance as modernization creep towards their doorstep (Ong *et al.*, 2011b). The aim of this study is to provide an in-depth description of plant resource of the Orang Asli community in a district in northern part of Peninsular Malaysia. Orang Asli are the indigenous minority people of Peninsular Malaysia (Nicholas, 2000).

1.2 Orang Asli in Malaysia

Orang Asli means ‘original people or ‘first people’ of the Malay Peninsula (now as Peninsular Malaysia) before the establishment of the Malay Sultanates. According to the Aboriginal Peoples Act (enacted in 1954 and revised in 1974) (*Laws of Malaysia*, 2006), an Orang Asli is defined as a member of an aboriginal ethnic group (either by blood descent or by adoption), who speaks an aboriginal language and who habitually follows an aboriginal custom and belief (Nicholas, 2000). According to Harper (1997) ‘Orang Asli’ or ‘Original people’ are a polite term that took on a legal status from the 1950s. Before then, the aborigines were called ‘sakai’ which brings a derogatory term

synonymous with ‘slave’. Beside of that, the other terms used by anthropologist and administrators referred to the Orang Asli including *Besisi* – people with scales, *Orang Liar*- wild people, *Pangan*-eaters of raw food, or *Orang Mawas* -ape like people (Nicholas, 2000). According to Wikipedia, the free encyclopedia, Orang Asli (‘original people’, ‘natural people’, or ‘aboriginal people’) is a general term used for any indigenous groups that are found in Peninsular Malaysia (Wikipedia, 2011). According to Gomes (2004), Orang Asli means ‘natural people’ in Malay, replaced the term ‘aborigines’ used by the British colonial administration while definition from Asian Indigenous & Tribal Peoples Network (AITPN), Orang Asli is a Malay term which means ‘original peoples’ or ‘first people’ (AITPN, 2008).

1.2.1 Statistic of Orang Asli in Malaysia

Table 1.1 shows the Orang Asli population has been growing steadily over the year since 1947 to 2010. The trend might be due to an overall improvement in the quality of life of the Orang Asli. It could also be due to better and more accurate counting methods used in the censuses over the years a contributory role (Nicholas, 2000). According to the record of the Department of Orang Asli Development (JKOA), in 2004, Orang Asli increasing to 0.6% of the national population than 0.5% in 1999 (AITPN, 2008). According to 1991 census survey as cited by Nicholas (2000), 88.7% of the Orang Asli lived in the rural areas while the rest lived in the urban areas or in small urban towns. Table 1.2 shows distribution of the Orang Asli villages in Peninsular Malaysia as at 2003. But from JKOA source, in 2010 there are 38% aborigines in rural areas, 61% in marginal areas and 1% in city areas (JKOA, 2011).

Table 1.1 Statistic of Orang Asli population in Peninsular Malaysia

Year	Number	Source
1947	34,747	Department of Statistic 1997 and Department of Orang Asli Development (JKOA) population figure for 1997 as cited by Nicholas (2000).
1957	41,360	
1970	53,379	
1980	67,014	
1991	98,494	
1993	92,529	
1997	106,131	
1999	105,000	Asian Indigenous & Tribal Peoples Network (AITPN) (AITPN, 2008)
2000	133,775	Center for Orang Asli Concerns (COAC) (COAC, 2006)
2003	147,412	
2004	141,230	Department of Orang Asli Development (JKOA, 2012b)
2010	178,197	Department of Orang Asli Development (JKOA, 2011)

Table 1.2 Distribution of Orang Asli villages in 2003 (COAC, 2006).

State	**No. of villages**	**Urban**	**Fringe**	**Interior**
Pahang	263	3	167	93
Perak	248	-	139	109
Kedah	1	-	1	-
Selangor	75	6	69	-
Kelantan	136	-	21	115
Terengganu	3	-	3	-
Negeri Sembilan	67	2	63	2
Melaka	14	-	14	-
Johor	62	1	57	4
TOTAL	**869**	**12**	**534**	**323**

1.2.2 Classification of Orang Asli in Malaysia

Orang Asli can be classified into three Aslian tribes and comprise at least nineteen culturally and linguistic distinct group (AITPN, 2008). JKOA web page (JKOA, 2012a) and Nicholas (2000), however, recognize 18 ethnic subgroups of Orang Asli.

They can be classified into three broad categories: Melayu Proto, Negrito and Senoi. This classification is based on physical characteristics, linguistic affinities and cultural practices (Nicholas, 2000). Each category can be divided into several sub-groups. Negritos sub-group consists of the Kintaq, Mendriq, Lanoh, Kensiu, Bateq and Jahai. The Senoi group consists of Semaq Beri, Che Wong, Mah Meri, Jah Hut, Temiar and Semai. The Proto Malay subgroup consists of the Semelai, Orang Kanaq, Orang Seletar, Orang Kuala, Temuan and Jakun.

The largest group in Orang Asli tribe is Senoi with about 55% of the orang Asli population followed by Proto- Malay. The Negritos comprises of over 3% of the Orang Asli population, is the smallest of these three groups (COAC, 2006).

The Negritos are nomadic hunters and gatherers of the northern forest, the Senoi were mainly swiddeners and dependent on the forest of the central highlands and the Proto-Malay of the south are fisherman and cultivators with their economy more similar to Malay (Harper, 1997; Nicholas, 2000; Nagata, 2006). Figure 1.1 shows the distribution of the Orang Asli subgroup in Peninsular Malaysia taken from COAC web page. Table 1.3 shows the population of the Orang Asli by state and subgroup on 2010 according to the source from Department of Orang Asli Development (JKOA, 2011).

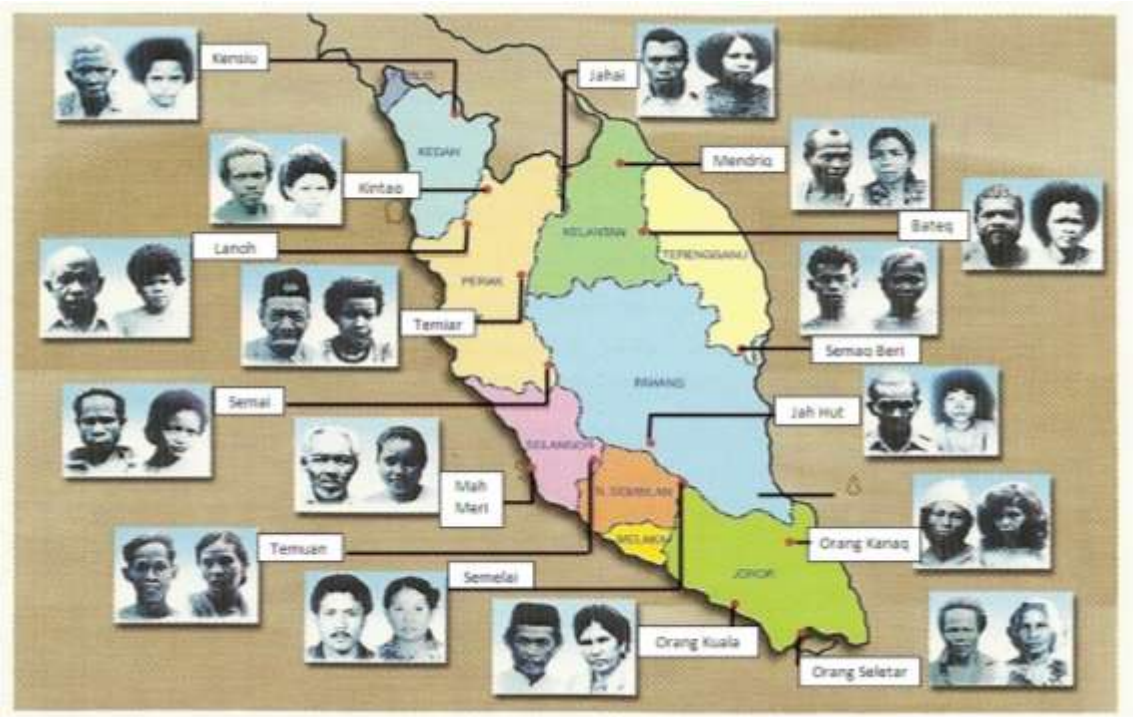


Figure 1.1 Distribution of the Orang Asli subgroups (COAC, 2012) .

Table 1.3 Distribution of the Orang Asli subgroup population by state on 2010.(JKOA, 2011)

State	Senoi	Proto-Malay	Negrito	Total Population
Johor	55	13,083	1	13,139
Kedah	19	-	251	270
Kelantan	12,047	29	1,381	13,457
Melaka	28	1,486	1	1,515
Negeri Sembilan	96	10,435	-	10,531
Pahang	29,439	37,142	925	67,506
Perak	50,281	605	2,413	53,299
Selangor	5,073	12,511	3	17,587
Terengganu	818	41	34	893
Total	**97,856**	**75,332**	**5,009**	**178,197**

1.2.3 The Negritos

Negrito or as some anthropologist would prefer to use the term 'Semang' is a minority and the smallest tribe among the other tribe of Orang Asli. They only encompassed 2.6% of the Orang Asli total population at 2008. They are also the oldest tribe and believed to have been in Peninsular Malaysia since at least 25,000 years ago (Nicholas, 2000; Nagata, 2006). Negrito are the direct descendent of Hoabinhians, who were largely nomadic foragers, living in one location as long as food supply was able to maintain the community (Nicholas, 2000). According to Harper (1997) they are nomadic hunters and gatherers of the northern forest. They move from place to place with the seasons in search of food, water and grazing land. They use blowguns to hunt and gather wild root and fruit (Alias, 2010). Nowadays, most Semang are permanently settled in resettlement villages established by the Malaysia government (Nicholas, 2000; Alias, 2010). Negritos are generally physical small in stature, dark skinned, typically wooly or frizzy hair and with a broad nose, round eyes and low cheekbones (Nicholas, 2000). Their language belong to the Northern Aslian division of the Aslian family of Mon-Khmer languages (Burenhult, 1999; Alias, 2010; Benjamin, 2010). There are six subgroup of Orang Asli under the Negrito tribes: Kensiu (Northeast Kedah), Kintaq (Kedah-Perak Border), Jahai (Northeast Perak and West Kelantan), Lanoh (North-central Perak), Mendriq (Southeast Kelantan) and Bateq (Northeast Pahang and Southern Kelantan).

1.1 Objectives

The objectives of this study are:

i. to identify plant resource used by the Orang Asli at Ulu Legong;

ii. to characterize plant resource used by the Orang Asli at Ulu Legong;

iii. to valuate plant resource used by the Orang Asli at Ulu Legong.

CHAPTER 2

2.0 LITERATURE REVIEW

2.1 Documentation of plant resource studies

Plant resource studies or in other term ethnobotany is a part of ethnoecology sub-disipline. The term ethnoecology is used to encompass all studies which describe local people's interaction with the natural environment including others subdicipline beside ethnobotany such as ethnobiology, enthnoentomology and ethnozoology. This field integrates techniques from multidisciplinary including biology, anthropology, ethnology, linguistic, and economy (Gerique, 2006).

Ethnobotany refers to the study of the interactions between people and plants (Martin, 1995). The term 'ethnobotany' suggested by John Harshberger in 1896 to delimit a specific field of botany and describe plant uses (Gerique, 2006). Figure 2.1 show the ethnobotanical matrix with others related field (Shipunov, 2011). The enthobotanical information besides listing the traditional uses of plants, helps ecologists, pharmacologist, taxonomist, watershed and wild life managers in their efforts for improving the wealth of area (Ibrar *et al.*, 2007).

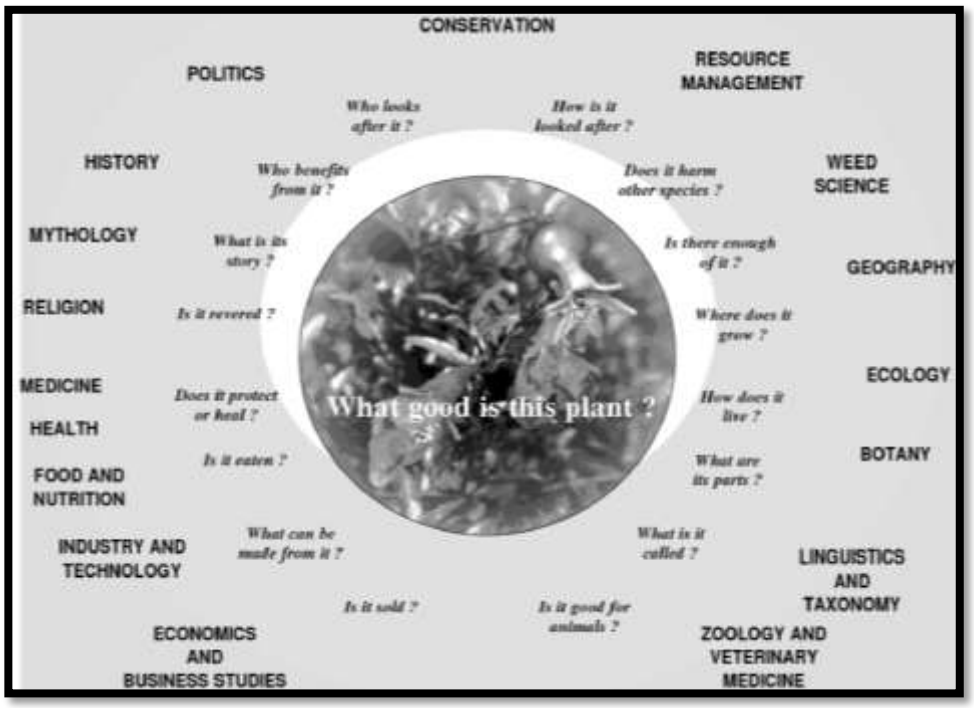


Figure 2.1 Ethnobotanical matrix with list of other related field (Shipunov, 2011).

Many studies have been done around the world on ethnobotany of medicinal plants (Shcippmann *et al.*, 2002; Kumar, 2004; Lin, 2005; Patil and Bhaskar, 2005; Pareek and Trivedi, 2011; Azliza *et al.*, 2012; Ong *et al.*, 2012), valuation and economic plant (High and Shackleton, 2000; Albuquerque *et al.*, 2006; Norfaizah, 2008; Norshahidatul, 2010; Norul, 2010), edible plant (Lee, 1972; Ong *et al.*, 2011b; Ong *et al.*, 2011c; Ong *et al.*, 2012), traditional knowledge and utilization (Ong, 1986; Othman, 1991; Junior, 1993; Bennett and Prance, 1999; Chang and Lee, 2003; Garcia *et al.*, 2005; Dahare and Jain, 2010; Carvalho and Frazao-Moreira, 2011), characterization of plant used (Milow *et al.*, 2011) and others useful plants (Alias, 1982; Philips and Gentry, 1993; Faezah, 1999; Letsela *et al.*, 2003; Ibrar *et al.*, 2007; Dahare and Jain, 2010; Sop *et al.*, 2011).

2.1.1 Plant resource documentation techniques

There are various techniques for documenting plant resource. However, most techniques in ethnobotanical and ethnoecological studies are time consuming and moderately costly making it impractical to apply all in single period of fieldwork (Martin, 1995; Gerique, 2006). Several trips to the field may be costly, but usually the most successful project are those which cover several seasons and continue for a number of years (Gerique, 2006).

Although many researchers prefer long term project, there is still a need to make a rapid ethnobotanical assessment such as gathering data on minor forest products for an environmental impact statement or making preliminary list of biological resources at sites that have been set aside ad protected areas. One disadvantage of rapid ethnobotanical assessment is that it is not possible to carefully document the cultural and biological aspect of local knowledge because of insufficient time to make voucher collection, transcribe local names or talk with a range informants (Martin, 1995). There are a few general points to keep in mind listed by Martin (1995) when planning a rapid ethnobotanical assessment. These are

i. preparation before fieldwork;
ii. forming multidisciplinary team;
iii. ensuring community participation;
iv. be selective in your choice of technique; and
v. to do everything systematically.

The problem with rapid botanical assessment can be overcome by using Participatory Rural Appraisal (PRA). PRA is a technique proposed by international development workers and has been adopted in various disciplines. This technique was developed to rapidly assess at a low cost the use of forest resource and many other

aspects of community development. PRA does not require expensive tool. An important aspect in applying PRA is community participation. They involved in the study design, data collection, analysis of the findings, discussion of how the result can be applied for the benefit of the community (Martin, 1995).

2.1.2 Methods of collecting data in plant resource documentation

According to Pareek and Trivedi (2011), there are three categories of methodology that are commonly used to collect ethnobotanical information. The categories are direct approach, indirect approach and miscellaneous (neither direct nor indirect approaches). Direct approach includes the intensive field surveys among tribal while indirect approach included collection of information from literature, museums, herbarium and others. For the miscellaneous category including some information collected after discussion with non-tribal persons such as a village headman, spiritual leader, teacher, veterinary, doctor, social worker and others.

Gathering of information in plant resource documentation usually involve the following;

i. Collecting and identifying plants

Among the basic skills in ethnobotany is plant collecting. Collections are valuable because they serve as voucher specimens. The specimens can allow the taxonomist to identify the family, genus, and species of a collection (Martin, 1995). Determinations of plant identification can only be as good as the specimens on which they are based. The herbarium label should include the name of the institution and of the collector, the project title, family, genus, and species of the specimen, specialist and date determination, locality, vegetation and habitat, latitude and longitude, plant description and collecting date (Martin, 1995; Gerique, 2006).

ii. Interviewing

Interviews can be used to gather ethnobotanical information. It requires a researcher to talk with people, watch what they do and participate in their activities (Gerique, 2006). According to Gerique (2006), various field interview techniques that exist have been adapted from Alexiades (1996), Cunningham (2001) and Martin (1995). These include participant observation, ethnobotanical inventory or field interview, plant interview, artifact interview, checklist interview and group interview. There are several types of interview such as informal interview, unstructured interview, semi structured interview and structured interview (Martin, 1995; Alexiades, 1996; Townsley, 1996).

iii. Mapping

Mapping way can act as a starting point for discussion with some individuals and groups of people in the villages for the purpose of drawing up rough maps of an area to be studied. Mapping provides a physical focus for discussion, giving something concrete for people to refer when talking about local conditions, changes in conditions or particular maters and allow them to illustrate their view of their environment and what is of relevance in it for them (Townsley, 1996).

iv. Market survey

Market survey involves direct observation, interviews and surveys of traders, vendors and consumers in order to obtain qualitative and quantitative data concerning social-economic, ecological and cultured aspects of plant product and horticulture products (Alexiades, 1996; Cunningham, 2001).

2.2 Plant resource valuation studies

Convention on Biological Diversity stressed the need for careful assessment, conservation and management of plant resources as it is the main component that fulfills human needs (CBD, 1992).

American ecologist Paul and Ehlich divided values that people gain from nature into four categories; direct economic value, indirect economic value, aesthetic value and ethical value and usually only direct economic value taken into account by traditional economist (Martin, 1995).

Quantitative ethnobotany mainly concerns with measuring importance or valuing plant resource to the people. A common tool to quantify otherwise qualitative data in biological and social sciences is an index. One of the indices that is commonly and widely used in ethnobotanical studies is relative cultural importance indices (RCI) (Albuquerque *et al.*, 2006; Hoffman and Gallaher, 2007). This index is based on informant consensus and is used to calculate a value per folk or biological plant taxon (Albuquerque *et al.*, 2006). Another index known as Use-Value (UV) which is based on the number of uses and the number of people that cite a given plant, has been widely use to indicate the species that are considered most important by a given population (Martin, 1995; Albuquerque *et al.*, 2006). Numerous researchers applied these techniques when studying the impact of exploitation of locally important resources. They are based on the supposition that more important a resource is, the greater will be the exploitation pressure placed upon it (Albuquerque et al., 2006).

Bennett and Prance (1999) proposed Relative Importance (RI) index to measure the usefulness of medicinal plant. The index is derived from the number of citations for that species and from the number ailments that it is used to treat. The importance of a species increase if it used to treat more infirmities (Albuquerque *et al.*, 2006). However, this technique is less used than the UV techniques.

There are various previous studies on valuation on plant resource around the world. In study on economic observation by Sher *et al* (2011) on Northern parts of Pakistan, information on the market value of the plants collected from local collectors,

hakim and shopkeepers were applied beside the others simple procedure. In Kenya, valuation study by Ngugi *et al.* (2011) about contribution of forest product to household economy, they applied integrated approach of Participatory Rural Appraisal (PRA), Participatory Environmental Valuation (PEV), Contingent Valuation (CV) and Substitute Products Value (SPV) as a one of their research methodology. According to Ngugi *et al.* (2011), CV was designed for valuing goods with markets and assumes that the value people willing to pay for plant resource. SPV uses some characteristics of marketed products to estimate the prices of similar products and PEV is an extension of the CV which seeks to address the problem of pricing non marketed products used for subsistence. Sop *et al.* (2011), UV to quantify the relative importance of woody plant species and the comparative between three ethnic group from Africa. Also in African, High and Shackleton (2000) done the valuation studies to compare the value of wild and domestic plants in home gardens of the rural village there. In this study the selling price was used to estimate the value of what was kept at home. Albuquerque *et al.* (2006) used UV and RI techniques to calculate native woody species in northeastern Brazil. In one of the studies in India on Environmental Impact Assessment (EIA) studies by Dixit and Geevan (2000), beside using the UV, they also propose new indices for measuring the impact on the useful plant species and major use-categories. The proposed indices combine the abundance of plants with their uses and utilization pattern. To incorporate the use-values and the relative abundance of plants, another measure is contemplated – Cumulative Use-Values (CUV). CUV is calculated by taking into account both the density of plants and the use-score of each species. Ugulu *et al.* (2009) carried out quantitative ethnobotanical evaluation on medicinal plants in Turkey. They determined the Informant Consensus Factor (F_{ic}) and the Fidelity Level (FL) of the medicinal plant species.

