MEDICINAL PLANTS OF KALIMANTAN FOREST : A REVIEW

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Abstract

Kalimantan is an island blessed with tropical rainforest which is rich of medicinal plants species. Utilization of medicinal plants by local people are various. In certain areas, particularly hinterland area, medicinal plants were still used by most of the people. However, in certain areas, with the active and vigorous introduction of modern health treatment, modern medicine is slowly taking over the place of traditional herbal medicine.

Survey and inventory of medicinal plants in 3 national parks in Kalimantan , reported the findings of species richness of medicinal plants in Betung Karihun National Park, West Kalimantan (41 species), Kutai National Parks, East Kalimantan (220 species) and Kayan Mentarang National Park, East Kalimantan (55 species). In the study of plant diversity and utilization of rattan gardens in West Kutai District, East Kalimantan, it was found that in 6 ha rattan gardens, there are 146 species of medicinal plants exist.
Preliminary results of current medicinal plants research which were carried out in several sites in Kalimantan on different topics of research by some group of researchers will be reported.

The development of traditional medicine and the trend of " going back to nature", causes increasing research on traditional medicinal plants as alternative medicine. Scientific forum activities, included seminars, workshops, talk shows and discussion about utilization, research and development of the increase of the use of medicinal plants indicated that medicinal plants and their derivated products from nature are known and needed by the public.

Key words : *medicinal plants, species richness, Kalimantan National Park*

1. Introduction

Kalimantan forest have long been regarded primarily as a source of timber and harbour a great diversity of plants species. The composition of their tree species, in general and non timber forest product species, in particular, is heterogeneous. As one of non timber forest product species, medicinal plants are of great economic importance and should therefore be a priority in forest protection measures. They are used as raw material for the extraction of active constituents in pure form, as precursors for synthetic vitamins and steroid, and as preparations for herbal and indigenous medicines.

In 1968, Kalimantan was estimated to have 77% forest cover, with 41, 470, 000

ha of forest, about 34% of the total forest area of Indonesia (Ave and King, 1986). Using satellite imagery and areal photographs from 1982 to 1988, the National Landuse Project mapped forest cover in Forest Land Use areas. At this time forest cover in Kalimantan was still estimated at 73%, although it was obvious that large areas of production and protection forest had been cleared of forest (RePProT, 1987). By 1990, with better baseline data, forests were estimated to cover only 34,730,000 ha, or 63% of Kalimantan (MoF/FAO, 1991). In 2005, by using satellite imagery, vegetation cover of Kalimantan was still remain at 43% (MoEnv, 2006).

During the past 30 years, exploitation of the interior has been rapid especially in the form of logging activities and land conversion to plantations, leading to serious consequences for the environment and for many of the indigenous people. Regional threats include the use of pesticides and poisons, habitat destruction and loss of genetic resources. Unfortunately, environmental degradation coupled with rapid development has seriously eroded traditional ethnobotanical knowledge. Thus, there is an urgent need to record this knowledge for preservation of the cultural understanding of indegenous people, and to ensure sustainable development of certain areas holding ethnobotanical resources. Moreover, there is a great number of wild and domesticated plants that contain active substance for medicine. These species have potential value to be developed in the future for medicinal plants. However, these plants received least attention in their cultivation and harvesting techniques. This is especially true for those have lack of marketing value in both local and regional trade.

This paper try to summarize some findings both the results of field surveys and preliminary results of laboratorium analysis in connection with medicinal plants.

2. Utilization of Medicinal Plants

From earliest times mankind has used plants in an attemp to cure diseases and relieved physical suffering. Primitive peoples in all ages have had some knowledge of medicinal plants, derived as the result of trial and error. These primitive attempts at medicine were based on speculation and superstition. In all the early civilizations there was much interest in drug plants. In China, as early as 5000 to 4000 B.C., many drugs were used. There are Sanskrit writings in existence which tell of the methods of gathering and preparing drugs (Hill, 1951). Diplomatic links between Chinese and Kalimantan coastal settlements are recorded in Chinese dynastic histories from the seventh to the sixteenth centuries A.D. (MacKinon, et al., 1996).

Knowledge of the potential of many wild species is scanty. The quest for new medicines to cure or alleviate modern diseases, such as AIDS and cancer, has to led to a resurgence of interest in rainforest plants. One rainforest tree genus Calophyllum is believed to have potential for treating AIDS. Surveys in West Kalimantan (Burley, 1991) and the Apo Kayan (Leaman et al., 1991) aim to inventory the plants used by local communities, particularly medicinal plants.

