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Ethnobotanical Survey of Medicinal Plants Traded at Tamu in Sabah Urban Area

Kaji Selidik Etnobotani terhadap Dagangan Tumbuhan Perubatan di Tamu dalam Kawasan Bandar Sabah

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ABSTRACT

Medicinal plants are still important to the livelihood of urban communities in Kota Kinabalu, Sabah. As the main regional growth centre, the rapid development of the city is not a problem for the medicinal plants market to survive. Most of this biomedicine product can be found being sold at the local market which they called as Tamu. Understanding the importance of medicinal plants may help to design appropriate resource management policies in fulfil the needs for urban community. To understand the values of this product to the urban community, identification of the species involved is necessary. This paper present the species of medicinal plant traded in Kota Kinabalu. Survey has been done through observation, interviews and sample collection from eight tamu. In total, 62 species has been collected, while their uses and the usage were described.

Keywords: Ethnobotanical survey; medicinal plants; Sabah

ABSTRAK

Tumbuhan perubatan masih lagi penting kepada kehidupan masyarakat bandar di Kota Kinabalu, Sabah. Sebagai pusat pertumbuhan wilayah utama, pembangunan pesat bandar tidak menjadi masalah untuk pasaran tumbuhan perubatan untuk terus hidup. Kebanyakan produk bioperubatan ini boleh didapati di pasaran tempatan yang disebut sebagai Tamu. Memahami kepentingan tumbuh-tumbuhan perubatan boleh membantu untuk membentuk dasar-dasar pengurusan sumber yang sesuai dalam memenuhi keperluan masyarakat bandar. Untuk memahami nilai-nilai produk ini bagi masyarakat bandar, spesies yang terlibat perlu dikenal pasti. Kertas kerja ini membentangkan spesies tumbuhan ubatan yang diniagakan di Kota Kinabalu. Kajian telah dilakukan melalui pemerhatian, temu bual dan pengumpulan sampel daripada lapan tamu. Keseluruhannya, 62 spesies telah dikumpulkan, dan kegunaan serta penggunaan telah diterangkan.

Kata kunci: Kajian etnobotani; tumbuhan ubatan; Sabah

INTRODUCTION

Kota Kinabalu is the main regional growth centre, as well as the primary city in the Sabah urban hierarchy (IDS 2007). Medicinal plants can be found in several tamus in Sabah. It is one of the specialty for the state (Mohd Yaakub 2013). The urban society is retaining the use of biomedicine, especially medicinal plants in daily life. This resulted to medicinal plants being sold at all *tamu*. *Tamu* is a local market originated by the goods and products' exchange activities since long ago. Tamu has its sentimental values to the Sabahan, since it was originally formed as a centre of gathering product for trading purposes. Previously, communities from all over places came to *tamu* to sell and to buy their needs. The communities from rural area sold their wild products from the forest as well as crops from their farm, while the coastal communities sold their products from the seas and coastal area. Until today, most of the medicinal plants are still important as well as the tamu ground, even for the urban communities, such as the residences of Kota Kinabalu, Sabah.

As a whole, Kota Kinabalu is managed under the Kota Kinabalu City Hall (DBKK). However, towns in the city are still conducted by its own district councils. DBKK creates and develops a quality management system in dealing with community matters particularly for areas located beyond the ratings area as well as the native culture and heritage. It is DBKK's responsibility to fulfil the government's vision of creating a strong society through planned developments and optimize use of technology and human resources (DBKK 2013).

To ensure the survival of medicinal plants supplies into urban areas, the importance of

medicinal plants must be identified. Therefore, this must be considered in the urban governance policy to preserve the space for the medicinal plants trade, such as *tamu*. This paper presents the collection of medicinal plants traded in Kota Kinabalu with description of their use.

STUDY SITE

This study was conducted in Kota Kinabalu, Sabah. Sabah is located in the northern tip of the Island of Borneo. As the second largest state in Malaysia, majority of the people are indigenous communities of Kadazandusun, Murut, Rungus and Bajau (Sabah State Government 2013; Kodoh et al. 2009). Most of them are still utilising plants for medication purposes. This survey covered the medicinal plants traders, mainly from those major ethnic groups. They were interviewed for data on the usage of the medicinal plants. The study was carried out in eight tamus in Kota Kinabalu (see Figure 1), namely Penampang tamu, Gaya street tamu, Koperasi Pembangunan Desa (KPD), Putatan Tamu, Menggatal Tamu, Tuaran tamu, Tamparuli Tamu and Tamu Inanam. All sites are located along the coastal area.