2.3 Orang Asli and plant resource studies in Malaysia

Ethnobotanical studies in Malaysia began since the early 1900s through the work of Gimmlett and Burkill (Salleh *et al.*, unpublished). In Milow *et al.,* (2011), also state that Burkill was one of the earliest provide a comprehensive account on plant resource utilization in Malaysia which listed about 1200 species used by local people in peninsular.

Many previous ethnobotanical studies on the Orang Asli focused on the Temuan tribe. Alias (1982) studied the useful plants of the Temuans in Ulu Gombak and Ulu Selangor. Ong (1986) studied the ecology, resource utilization and ethnobiology of Temuans at Ulu Langat. Ong (1991) studied the traditional medicine among Temuans. Junior (1993) had conducted an ethnobotanical survey on the Temuans in Negeri Sembilan. Chang and Lee (2003) studied the utilization of wild mushrooms by the Temuans in Selangor. Ong *et al.*, (2011b; 2011c) had studied traditional knowledge of edible plants among the Temuans in Negeri Sembilan. Norshahidatul (2010) had conducted a valuation on plant used by the Temuans in Gombak. Azliza *et al.*, (2012) had studied on the medicinal plants used by the Temuans in Ulu Kelang.

Several ethnobatanical studies had been carried on the Jah Hut tribe. Othman (1991) and Faezah (1999) studied plant resource utilization by the Jah Hut in Pahang. Lin (2005) and Ong *et al.*, (2012) had studied medicinal uses of plants by the Jah Hut

As for the Che Wong tribe, the only ethnobotanical study that had been carried out was by Rozidan (2006). He studied biological resources utilization by the Che Wong in Krau, Pahang.

This study focuses on the plant resource utilized by the Kensiu tribe. Prior to this there were no records of plant resource studies on this Orang Asli.

2.4 Valuation of plant resource in Malaysia

The development of environmental valuation in Malaysia is slow compared to other developing countries in Asia, Latin America and Africa. It only began in the late 1980s and early 90s. But, nowadays, the development of environmental valuation in Malaysia has been rapid and it is increasingly used (Yacob *et al.*, 2009).

Many studies on valuation of plant resource in Malaysia focus on economic valuation. Othman (1990) studied the value of wetland timber products to the peninsular Malaysia economy. This study was based on market-value of the forest product. Daud (2009) conducted an economic valuation of pineapple cultivated at Sarawak. The Total Economic Value (TEV) was calculated to show that Zero Burning Techniques (ZBT) produced greater benefit than residue burning in agricultural system. The concept of TEV is generally recognized as being the most suitable framework guiding the economic valuation of environmental impacts. Figure 2.2 shows the TEV of the environment is made of different types of economic values, each corresponding to the different use that is made of the environment which may be applied as a guiding in valuation of plant resource (DOE, 2008).

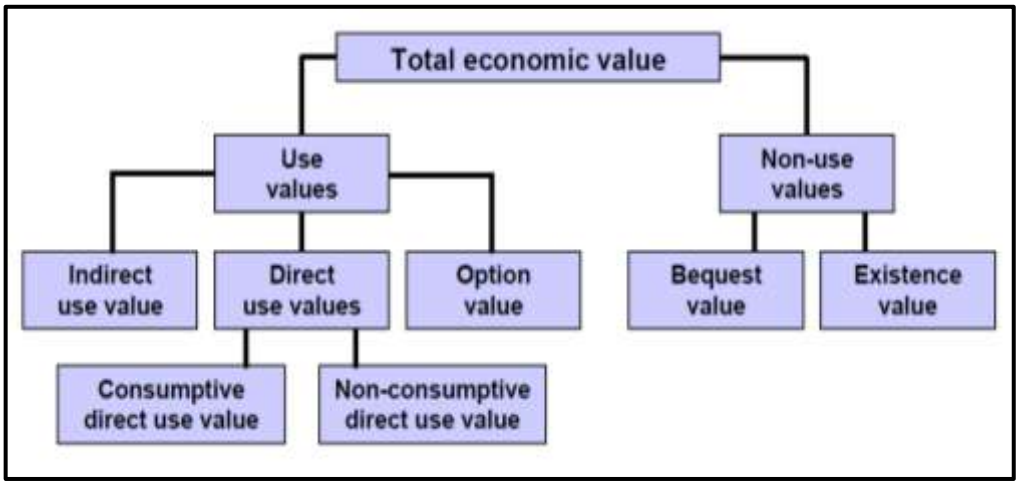


Figure 2.2 Total economic value and its components (DOE, 2008)

In Milow *et al.* (2011), valuation for total annual income was carried out on income-generating plant grown by the villagers at Kampung Parit Tok Ngah, Perak. Norshahidatul (2010) and Norfaizah (2008), respectively conducted a valuation on plant resource based on estimated market value for plant sold by the study community at their study sites.

One of the studies was done at Johor by Bann (1999), to estimate the biodiversity benefits of the mangroves. This study was carried out using a Contingent Valuation Method (CVM) which survey-based approach by a number of international organizations. It is flexible and comprehensive way of estimating the demand for public service, and the economic value of environmental. One of the techniques uses questionnaire to ask respondents their Willingness to Pay (WTP) to a biodiversity fund for the implementation of the management plan which would ensure that the mangroves were protected. Another study that used similar methodology was the valuation of beauty, rainforest and wildlife of Taman Negara by Samdin (2008).

2.5 Importance of plant resource studies and valuation

Since time immemorial, people have gathered plant resource for their needs. Example include edible nuts, mushrooms, fruits, herbs, spices, gums, game, fodder, fibers used for construction of shelter and housing, clothing or utensils and products for medicinal, cosmetic or cultural uses (Shcippmann *et al*., 2002). But, with increasing demand on plant resource and over-exploitation can lead the certain species of plant to the extinction.

Documentation, assessment, conservation and management needs to make carefully on plant resource which is the main components to fulfill various human needs (CBD, 1992).

Through documentation and valuation studies of plant resource, knowledge about edible and poison plant, aromatic plant, medicinal plant, and high commercial value plant in one of a tribe people can be published and shared with future other tribe and future generation. Beside that, documentation and valuation importance in order to suggest appropriate conservation and management strategies on certain species which have a high value in human need (Uprety *et al.*, 2010). It has been applied by ethnobotanist since the late 1960s, which have directed their attention to applying the results of their research on plant resource to conservation and development problem. They also return of the research results through community project which they participate to host communities, encouraging rational use of plants in health care and promoting traditional ecological knowledge (Martin, 1995).

According to Kengen (1997), valuation alone may be important or even necessary for decision making in other to protect our forestry. Besides that, by documenting plant species, we can know their population size, distribution, availability and abundance of plant species and their interactions with different stochastic environmental factors and all of it the play important roles in determining ecological sustainability of these resources. Poor understanding of economic value plants such as medicinal aromatic plants species can lead to their mismanagement and least profitable exploitation (Sher *et al.*, 2011).

Documentation and valuation of plant resources facilitate their future conservation and management. Information from the documentation and valuation of plant resource can also be used to sustainably exploit highly valued plant species that subsequently can generate more income for local communities.

CHAPTER 3

3.0 MATERIAL AND METHODOLOGY

3.1 Background of study site

This study was conducted in a village named Kampung Orang Asli Lubuk Ulu Legong. Kampung Orang Asli Lubuk Ulu Legong, located in sub-district Siong of Baling District, lies on longitude of 5°47.439' N and latitude of 100°54.075' E. Baling is the second largest district of Kedah. Figure 3.1 shows the location of the study site in Peninsular Malaysia and Figure 3.2 shows the location sites in Mukim Siong, District of Baling. Figure 3.3 shows Kampung Orang Asli Lubuk Ulu Legong and the land area that has been gazette as Orang Asli The village is located on the land that has been gazette by the JKOA as Orang Asli reserves in 1958 with an area of 428 acres.

According to Batin Rosman bin Isa, a former village chief, this settlement has existed since 1952. During early years, villagers lived in traditional houses built mainly from bamboo with sago palm roofs (Alias, 2010). Houses were later built for them at the village by JHEOA (then known as JKOA that stands for Jabatan Kemajuan Orang Asli or Department of Orang Asli Affair). According to Batin Rosman bin Isa, villagers began to occupy these new houses in 1989. Today, these houses can be distinguished by their brick walls with zinc roofs. These houses resemble typical Malay houses. Few houses with wooden planks and beams and cottage built from woods and leaves gathered from nearby forest can also be seen. Each of the latter was built close to a brick-walled house and thus thought as belong to the same family. Today, there are a total 46 houses in Kampung Orang Asli Lubuk Ulu Legong with a few them apparently unoccupied.

Figure 3.4 shows the village plan showing the distribution of houses. The dimension of each house is approximately 6 by 7 square meters and a compound of 445 m^2. House compounds generally do not support many plant individuals which, according to some villagers, are caused by indiscriminate disturbance by livestock from a neighboring village. Besides, cultivation of plants by the villagers has also been hampered by the nutrient-poor soil of the village.

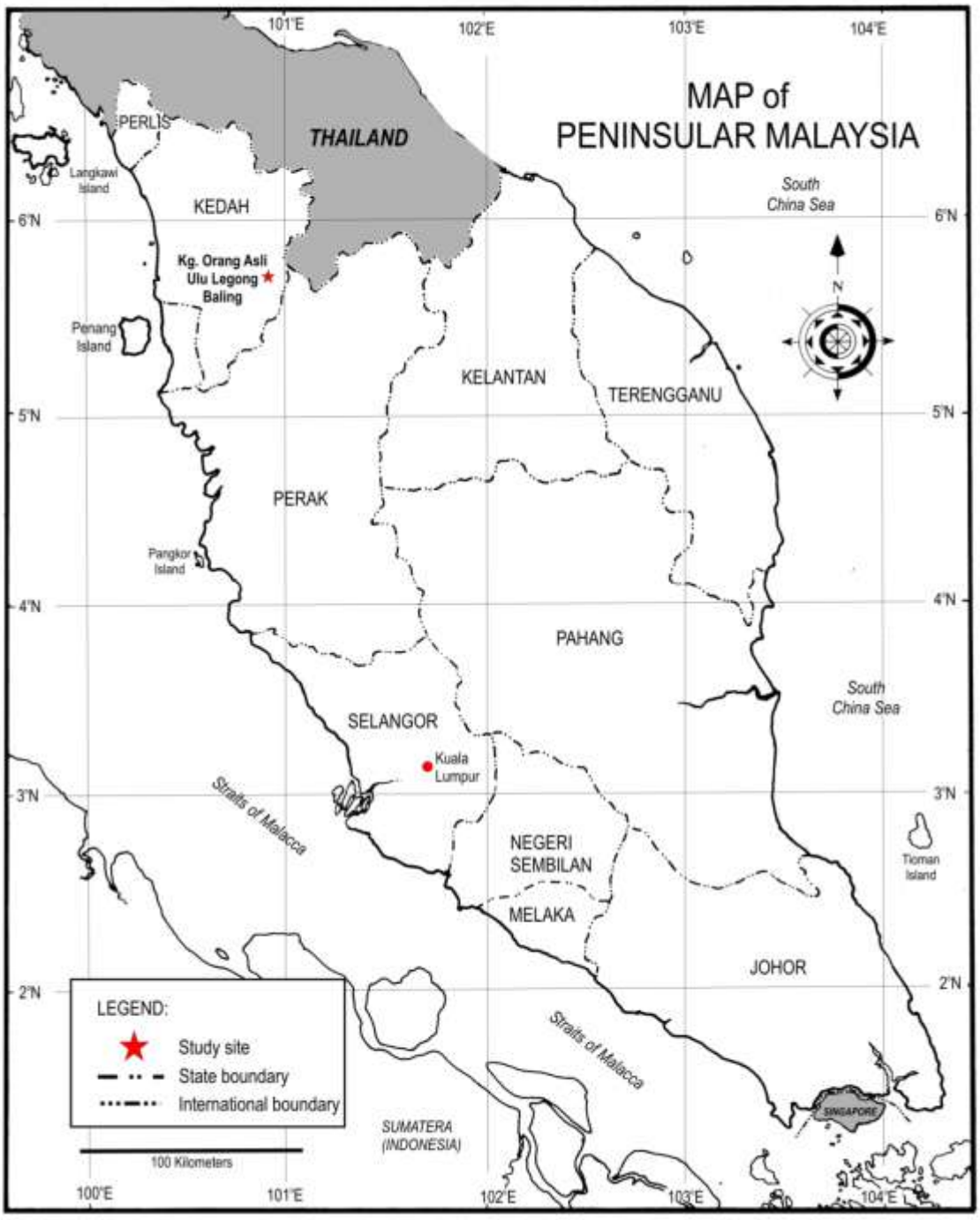


Figure 3.1 Location of Kampung Orang Asli Lubuk Ulu Legong in Peninsular Malaysia.

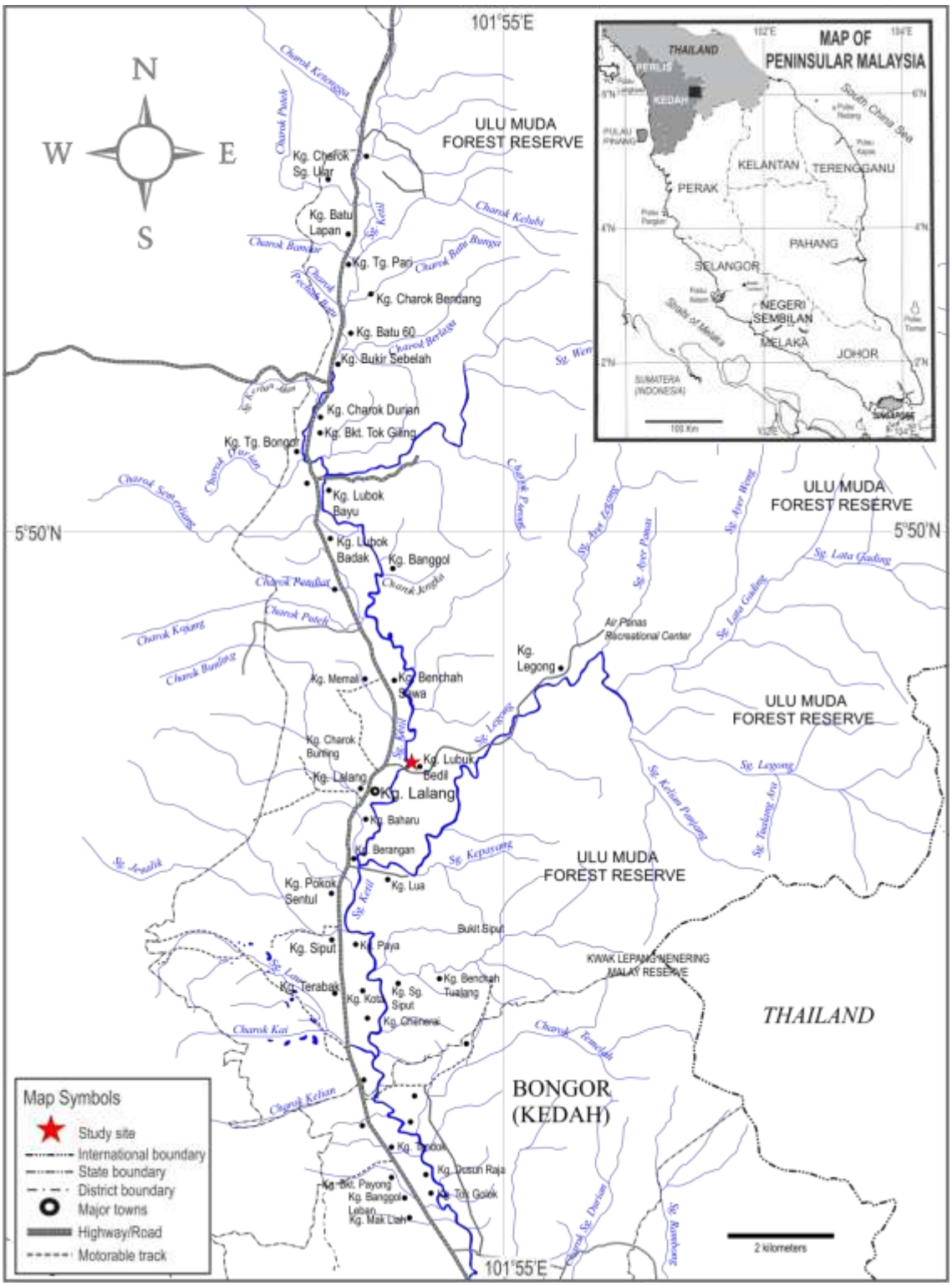


Figure 3.2 Location of Kampung Orang Asli Lubuk Ulu Legong in Mukim Siong, District of Baling Kedah

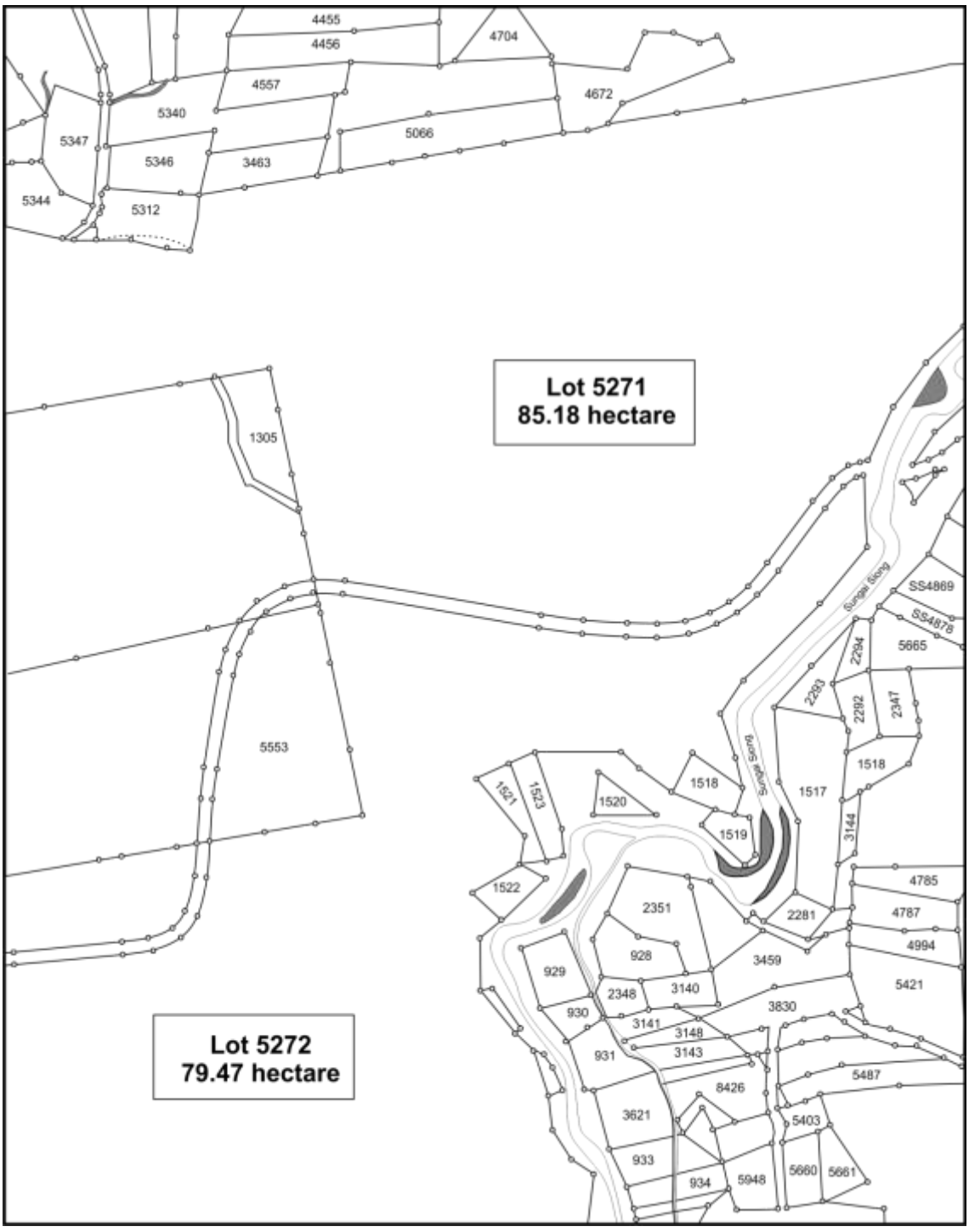


Figure 3.3 Orang Asli reserve in Kampung Orang Asli Lubuk Ulu Legong (Lot 5271 and 5272)
(* Source from Department of Survey and Mapping Malaysia (JUPEM) in 2012)

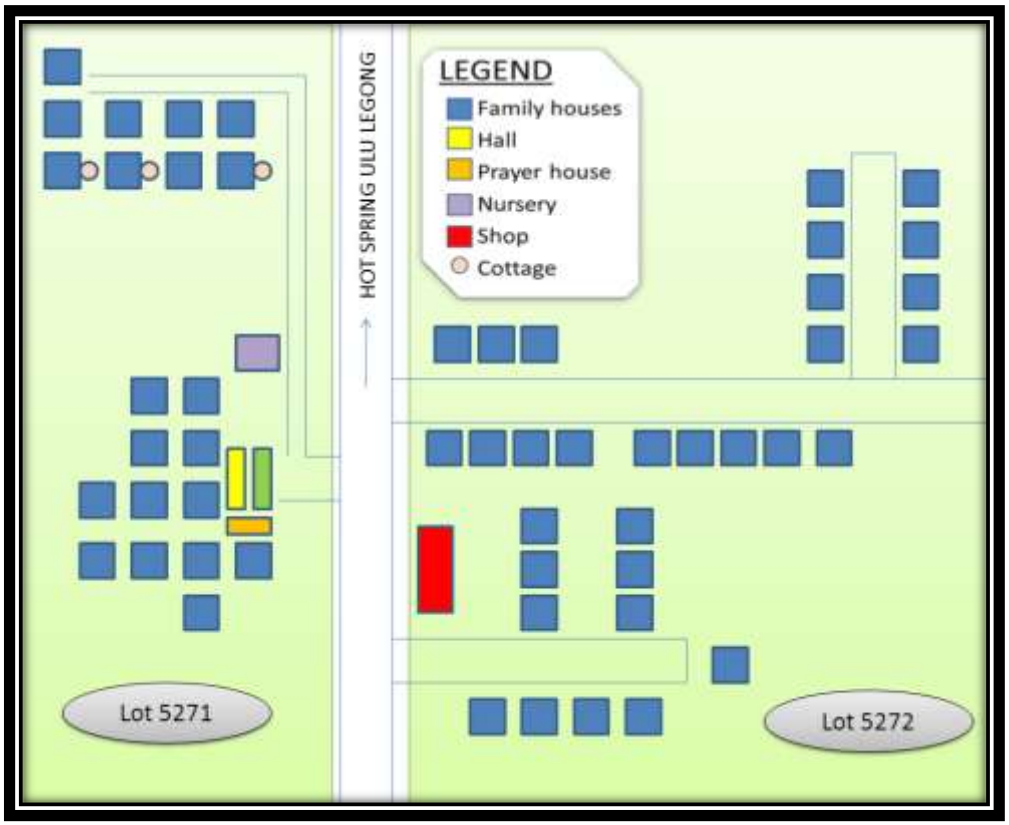


Figure 3.4 Distribution of houses in Kampung Orang Asli Lubuk Ulu Legong

3.1.1 Local community

Villagers in Kampung Orang Asli Lubuk Ulu Legong mostly belong to Kensiu tribe. Based on information gathered during this study and also from conversation with the former village head Batin Rosman, 98% of the villagers are Kensiu while another 2% belong to other Orang Asli tribes such as Melanoh, Jahai, and Kentaq. The presence of other tribes in the village is the result of inter-marriage between the tribes. Majority of the villagers are Muslim. Kensiu is a sub-group of Negrito. This tribe covers only 7.24% and 5.79% of the total Negrito in Peninsular Malaysia in 2000 and 2003 respectively. Kensiu comprised only 0.22% and 0.16% of the population of Orang Asli in Malaysia in 2000 and 2003 respectively. The population size of Kensiu in Kampung Orang Asli Lubuk Ulu Legong in 1994, 2000, 2003, 2010, and 2012 was 416, 254, 232, 247, and 258 respectively. Currently, there are 69 of families, 137 of man and 121 of

women in Kampung Orang Asli Lubuk Ulu Legong (JKOA, 2010). Currently, the chief of the village is Batin Razali bin Kulim.