According to Farnsworth and Soedjarto (1985), about 40% of all drug prescriptions in the USA (valued at $ 8 billion per year) are compounds of natural plant origin. Worldwide, 119 pure chemical sub-

stances extracted from fewer than ninety species of higher plants are used in medicine. Farnsworth (1988) added that the impotance of traditional knowledge and medical folklore is well illustrated by the fact that of these 119 natural substances, 74% have the same, or related, current medical use as the plants from which they are derrived.

The classification of medicinal plants is difficult for there are many methods of approach. The classification might be based on the chemical nature or the therapeutic value of the plant product, the natural affinities of the various species, or the morphology of the plant organ from which the medicine/drug is obtained. According to Hill (1951) it seems best to consider the more important medicinal plants on a morphological basis, as followed : (1) obtained from roots and other underground parts, (e.g aconite, gentian, goldenseal, ginseng,ipecac, jalap, licorice, podophyllum, rhubarb, squills, senega,valerian); (2) obtained from barks, (e.g. cascara, curare, quinine, slippery elm); (3) obtained from stems and woods, (e.g. ephedrine, guaiacum, quassia),;(4) obtained from leaves (aloe, belladonna, cocaine, buchu, digitalis, eucalyptus); (5) obtained from flowers, (e.g. chamomile, hops, santonin); (6) obtained from fruits and seeds, (e.g. colocynth, cubebs, croton oil, opium, psyllium, wormseed); (7) obtained from lower plants, (e.g. antibiotics, agar, ergot, kelp, lycopodium, aspidium).

Regarding systems of medicine, it is important to distinguish between three different types of medicine : (1) traditional; (2) herbal, and (3) pharmaceutical. A plant may be consumed as a medicinal tea by member of a community living in the area where the plant is indigenous, the same plant may be cultivated and processed in the country of origin into a formulation of a herbal medicine sold in western countries, and it may provide a lead compound for a pharmaceutical product. These systems of medicine are complementary in health care and can in no way substitute one another (Balick et al., 1996).

Utilization of medicinal plants by local people are various. In certain areas, particularly remote area, far away from the urban, medicinal plants probably were still use by most of the community. But in certain areas, with the active and vigorous introduction of western health treatmen, modern medicine is slowly taking the place of traditional herbal medicine. Guntavid et al. (1999) reported that the local Dayak communities in Kapuas Hulu District, West Kalimantan, adjacent to Betung Kerihun National Park, are willing to accept the new trend of modern medicine, however, there are elders and youngsters who still practise what has been handed down to them for generations. Herbal medicine although seldom utilised, is employed especially by women to treat the basic ailments of their children and after child delivery. With the improved accessibility of government rural clinics in the villages, most complaints are now dealt with by medical doctors and their assistants. The use of traditional cures, however seems not to conflict with the use of modern medicine; in many cases one complements the other. In the same report, they also explained that efficacy of traditional medicine made by someone specialist, is believe to be equivalent to western herbal medicine. Generally, traditional societies such as the Dayak believe the efficacy and restirative power of a plant depends on the mystical quality of the plant. Dayak tribes at research site believe that

curing a disease also requires a ceremony. They believe that someone is sick because his spiritor soul is disturbed, or taken away by invisible spirit. Moreover, traditional indigenous knowledge of herbal medicine is revealed either through dreams and also said to be revealed by spirits of the forests. Through the ages, practicing through trial and error they were able to substantiate and sustain their traditional practices of herbal medicine. During the harvesting of plants materials for use in traditional medicine, several rules and regulations must be observed. Spirits and other unseen forces of the jungle are consulted prior to collection. Taboos and other do's and don'ts also must be fully observed. Timing the collection at the right moment is vital. All the proper actions and deeds are believed to contribute to a good, sound and effective remedy.