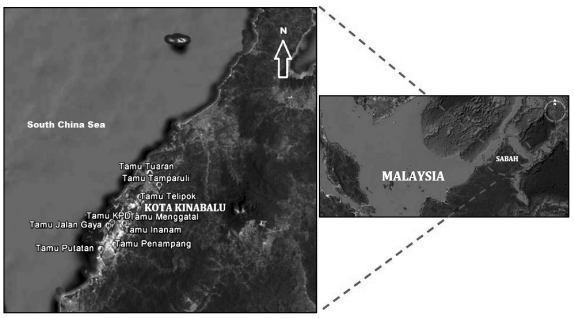

FIGURE 1. Location of the tamu where study was carried out

MATERIAL AND METHOD

The study was conducted in February 2012 to August 2013. Data has been obtained trough survey, interviews and questionnaires. Total of 63 local medicinal plants' traders took part in the process. Most of them are form the ethnic Kadazandusun, Kadazandusun-Murut, Bajau, Bajau-Banjar, Brunei, Kedayan, Lundayeh, Murut, Rungus and Sino Native. Study began with the survey to the study sites to understand the medicinal plants status, as well as to collect some preliminary data. Most of the respondents are fluent in Malay language. Hence, interview process and questionnaires were conducted in Malay as well as in local dialect with the help of a translator. Local name, the usage of medicinal plants traded at the study site were recorded in writing and photos. Data obtained from the field were analysed using the Statistical Program for Social Sciences (SPSS) software.

FINDING

A total of 62 species from 37 families of medicinal plants were found sold in the study site (See Table 1). Those plants were harvested from the forest and farms (27 species), while some are cultivated and bought from supplier (38 species). From the total number of species, four species were either cultivated and wild, or cultivated.

Survey showed that those plants have 99 uses. Majority of them are believed to be a cure for high blood pressure (10.2 %), diabetes (7.2%), cold (4.9%), cough (3%), fever (3%) and digestion (3%). While other plants with less than 1% uses, such as ulcer and some skin diseases. Four species were used for a cure for cancer (2.7%), stomach ache (2.7%), flu (2.7%) and Abscesses (2.7%), while 2.3 per cent are for asthma.

Species with highest value in uses is Jerangau merah (*Baesenbergia stenophylla*) (6.4%), Raja Kayu (*Koompassia malaccensis*), Sirih (*Piper sp*.) and Tapayas (*Caricca papaya*) with 4.9 per cent and Mahkota Dewa (*Phaleria papuana*) (4.2%). Those species with uses between two percent and below four percent are Pegaga (*Cantella asiatica*), Sarang semut, Belalai gajah (*Clinacanthus nutans*); (*also known as Sabah snake grass*), Bunga raya (*Hibiscus sp*.), Bunga kertas (*Bougainvillea sp*.), Bawing (*Ocimum tenuiflorum*), Ekor anjing (*Plantago major*), Petai (*Parkia sp*.), Sakot Tongus (*Usnea sp*.), and Senduduk putih (*Melastoma sanguineum*).

TABLE 1. Medicinal plants sold in Kota Kinabalu, Sabah

Local name / Botanical name	Preparation	Ailment treated or plant used	Part used
1. Agar-agar / *N.A*	Fried or boiled and eat as side dish	Digestion	Whole part
2. Aru / *Casuarina sp.*	Soaked in alcohol (brandy) and apply to hair	Hair fall	Leaves
3. Ati-ati / *Coleus Blumei*	Pounded and applied on abscesses	Abscesses	Leaves
	Boiled and drank	Fever	Leaves
		Headache	Leaves
4. Bawing / *Ocimum tenuiflorum*	Side dish	i. Digestion	Leaves
		ii. Headache	Leaves
		iii. Cough	
		iv. Asthma	
		v. Fever	
		vi. Cold	
5. Belalai gajah / *Clinacanthus Nutans*	Side dish	i. Cancer	Leaves
		ii. Leukaemia	
		iii. Haemorrhoids	
	Blended and drank	i. Cancer	Shoots and leaves
		ii. High blood pressure	Leaves
		iii. Diabetes	
		iv. Kidney stone	
6. Buah jantung / *Dischidia rafflesiana*	Soaked and drank	i. Cancer	Fruit
		ii. Skin problem	
7. Bunga kertas / *Bougainvillea sp.*	Blended and applied on to abscesses	Abscesses	Leaves
	Patched on forehead	Fever	
	Boiled and drank	i. Body ache	
		ii. Flu	
	Pounded and applied on abscesses	Abscesses	
	Pounded and patched on wound	Wound	
	Blended and patched on forehead	Migraine	
8. Bunga raya / *Hibiscus sp.*	Apply gel to the hair	Hair problem	Gel
	Applied the mixture of gel and piper to abscesses.	Abscesses	
	Pounded and applied on hair	Hair problem	Leaves
	Boiled and drank	i. Fever	Root
		ii. Flu	
		iii. Cough	
	Pounded and applied on abscesses	Abscesses	Leaves
9. Durian belanda / *Annona muricata*	Boiled and drank	Cancer	Leaves
10. Ekor anjing / *Plantago major*	Boiled, add sugar and drank	i. Diuretic	Whole part
		ii. Menstruation	
		iii. High blood pressure	
		iv. Flu	
		v. Cough	
		vi. Digestion	
11. Gambir / *Uncaria gambir*	Boiled and drank	i. Joint pain	Stem
		ii. Flu	
		iii. Wound	