Based on information gathered during this study, the size of a household in Kampung Orang Asli Lubuk Ulu Legong ranges from one to eleven people. Highest level of education attained by respondents is secondary level. 52% of respondent have a primary level and 45% of respondent had never attended school. Based on information by JKOA (2010), 27 children in this village studied in primary school and 15 children continued their study at secondary school in 2010.

Villagers in Kampung Orang Asli Lubuk Legong speak Kensiu language when conversing among themselves but are equally adept with Malay language especially when talking to visitors in the village. Kensiu language is of the Northern Aslian family of Mon-Khmer languages (Alias, 2010).

For accessibility to villagers of Kampung Orang Asli Lubul Legong, government has built at or near the village primary and secondary schools, clinics, post office, community hall, and *surau*. The village is also provided with tarred roads, electricity and water supply.

3.1.2 Economic activity

Information gathered during this study indicated most of the villagers (67% of the respondents) in Kampung Orang Asli Ulu Legong are self-employed. Among the income-earning activities are collecting and selling of forest product, rubber tapping, and selling of food crops such as fruits and vegetables. Income from such activities is not steady and unpredictable. Forest products that are collected and sold by the villagers include medicinal herbs and edible plants. Besides these, they also take wages in making home utensil such as leaf roof, bird cage, handicraft, and floor mats. However, acquisition of forest products mostly depending on the season and customers demand. Rubber tappers in the village obtained assistance in the form of advice on plant and

tending the crop care and also by providing rubber saplings. There are also villagers that take up labor jobs in construction sites in nearby towns and earn monthly salary.

3.1.3 Meteorology

Metereological information was obtained from the official web page of Metereological Depatment of Malaysia webpage (JMM, 2012). For the year 2012, 2750mm of rain was recorded. Usually, Baling experiences heavy rainfall from March to April and August to November annually. The dry season usually occurs in December till the March. Average temperature of this district minimum is 24˚C and maximum temperature is 33˚C.

3.1.4 Physical earth

Kampung Orang Asli Lubuk Ulu Legong lies at an altitude of 79 to 141 m above sea-level. The village lies on a land that gently dipped into two rivers called Sungai Ketil and Sungai Legong. Sungai Ketil, one of the tributaries of Muda river or Sungai Muda is over 104 meters long and unpolluted (class I). Sungai Legong, one of the tributaries of Siong River or Sungai Siong still considered unpolluted (class IIA). The village was originally surrounded by forests that mostly of which have already been converted into rubber plantations with assistance from RISDA.

3.1.5 Vegetation

It is difficult to distinguish home gardens of Kampung Orang Asli Lubuk Legong from home gardens of neighboring Malay villages in terms of their plant species. However, it is noted home gardens in Kampung Orang Asli are generally less dense in terms of plant individuals or cover as compared to those of their Malay in neighboring villages. Initial observation shows that plants that are commonly grown in home gardens in Kampung Orang Asli Lubuk Legong are bananas, chilies, lemongrass,

and ornamental plants. Efforts were also taken made by home garden owners to earnestly replant the crops to offset losses caused by disturbance from free-grazing livestock.

Map in figure 3.2 shows that the village surrounded with Ulu Muda Forest reserve which total area is 160,000 hectares. This forest encompasses three district of Kedah states, Baling, Padang Terap and Sik. There are three large man-made lakes within Ulu Muda area namely Muda, Ahning and Pedu, formed by the construction of three correspondingly named dams that regulate water for domestic use and irrigation for most Kedah, Penang and Perlis (Suksuwan, 2008).

The main primary forest types in Ulu Muda are lowland dipterocarp forest, hill dipterocarp forest and upper hill dipterocarp forest. The forest of Ulu Muda contains elements of Thai-Burmese flora due to their proximity to southern Thailand. Ulu Muda forest is a main supplier of forest product such as food and medicine to the Orang Asli and other local communities.

Based on floristic survey during this study, Ulu Muda forest is the main supplier of forest product to the community Orang Asli at Kampung Lubuk Ulu Legong. Besides the reserve forest, these areas also have the rubber and oil plantation which endeavored by the local community.

3.1.6 Soil and geology

Soil is an important aspect of earth ecosystem which sustains the life of mankind and other living organism. Soil color could be an indicator to the slope or soil stability. The samples for soil determination were done at four random soil sampling sites at surrounding the village.

Table 3.1 Results of the random soil sampling.

Site location/ soil profile		Site 1 N 05˚47.622' E 100˚54.102'	Site 2 N 05˚47.538' E 100˚54.082'	Site 3 N 05˚47.727' E 100˚54.070'	Site 4 N 05˚47.720' E 100˚54.036'
Soil color	Surface	Dull reddish brown	Very dark reddish brown	Bright brown	Brown
	Middle	Bright brown	Orange	Bright reddish brown	Brown
	Bottom	Dull brown	Yellow orange	Bright brown	Brown
Soil water content (SWC)		11.2	14.1	17.0	17.5
Soil Field Capacity (SFC)		23.3	28.3	32.0	39.3
pH		7.31	6.75	6.57	7.13
Texture class		Sand	Sand	Sand	Clay
Bulk density (g cm^{-3})		1.10	0.62	0.94	1.01

Table 3.1 shows the characteristic of soils in four different sampling sites. From the sampling, the all sites have from orange to dark color of the soils particles. This indicate that all soil particles at the locations exhibited stable soil stability as the increasing redness of the soil particles relate to the increase of iron content and rock content. These soil colors were determined by referring to Muncell's Standard Soil Color Chart.

Soil water content (SWC) one of the factors that affects soil stability. The reduction of the soil strength is because of increase in water content. Soil field capacity is controlled primarily by soil texture and organic matter. Examination of soil sample indicates that the soil at Kampung Orang Asli Lubuk Ulu Legong have high clay and low san content (Table 3.1). Site 4 contributes to more slope stability as its higher clay particle percentage. For soils pH in this area is mildly acidic and alkaline with range 6.57 to 7.31.

The result of the soil profile showed that the soil in this village is in stable condition. This is mainly based on the results of soil water content and soil field capacity.

3.2 Material and methods

A total of eleven visits to this study sites were done between early June 2011 and the end of December 2012. The first few visits were used to engage village elders into a conversation that aimed at identifying villagers that are willing to share their knowledge on plant utilization. Most of the information acquired from these first few visits was from face to face conversation with the village chief and from which a preliminary list of plant species used by the villagers was derived. The preliminary list, together with guidelines of Martin (1995), was used to construct survey questions for subsequent parts of this study. Subsequent parts of this study involve plant resource identification via home garden survey and wild plant survey, plant resource characterization and plant resource valuation.

3.2.6 Identification of plant resource

In order to collect the ethnobotany data, they are referring to the broad range of information on how local people interact with the natural environment. Data are recorded in many different forms such as collection of plants and animals, recorded interview, photograph market surveys and so on (Martin, 1995).

3.2.6.1 Home garden survey

The survey was carried out by enquiring and recording down species of plants during visits to the home gardens. Useful plants were enquired from home garden owners through face to face conversation with the aid of semi-structured questions.

Photographs of plants were taken to facilitate their identification. Plant specimens were collected when allowed to do so by home garden owners [Appendix].

3.2.6.2 Wild plant survey

A visit to a nearby forest that has often been visited by villagers to look for and collect forest products was also carried out. A few villagers knowledgeable in forest product were engaged both as guides and informants for the visit. During the visit, information imparted by the informants on uses of each species useful plants that were encountered was recorded. The plants photographs were also taken for identification and documentation. Plants specimens were also collected and later prepared for deposition in herbarium.

3.2.7 Characterization of plant resource used by the Orang Asli at Lubuk Ulu Legong

Plant resource used by villagers at Kampung Orang Asli at Lubuk Ulu Legong is characterized according to plant uses, parts used, and planting status and indices. Indices that are used to characterize each species encountered during this study are described below.

3.2.7.1 Use-Value index

The relative importance of each plant was quantified by calculating the use-value of each cited species (Sop *et al.*, 2011). This index is based on the number of uses and the number of people that cite a given plant. This technique has been widely used within the ethnobotanical community to indicate the species that are considered most important by a given population. One of the most common approaches has been to associate the use-value with questions of conservation, based on the idea that the most important species will suffer the greatest harvesting pressure (Albuquerque *et al.*, 2006).

This technique was proposed by Ghillean Prance and friends (1987) to calculate use-value of one species (Martin, 1995). The species use-value is a sum of the scores which generated by the researcher for each of its uses. Major uses are scored 1 while minor uses are scored 0.3. This uses refer to use-categories such as food, medicine, ornamental, economic, utensil or handcraft. The use value was calculated using the formula **UVs =** $\sum_i^n \boldsymbol{Value}_{\textbf{UseCategory (i)}}$ (Albuquerque *et al.*, 2006). This technique was used also expanded to find out the plant species which was not only has a high of use-value, but was also widely used among the study community. The formula to calculate this purpose is **N = (∑ UVs) R** where there N is the use-value of species which have been used widely, **∑ UVs** is a use-value of a plant species, while **R** is the number of the informants which used the species. This method was done to identify the species which contribute the greatest benefit in the community.

3.2.7.2 Medicinal Importance Value Index

The Medicinal Importance Value Index (Iv) was modified from importance Value by Byg and Balslev (2001) (Hoffman and Gallaher, 2007). This index was calculated only for medicinal plant species to find out importance species which used and known widely among the community study. The importance value of medicinal species calculated by using the formula $\mathbf{Iv_s = n_{ts}\ (n)}$ where the $\mathbf{Iv_s}$ is the value of species which used and known widely among the community, $\mathbf{n_{ts}}$ is the values ranges from 0.1 to 1 according to the number of the illness can treated by the species (0.1 for one illness can be treated by the species), while **n** is the total of informants. The higher value of index shows the most importance of the medicinal species to the community.

3.2.8 Valuation of plant resource

This valuation focused on economic valuation. A household survey was carried to estimate income of villagers that are earned from plant resource. A total of 36 villagers, each representing a household, were interviewed. They comprised of 22 of men and 14 women. The youngest and oldest of the 38 were 19 years old and the older is 60 years old respectively. The open-ended sections are related on types of uses of plant resource and other related information on plant resources used by them in their daily lives.

This valuation only involved the species of plant which have commercial value in the community. This method is by calculating the annual estimation of income earned from the plant resource in study community. Among the main aspects in this method which directly obtained from the community is the total amount received by the community for the sale at the once time. The price for each unit, kilogram, meter or bunch was also recorded. The other important aspect is a frequency of sales in a month. There are several species of plant just only sold according to the certain seasons and sold based on market demand. The month of a season in a year also recorded as an effort to achieve this calculation. The estimation of the total amount generated from plant resource in study community calculated by multiplication of the: (1) frequency of sales in a year for plant species sold based on demand or frequency of sold in seasons month in a year for the seasonal plant species; (2) the average price received by the community in once sale; (3) the number of community whose sold the plant species.

CHAPTER 4

4.0 RESULTS

This study recorded a total of 175 plant species used by the Orang Asli at Lubuk Ulu Legong. These species numbers consists of exclusively home garden, plants exclusively collected from the wild plant and plants that are both cultivated and obtained from the wild. 91.5% **(**167 species) of the plant species encountered are angiosperms while 8.5% (8 species) are pteridophytes. Table 4.3 shows the main groups of plant resource recorded, and the number of species for each family and order.

4.1 Home garden survey

The totals of 84 species of useful home garden plants were found in Kampung Orang Asli Lubuk Ulu Legong. Table 4.1 shows the list of the species names and family, local name, types of uses, part of plant used, method of plant use and number of houses with the species.

The 84 species of home garden plants belong to 43 families. The most common plant family in term of the number of species was Euphorbiaceae (8 species). This was followed by Apocynaceae (4 species), Cucurbitaceae (4 species), Sapindaceae (4 species), Fabaceae (3 species), Meliaceae (3 species), Moraceae (3 species), Rubiaceae (3 species), Rutaceae (3 species), Zingiberaceae (3 species), Asparagaceae (2 species), Amaranthaceae (2 species), Anacardiaceae (2 species), Arecaceae (2 species), Asteraceae (2species), Convolvulaceae (2 species), Liliaceae (2 species), Malvaceae (2 species), Musaceae (2 species), Myrtaceae (2 species), Poaceae (2 species), Solanaceae (2 species) and Turneraceae (2 species). Families represented by only one species were Acanthaceae, Amaryllidaceae, Araceae, Bixaceae, Bombacaceae, Bromeliaceae, Caricaceae, Crassulaceae, Cycadaceae, Lauraceae, Lythraceae, Marantaceae,

Melastomataceae, Nyctaginaceae, Oleaceae, Orchidaceae, Oxalidaceae, Piperaceae, Polygonaceae and Rosaceae.

Table 4.1 List of home garden plants recorded in Kampung Orang Asli at Lubuk Ulu Legong.

No	Scientific name/ Family	Local name	Uses	Part used	Method of uses	Number of houses with the species
1	*Agave augustifolia* Haw. Asparagaceae	Kelumpang telur	O	Whole plant	Home garden landscaping.	6
2	*Allamanda cathartica* L. Apocynaceae	Bunga loceng	O	Whole plant	Home garden landscaping.	6
3	*Aloe barbadensis* Mill. Liliaceae	Lidah buaya	O	Whole plant	Home garden landscaping.	8
4	*Alpinia galanga* (L.) Willd Zingiberaceae	Lengkuas	F	Rhizomes leaf	Rhizome and young leaf used to flavor food.	2
5	*Amaranthus giganticus* L. Amaranthaceae	Bayam	F	Leaf Stem	Leaf and stem eaten cooked.	6
6	*Ananas comosus* (L.) Merr. Bromeliaceae	Nenas	F	Fruit	Eaten raw.	3
7	*Arachnis flosaeris* (L.) Rchb.f. Orchidaceae	Orkid	O	Whole plant	Home garden landscaping.	9
8	*Archidendron jiringa* (Jack) I.C. Nielsen Fabaceae	Jering	EF	Fruit	Sold for income; mature fruit are eaten raw.	8
9	*Areca catechu* L. Arecaceae	Pinang	FM	Fruit	Eaten raw; fruit soaked in water (accompanied with incantation) an then taken orally or applied topically to treat fever.	5
10	*Artocarpus heterophyllus* Lamk. Moraceae	Nangka	F	Fruit	Eaten raw.	9
11	*Artocarpus integer* (Thunb.) Merr. Moraceae	Cempedak	F	Fruit	Eaten raw.	6
12	*Averrhoa carambola* L. Oxalidaceae	Belimbing	F	Fruit	Eaten raw.	6

13	*Benincasa hispida (*Thunb.) Cogn. Cucurbitaceae	Kundur	F	Fruit	Eaten cooked.	7
14	*Bixa orellana* L. Bixaceae	Bunga warna/kesumba	O	Whole plant	Home garden landscaping.	3
15	*Bougainvillea spectabilis* Comm. ex Juss. Nyctaginaceae	Bunga kertas	O	Whole plant	Home garden landscaping.	10
16	*Caladium humboldtii* (Raf.) Schott Araceae	Keladi putih, bunga, telor	O	Whole plant	Home garden landscaping.	14
17	*Cantharanthus roseus* (L.) G. Don Apocynaceae	Kemunting cina	O	Whole plant	Home garden landscaping.	4
18	*Capsicum frutescens* L. Solanaceae	Cili	F	Fruit	Eaten raw and cooked.	13
19	*Carica papaya* L. Caricaceae	Betik	FM	Fruit	Eaten raw; mixture of fruit and honey is taken orally to treat cough.	8
20	*Celosia argentea var cristata* Kuntze Amaranthaceae	Balung ayam	O	Whole plant	Home garden landscaping.	7
21	*Centratherum punctatum* Cass. Asteraceae	Bunga butang	O	Whole plant	Home garden landscaping.	6
22	*Cinnamomum culilawan* Bl Lauraceae	Teja	O	Whole plant	Home garden landscaping.	4
23	*Citrus aurantifolia* (Christm and Panzer) Swing. Rutaceae	Limau nipis	F	Fruit	Eaten raw.	5
24	*Citrus microcarpa* Bunge Rutaceae	Limau kasturi	F	Fruit	Eaten raw.	8
25	*Cocus nucifera* L. Arecaceae	Kelapa	F	Fruit	Eaten raw.	7
26	*Codiaeum variegatum* (L.) Blume Euphorbiaceae	Puding	O	Whole plant	Home garden landscaping.	5
27	*Coffea arabica* L. Rubiaceae	Kopi	F	Fruit	Eaten raw.	5
28	*Cordyline terminalis* Kunth	Jemaluang	O	Whole	Home garden landscaping.	4

	Asparagaceae			plant		
29	*Cosmos caudatus* Kunth Asteraceae	Ulam raja	F	Leaf	Young leaf eaten raw.	5
30	*Crinum asiaticum* L. Amaryllidaceae	Suasa	O	Whole plant	Home garden landscaping.	6
31	*Cucumis sativus* L. Cucurbitaceae	Timun	F	Fruit	Eaten raw and cooked.	2
32	*Cucurbita moschata* (Duch. & Lam.) Duch. & Poir Cucurbitaceae	Labu	F	Fruit	Eaten cooked.	5
33	*Cycas rumphii* Miq. Cycadaceae	Paku aji	O	Whole plant	Home garden landscaping.	3
34	*Cymbopogon citratus* (DC.) Stapf. Poaceae	Serai	EF	Whole plant	Sold for income; cooking ingredient.	21
35	*Dimocarpus longan malesianus* Leenh Sapindaceae	Mata kucing	F	Fruit	Eaten raw.	2
36	*Durio zibethinus* Murray Bombacaceae	Durian	FM	Fruit	Eaten raw; water mashed with leaves (together with other species) is used as bath to treat fever and influenza.	19
37	*Etlingera elatior* (Jack) Smith Zingiberaceae	Kantan	FM	Flower, Leaf	Flower for cooking ingredient; decoction of leaves is used in bath water to treat aches in body.	1
38	*Eugenia aquea* Burm. Myrtaceae	Jambu air	F	Fruit	Eaten raw.	5
39	*Euphorbia milii* Desmoul. Euphorbiaceae	Bunga duri	O	Whole plant	Home garden landscaping.	6
40	*Euphorbia neriifolia* L. Euphorbiaceae	Kaktus daun	O	Whole plant	Home garden landscaping.	2
41	*Euphorbia phillipsioides* S.Carter Euphorbiaceae	Kaktus	O	Whole plant	Home garden landscaping.	1
42	*Ficus variegata* Blume Moraceae	Kelopong	F	Fruit	Eaten raw.	6
43	*Grapthophyllum hortense* Nees. Acanthaceae	Puding hutan	O	Whole plant	Home garden landscaping	4