Leaman et al. (1991) reported utilization traditional medicine of the Dayak Kenyah at the remote Apo Kayan plateau of East Kalimantan. They gather many of their own medicines from local plant species. Informants identified 213 plants they regard as medicinal species, used to treat at least 66 distinct health problems. A large number of these plant preparations are commonly used to treat wounds and illness, to purge worms and other parasites, and for many other medical and ritual purposes. Some medicinal plants can be found only in the undisturbed forests. These are normally collected by the men while hunting wild and deer, or on expedition to cut wood for construction and to gather rattan. Other medicinal plants are cultivated by the women in home gardens or encouraged to invade recently cleared and burned fields. Most medicinal species known to Kenyah are found in the secondary forest created by the traditional farming system. The people of Long Sungai Barang, one of the Kenyah villages on the Apo Kayan plateau, know more than 200 local medicinal plants. One important example is *Eurycoma longifolia*, a tree known throughout Indonesia as kayu pasak bumi, famous for its bitter taste and valued for its various medicinal and tonic properties, especially as an aphrodisiac. Most Kenyah traditional medicines, however, are used locally since imported medicines are rarely available and are costly. The study of plants used as traditional medicines may lead to the discovery of new drugs and more effective treatments for disease. The great variety of local species used by the Kenyah of the Apo Kayan plateau indicates the great potential of Kalimantan forests as sources of new medicines, and confirms the importance of traditional knowledge of forest resources.

Forest medicines offer three benefits. First, their continuing use represents a knowledge resource of considerable significance for the world's current and future pharmacopoeia. Second, the plants are the physical reservoir for this future use. Third, they represent the only pharmacy for people living in remote areas where modern medicine is not available (Colfer et al., 2006).

The World Conservation Union (IUCN) concludes that more than 20 000 species are used as medicine worldwide, and half of these are under threat of extinction. Many authors have recounted the threats to medicinal plants from habitat destruction, overharvesting, increasing commercialization, and loss of indigenous knowledge, as well as population increase, forest fire, shifting cultivation and overgrazing (Anyinam, 1995; Bhattarai, 1997; Chivian and Sullivan, 2002; de Alwis, 1997;

Elisabetsky and Shanley, 1994; Rao et al., 2004). Tabat Barito (*Ficus deltoidea*) is one of the Kalimantan traditional herbal plants that approaching extinction. Tradionally, Tabat Barito is used as natural antimicrobes, especially for female organ. Bioassay evaluation revealed that Tabat Barito has antimicrobial activity against human pathogenic microorganism, i.e. *Staphylococcus aureus, Candida albicans, and Trichophyton rubrum*. Fractionation and phytochemical identification revealed that Tabat Barito has steroid, alkaloid, and triterpenoid compounds.

Genetic transformation has now become an established method for gene transfer in medicinal plants; more than 60 genera of such plants have been transformed. Secondary metabolite studies have been conducted on cell suspensions, hairy roots, and shooty teratomas (Bajaj and Ishimaru, 1999). They also noted some achievements in the genetic transformation of medicinal plants have been the (1) production of pharmaceutics, alkaloids, polyphenols, terpenoids, nematocidal compounds, and also some novel compounds not found in the whole plant, (2) regeneration of plants resistant to herbicides, diseases, and pests, scaleup of culture in bioreactors, (4) plants with different morphological traits, and (5) transgenic plants for the production of vaccines, enzymes, etc. These developments have far-reaching implications for the pharmaceutical industry.

3. Species Richness of Medicinal Plants in Kalimantan National Parks

Generally, National Park is large, relatively undisturbed areas of outstanding natural value with high conservation importance, high recreation potential, of easy access to visitors and clearly of benefit to the region. Although, some of national parks in Kalimantan have suffered badly from agricultural encroachment, timber felling and other destructive officially prohibited in conservation areas, however, a number of surveys in some national park indicated species richness of medicinal plants. Selection of representative expedition or survey sites, for instance was selected as far as possible to be both representative of certain national park and of unique scientific value. Illustration of medicinal plants species richness of 3 national parks in Kalimantan are describe below.

3.1. Betung Kerihun National Park in West Kalimantan

Betung Kerihun National Park, the largest conservation area in West Kalimantan was established on 5 September 1995, covering an area of almost 800,000 ha. Based on the interview of three communities consisted of 62 households in the upper Embaloh, Kapuas Hulu Districs, adjacent to National Park, Guntavid et al (1999). reported that a total of 27 families, 36 genera and 41 species of medicinal plants were collected and their functions noted. Normal and common alments are treated with traditional herbal medicine. These common ailments range from simple fevers, boils, skin diseases, cut and wounds, diarroea to chronic dysentry and maternal ailing after giving birth. For fevers *Ceiba pentandra*, *Bauhinia acuminata* or *Tetracera korthalsii* are employed. Cut and woundsare treated with *Bellucia pentamera*. *Phyllanthus urinaria* or *Psidium guajava* are used to remedy diarrhoea and dysentry. Ater giving birth, mother use *Blumea balsamifera* to regain energy. For aphrodisiac properties, *Eurycoma longifolia* is used. For skin diseases *Cassia alata* is said to be an instant cure. For suckling children with stomach ail-

ments, *Caryota mitis* is decocted and consumed by mothers. To expel and eradicate stubborn stomach thread worms and other helminthics, the aromatic rhizomes of *Acorus calamus* is consumed after decoction.