44	*Guioa pubescens* (Zoll. & Mor.) Radlk. Sapindaceae	Cemenui	M	Root, Leaf	Decoction of root used is used to treat fever and influenza, pounded leaves applied topically to treat headache.	3
45	*Hedychium longicornutum* Baker Zingiberaceae	Ramu akar cacing	M	Root	Decoction of root used as bath to treat worms.	2
46	*Hevea brasiliensis* Muell. Arg. Euphorbiaceae	Getah	E	Latex	Sold for income.	5
47	*Hibiscus abelmoschus* L. Malvaceae	Kapas	O	Whole plant	Home garden landscaping.	3
48	*Hibiscus rosa-sinensis* L. Malvaceae	Bunga raya	OM	Whole plant, Leaf	Home garden landscaping; water mashed with leaves (together with other species) is used as bath to treat fever and influenza.	10
49	*Ipomoea aquatica* Forsk. Convolvulaceae	Kangkung	F	Leaf	Eaten cooked.	3
50	*Ipomoea batatas* (L.) Poir Convolvulaceae	Ubi keledek	EF	Tuber	Sold for income; eaten cooked.	5
51	*Ixora javanica* (Blume) DC. Rubiaceae	Bunga jenjarum	O	Whole plant	Home garden landscaping.	2
52	*Jasminum sambac* (L.) Aiton Oleaceae	Bunga melur	O	Whole plant	Home garden landscaping.	6
53	*Jatropha curcas* L. Euphorbiaceae	Jarak	O	Whole plant	Home garden landscaping.	3
54	*Kalanchoe pinnata* (Lam.) Pers. Crassulaceae	Setawar/ Sedingin	OM	Whole plant, leaf	Home garden landscaping; pounded leaves are applied topically to treat headache.	5
55	*Lansium domesticum* Correa Meliaceae	Langsat	F	Fruit	Eaten raw.	4
56	*Lansium domesticum* Jack Meliaceae	Dokong	F	Fruit	Eaten raw.	8
57	*Lawsonia inermis* (L.) Pers. Lythraceae	Inai	M	Leaf	Pounded leaves applied topically to treat cuts and wound, decoction of leaves taken orally to treat stones in kidneys.	5
58	*Lepisanthes fruticosa* (Roxb.)	Ceri	F	Fruit	Eaten raw.	1

	Leenh. Blumea Sapindaceae					
59	*Luffa acutangula* (L.) Roxb. Cucurbitaceae	Petola	F	Fruit	Eaten cooked.	7
60	*Mangifera indica* L. Anacardiaceae	Mangga/ Mempelam	F	Fruit	Eaten raw.	10
61	*Mangifera macrocarpa* Blume Anacardiaceae	Macang	F	Fruit	Eaten cooked.	3
62	*Manihot esculenta* Crantz Euphorbiaceae	Ubi kayu/putih	F	Tuber	Eaten cooked.	6
63	*Manihot glaziovii* Mull. Arg. Euphorbiaceae	Ubi gajah	O	Whole plant	Home garden landscaping.	5
64	*Melastoma malabathricum* L. Melastomataceae	Senduduk biru	O	Whole plant	Home garden landscaping.	3
65	*Morinda citrifolia* L. Rubiaceae	Mengkudu	O	Whole plant	Home garden landscaping.	2
66	*Murraya koenigii* (L.) Sprengel Rutaceae	Kari	F	Leaf	Cooking ingredient.	2
67	*Musa acuminata* Colla (AAA Group) Musaceae	Pisang abu	EF	Fruit	Sold for income, eaten raw.	5
68	*Musa sapientum* L. Musaceae	Pisang kebatu	FM	Fruit	Eaten raw; pounded young fruit with salt applied at forehead to treat fever and headache.	5
69	*Nephelium lappaceum* L. Sapindaceae	Rambutan	EFM	Fruit	Sold for income; eaten raw; water mashed leaves (together with several other species) is used as bath to treat fever and influenza.	7
70	*Phrynium capitatum* Willd. Marantaceae	Lerek/ Pelum	F	Leaf	Leaf is used as wrap rice in bamboo-cooked rice.	3
71	*Piper betle* L. Piperaceae	Sireh	F	Leaf	Eaten raw with bettle nut (pinang).	3
72	*Plumeria rubra* L. Apocynaceae	bunga kemboja	O	Whole plant	Home garden landscaping.	2
73	*Polygonum minus* Huds.	Kesum	F	leaf	Cooking ingredient.	3

	Polygonaceae					
74	*Prunus arborea* (Bl.) Kalkman. Rosaceae	Sekentut	F	Leaf	Cooking ingredient.	5
75	*Psidium guajava* L. Myrtaceae	Jambu batu	FM	Fruit	Eaten raw; grounded fruit is applied topically on face for anti-aging.	5
76	*Saccharum officinarum* L. Poaceae	Tebu	F	Stem	Eaten raw.	5
77	*Sandoricum koetjape* Merr. Meliaceae	Setoi	F	Fruit	Eaten raw.	3
78	*Sanseviera trifasciata* Prain. Liliaceae	Lidah mentua	O	Whole plant	Home garden landscaping.	3
79	*Solanum melongena* L. Solanaceae	Terung	F	Fruit	Eaten cooked.	6
80	*Tabernaemontana divaricata* (L.) R. Br. ex Roem. & Schult. Apocynaceae	Melur	O	Whole plant	Home garden landscaping.	3
81	*Tamarindus indica* L. Fabaceae	Asam jawa	F	Fruit	Cooking ingredient.	3
82	*Turnera subulata* Sm. Turneraceae	Bunga Kuning	O	Whole plant	Home garden landscaping.	4
83	*Turnera ulmifolia* L. Turneraceae	Bunga Kuning	O	Whole plant	Home garden landscaping.	5
84	*Vigna unguiculata sesquipedalis* (L.) Verdc. Fabaceae	Kacang panjang	F	Fruit	Eaten cooked.	5

*Uses: E; economic/income sources, F; food, O; Ornamental, M; Medicinal, H; Handcraft, U; Utensil, B; Belief and P; Poison

4.2 Wild plant survey

A total of 107 species of useful plants for the Orang Asli at Kampung Lubuk Ulu Legong was recorded during this study. Table 4.2 shows the list of the species names and family, local name, types of uses, part used and method of plant use.

These 107 species belonged to 62 families. The most common plant family for the wild plant used by them was Arecaceae which represented 9 species. This was followed by Fabaceae (7 species), Zingiberaceae (7 species), Rubiaceae (6 species), Euphorbiaceae (5 species), Asteraceae (3 species), Poaceae (3species), Apocynaceae (2 species), Araceae (2 species), Begoniaceae (2 species), Convolvulaceae (2 species), Dilleniaceae (2 species), Dryopteridaceae (2 species), Flacourtiaceae (2 species), Meliaceae (2 species), Myrsinaceae (2 species), Pandanaceae (2 species), Piperaceae (2 species) and Smilaceae (2 species). Families represented by only one species were Anacardiaceae, Ancistrocladaceae, Anisophylleaeceae, Aristolochiaceae, Asparagaceae, Barringtoniaceae, Bignoniaceae, Blechnaceae, Bombacaceae, Burseraceae, Connaraceae, Cucurbitaceae, Davalliaceae, Dioscoreaceae, Ganodermataceae, Hanguanaceae, Lamiaceae, Lauraceae, Leeaceae, Loranthaceae, Malvaceae, Melastomataceae, Menispermaceae, Moraceae, Musaceae, Olacaceae, Ophioglossaceae, Opiliaceae, Peliosantheae, Pentaphragmataceae, Polygonaceae, Polypodiaceae, Polyporaceae, Rosaceae, Sapindaceae, Schizaeaceae, Simaroubaceae, Solanaceae, Styracaceae, Theaceae, Thymelaeaceae and Woodsiaceae.

Table 4.2 List of wild plants recorded used by the Orang Asli in Kampung Lubuk Ulu Legong.

No	Scientific name/ Family	Local name	Uses	Part used	Method of uses	Numbers of respondents use the species
1	*Acrotrema costatum* Jack. Dilleniaceae	Tutup bumi/ceqloq	M	Root	Decoction of root are taken orally to treat bloody defecates.	12
2	*Ancistrocladus tectorius* (Lour.) Merr. Ancistrocladaceae	Ali sengau	M	Root	Burned dry root are used as tobacco to treat sinus.	4
3	*Anisophyllea disticha* (Jack) Baill. Anisophylleaceae	Cabang tiga/ kroi manding	F	Fruit	Fruit eaten raw.	12
4	*Aquilaria malaccensis* Lamk. Thymelaeaceae	kayu depoh/ gaharu	E	Bark	Sold for income.	13
5	*Archidendron jiringa* (Jack) I.C. Nielsen Fabaceae	Jering	EF	Fruit	Sold for income; mature fruit eaten raw.	8
6	*Ardisia crispa* (Thunb.) DC Myrsinaceae	Gunlum	EM	Whole plant	Decoction of whole plants is used as bath to treat body aches, hemorrhoids and bloody defecate.	12
7	*Argostemma pictum* Wall. Rubiaceae	Paru-paru/ bayam kahap	M	Whole plant	Pounded whole plant is applied topically on chest to treat pneumonia.	11
8	*Artocarpus elasticus* Reinw. ex Blume Moraceae	Terap/heok	F	Bark	Bark eaten raw	12
9	*Bambusa ventricosa* McClure Poaceae	Buluh	EFU	Leaf, stem	Shoot eaten cooked; sold for income (stems are making darts and birdcage); fencing, house wall, floor and suspension	17
10	*Barringtonia acutangula* (L.) Gaertn. Barringtoniaceae	Gajah beranak/ham	EM	Stem, Root	Sold for income; decoction of stem is taken orally by women to prevent pregnancy; decoction of	12

					roots is taken orally by women to cleanse postnatal blood and improve blood circulation.	
11	*Bauhinia bidentata* Jack Fabaceae	Tapak kerbau	F	Leaf	Made into cigarette.	12
12	*Begonia pseudisoptera* Irmscher Begoniaceae	Asam putih	F	Fruit	Cooking ingredient.	4
13	*Begonia tricornis* Ridl. Begoniaceae	Asam bukit	F	Fruit	Cooking ingredient.	7
14	*Calamus conirostris* Becc Arecaceae	Rotan Krai/ awei krai	E	Stem	Sold for income.	13
15	*Calamus manan* Miq. Arecaceae	Rotan leban	U	Stem	Furniture-making such as chairs.	3
16	*Canarium rufum* Benn. Burseraceae	Kerat telunjuk	F	Fruit	Fruit eaten raw.	7
17	*Ceiba pentandra (*L.) Gaertn. Bombacaceae	Kekabu	U	Fruit	Pillows stuffing.	13
18	*Centella asiatica* (Linn.) Urban Apiaceae	Pegaga bukit/bobob	FM	Whole plant	Eaten as salad; decoction of the whole plant is used to treat stive, cough and phlegm.	12
19	*Champereia manillana* (Bl.) Merr. Opiliaceae	Lemak/ jempiang/ pucuk cempereh	FM	Shoot, Root	Shoot eaten cooked; decoction of roots mixed with Pinang fruit and other herb is taken orally to increase the fertility.	9
20	*Chasalia chartacea* Craib Rubiaceae.	Makmoq	EFM	Leaf, Root	Sold for income; leaf eaten as salad; decoction of root is taken orally to treat joint pain.	9
21	*Cinnamomum iners* Reinw. ex Blume Lauraceae	Tajalawang	EM	Root	Sold for income; decoction of root is taken orally during postpartum to shrink veins in the body, hypertension, sinus and for abortion.	14
22	*Claoxylon longifolium*	Salang	F	Leaf	Eaten cooked.	14

	(Blume) Endl. Ex Hassk Euphorbiaceae					
23	*Cnestis ramiflora* Griff. Connaraceae	Asam jawa bukit	EM	Root	Decoction of root is taken orally to treat diabetes.	14
24	*Coffea arabica* L. Rubiaceae	Kopi	F	Fruit	Eaten raw.	5
25	*Costus speciosus* (Koenig.) Smith Zingiberaceae	Tepus bukit/ penyau	M	Stem	Pounded stem is applied topically to treat cuts and wounds.	12
26	*Curcuma xanthorrhiza* Roxb. Zingiberaceae	Temulawak	M	Rhizome	Decoction of rhizomes is taken orally for anti- aging.	11
27	*Cyrtosstachys renda* Blume Arecaceae	Pinang bukit merah/bong	F	Fruit	Eaten raw.	10
28	*Daemonorops didymophylla* Becc. Arecaceae	Rotan	EH	Stem	Sold for income (making birdcage and darts), and bracelet.	9
29	*Davallia solida* (Forst.) Sw. Davalliaceae	Paku sekam	F	Leaf	Decoction of leaves is eaten as salad.	13
30	*Dioscorea pyrifolia* Kunth. Dioscoreaceae	Tuba/tohong	P	Tuber	Pounded tuber is used as fish poison.	14
31	*Diplazium esculentum* (Retz.) Sw. Woodsiaceae	Pucuk paku	EF	Leaf	Sold for income; young shoot are eaten cooked.	17
32	*Dracontomelum mangifera* Bl. Anacardiaceae	Sipu	U	Stem	Timber for fencing and stilts.	14
33	*Dyera costulata* Hk. F. Apocynaceae	Jelutung	U	Latex	Latex is used to trap bird.	4
34	*Dysoxylum alliaceum* (Bl.) Bl. Meliaceae	Hatap selaya	EM	Root	Sold for income; decoction of root taken orally during post-partum to treat internal wound.	14
35	*Elateriospermum tapos* Bl. Euphorbiaceae	Perah/son	FM	Fruit	Fruit and young leaves are eaten as salad; latex is applied topically on teeth to treat toothaches.	13

36	*Elettariopsis curtisii* Baker ex Hook.f. Zingiberaceae	Heklek/ ceklek	B	Leaf	Leaves are used in Sewang ritual.	12
37	*Elettariopsis triloba* (Gagnep.)Loes. Zingiberaceae	Tepus etut	B	Leaf	Leaves are used in Sewang ritual.	11
38	*Etlingera elatior* (Jack) Smith Zingiberaceae	Kantan	FM	Flower, Leaf	Flower is used as cooking ingredient; decoction of leaves is used in bath water to treat aches in body.	1
39	*Eugeissona tristis* Griff. Arecaceae	Bertam	EU	Leaf, stem	Leaves are for roofing; sold for income (stems are making birdcage)	12
40	*Eupatorium odoratum* L. Asteraceae	Kapal terbang	M	Leaf	Pounded leaves are applied topically to treat cuts and wounds.	7
41	*Eurycoma longifolia* Jack Simaroubaceae	Tongkat ali	EM	Root	Sold for income; decoction of roots is taken orally to treat hypertension and low sexual energy.	17
42	*Fibraurea cloroleuca* Miers. Menispermaceae	Kuning/ jelatang	MB	Root	Decoction of root is applied topically as bath to treat jaundice, Drive away devils.	9
43	*Flacourtia inermis* Roxb. Flacourtiaceae	Tembela	F	Leaf	Young leaves are eaten as salad.	13
44	*Freycinetia javanica* Bl. Pandanaceae	Kelawit mantai	EM	Root	Decoction of root is taken orally to treat back pain.	14
45	*Ganoderma lucidum* (Curtis) P. Karst Ganodermataceae	Kulat senduk	E	Whole plant	Sold for income..	4
46	*Gmelina asiatica* L. Lamiaceae	Bulan	M	Fruit	Sliced mature fruit are applied topically on neck to treat cough.	13
47	*Grewia paniculata* Roxb. Malvaceae	Cenerai	F	Fruit	Eaten raw.	5
48	*Guioa pubescens* (Zoll. & Mor.) Radlk. Sapindaceae	Cemenui	M	Root, Leaf	Decoction of root is used as bath to treat fever and influenza; pounded leaves are applied topically to treat	3

					headache.	
49	*Hanguana malayana* (Jack) Merr. Hanguanaceae	Lebek	EB	Leaf	Sold for income; leaves used in Sewang ritual.	13
50	*Hedychium longicornutum* Baker Zingiberaceae	Ramu akar cacing	M	Root	Decoction of root is used as bath to treat worms.	13
51	*Helmintostachys zeylanica* (L) Hook. Ophioglossaceae	Tunjuk langit	M	Whole plant	Decoction of whole plant is for women post-partum; decoction of root is taken orally to treat diabetes.	3
52	*Hevea brasiliensis* Muell. Arg. Euphorbiaceae	Getah	E	Latex	Sold for income.	15
53	*Homalomena pendula* (Bl.) Bakh. Araceae	Keladi bukit	F	Leaf	Young leaves are eaten as salad.	13
54	*Inocarpus edulis* Forst. Fabaceae	Gatei	F	Fruit	Fruit are eaten raw.	2
55	*Ipomoea aquatica* Forsk. Convolvulaceae	Kangkung	F	Leaf	Eaten cooked.	3
56	*Ipomoea batatas* (L.) Poir Convolvulaceae	Ubi keledek	EF	Tuber	Sold for income; eaten cooked.	5
57	*Labisia pumila* (Blume) Mez Myrsinaceae	Kacip fatimah	EM	Root	Sold for income; decoction of root taken orally during post-partum and increase the energy.	15
58	*Lasia spinosa* Thwaites Araceae	Geli	FM	Leaf, tuber	Young leaves are eaten as salad; decoction of tuber is taken orally to treat diabetes.	13
59	*Leea indica* (Burm.f.) Merr. Leeaceae	Kerak nasi	M	Leaf	Decoction of leaves is taken orally to treat diabetes.	4
60	*Licuala spinosa* Roxb. Arecaceae	Palas	U	Leaf	Wrappers for traditional cookies such as “ketupat”	13
61	*Lignosus rhinocerus* (Cooke) Ryvarden	Susu rimau/ tish am ong	EM	Whole plant,	Sold for income; burnt tuber is applied to chest to treat asthma;	14

	Polyporaceae			tuber	eaten raw to increase energy; shredded tuber mixed with water applied on skin to treat breast cancer.	
62	*Lophatherum gracile* Brongn Pocaeae	Cekrek/ kamal bel ek	EM	Root	Sold for income; decoction of root is taken orally to treat body aches.	10
63	*Loranthus cochinchinensis* Lour. Loranthaceae	Dedalu api	M	Stem, Whole plant	Decoction of stem is taken orally to treat hypertension; immersion of the whole plant with other herb is used as bath to treat fever.	8
64	*Luffa acutangula* (L.) Roxb. Cucurbitaceae	Petola	F	Fruit	Eaten cooked.	7
65	*Lygodium circinnatum* (Burm.) Sw. Schizaeaceae	Akar ribu	MHU	Leaf	Pounded leaves are applied topically with cold powder to treat shingles; bracelet making; tying lids of blowpipe casing.	13
66	*Manihot carthaginensis* (Jacq.) Mull. Arg Euphorbiaceae	Ubi tahun	F	Tuber	Eaten cooked.	3
67	*Manihot esculenta* Crantz Euphorbiaceae	Ubi kayu/ putih	F	Tuber	Eaten cooked.	6
68	*Mikania micrantha* Kunth ex H.B.K. Asteraceae	Selapok tunggul	EM	Whole plant	Sold for income; decoction of the whole plant is used as bath to treat rashes; pounded the whole plant is applied topically to treat cuts.	14
69	*Mitragyna speciosa* Korth Rubiaceae	Ketum	M	Leaf	Decoction of leaves is taken orally to treat diarrhea.	20
70	*Musa acuminata* Colla (AA Group) Musaceae	Pisang Emas	FM	Fruit, Latex	Eaten raw; latex from frond is applied on mother‘s nipples to treat ulcer for babies.	12
71	*Neodissochaeta gracilis* (Jack.) Bakh. Melastomataceae	Cetliot	M	Leave	Mixture of burnt leaves and oil is applied topically to treat scalds.	8
72	*Oncospermum horridum*	Umbut bayah	EF	Shoot	Sold for income; eaten cooked.	14

	(Griff.) Scheff. Arecaceae					
73	*Oroxylum indicum* (L.) Kurz Bignoniaceae	Bekah	M	Bark	Washed bark is taken orally to treat nausea and vomiting.	1
74	*Pandanus atrocarpus* Griff. Pandanaceae	Mengkuang	EHU	Leaf	Sold for income (making floor mats and handicraft)	3
75	*Pangium edule* Reinw. Flacourtiaceae	Kepayang	M	Fruit	Burnt twigs are sucked orally to treat sinus.	13
76	*Parameria barbata* (Blume) K.Schum. Apocynaceae	Akar putih	M	Root	Decoction of root is taken orally by women to prevent pregnancy.	3
77	*Parkia speciosa* Hassk. Fabaceae	Petai	EF	Fruit	Sold for income; eaten cooked.	12
78	*Peliosanthes lurida* Ridl. Peliosantheae	Lemba seratus/ alugheh	EM	Root	Sold for income; decoction of root is taken orally to treat body aches and flatulence.	9
79	*Peliosanthes violacea* Wall. Peliosantheae	Rambu suntum	EM	Root	Sold for income; decoction of root is taken orally to treat veins aches.	13
80	*Pentaphragma begoniaefolium* Wall. Pentaphragmataceae	Sil/supsil/sup baun	F	Leaf	Eaten as salad.	13
81	*Piper caninum* Blume Piperaceae	Lada bukit	FM	Fruit, bark	Cooking ingredient to tenderize meat and bone; pounded fruit is applied topically for baby navel care; decoction of bark is taken orally to treat gout.	14
82	*Piper pedocellosum* Wall. Piperaceae	Sirih bukit/cawit	F	Leaf	Chewed raw with bettle nut (pinang).	14
83	*Pithecellobium bubalinium* Benth. Fabaceae	Kerdas	EF	Fruit	Sold for income; eaten raw.	3
84	*Platycerium bifurcatum* (Cav.) C. Chr. Polypodiaceae	Tanduk rusa	M	Tuber	Immersion of tuber with other herb used as bath to treat fever.	2