3.2. Kutai National Park in East Kalimantan

Kutai National Park in East Kalimantan was originally established as a game reserve of 360,000 hectares in 1936 by the Sultan of Kutai to protect species such as sumatra rhino, banteng and orangutan. In 1982, for the first time, Kutai National Park was declared, covering an area of 200,000 hectares. Inventory of medicinal plants noted 220 species of medicinal plants, for which botanical names of 23 species among others not identified yet (Purwanto, 2005). Based on family of the medicinal plants, 4.55% of them consisted of Euphorbiaceae, followed by Rubiaceae (4.55%), Mellaceae (5.45%),Verbenaceae (3.64%), Lauraceae (2.73%), Moraceae (2.73%) Asteraceae (2.27%), Annonaceae (2.27%), Papilionaceae (2.27%), Rhizophoraceae (1.82%), Myrtaceae (1.82%), Piperaceae (1.82%), Arecaceae (1.82%) Anacardiaceae (1.36%), Clusiaceae (1.36%), Sapindaceae (1.36%), Urticaceae (1.36%) and others families which were less than 1%. Parts of medicinal plants were used obtained from leaves (116 species), roots (59 species), bark (52 species), fruit (21 species), and seed (20 species).

3.3. Kayan Mentarang National Park in East Kalimantan

Kayan Mentarang National Park is located at Malinau and Nunukan District in the Province of East Kalimantan, established formally by government of Indonesia in 1996, covering an area approximately 1.35 million hectares. Matius et al. (2003) reported results of the survey of medicinal plants which were carried out in Pa'Raye, a Lundayeh village, in Kerayan sub-district, regency of Nunukan, East Kalimantan. The village is located at the edge of the Kayan Mentarang National Park at altitude approximately 920 m above sea level. The study of medicinal plants was conducted by household interviews and field surveys. A total of 52 plants species from the forest and 3 species from home gardens are known used by local people for their healing properties. They consisted of 16 species of climbers, 12 species of herbs, 11 species of shrubs, 11 species of trees, 3 species of fern, 1 species of rattan and 1 species of bamboo. Two parts of a plant that are most commonly used are the leaves and the roots. The local people usually used the root of *Etlingera* sp, sap of *Tetracera* sp, the whole plant of *Leucosyke capitellata* for treating stomachache. Malaria disease is treated either by using the root of *Alstonia angustiloba, Eurycoma longifolia*. The latex of *Alstonia angustiloba* is also can be used for healing wounds caused by burns. For treating ulcers, the villagers normally used either the leaves of Piper sp young fronds of *Blechnum orientale* or young leaves of *Scheffers* sp. Leaves and stem of *Borreria* sp. are used for treating syphilis and gonorrhea. Besides the plants that can be used alone, there also plants that need to be mixed together for treating certain kind of illness, for example, leaves, inner bark and root of *Vernonia arborea, Desmos chinensis, Piper* sp., *Disochaeta* sp. and *Litsea cubeba* mixed pounded together and then rubbed from the chest down toward the stomach. It is for curing a kind of internal pain that occurs from stomach to the chest.

4. Preliminary Results of Current Medicinal Plants Research in Mulawarman University, East Kalimantan, Indonesia

4.1. The Medicinal Plants in CIFOR Mali nau Research Forest Area (Rahayu, 2005)

The purpose of this research were to study the knowledge of the community about medicinal plants in term of their species, the way of preparing them, and organ/part their usefulness. This research also intends to study the perception and appreciation of the community towards the medicinal plants identification of medicinal plant and to find out the characteristic of certain ecology based on the density, pattern of distribution and the association among the medicinal plants. Another purpose was to find out the chemical contents of particular medicinal plants. Based on the interviewed, there was 132 plants species which were used as medication by the people, 95 species were used by the Dayak Punan and 81 species were used by the Dayak Kenyah. These medicinal plants consist of 105 genus and 57 families. The medicinal plants which were most frequently used include those from Araceae and Zingiberaceae families, and based on their habitus herb, these plants were used more than others. The parts of the plants which were mostly used include leaves, followed by roots, stems and tubers. The ways in preparing the medicine can take only one kind of plant or it can be a mixture of some kinds of plants and they can be directly consumed (swallowed, stamped it on particular part of body, used it as shampoo, or bath). The medicine can also be indirectly consumed (pounded, boiled/stemed, burned, sliced, scraped off). The community has a good and a very good perception about the medicinal plants. However, their appreciation on the medicinal plants has decreased because they think that it was less practical and not modern. There were 28 species of medicinal plants found at CIFOR plots and 52 species in the community reserved forests. The density of the plants in each location was categorized as low. The patterns of the medicinal plants distribution were generally in groups rather than evenly distributed. In terms of species association at the plots, it was found that 44 combined species have significant association, and 26 combined species have significant positive association. In the community reserve forests, there were 189 combination which associate significantly at the level of 95%; 46 species have significant negative association. 46 species have significant negative association and 143 combined species have significant positive association. The result of phytochemistry shows that there were 19 species of medicinal plants contain alkaloid, 14 species contain triterpenoid, 5 species contain steroid, 10 species contain saponin, and 18 species contain flavonoid.

4.2. Analysis, Identification and Characteristic of Medicinal Plants in Education Forest of Palangkaraya University, Central Kalimantan (Ilona, 2003)

The aims of the research were to find out information about diversity of medicinal plants and association among species by vegetation analysis, names and morphological characteristic, parts of plant usable for the medicine, efficacy of the plants to human health and the opinion of local people toward the medicinal plants. Results of the research showed that there were 38 species (27 families) found on

the observation plots and 53 species (33 families) found on the outside ones. The most useful family of the medicinal plants was the Apocynaceae. The highest Important Value Index (IVI) for seedlings, saplings, poles and trees was *Cinnamomum sp*. (IVI : 28.80%), *Cinnamomum sp*.(IVI : 61.54%), *Garcinia syzygiifolia* (IVI: 74.26%) and *Tristania maingayi* (IVI: 109.70%) respectively. The medicinal plants distributed in clustered manner in all stages of growth. There were 91 species of 51 families were utilized by the people and 59 species of them were registered and well known their uses. There were 28 processing methods of medicinal plants, among them, 18 species were processed by boiling and immerse prior to drink is the most used by the people. The usable parts of plants as the medicine were leaves (39 species), roots (25 species), stems (12 species), fruits/seeds (10 species), barks (9 species), resin (7 species), tuber (5 species), and all part of plant (2 species). Based on the kind of medicinal plants, 32% of them consisted of trees, followed by shrubs (30%), climbers (17%), herbs (16%), fungi (2%), grasses (2%) and pterydophyts (1%). The utilization of medicinal plants by the people is still not maximum yet, hence the guidance and information about the utilization are necessary. It is also necessary to inform the people that besides utilization, cultivation for commercial scale is possible, so that they have an interest to cultivate and to conserve the medicinal plants in their own garden.

4.3. Acute toxicity test and Analgetic-Antipiretic-Antiinflammation Effect of Leaves and Bark of *Vitex pubescens* (Leatemia, et al., 2006)

Based on ethnobotanical fact, the bark and leaves of *Vitex pubescens* in many place can be used as medicine for back ache, fever, sprain and stomach ache but scientific proven and acute toxicity data still not exist. In the experiment, the simplisia and infuse were made from from the bark and leaves and then the simplisia was maserated with ethanol. The ethanol extract and the infusion were given orally with single dose to mice for acute toxicity test. Mice were induced by yeast sub cultaneously due to fever to mice and then the extract and the infusion were given orally. Rectal temperature was measured per hour for 5 hours. Giving orally single dose of ethanol extract and infusion of leaves and the bark and the leaves reduced the rectal temperature of mice compared with control. The reduction was equivalent with paracetamol given at 300 mg per kg of body weight. Ethanol extract of the bark and the leaves of *Vitex pubescens* have antipyretical effect and low toxicity.