85	*Pleocnemia irregularis* (Presl.) Holtt. Dryopteridaceae	Pucuk Paku Kelah	F	leaf	Eaten as salad.	3
86	*Ploiarium alternifolium* (Vahl) Melch. Theaceae	Riang det	F	Fruit	Eaten raw.	13
87	*Polygonum minus* Huds. Polygonaceae	Kesum	F	Leaf	Cooking ingredient.	3
88	*Prunus arborea* (Bl.) Kalkman. Rosaceae	Sekentut	F	Leaf	Cooking ingredient.	11
89	*Psychotria montana* Bl Rubiaceae	Sembelit bukit	F	Leaf	Leaves eaten cooked.	12
90	*Rhopaloblaste singaporensis* (Becc.) Moore Arecaceae	Atap cucuh	EU	Leaf	Roofing.	14
91	*Saccharum officinarum* L. Poaceae	Tebu	F	Stem	Eaten raw.	5
92	*Salaca glabrescens* Griff. Arecaceae	Salak	F	Fruit	Eaten raw.	6
93	*Sandoricum koetjape* Merr. Meliaceae	Setoi	F	Fruit	Eaten raw.	1
94	*Saraca indica* L. Fabaceae	Kapih/ manang	F	Leaf	Young leaves are eaten as salad.	7
95	*Scorodocarpus borneensis* Becc. Olacaceae	Kulim	EM	Root	Sold for income; decoction of root is taken orally to treat hemorrhoids.	12
96	*Smilax calophylla* Wall. Smilaceae	Alek Tembaga	EM	Root	Sold for income; decoction of root is taken orally by men for sexual vitality.	5
97	*Smilax myosotiflora* A. DC. Smilaceae	Ubi jaga	EF	Tuber	Sold for income; eaten cooked	14
98	*Solanum melongena* L. Solanaceae	Terung	F	Fruit	Eaten cooked.	6

99	*Spilanthes paniculata* Wall. Ex Dc Asteraceae	Cengkih bukit/ladak	M	Flower	Flower is taken orally with "sireh" and bettle nut to prevent pregnancy.	12
100	*Stenochlaena palustris* (Burm. f.) Bedd. Blechnaceae	Umbut meding	F	Shoots	Eaten cooked.	9
101	*Styrax benzoin* Dryand Styracaceae	Kemenyan	EB	Latex	Latex is burnt during funerals.	13
102	*Tectaria angulata* (Willd.) Copel Dryopteridaceae	Paku bukit/ubat lelah	EM	Root	Sold for income; decoction of root is taken orally to treat asthma.	16
103	*Tetracera macrophylla* Wall. Dilleniaceae	Plus/ memplas/ tenohol	F	Trunk	Exudate obtained from trunk is used as drink.	12
104	*Thottea grandiflora* Rottb. Aristolochiaceae	Pedu beruang	M	Root	Decoction of root is taken orally to treat asthma.	3
105	*Timonius wallichianus* (Korth.) Val. Rubiaceae	Patah bawah tangga	EM	Root	Sold for income; decoction of root mixed with another herb is taken orally to treat low sexual energy for man.	17
106	*Vigna unguiculata sesquipedalis* (L.) Verdc. Fabaceae	Kacang panjang	F	Fruit	Eaten cooked.	14
107	*Zingiber zerumbet* (L.) Roscoe ex Sm. Zingiberaceae	Gelam	FM	Rhizome, Latex	Rhizomes are eaten cooked; latex is applied at mother's nipples to treat ulcer for babies.	13

*Uses: E; economic/income sources, F; food, O; Ornamental, M; Medicinal, H; Handicraft, U; Utensil, B; Belief and P; Poison

Table 4.3 Main groups and the number of species for each family.

No.	Main group	Order	Family	Number of species
1		Cycadales	Cycadaceae	1
2		Ophioglossales	Ophioglossaceae	1
3			Blechnaceae	1
4			Dryopteridaceae	2
5		Polypodiales	Davalliaceae	1
6	Pteridophyta		Polypodiaceae	1
7			Schizaeaceae	1
8			Woodsiaceae	1
9		Polyporales	Polyporaceae	1
10			Ganodermataceae	1
		Number of species		**11**
11		Alismatales	Araceae	3
12		Asparagales	Asparagaceae	2
13			Peliosantheae	2
14		Commelinales	Bromeliaceae	1
15			Hanguanaceae	1
16		Dioscoreales	Dioscoreaceae	1
17		Geraniales	Orchidaceae	1
18		Glumiflorae	Graminae	1
19	Monocotyledonaea		Poaceae	1
20			Amaryllidaceae	1
21		Liliflorae	Liliaceae	2
22			Smilaceae	2
23		Pandanales	Pandanaceae	2
24			Marantaceae	1
25		Zingiberales	Musaceae	3
26			Zingiberaceae	8
27		Orchidales	Orchidaceae	1
		Number of species		**33**
28		Apiales	Apiaceae	1
29	Dicotyledonaea	Asterales	Asteraceae	4
30			Pentaphragmataceae	1
31		Caryophyllales	Amaranthaceae	2

32		Ancistrocladaceae	1
33		Nyctaginaceae	1
34		Polygonaceae	1
35	Cucurbitales	Anisophylleaceae	1
36	Ericales	Styracaceae	1
37	Gentianales	Apocynaceae	6
38	Geraniales	Euphorbiaceae	11
39		Meliaceae	4
40		Oxalidaceae	1
41		Rutaceae	3
42		Simaroubaceae	1
43	Guttiferales	Dilleniaceae	2
44		Theaceae	1
45	Hypericales	Flacourtiaceae	2
46	Malvales	Bombacaceae	2
47		Malvaceae	3
48	Malpighiales	Passifloraceae	2
49	Myrtales	Barringtoniaceae	1
50		Lythraceae	1
51		Myrtaceae	2
52		Melastomataceae	2
53		Thymelaeaceae	1
54	Lamiales	Lamiaceae	1
55		Oleaceae	1
56		Acanthaceae	1
57	Opiliales	Loranthaceae	1
58	Oxalidales	Connaraceae	1
59	Passiflorales	Begoniaceae	2
60		Bixaceae	1
61		Cucurbitaceae	4
62		Caricaceae	1
63	Piperales	Piperaceae	3
64		Aristolochiaceae	1
65	Primulales	Myrsinaceae	1
66		Primulaceae	1
67	Ranales	Lauraceae	2

68		Menispermaceae	1
69	Rosales	Crassulaceae	1
70		Fabaceae	8
71		Rosaceae	1
72	Rubiales	Rubiaceae	8
73	Santalales	Oleaceae	1
74		Opiliaceae	1
75	Sapindales	Burseraceae	1
76		Arecaceae	11
77		Sapindaceae	4
78	Tubiflorae	Bignoniaceae	1
79		Convolvulaceae	2
80		Solanaceae	2
81	Urticales	Moraceae	4
82	Vitales	Vitaceae	1
Number of species			**131**

4.3 Characterization of plant resource used by the Orang Asli at Lubuk Ulu Legong

4.3.1 Plant uses

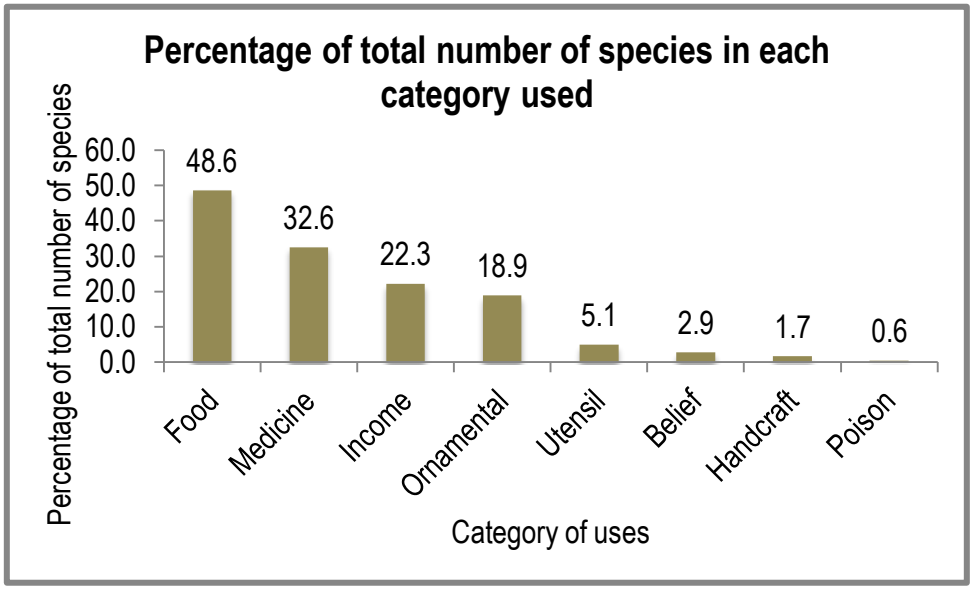
Villagers of Kampung Orang Asli Lubuk Ulu Legong use plants for food, income, medicine, ornamental, handicraft, utensil, belief rituals and poison. 29.7% (52 species) of the total number of plants has diverse uses and 70.3% (123 species) has one use only. There are overlaps between categories of uses of plant species useful to the villagers at Kampung Orang Asli Lubuk Ulu Legong (Table 4.1). Only category poison has no overlaps and is represented by one species.

In term of number of species, the most represented category of uses of plant resources among the Orang Asli at Kampung Lubuk Ulu Legong is food or drink category (84 species). This is followed by medicine (57 species), income source (39 species), ornamental (33 species), utensil (10 species), belief (5 species), handcraft (3 species) and as

fish poison (1 species). Graph 4.1 shows percentage ofthe total number of species in each category of uses.

Table 4.4 Number of species of plants for each category that are used by the Orang Asli at Kampung Lubuk Ulu Legong.

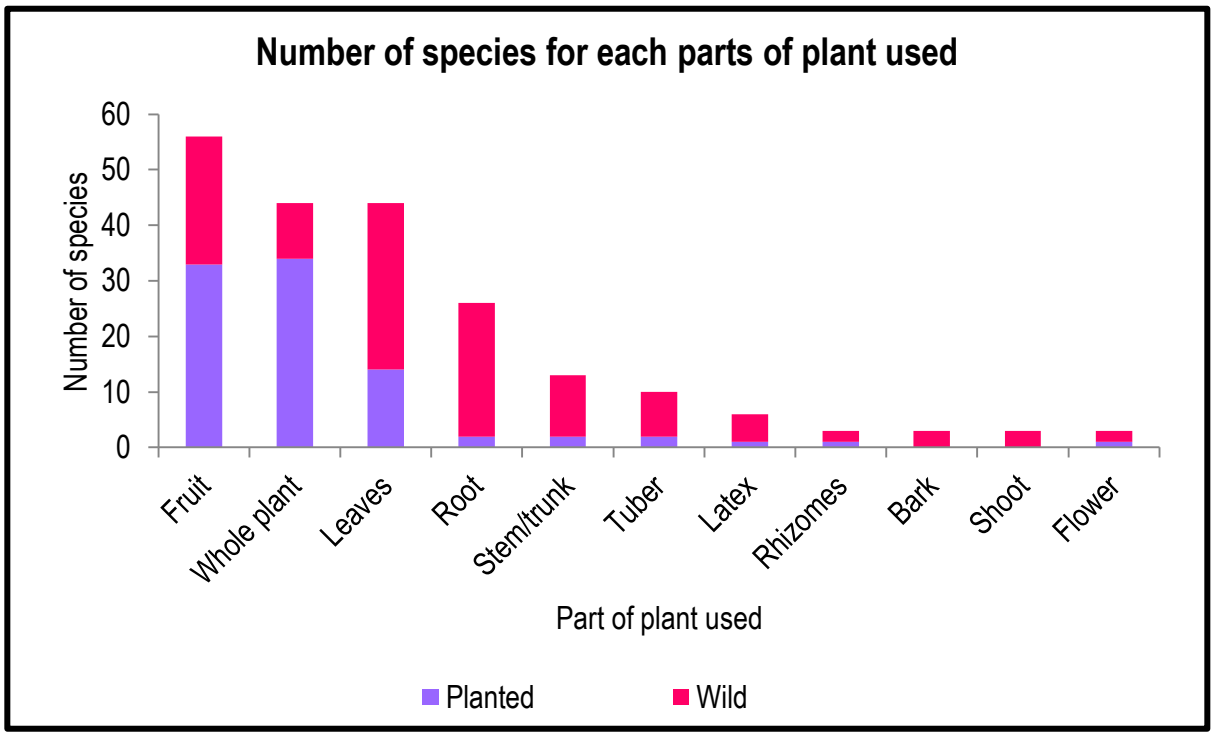
Categories of use	**No. of species**
Food or drink only	59
Food or drink + Medicine	13
Food or drink + Income	9
Food or drink + Medicine + Income	2
Food or drink + Income + Utensil	1
Ornamental only	31
Ornamental + Medicine	2
Medicine only	21
Medicine + Income	17
Medicine + Belief	1
Utensil only	5
Utensil + Handicraft + Medicine	1
Income only	4
Income + Utensil	2
Income + Belief	2
Income + Handicraft	1
Income + Handicraft + Utensil	1
Belief only	2
Poison only	1
Total	**175**



Graph 4.1 The percentage of total number of species in each category of uses.

4.3.2 Part of plant used

The most frequently utilized plant part in term of number of species was fruit followed by the whole, leaves, root, trunk or stem tuber, latex, rhizomes, bark, shoot and flower. Graph 4.2 shows the number of the species for each part of plant used by the Orang Asli at Kampung Lubuk Ulu Legong. Based on the graph, the most frequently used plant part of the planted plant was the whole plant while for the wild plant was the leaves.



Graph 4.2 Number of species and the parts of plant used.

4.3.3 Planting status of plant

Exclusively wild plants, which are gathered from the surrounding forest, comprised of 52.0% (91 species) of the total number of plant species used by the villagers of Kampung Orang Asli Lubuk Ulu Legong. Exclusively planted plant was only 38.9% (68 species). 9.1% (16 species) of the total number of species of plants both planted and wild plants. The breakdown of the plant species according their planting status is shown in Figure 4.1. Graph 4.3 shows the number of species in each category of uses and their planting status. Based on the graph, seven of eight categories of uses involve wild plant species. While planted plants are present in four categories of uses and plants which were obtained from both the wild and planted species only present in three types of uses.

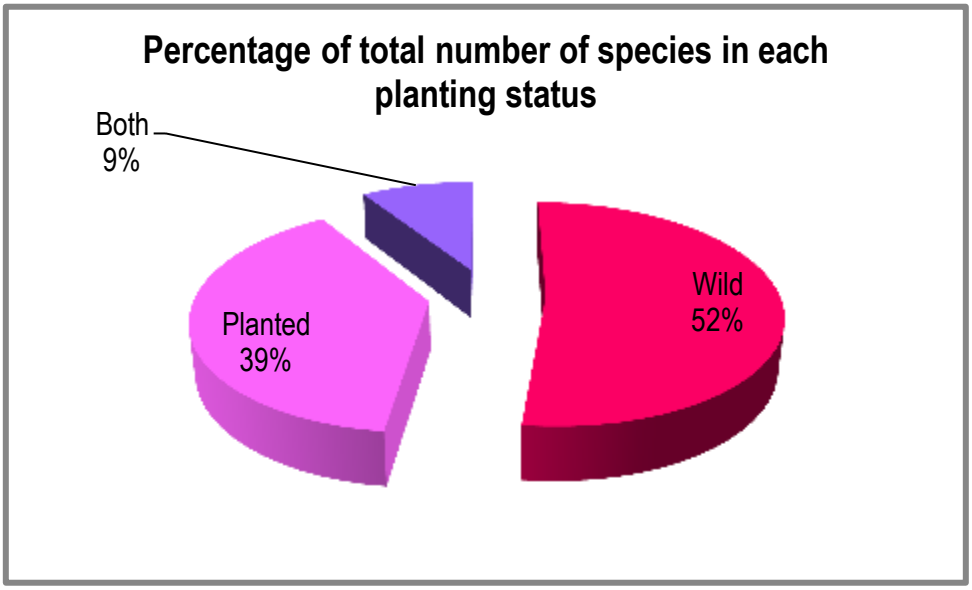
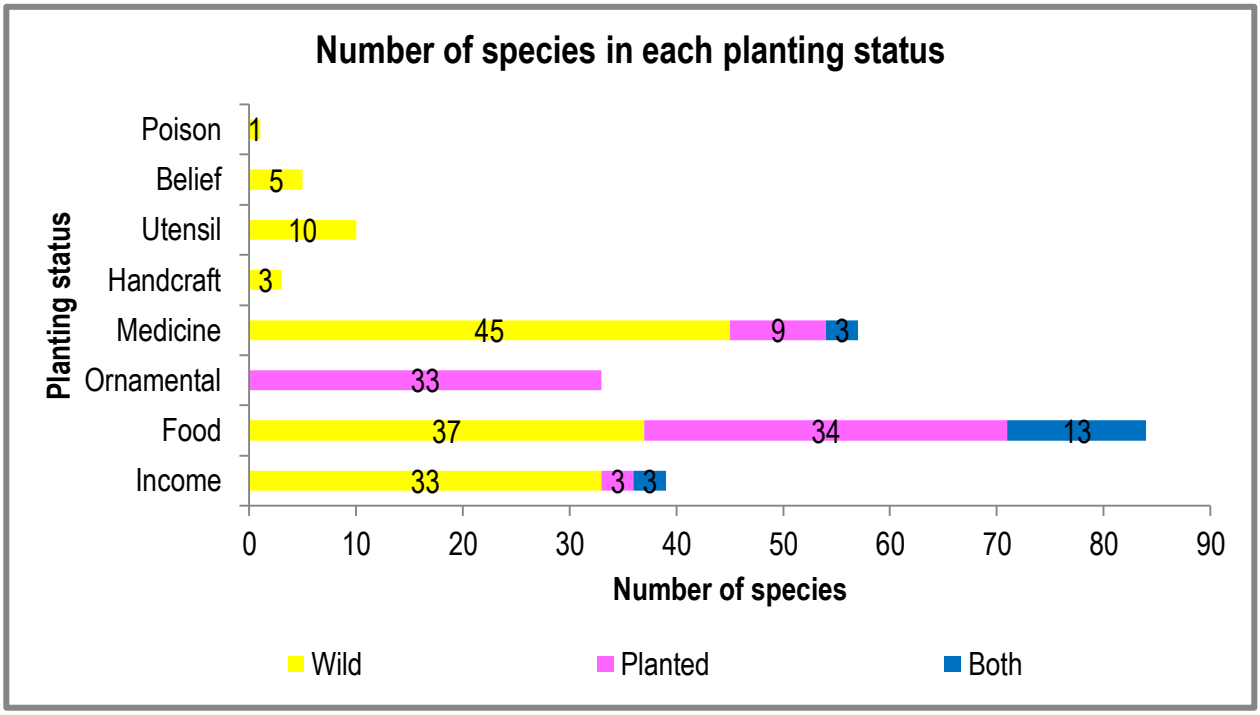


Figure 4.1 Percentage of the total number of species in each planting status.



Graph 4.3 The number of species in each category of uses and their planting status.

4.3.4 Use- Value index

This index measures the significance attributed to the resource by local the people (Martin, 1995). Major uses were given an arbitrary value of 1.0 and minor uses a value of 0.3. The summing of the use-values for all uses for a species thus indicates its relative importance to the villagers at Kampung Orang Asli Lubuk Ulu Legong.

4.3.4.1 Use-value of species

Table 4.5 shows the result of the use-value for each species. The highest use-value is 2.7 for the species *Nephelium lappaceum* L. and *Chasalia chartacea* Craib. Followed by *Bambusa ventricosa* McClure with the UV of 2.4 and 1.9 for 18 other species as listed in the table. The lowest UV recorded is 0.3 for the species *Dioscorea pyrifolia* Kunth.

Table 4.5 The number of species and species use-value.

Species	Number of species	Use-Value (UV)
Chasalia chartacea Craib., *Nephelium lappaceum* L.	2	2.7
Bambusa ventricosa McClure	1	2.4
Areca catechu L., *Carica papaya* L., *Centella asiatica* (Linn.) Urban, *Champereia manillana* (Bl.) Merr., *Durio zibethinus* Murray, *Elateriospermum tapos* Bl., *Etlingera elatior* (Jack) Smith, *Lasia spinosa* Thwaites, *Lygodium circinnatum* (Burm.) Sw., *Musa acuminata* Colla (AA Group), *Musa sapientum* L., *Neodissochaeta gracilis* (Jack.) Bakh., *Oroxylum indicum* (L.) Kurz, *Pangium edule* Reinw., *Parameria barbata* (Blume) K.Schum., *Piper caninum* Blume, *Psidium guajava* L., *Zingiber zerumbet* (L.) Roscoe ex Sm.	18	1.9
Archidendron jiringa (Jack) I.C. Nielsen, *Cymbopogon citratus* (DC.) Stapf, *Diplazium esculentum* (Retz.) Sw., *Ipomoea batatas* (L.) Poir, *Musa acuminata* Colla (AAA Group), *Oncospermum horridum* (Griff.) Scheff., *Pandanus atrocarpus* Griff., *Parkia speciosa* Hassk., *Pithecellobium bubalinium* Benth., *Smilax myosotiflora* A. DC.	10	1.8
Aquilaria malaccensis Lamk., *Arachnis flosaeris* (L.) Rchb.f., *Ardisia crispa* (Thunb.) DC, *Barringtonia acutangula* (L.) Gaertn., *Centratherum punctatum* Cass., *Cinnamomum culilawan* Bl, *Cinnamomum iners* Reinw. ex Blume, *Cnestis ramiflora* Griff.,	21	1.7

Dysoxylum alliaceum (Bl.) Bl., *Eurycoma longifolia* Jack, *Freycinetia javanica* Bl., *Labisia pumila* (Blume) Mez, *Lignosus rhinocerus* (Cooke) Ryvarden, *Lophatherum gracile* Brongn, *Mikania micrantha* Kunth ex H.B.K., *Peliosanthes lurida* Ridl., *Peliosanthes violacea* Wall., *Scorodocarpus borneensis* Becc., *Smilax calophylla* Wall., *Tectaria angulata* (Willd.) Copel, *Timonius wallichianus* (Korth.) Val.		
Hibiscus rosa-sinensis L., *Kalanchoe pinnata (Lam.) Pers.*	2	1.6
Eugeissona tristis Griff., *Fibraurea cloroleuca* Miers., *Rhopaloblaste singaporensis* (Becc.) Moore	3	1.4
Hanguana malayana (Jack) Merr., *Styrax benzoin* Dryand	2	1.3
Daemonorops didymophylla Becc.	1	1.2
Alpinia galanga (L.) Willd, *Amaranthus giganticus* L., *Ananas comosus* (L.) Merr., *Anisophyllea disticha* (Jack) Baill., *Artocarpus elasticus* Reinw. ex Blume, *Artocarpus heterophyllus* Lamk., *Artocarpus integer* (Thunb.) Merr., *Averrhoa carambola* L., *Bauhinia bidentata* Jack, *Begonia pseudisoptera* Irmscher, *Begonia tricornis* Ridl., *Benincasa hispida (*Thunb.) Cogn., *Canarium rufum* Benn., *Capsicum frutescens* L., *Citrus aurantifolia* (Christm and Panzer) Swing., *Citrus microcarpa* Bunge, *Claoxylon longifolium* (Blume) Endl. Ex Hassk, *Cocus nucifera* L., *Coffea arabica* L.,*Cosmos caudatus* Kunth, *Cucumis sativus* L., *Cucurbita moschata* (Duch. & Lam.) Duch. & Poir, *Cyrtosstachys renda* Blume, *Davallia solida* (Forst.) Sw., *Dimocarpus longan malesianus* Leenh, *Eugenia aquea* Burm., *Ficus variegata* Blume, *Flacourtia inermis* Roxb., *Grewia paniculata* Roxb., *Homalomena pendula* (Bl.) Bakh., *Inocarpus edulis* Forst., *Ipomoea aquatica* Forsk., *Lansium domesticum* Correa, *Lansium domesticum* Jack, *Lepisanthes fruticosa* (Roxb.) Leenh. Blumea, *Licuala sapinosa* Roxb., *Luffa acutangula* (L.) Roxb., *Mangifera indica* L., *Mangifera macrocarpa* Blume, *Manihot carthaginensis* (Jacq.) Mull. Arg, *Manihot esculenta* Crantz, *Murraya koenigii* (L.) Sprengel, *Pentaphragma begoniaefolium* Wall., *Phrynium capitatum* Willd., *Piper betle* L., *Piper pedocellosum* Wall., *Pleocnemia irregularis* (Presl.) Holtt., *Ploiarium alternifolium* (Vahl) Melch., *Polygonum minus* Huds., *Prunus arborea* (Bl.) Kalkman., *Psychotria montana* Bl, *Saccharum officinarum* L., *Salaca glabrescens* Griff., *Sandoricum koetjape* Merr., *Saraca indica* L., *Solanum melongena* L., *Stenochlaena palustris* (Burm. f.) Bedd., *Tamarindus indica* L., *Tetracera macrophylla* Wall., *Vigna unguiculata sesquipedalis* (L.) Verdc.	60	1.0
Acrotrema costatum Jack., *Ancistrocladus tectorius* (Lour.) Merr., *Argostemma pictum* Wall., *Costus speciosus* (Koenig.) Smith, *Curcuma xanthorrhiza* Roxb., *Eupatorium odoratum* L., *Gmelina asiatica* L., *Guioa pubescens* (Zoll. & Mor.) Radlk., *Hedychium longicornutum* Baker, *Helmintostachys zeylanica* (L) Hook., *Lawsonia inermis* (L.) Pers., *Leea indica* (Burm.f.) Merr.,	17	0.9

L*oranthus cochinchinensis* Lour., *Mitragyna speciosa* Korth, *Platycerium bifurcatum* (Cav.) C. Chr., *Spilanthes paniculata* Wall. Ex Dc, *Thottea grandiflora* Rottb.		
Calamus conirostris Becc, *Ganoderma lucidum* (Curtis) P. Karst, *Hevea brasiliensis* Muell. Arg.	3	0.8
Agave augustifolia Haw., *Allamanda cathartica* L., *Aloe barbadensis* Mill., *Bougainvillea spectabilis* Comm. ex Juss., *Caladium humboldtii* (Raf.) Schott, *Celosia argentea var cristata* Kuntze, *Codiaeum variegatum* (L.) Blume, *Crinum asiaticum* L., *Euphorbia milii* Desmoul., *Jasminum sambac* (L.) Aiton	10	0.7
Calamus manan Miq., *Ceiba pentandra (*L.) Gaertn., *Dracontomelum mangifera* Bl., *Dyera costulata* Hk. F.	4	0.6
Elettariopsis curtisii Baker ex Hook. F., *Elettariopsis triloba* (Gagnep.)Loes.	2	0.5
Dioscorea pyrifolia Kunth.	1	0.3

4.3.4.2 Plant species with high use-value

Table 4.6 shows the list of species with a high use-value and widely used (N) among the Orang Asli at Kampung Lubuk Ulu Legong. The species with the highest N value is *Bambusa ventricosa* McClure. Followed by *Cymbopogon citratus* (DC.) Stapf., *Nephelium lappaceum* L. , *Musa acuminata* Colla (AAA Group) and *Diplazium esculentum* (Retz.) Sw. These species recorded with values over 30. The lowest N value is by *Euphorbia phillipsioides* S.Carter (0.7).

Table 4.6 Plant species used with N value of more than 20.

No.	Local name	Uses	UV	R	N
1	*Bambusa ventricosa* McClure	EFU	2.4	17	40.8
2	*Cymbopogon citratus* (DC.) Stapf.	EF	1.8	21	37.8
3	*Nephelium lappaceum* L.	EFM	2.7	14	37.8
4	*Musa acuminata* Colla (AAA Group)	EF	1.8	19	34.2
5	*Diplazium esculentum* (Retz.) Sw.	EF	1.8	17	30.6
6	*Eurycoma longifolia* Jack	EM	1.7	17	28.9
7	*Timonius wallichianus* (Korth.) Val.	EM	1.7	17	28.9

8	*Tectaria angulata* (Willd.) Copel	EM	1.7	16	27.2
9	*Piper caninum* Blume	FM	1.9	14	26.6
10	*Labisia pumila* (Blume) Mez	EM	1.7	15	25.5
11	*Oncospermum horridum* (Griff.) Scheff.	EF	1.8	14	25.2
12	*Smilax myosotiflora* A. DC.	EF	1.8	14	25.2
13	*Elateriospermum tapos* Bl.	FM	1.9	13	24.7
14	*Lasia spinosa* Thwaites	FM	1.9	13	24.7
15	*Lygodium circinnatum* (Burm.) Sw.	MHU	1.9	13	24.7
16	*Pangium edule* Reinw.	FM	1.9	13	24.7
17	*Zingiber zerumbet* (L.) Roscoe ex Sm.	FM	1.9	13	24.7
18	*Chasalia chartacea* Craib.	EFM	2.7	9	24.3
19	*Cinnamomum iners* Reinw. ex Blume	EM	1.7	14	23.8
20	*Cnestis ramiflora* Griff.	EM	1.7	14	23.8
21	*Dysoxylum alliaceum* (Bl.)Bl.	EM	1.7	14	23.8
22	*Freycinetia javanica* Bl.	EM	1.7	14	23.8
23	*Lignosus rhinocerus* (Cooke) Ryvarden	EM	1.7	14	23.8
24	*Mikania micrantha* Kunth ex H.B.K.	EM	1.7	14	23.8
25	*Centella asiatica* (Linn.) Urban	FM	1.9	12	22.8
26	*Musa acuminata* Colla (AA Group)	FM	1.9	12	22.8
27	*Dracontomelum mangifera* Bl.	U	1.6	14	22.4
28	*Peliosanthes violacea* Wall.	EM	1.7	13	22.1
29	*Parkia speciosa* Hassk.	EF	1.8	12	21.6
30	*Ardisia crispa* (Thunb.) DC	EM	1.7	12	20.4
31	*Barringtonia acutangula* (L.) Gaertn.	EM	1.7	12	20.4
32	*Scorodocarpus borneensis* Becc.	EM	1.7	12	20.4

*UV; Use-Value, R; Number of responden, N; widely used value

4.3.5 Medicinal Importance value index

A total of 57 species of plants were identified by Orang Asli informants at Kampung Lubuk Ulu Legong as medicinal plants. Table 4.7 shows the list of all medicinal species utilized among this community, status of plant, part used, method of preparations, ailments and their Medicinal ImportanceValue Index (Iv). These 57 species were found to treat 40 ailments, 18 species were used to treat more than one disease and the remaining 39 species were used to treat only one disease each.

The most commonly used medicinal plant part was the root (25 species), followed by leaves (10 species), fruit (7 species), whole plant (6 species), stem (4 species), tuber, latex (each with 3 species) and bark (2 species). The other plant parts used were flower and rhizomes each with one species. Figure 4.2 shows the percentage of medicinal plant species for each part used in the preparation of medicine.

The common methods of preparing herbal medicine are decoction (63.8%), followed by pounded or mashed (24.1%), burned (6.9%) and other method (5.2%) such as incantation, shredded, eaten raw or grounded. Figure 4.3 shows the percentage of methods used in preparation of medicine by the Orang Asli at Kampung Lubuk Ulu Legong. More herbal medicine was taken orally (59%) compared to topical usage (41%).

Based on Table 4.6, five species with the highest Medicinal Importance value (Iv) is *Cinnamomum iners* Reinw. ex Blume (5.6), followed by *Lignosus rhinocerus* (Cooke) Ryvarden (4.2), *Ardisia crispa* (Thunb.) DC (3.6), *Centella asiatica* (Linn.) Urban (3.6) and *Eurycoma longifolia* Jack (3.4). The lowest Iv recorded is 0.1 for *Etlingera elatior* (Jack) Smith and *Oroxylum indicum* (L.) Kurz. Graph 4.4 shows the Iv of species with values over 2.0.

Table 4.7 Medicinal plant species and Medicinal Important Value Index (Iv)

No	Species/Family	Status	Number of medicinal uses	Ailments treated	Iv_s
1	*Acrotrema costatum* Jack. Dilleniaceae	W	1	Bloody stool.	1.2
2	*Ancistrocladus tectorius* (Lour.) Merr. Ancistrocladaceae	W	1	Sinus	0.8
3	*Ardisia crispa* (Thunb.) DC Myrsinaceae	W	3	Body aches Hemorrhoids Bloody defecate	3.6
4	*Areca catechu* L. Arecaceae	P	1	Fever	0.5
5	*Argostemma pictum* Wall. Rubiaceae	W	1	Pneumonia	1.1
6	*Barringtonia acutangula* (L.) Gaertn. Barringtoniaceae	W	3	Family planning Postnatal Blood circulation	2.6
7	*Carica papaya* L. Caricaceae	P	1	Cough	0.8
8	*Centella asiatica* (Linn.) Urban Apiaceae	W	3	Asphyxiate Cough Phlegm	3.6
9	*Champereia manillana* (Bl.) Merr. Opiliaceae	W	1	To increase the fertility.	0.9
10	*Chasalia chartacea* Craib. Rubiaceae	W	1	Joint pain.	0.9
11	*Cinnamomum iners* Reinw. ex Blume Lauraceae	W	4	Postnatal Hypertension Sinus Abortion.	5.6
12	*Cnestis ramiflora* Griff. Connaraceae	W	1	Diabetes	1.4
13	*Costus speciosus* (Koenig.) Smith	W	1	Cuts and wounds.	1.2

	Zingiberaceae				
14	*Curcuma xanthorrhiza* Roxb. Zingiberaceae	W	1	Delay the aging	1.1
15	*Durio zibethinus* Murray Bombacaceae	P	2	Fever Influenza.	2
16	*Dysoxylum alliaceum* (Bl.) Bl. Meliaceae	W	1	Postnatal	1.4
17	*Elateriospermum tapos* Bl. Euphorbiaceae	W	1	Toothaches	1.3
18	*Etlingera elatior* (Jack) Smith Zingiberaceae	B	1	Body aches	0.1
19	*Eupatorium odoratum* L. Asteraceae	W	1	Cuts and wounds.	1.7
20	*Eurycoma longifolia* Jack Simaroubaceae	W	2	Hypertension Low sexual energy.	3.4
21	*Fibraurea cloroleuca* Miers. Menispermaceae	W	1	Jaundice	0.9
22	*Freycinetia javanica* Bl. Pandanaceae	W	1	Back pain.	1.4
23	*Gmelina asiatica* L. Lamiaceae	W	1	Cough	1.3
24	*Guioa pubescens* (Zoll. & Mor.) Radlk. Sapindaceae	B	3	Fever Influenza Headache	0.9
25	*Hedychium longicornutum* Baker Zingiberaceae	B	1	Worms	1.3
26	*Helmintostachys zeylanica* (L) Hook. Ophioglossaceae	W	2	Postnatal Diabetes	0.6
27	*Hibiscus rosa-sinensis* L. Malvaceae	P	2	Fever Influenza	2
28	*Kalanchoe pinnata* (Lam.) Pers. Crassulaceae	P	1	Headache	0.5
29	*Labisia pumila* (Blume) Mez Primulaceae	W	2	Postnatal Increase energy	0.3

30	*Lasia spinosa* Thwaites Araceae	W	1	Diabetes	1.3
31	*Lawsonia inermis* (L.) Pers. Lythraceae	P	2	Cuts and wound Kidney stones.	1
32	*Leea indica* (Burm.f.) Merr. Vitaceae	W	1	Diabetes	0.4
33	*Lignosus rhinocerus* (Cooke) Ryvarden Polyporaceae	W	3	Asthma Increase energy Breast cancer	4.2
34	*Lophatherum gracile* Brongn Graminae	W	1	Body aches	1
35	L*oranthus cochinchinensis* Lour. Loranthaceae	W	2	Hypertension Fever	1.6
36	*Lygodium circinnatum* (Burm.) Sw. Schizaeaceae	W	1	Shingles	1.3
37	*Mikania micrantha* Kunth ex H.B.K. Asteraceae	W	2	Rashes Cuts	2.8
38	*Mitragyna speciosa* Korth Rubiaceae	W	1	Diarrhea	2
39	*Musa acuminata* Colla (AA Group) Musaceae	W	1	Ulcer for baby	1.2
40	*Musa sapientum* L. Musaceae	P	2	Fever Headache	1.0
41	*Neodissochaeta gracilis* (Jack.) Bakh. Melastomataceae	W	1	Scalds	0.8
42	*Nephelium lappaceum* L. Sapindaceae	P	2	Fever Influenza	2.8
43	*Oroxylum indicum* (L.) Kurz Bignoniaceae	W	1	Nausea	0.1
44	*Pangium edule* Reinw. Flacourtiaceae	W	1	Sinus	1.3
45	*Parameria barbata* (Blume) K.Schum. Apocynaceae	W	1	Family planning.	0.3

46	*Peliosanthes lurida* Ridl. Peliosantheae	W	2	Body aches Flatulence	1.8
47	*Peliosanthes violacea* Wall. Peliosantheae	W	1	Veins aches	1.3
48	*Piper caninum* Blume Piperaceae	W	2	Navel care Gout	2.8
49	*Platycerium bifurcatum* (Cav.) C. Chr. Polypodiaceae	W	1	Fever	0.2
50	*Psidium guajava* L. Myrtaceae	P	1	Delay aging	0.5
51	*Scorodocarpus borneensis* Becc. Olacaceae	W	1	Hemorrhoids	1.2
52	*Smilax calophylla* Wall. Smilaceae	W	1	Low sexual energy for men	0.5
53	*Spilanthes paniculata* Wall. Ex Dc Asteraceae	W	1	Avoid a pregnant	1.2
54	*Tectaria angulata* (Willd.) Copel Dryopteridaceae	W	1	Asthma	1.6
55	*Thottea grandiflora* Rottb. Aristolochiaceae	W	1	Asthma	0.3
56	*Timonius wallichianus* (Korth.) Val. Rubiaceae	W	1	Low sexual energy for men.	0.7
57	*Zingiber zerumbet* (L.) Roscoe ex Sm. Zingiberaceae	W	1	Ulcer for baby	1.3

*W; wild, P; planted

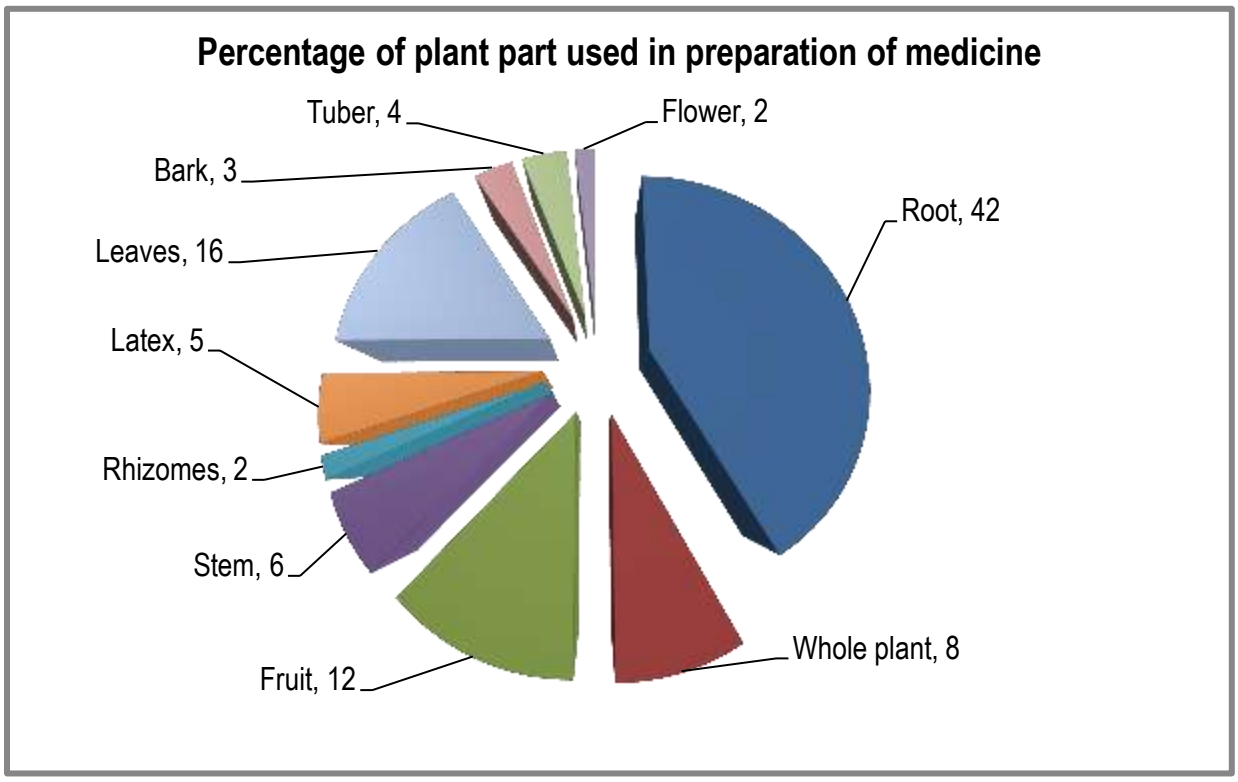
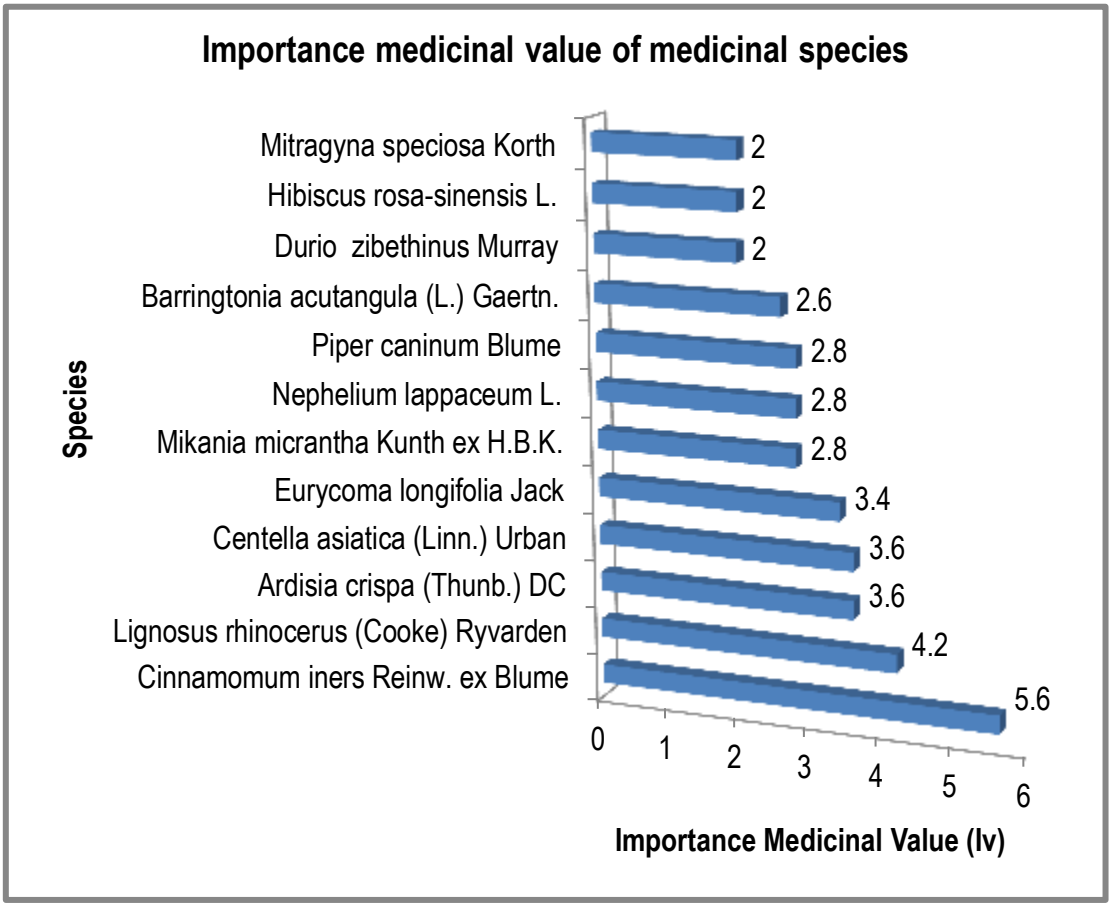


Figure 4.2 Percentage of plant part used in the preparation of medicine.