4.4. Medicinal plants in Rattan Garden (Matius, 2004)

In the study of plant diversity and utilization of rattan garden, it was found that in 6 ha of rattan gardens contained 146 species of medicinal plants from 7 plant groups. These included 73 climber species, 29 tree species, 26 shrub species, 12 herb species, 3 fern species and 2 palm species. For using these plants as medicine the local people believe that someone has to fulfil one to several requirements. If these requirements are ignored, the plants have no medicinal effect for curing diseases.If someone wants to learn something about medicinal plants from other people, he must give *temaai* to the person who teaches or gives him information. *Temaai* is a kind of knowledge transfer payment in

order to transfer restorative power of medicine or magical plants. The value of *temaai* vary and depend on the value of medicinal function. It can be a certain combination of money, jug, plate, bowl, knife, spear, cloth and rice. People using medicinal plants to cure their health have to follow taboos like not to eat a certain kind of food. Sap of 70 medicinal plant species (47.9%) is used as medicine, as well as 54 leave species (37%), inner barks from 15 species (10.3%), cambiums from 4 species (2.7%), fruits from 4 species (2.7%), roots from 6 species (4.1%), tuber from 1 species (0.7%), young tips from 1 species (0.7%) and seedling from 1 species (0.7%).

4.5. The development prospect of *Fibraurea tinctoria* as antioxidant (Fikriah et al. 2006).

Fibraurea tinctoria have been used by certain people of East Kalimantan for hepatitis treatment, however, safety doses for acute usage by oral and secondary metabolites does not find yet. Hepatitis caused may many things. One of them is the increasing of abundant free radical, that can cause lipid peroxidation at liver cell membrant, resulting in liver damage. The aims of the research were to find out the content of secondary metabolites, the acute usage by oral securely, and the effect of lipid peoxidation reducing in vitro. The powder of *Fibraurea tinctoria* bar was extracted with ethanol before conducting phytochemical screening, then measured acute toxicity test by using brine shrimp, and measured acute toxicity test orally by using female and male mice; lipid peroxidation inhibition test with thiocynate test and tiobarbiturat. Phytochemical screening resulted alkaloid secondary metabolites and terpenoid/steroid, acute toxicity test by using brine shrimp resulted LC50 value equal to (105.328 ± 87.325). Acute toxicity test by oral up to dose 2 gram/kg body weight do not cause death at female and male mice. Result of thiocyanate test and thiobarbiturate with doses 5,10,20 mg/extract ml inhibited the lipid peroxidation in vitro, which was stronger than vitamine E (10 mg/ml).

4.6. Exploration of bioactive compounds, toxicity and antioxidant activity from plants origin of East Kalimantan (Ismail, Hajar, Marliana, Indrayatno and Mangestuti, 2006)

Ten plants from the forest (root, stem and leaf) were macerated with methanol, then screen the antioxidant activity with 2,2-diphenyl-1-picrylhydrazil (DPPH) free radical scavenging, reducing power, hidroxyl radical scavenging assay, and decoloration DPHH reagent spray on TLC. Brine Shrimp Lethality Test was used to evaluate toxicity. It was found that three species have high activity of antioxidant and non toxic, i.e. leave of *Dracontomelon dao* on flavonoid and alkaloid; root of *Elaecarpus stipularis* on polyphenol and root of *Macaranga gigantea* on flavonoid and polyphenol.

Closing Remarks

1. With regard to species richness of medicinal plants mentioned in certain location, it should be take into account that number of species and identified species were illustrated only the areas sampled and did not represented the whole areas. For example in large area of national parks, exploration of ethnobotanical surveys were still limited because of a number of constaints. On the

other hand, there is a worries of forest destruction and tradional knowledge of medicinal plants which are only understand by certain people.

2. Utilization of medicinal plants by local people are various and sometimes is questionable whether is really can be cured of diseases effectively or may be become more complicated and worsed. In some cases, the effectiveness of traditional medicine is challenges to be proven by pharmacologist. Though formally not always acceptable by the conventional health providers, tradional medicines are continously developed used by the community.

3. With the slogan " back to nature ", both government and researchers and local industries have been several efforts to develop tradional medicine, so that can be used in heath services. However, quality assurance measures must be established to ensure a steady, affordable and sustainable supply of good quality of medicinal plant materials.

4. Research on medicinal plants were carried out by some institutions and individual researchers. It is important to make a series of research priority to find out the whole aspects of medicinal plants including the quality of safety and efficacy data of medicinal plants.

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