Graph 4.4 Species with importance medicinal value over 2.0.

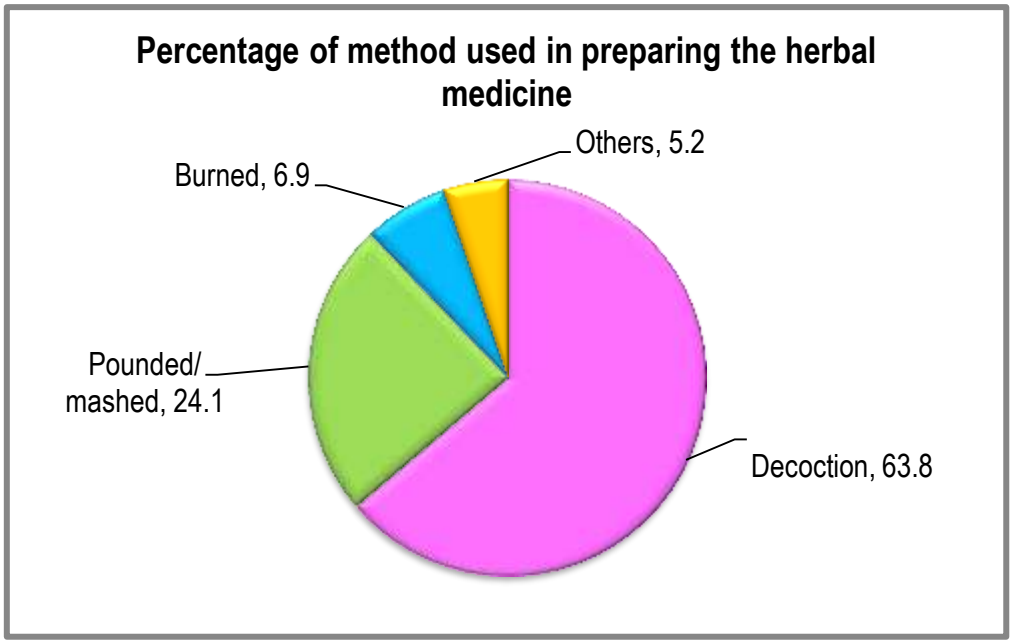


Figure 4.3 Percentage of types of method used in the preparation of medicine.

4.4 Economic valuation of plant resource used by the Orang Asli at Lubuk Ulu Legong

Plant resources that generate income for the villagers at Kampung Lubuk Ulu Legong are grouped into those that are;

i. those that are less often traded species, regularly sold plant species but based on buyers demand
ii. those that are seasonal
iii. those that are irregular in availability and
iv. Commercial crop

Incomes generated from all species were generally consistent among the interviewees. However, there are fluctuations of incomes generated from certain species. The fluctuations are caused by the amount of items that are available or can be gathered for sale. Hence, the average incomes obtained are used for these species.

Table 4.8 shows the list of plants which have commercial value among the Orang Asli at Kampung Lubuk Ulu Legong. These species have been valuated to get the total per year generated by this community. The three species of major income contributors in this community is *Hevea brasiliensis* Muell. Arg. (RM 270,000 /year), followed by *Aquilaria malaccensis* Lamk. (RM 14,300 /year) and *Calamus conirostris* Becc (RM 14,040 /year). Estimated total annual income from all species in Table 4.8 is RM 505,750 for the whole village.

Table 4.8 Species in economic valuation in Kampung Orang Asli Lubuk Ulu Legong.

No.	Species	Types of materials	Demand/ seasons	A Price (RM) (one sale)	B Frequencies of sale/ month	C Monthly estimation	D Frequencies of sales/year	d Months of seasons	R Informant	Total/year (RM)
1	*Aquilaria malaccensis* Lamk. kayu depoh/ gaharu	Trunk	Demand	550	-	-	2	-	13	14300
2	*Archidendron jiringa* (Jack) I.C. Nielsen Jering	Fruit	June	50	5	250	-	1	8	2000
3	*Ardisia crispa* (Thunb.) DC Gunlum	Whole plant	Demand	10	2	20	24	-	12	2880
4	*Bambusa ventricosa* McClure Buluh	Shoots	If available	20	-	-	25	-	17	8500
		Birdcage	Oct-Nov	15	3	45	-	2		1530
5	*Barringtonia acutangula* (L.) Gaertn. Gajah beranak/ham	Root	Demand	18	-	-	20	-	12	4320
6	*Calamus conirostris* Becc Rotan Krai/awei krai	Rattan	Demand	30	3	90	36	-	13	14040
7	*Chasalia chartacea* Craib. Makmoq	Root	Demand	15	4	60	48	-	9	6480
8	*Cinnamomum iners* Reinw. ex Blume Tajalawang	Root	Demand	15	4	60	48	-	14	10080
9	*Cnestis ramiflora* Griff. Asam jawa bukit	Root	Demand	15	4	60	48	-	14	10080
10	*Cymbopogon citratus*	Lemongras	If	10	-	-	20	-	21	4200

	(DC.) Stapf. Serai	s	available							
11	*Daemonorops didymophylla* Becc. Rotan	Rattan	Demand	25	-	-	12	-	9	2700
		Dart	Demand	70	-	-	5	-		3150
		Roofing	July, Aug	30	3	-	-	2		1620
12	*Diplazium esculentum* (Retz.) Sw. Pucuk paku	Young leaves	May, June	15	5	75	-	2	17	2550
13	*Dysoxylum alliaceum* (Bl.) Bl. Hatap selaya	Root	Demand	15	4	60	48	-	14	10080
14	*Eugeissona tristis* Griff. Bertam	Stem	Demand	50	-	-	10	-	12	6000
		Birdcage	Oct, Nov	15	4	60	-	2		1440
		Roofing	July, Aug	120	3	360	-	2		8640
15	*Eurycoma longifolia* Jack Tongkat ali	Root	Demand	25	3	75	36	-	17	15300
16	*Freycinetia javanica* Bl. Kelawit mantai	Root	Demand	15	3	45	36	-	14	7560
17	*Ganoderma lucidum* (Curtis) P. Karst Kulat senduk	Kulat	April, May	70	3	210	-	1	17	3570
18	*Hanguana malayana* (Jack) Merr. Lebek	Leaves	Demand	20	1	20	12	-	13	3120
19	*Hevea brasiliensis* Muell. Arg. Getah	Latex	Daily	300	5	1500	60	-	15	270000
20	*Ipomoea batatas* (L.) Poir Ubi keledek	Tuber	If available	20	-	-	7	-	5	700
21	*Labisia pumila* (Blume) Mez Kacip fatimah	Root	Demand	15	2	30	36	-	15	8100
22	*Lignosus rhinocerus* (Cooke) Ryvarden	Whole plant	Demand	90	-	-	1	-	10	600

	Susu rimau/tish am ong									
23	*Lophatherum gracile* Brongn Cekrek/kamal bel ek	Root	Demand	15	3	45	36	-	10	5400
24	*Mikania micrantha* Kunth ex H.B.K. Selapok tunggul	Whole plant	Demand	6	-	-	2	-	5	60
25	*Musa acuminata* Colla (AAA Group) Pisang abu	Fruit	If available	40	-	-	7	-	19	5320
26	*Nephelium lappaceum* L. Rambutan	Fruit	June, July, Aug	30	4	120	-	3	14	5040
27	*Oncospermum horridum* (Griff.) Scheff Umbut bayah.	Shoot	Demand	100	-	-	4	-	14	5600
28	*Pandanus atrocarpus* Griff. Mengkuang	Matting	Demand	25	-	-	6	-	3	450
29	*Parkia speciosa* Hassk. Petai	Fruit	Aug, Sept	30	5	150	-	2	12	3600
30	*Peliosanthes lurida* Ridl. Lemba seratus/alugheh	Root	Demand	15	4	60	48	-	9	6480
31	*Peliosanthes violacea* Wall. Rambu suntum	Root	Demand	25	2	50	24	-	13	7800
32	*Pithecellobium bubalinium* Benth. Kerdas	Fruit	July	50	4	200	-	1	3	600
33	*Rhopaloblaste singaporensis* (Becc.) Moore Atap cucuh	Roofing	Demand	70	-	-	7	-	14	6860
34	*Scorodocarpus borneensis* Becc.	Root	Demand	15	2	30	24	-	12	4320

	Kulim									
35	*Smilax calophylla* Wall. Alek Tembaga	Root	Demand	20	3	60	36	-	5	3600
36	*Smilax myosotiflora* A. DC. Ubi jaga	Tuber	If available	50	1	50	12	-	14	8400
37	*Styrax benzoin* Dryand Kemenyan	Latex	If available	50	-	-	4	-	13	2600
38	*Tectaria angulata* (Willd.) Copel Paku bukit/ubat lelah	Root	Demand	10	2	20	24	-	16	3840
39	*Timonius wallichianus* (Korth.) Val. Patah bawah tangga	Root	Demand	15	4	60	48	-	17	12240
				TOTAL						505750.00

CHAPTER 5

5.0 DISCUSSION

The total number of species recorded in this study is almost twice the number of plant species recorded by Norshahidatul (2010) (86 species) and Maksir (2009) (50 species) for Orang Asli villages in state of Selangor. The number of plant species in the present study is also more than those recorded by Kulip (2003) on Muruts, Sabah.

Most of the plants used by the Orang Asli in this study were angiosperms and followed by pteridophytes.

5.1 Home garden survey

The total number of home garden plant species recorded in this study is comparable to the total number of species for villages of Orang Asli in Negeri Sembilan as recorded by Milow *et al.* (2013). The total numbers of species recorded by them ranged from 72 to 106 species for a single village. Similarly, a study by Tynsong and Tiwari (2010) in five villages in India recorded an average of 89 plant species per home garden.

Most plant species in the home gardens belong to the family Euphorbiaceae. This is similar to the findings of Milow *et al.* (2013). However, Ramli (2012) indicate that many species in home gardens in Peninsular Malaysia belong to the family Leguminosae.

Cymbopogon citratus (DC.) was the most common among the species of plants recorded in this study. It was found in 21 homegardens and followed by *Durio zibethinus* Murray (19 home gardens), *Caladium humboldtii* (Raf.) (14 home gardens),

Capsicum frutescens L. (13 home gardens), *Bougainvillea spectabilis* Comm. ex Juss. and *Hibiscus rosa-sinensis* L. (10 home gardens each). Three species were each found in only one home garden. They were *Etlingera elatior* (Jack) Smith, *Euphorbia phillipsioides* S.Carter, and *Lepisanthes fruticosa* (Roxb.) Leenh. Blumea.

Four major uses of plants found in home gardens in Kampung Orang Asli Lubuk Ulu Legong are food, ornamental, medicinal and source income. In term of number of species, the home garden plants in this village were dominated by species of food plant followed by ornamental, medicinal and species used to earn their daily income. This pattern is similar to the previous study on thirteen home gardens in Pahang by Milow *et al.* (2010) and study on ten villages in Negeri Sembilan by Milow *et al.* (2013). From the total of home garden species recorded only 12 species identified have multiple uses while 72 species have one specific use for each species of plant cultivated in their home gardens.

5.2 Wild plant survey

Present study shows the total number of wild species used by the Orang Asli community in Kampung Lubuk Ulu Legong was more than another study recorded by Norshahidatul (2010) on Temuan tribe with a total of 65 species. The total number of species recorded in this present study is comparable with a study by Pohle and Reinhardt (2004) and another study by Prigge *et al.*(2005). Pohle and Reinhardt (2004) noted the total number of wild plant species used by the indigenous group in Ecuador is more than the present study with a total of 120 species while Prigge *et al.*(2005) noted 123 plant species used by the farmers in Philippines.

This study shows that most of the species of wild plants used by villagers at Kampung Lubuk Ulu Legong belong to the family Arecaceae. Prigge *et al.*(2005)

reported that most common plant family in an ethnobotanical survey the Philippines was Euphorbiaceae.

Interviews with villagers at Kampung Lubuk Ulu Legong show that the most commonly used wild plant species by the villagers is *Mitragyna speciosa* Korth. It was quoted by 20 of 38 respondents. The second most quoted species (17 respondents) were *Diplazium esculentum* (Retz.) Sw., *Eurycoma longifolia* Jack, *Timonius wallichianus* (Korth.) Val. this was then followed by *Tectaria angulata* (Willd.) Copel which was quoted by 16 respondents.

There are seven categories of uses of wild plant in this study. The categories of plant use arranged according to their number of species from the highest to the lowest number, were food (52 species), followed by medicinal species (49 species), economic value species (36 species), and utensil (9 species). The number of species used for belief, handcraft making, and poison were 5, 3 and 1 respectively. This pattern is similar to a study by Pohle and Reinhardt (2004) in Ecuador. However, Prigge *et al.* (2005) noted in their study, the most common wild plant used are medicinal species and followed by food.

42 species of wild plant encountered in this study have multiple uses while 65 species of wild plants have single use each.

5.3 Characterization of plant resource used by the Orang Asli at Lubuk Ulu Legong

5.3.1 Plant uses

Most species of plants used by the Orang Asli at Kampung Lubuk Ulu Legong have a specific use. Only 30% of the total numbers of plant species utilized by this community were multi-purpose.

Most of the plant species recorded in this study was used for food and similar results were obtained during previous studies on plant resource of other communities in Peninsular Malaysia. These studies were by Milow *et al.* (2011) on Malay villages in Perak, Milow *et al.*(2013) on Orang Asli villages in Negeri Sembilan, Milow *et al.* (2010) on villages at Pahang, and study by Norshahidatul (2010) on Orang Asli village in Selangor.

The number citation during interviews shows that *Cymbopogon citratus* (DC.) Stapf. as the most commonly used plants by the Orang Asli at Lubuk Ulu Legong. This plant has several uses. Among the food plants recorded, 60 species were specifically used as food. The total of food plant species recorded in this study is slightly more than those recorded for the Temuan villagers by Ong *et al.* (2011b; 2011c) and for the Malay villagers by Milow *et al.* (2011).

Medicinal use contains the second highest number of species among the categories of use for plants used by Orang Asli at Kampung Lubuk Ulu Legong. The total number of medicinal plant species was 57. The total number of medicinal plant species in this study is comparable with study by Ong *et al.* (2011e; 2011f) on Malay village, by Ong *et al.* (2011a) on Temuan village and by Ong *et al.* (2012) on a Jah Hut village. However this study recorded more medicinal plant species than a study by Ong *et al*. (2011d) on Temuan village at Negeri Sembilan and study by Azliza *et al.* (2012) on Temuan village at Ulu Kelang.

Apart from self-use, most species of medicinal plants at Kampung Lubuk Ulu Legong were also used by the villagers as a source of income. Based on the interviews with respondents, almost 35% of the total numbers of medicinal species were sold to earn an income. According to Hamilton (2004), medicinal plants can provide a significant source of income for rural people especially through the sale of wild-

harvested material. Among the medicinal plant species widely used by the Orang Asli at Kampung Lubuk Ulu Legong were *Mitragyna speciosa* Korth, *Fibraurea cloroleuca* Miers. and *Tectaria angulata* (Willd.) Copel. More than 45% of the total respondents interviewed have used these plants. Almost 22% of the total numbers of species recorded were sold either as raw, dried or in a new product.

33 species of plants recorded in this study were ornamental plants. This is more than those recorded by Milow *et al.* (2011) for a Malay village in Perak and half of the total of ornamental species recorded in study by Milow *et al.* (2013) for Temuan home gardens in Negeri Sembilan. Each of the categories utensils, belief, handicraft-making, and fish poison contain less than 10% of the total number of plant species.

5.3.2 Part of plant used

The plant part mostly used by the villagers at Kampung Lubuk Ulu Legong as food was fruit. Similar trends were also noted by Amusa *et al.* (2010) in Nigeria, Ong *et al.* (2011b) in Malaysia. Among plant species with fruit eaten by the Orang Asli at Kampung Lubuk Ulu Legong were *Musa acuminata* Colla (AAA Group), *Nephelium lappaceum* L. and *Piper caninum* Blume. 37% of the total respondents surveyed mentioned that they used these species. Fruit plant species cultivated by the community were *Ananas comosus* (L.) Merr., *Areca catechu* L. and *Artocarpus heterophyllus* Lamk. Wild plant species that produced useful fruit to villagers at Kampung Lubuk Ulu Legong were *Ceiba pentandra* (L.) Gaertn., *Cyrtosstachys renda* Blume and *Gmelina asiatica* L.

It is important to note more details about fruit plant species in order to conserve the species because fruits have value as genetic resources (Saw *et al.*, 1991). Furthermore the wild species received less or even no efforts to cultivate. The threat of

extinction can occur by the way the fruit harvested. As an example of how harvesting way can lead to extinction is cutting down the trees to get the fruit.

The second most common plant part used is the whole. Almost 77% of the total are planted while 23% are wild. Most of the planted species are ornamental plants cultivated by the villagers in their home gardens. Some species which contribute the whole plant for the human benefit as a food source and medicinal purpose are wild plants. The species such as *Argostemma pictum* Wall., *Ardisia crispa* (Thunb.) DC and *Centella asiatica* (Linn.) Urban. Over exploitation of these plant species can lead to extinction (Shcippmann *et al.*, 2002).

The leaves of almost 22% of the total number of plant species are useful to the villagers of Kampung Orang Asli Lubuk Ulu Legong and 68% of these are wild. The villagers used the leaves of the plants for food (e.g. leaves of *Polygonum minus* Huds. are used as cooking ingredient and leaves of *Pentaphragma begoniaefolium* Wall. are eaten as salad), medicine (e.g. leaves of *Etlingera elatior* (Jack) Smith are used to treat body ache and pounded leaves of *Eupatorium odoratum* L. are used to treat wound and cuts), and income (e.g. selling of mat and roof thatch made from leaves of *Pandanus atrocarpus* Griff. and *Rhopaloblaste singaporensis* (Becc.) Moore).

Another common part of plant used is root. Roots are commonly used in medicinal purpose (e.g. root of *Acrotrema costatum* Jack. to treat bloody defecate) and generating income (e.g. dried root of *Eurycoma longifolia* Jack) among this community. This pattern can also be seen in a study by Uprety *et al.* (2010). Most of the roots of plant species were from the wild plant. Only 8% of the total number of roots plant species were cultivated.

Other parts of plant used by villagers at Kampung Orang Asli Lubuk Ulu Legong were stem or trunk, latex, rhizomes, bark, umbut, and flower. These plant parts

belong to wild plants and cultivated plants. Bark and shoot were exclusively obtained from the wild. Example of species with useful stem is *Costus speciosus* (Koenig.) Smith. Stem of *Costus speciosus* (Koenig.) Smith, are used to treat cuts and wounds.

Latex of *Musa acuminata* Colla (AA Group) is used to treat baby ulcer and rhizomes of *Alpinia galanga* (L.) Willd is used in cooking ingredient. While bark of *Piper caninum* Blume is used to treat gout, shoots of *Stenochlaena palustris* (Burm. f.) Bedd. are used as food. Flowers of *Etlingera elatior* (Jack) Smith is used in cooking ingredient.

5.3.3 Planting plant status

Species of plants useful to villagers at Kampung Orang Asli Lubuk Ulu Legong are cultivated, wild or cultivated and wild. Most of the plant species used by the Orang Asli at Kampung Lubuk Ulu Legong were wild. This showed that this community still practices their traditional lifestyle and skills in gathering wild plant species from the forest. Almost 52% of the total plant species recorded they gained from the wild while 38% can be found in their home gardens. However, there are efforts among them to cultivate the wild species. It can be seen where 10% of the total species recorded can be obtained from both wild and cultivated. Among the wild species that are planted by several villagers is *Hedychium longicornutum* Baker, *Prunus arborea* (Bl.) Kalkman. and *Guioa pubescens* (Zoll. & Mor.) Radlk. However, many species are difficult to cultivated because of certain biological features and ecological requirements as cited in Shcippmann *et al.* (2002). Ong *et al.* (2011d) noted among the Temuan effort to cultivated several wild medicinal species reflects the increasing demand of the plants and their declining availability in the wild.

Graph 4.3 shows that there is more wild plant species as compared to cultivated plant species. This suggests that villagers at Kampung Orang Asli Lubuk Ulu Legong community showed they still depend on wild plants uses.

5.3.4 Use-value Index

The use value places more emphasis on species that have many uses, even if these uses are only known to a few people (Albuquerque *et al.*, 2006). This study reveals the species *Nephelium lappaceum* L. and *Chasalia chartacea* Craib. have the highest use-value compared to other species. Villagers at Kampung Orang Asli Lubuk Ulu Legong used these species for income, food, and medicinal purpose. A species with a high use-value after *Nephelium lappaceum* L. and *Chasalia chartacea* Craib is *Bambusa ventricosa* McClure. The latter is used as food, source of income (through selling the product from this species), and home utensils. *Nephelium lappaceum* L. was cultivated while *Chasalia chartacea* Craib.and *Bambusa ventricosa* McClure were wild.

The most widely used plant species among the villagers of Kampung Orang Asli Lubuk Ulu Legong was *Bambusa ventricosa* McClure. This was followed by *Cymbopogon citratus* (DC.) Stapf. and *Nephelium lappaceum* L. This study shows that species with the highest use-value is not necessarily the most widely used.

The above techniques used together provide insights on the relative importance of plant species to a community. This in turn can be used to identify threats to plant resource of the community.

5.3.5 Medicinal Importance value Index

Medicinal Importance value index were applied to identify the most valuable species in term of medicinal use among the Orang Asli at Kampung Lubuk Ulu Legong. The most valuable of medicinal species is *Cinnamomum iners* Reinw. ex Blume 32% of

the total respondents mentioned that the root of this species used to treat hypertension, sinus, abortion and also used for postnatal. Followed by *Lignosus rhinocerus* (Cooke) Ryvarden. The tuber of *Lignosus rhinocerus* (Cooke) Ryvarden mentioned by 8% of respondents used to treat three types of illness; asthma, breast cancer and to increase energy. Other species listed in three highest value is *Ardisia crispa* (Thunb.) DC and *Centella asiatica* (Linn.) Urban. *Ardisia crispa* (Thunb.) DC mentioned by the 32% of respondents used to treat body ache, hemorrhoids, bloody defecate using the whole plant. While 24% of respondents mentioned that the whole plant of *Centella asiatica* (Linn.) Urban used to treat asphyxiate, cough and phlegm.

5.4 Economic valuation of plant resource used by the Orang Asli at Lubuk Ulu Legong

39 species recorded are collected for sale and source of income for the villagers. 51% of plant species sold is medicinal plants, and the rest are food plants (31%) and plants for utensil-making (10%). The major source of income among all the species that are sold is *Hevea brasiliensis* Muell. Arg. (RM 270,000/year), followed by *Aquilaria malaccensis* Lamk. (RM 14,300/year) and *Calamus conirostris* Becc (RM 14,040/year).

Shown in Table 4.8 are average prices based on information gathered from informants and plant collectors. The present study reveals that the selling of plant products is often through middleman. The middlemen who purchase material from collectors and sell them either to small shop or agents of large dealers. Among the species which are sold through middleman are *Aquilaria malaccensis* Lamk., *Hevea brasiliensis* Muell. Arg. and *Ganoderma lucidum* (Curtis) P. Karst.

Plant species with parts or products sold directly are *Bambusa ventricosa* McClure (e.g. birdcage), *Daemonorops didymophylla* Becc. (e.g.dart) and *Pandanus atrocarpus* Griff. (e.g. floor mat).

The estimated total of commercial value generated from plant species among the community of Orang Asli are Malaysian Ringgit 505,750.00 for a year.

CHAPTER 6

6.0 Conclusion

6.1 Summaries and implications of the study

This study recorded 175 species of plant species were used by Orang Asli Kampung Lubuk Ulu Legong belonged to 82 families of 40 orders. Most of the useful plant species were exclusively wild (52%). 37% of the species were cultivated and the rest of species are both cultivated and obtained from the wild. Plants were cultivated in home gardens whereas useful wild plants were collected from nearby forest and jungles. These shows that the Orang Asli at Kampung Lubuk Ulu Legong still practice their traditional life-style and knowledge in the utilization of plants. This study also shows that villagers that possess the traditional knowledge on plant utilization are of the older generation. Some of the younger respondent can recognize useful plant species without knowing the names of plants. Documentation of plant resource of local communities is a one of the effort we can do to make sure that this knowledge continues benefiting our future generations.

During this study, some villagers mentioned that it is getting more difficult to find wild plants as compared to several years ago. Factors contributing to the scarcity and availability of plant resource therefore, need to be studied. It was noted that several species (e.g. *Hedychium longicornutum* Baker and *Peliosanthes violacea* Wall.) were encountered only once during wild plant survey of this study. *Hedychium longicornutum* Baker and *Peliosanthes violacea* Wall. are used for medicinal purposes. However for species *Hedychium longicornutum* Baker, there are efforts by the villagers to cultivate in their home garden but the species very difficult to survive. This may caused of several factor such as habitat alteration, the loss of the forest area, over

exploitation and improper harvesting methods. This situation if not controlled can lead to the loss of genetic of diversity of plant species, especially for medicinal species.

High use-value species (e.g. *Nephelium lappaceum* L. and *Chasalia chartacea* Craib), commonly used species (e.g. *Bambusa ventricosa* McClure), high medicinal importance value (e.g. *Cinnamomum iners* Reinw. ex Blume) and high commercial value species (e.g. *Hevea brasiliensis* Muell. Arg.) should be given more emphasis in future studies as they are critical in supporting the livelihood of the villagers at Kampung Orang Asli Lubuk Ulu Legong. These species need to be monitored as they are prone to over-exploitation. Species that are often and regularly collected are also prone to over-exploitation. For example, this study shows that *Timonius wallichianus* (Korth.) Val., a medicinal and source of income plant, was quoted by almost 46% of respondents. This species is collected once a week.

6.2 Suggestions for further study

Findings from this study will contribute to an efficient exploitation and conservation of plant species which used in Orang Asli at Kampung Lubuk Ulu Legong. This study may lead for further study in term of specific study such as medicinal species which may have potential for clinical trials in treating various ailments and contribute towards better health. Besides that, further study also required to help this community implementing the commercial cultivation of some of wild species particularly for ensure the sustainability of the resource in their lives.

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APPENDIX A: Sample of questionnaires

QUESTIONAIRRE

DATE: _____ Q'naire No: _____

PART A: RESPONDENT PROFILE

Name: _____Age: _____ Gender: M W

Occupation: _____ Total of Family: M: ____W:____

Education level: _____ Log lat: _____

PART B: TYPES OF PLANT RESOURCE USES

Local name	Uses	Part used	Method of plant used	Characteristic	Status	
					Tended	Wild

APPENDIX B: Selected photographs of species of plants used by the Orang Asli at Kampung Lubuk Ulu Legong

Agave augustifolia- Kelumpang telur

Centratherum punctatum- Bunga butang

Cycas rumphii- Paku aji

Cantharanthus roseus- Bunga cina

Grewia paniculata- Cenerai

Euphorbia neriifolia-Kaktus

Jatropha curcas - Jarak

Tabernaemontana divaricate -Kemboja

Turnera subulata - Bunga kuning

Turnera ulmifolia - Bunga Kuning

Begonia pseudisoptera - Asam putih

Rhopaloblaste singaporensis - Atap cucuh

Pangium edule - Kepayang

Lophatherum gracile - Cekrek

Labisia pumila - Kacip fatimah

Saraca indica - Kapih

Homalomena pendula - Keladi bukit

Freycinetia javanica - Kelawit mantai

Fibraurea cloroleuca - Kuning

Peliosanthes lurida - Lemba seratus

Phrynium capitatum - Lerek

Chasalia chartacea - Makmoq

Tetracera macrophylla - Tenohol

Tectaria angulate - Paku bukit

Timonius wallichianus - Patah bawah tangga

Lasia spinosa - Geli

Pleocnemia irregularis - Pucuk paku kelah

Flacourtia inermis - Tembela

Bauhinia bidentata - Tapak kerbau

Costus speciosus - Tepus bukit

Eurycoma longifolia - Tongkat ali

Oncospermum horridum - Umbut bayah

Cnestis ramiflora - Asam jawa bukit

Dysoxylum alliaceum - Hatap selaya

Leea indica - Kerak nasi

Scorodocarpus borneensis- Kulim

Pleocnemia irregularis - Paku kelah

Davallia solida - Paku sekam

Thottea grandiflora - Perdu beruang

Peliosanthes violacea - Rambu suntum

Hedychium longicornutum - Ramu akar cacing

Pentaphragma begoniaefolium - Sil

Cinnamomum iners - Tajalawang

Smilax myosotiflora - Ubi jaga

Smilax calophylla - Alek tembaga

Lygodium circinnatum - Akar ribu

Ancistrocladus tectorius - Ali sengau

Elettariopsis curtisii - Heklek

Hanguana malayana - Lebek

Champereia manillana - Lemak

Psychotria Montana- Sembelit bukit

Elettariopsis triloba - Tepus etot

Artocarpus elasticus - Terap

Acrotrema costatum - Tutup bumi

Anisophyllea disticha - Cabang tiga

Neodissochaeta gracilis - Cetliot

Dioscorea pyrifolia- Tuba

Piper caninum - Lada bukit

Argostemma pictum - Paru-paru

Calamus conirostris - Rotan krai

Piper pedocellosum - Sirih bukit

Spilanthes paniculata - Cengkih bukit

APPENDIX C: List of informants

No	Name	Age	Education level	Occupation	Longitude /Latitude	Altimeter/m
1	Norma Bt Awang	28	Secondary School	Housewife	5°47 693' N 100°54 156' E	113
2	Waida Panjang	20	Primary School	Housewife	5°47 706' N 100°54 150' E	114
3	Ta Awang Besar	33	Primary School	Self-employed	5°47 710' N 100°54 141' E	118
4	Murni	30	None	Housewife	5°47 708' N 100°54 129' E	120
5	Milah bt Macang	45	Primary School	Housewife	5°47 629' N 100°54 138' E	114
6	Yati bt Norman	32	None	Housewife	5°47 692' N 100°54 138' E	114
7	Munah bt Caruk	30	Primary School	Self-employed	5°47 671' N 100°54 175' E	128
8	Aishah Tero	28	None	Housewife	5°47 700' N 100°54 181' E	141
9	Kutum bt Buluh	60	Primary School	Housewife	5°47 703' N 100°54 178' E	134
10	Minah bt Kacang	40	Primary School	Self-employed	5°47 713' N 100°54 181' E	116
11	Besah bt Ismail	34	Primary School	Housewife	5°47 748' N 100°54 212' E	95
12	Taba bin Kacing	40	Primary School	Self-employed	5°47 688' N 100°54 194' E	133
13	Jamil bin Ayu	26	Primary School	Self-employed	5°47 437' N 100°54 076' E	107
14	Azuan bin Tero	19	Primary School	Self-employed	5°47 440' N 100°54 092' E	120
15	Pin bin Itam	30	None	Self-employed	5°47 445' N	110

					100°54 078' E	
16	Mohd Radzi bin Mohd Isa	55	None	Self-employed	5°47 445' N 100°54 072' E	79
17	Ramlah bt Ahmad	60	None	Self-employed	5°47 466' N 100°54 054' E	97
18	Iti binti Mengkuas	40	Primary School	Self-employed	5°47 579' N 100°54 098' E	114
19	Awang bin Tero	26	None	Self-employed	5°47 574' N 100°54 096' E	118
20	Putik bt Papan	50	None	Housewife	5°47 568' N 100°54 091' E	112
21	Matang bin Keladi	45	None	Self-employed	5°47 624' N 100°54 126' E	108
22	Jusoh bin Langsat	30	Primary School	Self-employed	5°47 637' N 100°54 129' E	103
23	Robiah bt Sani	26	Primary School	Self-employed	5°47 639' N 100°54 133' E	105
24	Mohammad Noor Johan	27	None	Self-employed	5°47 637' N 100°54 092' E	121
25	Razali bin Kulim	31	Primary School	Self-employed	5°47 633' N 100°54 097' E	114
26	Dah binti Lapan	uk	None	Housewife	5°47 632' N 100°54 102' E	113
27	Zulkifli bin Kulim	28	Primary School	Self-employed	5°47 637' N 100°54 107' E	107
28	Kulim bin Keramat	60	None	Self-employed	5°47 637' N 100°54 106' E	102
29	Sudin bin Kelubi	48	None	Self-employed	5°47 652' N 100°54 090' E	109
30	Buluh bin Ayau	22	Primary School	Self-employed	5°47 652' N 100°54 097' E	107
31	Ibrahim bin Dalu	50	None	Self-employed	5°47 635' N	110

32	Kamal bin Din	32	Primary School	Self-employed	100°54 082' E 5°47 639' N 100°54 088' E	115
33	Sani Abdul Halim	34	Primary School	Self-employed	5°47 652 ' N 100°54 134' E	114
34	Rosman bin Isa	41	Primary School	Headman	5°47 439 ' N 100°54 075' E	107
35	Mohd Syukor bin Isa	34	Uk	Self-employed	-	-
36	Kulim Jamal bin Ayong	50	Uk	Self-employed	-	-
37	Abidin a/k Awang Besar	43	Uk	Self-employed	-	-

APPENDIX D: Papers presented at conferences

Proceedings of the 2nd. International Conference on Arts, Social Sciences & Technology
Penang, Malaysia, 3rd. – 5th. March 2012

Paper Code. No. 12208

KAJIAN TERHADAP SUMBER TUMBUHAN DI KAMPUNG ORANG ASLI ULU LEGONG, BALING KEDAH.

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ABSTRAK

Satu kajian floristik melalui pemerhatian di kawasan kajian dan temubual dengan penduduk kampung telah dijalankan mengenai sumber tumbuhan di Kampung Orang Asli Ulu Legong, Kedah. Sebanyak 101 spesies daripada 53 famili sumber tumbuhan dikenalpasti yang digunakan oleh komuniti Orang Asli di kawasan kajian. Antaranya terdiri daripada 60 jenis pokok berkayu, 17 jenis tumbuhan renek, 12 jenis tumbuhan herba, 12 jenis tumbuhan memanjat dan menjalar dan melibatkan 53 spesies yang ditanam, 37 spesies tumbuh meliar dan 9 spesies diperolehi daripada kedua-duanya. Sumber tumbuhan yang dikenal pasti digunakan sebagai makanan (60%), hiasan (23%), ekonomi (19%), ubatan (19%), perkakas rumah (4%) dan kraftangan (2%). Dua puluh tiga sepsis dikenalpasti mempunyai lebih dari satu kegunaan. Buah merupakan bahagian yang banyak digunakan iaitu 40 spesis, diikuti oleh seluruh tumbuhan (23 spesis), bahagian daun (18 spesis), batang (11 spesis), rizom dan ubi (8 spesis), akar dan bunga (5 spesis).

Keywords: Orang Asli, sumber tumbuhan, kegunaan tumbuhan

1. PENGENALAN

Orang Asli merupakan istilah Melayu yang diberikan kepada "orang asal" ataupun keturunan pertama yang mendiami kawasan semenanjung sebelum penubuhan Kerajaan Malaya (Nicholas, 2005). Menurut kajian oleh Nicholas dan Lasimbang (2004), sebanyak 88.7% Orang Asli hidup didalam kawasan hutan dan pinggir hutan dan bergantung hidup kepada sumber biodiversiti daripada generasi ke generasi (Nicholas, 2006). Mereka menggunakan sumber bidiversiti untuk pelbagai tujuan, antaranya di dalam perubatan (Lin, 2005 & Samuel et al., 2010), sebagai makanan (Rozidan, 2006), peralatan memburu, peralatan muzik, untuk tujuan keagamaan dan banyak lagi (Awasthi, 1991). Banyak kajian telah dijalankan mengenai penggunaan sumber tumbuhan di dalam kaum Orang Asli antaranya kaum Temuan oleh Ong, Chua & Pozi (2011), Ong (2004), Ong (1991), Ong, Mojiun & Milow (2011), Kaum Che Wong oleh Rozidan (2006) dan Kaum Jah Hut oleh Lin (2005).

Traditional Knowledge on Medicinal Plant among the Orang Asli Villagers in Kampung Lubuk Ulu Legong, Kedah Malaysia.

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Abstract

A total of 39 species from 35 families of medicinal plants were recorded which is used for treating various ailments. 10.2% of species were identified used to treat more than one ailment. The common mode of administration was oral (69.2%) followed by external use (30.8%).The common part of plant used is the root followed by leaves, stem, fruit, whole plan and rhizome. Decoction is a common method of preparing herbal (69.2%) followed by pounded (15.4%), mashed (7.7%), burned(2.6%), shredded and incantation (3%) respectively. 59% species were obtained only form wild, 28.2% were planted and 12.8% species of plant exist as both wild and planted.

Key words: Orang asli, ailment, decoction

1. Introduction

The term Orang Asli encompasses three basic types of communities; the Negritos, the Senoi and the proto-Malays. The Kensiu tribe is in the Negritos ethnic groups which were largely nomadic foragers, living in one location as long as the food supply was able to maintain the community (Harper 1997; Nicholas 2000). Most of them live on the jungle in the North and North-East. However, today Kensiu tribe lives in permanent settlements which can be found in the north east of the state of Kedah and a few of them can be found living in Perak and Kelantan (Nicholas 2000; Nagata 2006). The Kensiu are the minority tribe in minority group of Orang Asli.

This study focuses on the plant used in traditional medicine in Kensiu as no study on the medicinal plants used in this particular village has been published before. The medicinal plants in Kensiu traditional knowledge must be recorded before that knowledge and their usage is lost to humanity due to modernization moving towards the doorsteps of the indigenous tribes (Ong et al. 2011)

APPENDIX E: ISI published study paper

Ethno Med, 6(3): 149-153 (2012)

Traditional Medicinal Plants Used by the Kensiu Tribe of Lubuk Ulu Legong, Kedah, Malaysia

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KEYWORDS Negritos. Modernization. Surveys. Interviews. Informants

ABSTRACT This study is based on information obtained through interviews with respondents, observations, collection and identification of medicinal plants in Kampung Orang Asli Lubuk Ulu Legong Baling, Kedah. A total of 39 species from 35 families of medicinal plants used for treating various ailments were recorded. 10.2% of the species were used to treat more than one ailment. The common mode of administration was oral (69.2%) followed by external use (30.8%). The common part of plant used is the root followed by leaves, stem, fruit, whole plant and tuber. Decoction (69.2%) is a common method of preparing herbal medicine followed by pounded (15.4%), mashed (7.7%), burned (2.6%), shredded and incantation (3%). 59% of the species were obtained from the wild, 28.2% were planted and 12.8% species of the species were both wild and planted.

INTRODUCTION

The term "Orang Asli" encompasses three basic types of communities; the Negritos, the Senoi and the proto-Malays. The Kensiu tribe belongs to the Negritos ethnic group who were largely nomadic foragers, living in one location as long as the food supply was able to maintain the community (Harper 1997; Nicholas 2000). Most of them lived in the jungle of the North and North-East Malaysian peninsula. However, today the Kensiu tribe lives in permanent settlements which can be found in the north- east of the state of Kedah and a few of them can be found living in Perak and Kelantan (Nicholas 2000; Nagata 2006). The Kensiu is a minority tribe in minority group of Orang Asli.

This study focuses on the plants used in traditional medicine by the Kensiu tribe. Prior to this study there were no prior records regarding this matter. The usage of medicinal plants in Kensiu traditional knowledge must be recorded and preserved before it is lost forever as modernization is slowly creeping towards the doorsteps of the indigenous tribes (Ong et al. 2011).

Documentation of traditional knowledge on medicinal plant usage by the native people in Peninsular Malaysia is still far from complete (Ong et al. 2012). This study was carried out to help the Kensiu to conserve their knowledge of medicinal plants usage that may be useful for the future generation especially its genetic and pharmaceutical resources. This study is also a part of the effort towards conservation and developing the main resources in the Kensiu community. Information from this study can also be used as a reference for further studies which can be expanded for further research especially for species with high health and economic values.

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METERIALS AND METHODS

This study was conducted in a Kensiu tribe village named Kampung Orang Asli Lubuk Ulu Legong in the state of Kedah. It is located in the North of Baling the second largest district in Kedah with a longitude of 5°47 439' N and a latitude of 100°54 075' E. In this village there are 46 houses which were built by the Department of Orang Asli Development (JKOA) in 1952 with a total of 258 persons living in an area of about 2.51 km^2 including the vegetation fields. While there are also houses built using planks and beams, most of the houses were built using bricks. However, there are several cottages that can be found built using material from surrounding forests such as bamboo walls and floor and roofed with leaves that are built next to their brick houses.

Information was obtained using several ethno-botanical methods. The first method is site surveys including interviews with villagers guided by a predetermined set of questions, observations on site and specimen collection. These sessions were recorded using a field notebook and voice recorder. All of these methods were applied during the field trips which were conducted from June 2011 till June 2012. Plant specimens were collected and determined according to Martin (1995). Photographs of the specimens were also taken for identification purposes. Identification was done using various