12. Halia / *Zingiber officinale Roscoe*	Pounded and boiled and drank or, boiled in soup or, pounded, boiled and drank	Cold	Rhizome
13. Halia merah / *Zingiber officinale Vara rubrum*	Boiled and drank	Blood circulation	Rhizome
	Soaked and drank	Cold	Rhizome
	Pounded and rub	i. Swelling ii. Fever iii. Flu	
	Pounded, boiled and drank or pounded and applied to face	Facial	
14. Hempedu bumi / *Andrographis paniculata*	Soaked and drank	High blood pressure	Leaves
	Boiled and drank	i. Skin disease ii. Diabetes iii. High blood pressure	
15. Jambu batu / *Psidium Guava*	Boiled and drank	i. Diarrhoea ii. Digestion	Leaves
16. Jambu Madu / *Syzygium aqueum*	Dispatched on forehead (baby)	Fever	Leaves
17. Jerangau merah / *Baesenbergia stenophylla*	Pounded, soaked and drank or added into drinks	i. Breathless ii. Diabetes iii. High blood pressure iv. Heart disease v. Kidney stones vi. Cough vii. Food poisoning viii. Stomach ache ix. Diarrhoea x. Fever	Stem
	Pounded, soaked and drank	Vomiting blood	
	Added into drinks	i. Fever ii. Malaria iii. Asthma iv. Tonic v. Bleeding	
18. Kayu madu / *N.A*	Soaked and drank	Diabetes Cigarette addict Cold Diarrhoea Digestion Vomiting Acne	Stem Stem
19. Kayu Manis / *Cinnamomum sp.*	Soaked and drank	Cold	Stem
20. Kayu Resdung / *N.A*	Smoked	Sinus	Stem
21. Kesum / *Polygonum minus*	Boiled and drank	i. Cold ii. Digestion iii. Menstrual stimulant	Leaves
22. Kesur / *Kaempferia galanga*	Added into dish	i. Cold ii. Headache iii. Cough iv. Menstruation	Whole part
23. Kokos / *Dichapetalum gelonioides*	Boiled and drank	i. Menstruation ii. Postpartum women iii. Gastric iv. Cold v. *Hearing problem*	Stem

		vi. High blood pressure	Root
		vii. Diabetes	
24. Kulimpapa / *Vitex Pinnata*	Boiled and drank	i. Stomach ache	Leaves
		ii. Digestion	
		iii. Breathless	
25. Kunyit / *Cucurma domestica/ Curcuma longa L.*	Pounded, add water and drank	i. Menstruation	Rhizome
		ii. Fever	
	Pounded and applied to nose	Flu	
26. Lengkuas / *Languas galangal L.*	Boiled and drank	Cold	Rhizome
	Boiled and drank	Fever	
27. Lidah buaya / *Aloe vera*	Apply gel to the hair	Hair problem	Gel
	Apply gel to the acne	Acne	
	Apply gel to the wound	Wound	
	Gel applied to the face	Facial	
28. Lidah jin / *Sansevieria sp.*	Apply gel to the needed part	Antidote	Gel
	Boiled and drank	i. Kidney stone	Leaves
		ii. Kidney problem	
	Patched to wound	Wound	
	Added into dish	Blood circulation	
29. Limpanas / *Goniothalamus roseus*	Boiled and drank	i. Fever	Stem
		ii. Tonic	
30. Longsima / *Peperomia Pellucida*	Side dish	High blood pressure	Whole part
31. Mahkota dewa / *Phaleria papuana*	Boiled and drank	i. High blood pressure	Leaves
		ii. Tiredness	
	Side dish or drinks	i. Gout	Fruit and Leaves
		ii. Cough	
		iii. Asthma	
		iv. Digestion	
		v. Allergic	
		vi. Hepatitis	
		vii. Heart disease	
	Boiled and drank	i. Diabetes	
		ii. Kidney problem	
		iii. Dizziness	Leaves
32. Marunggai / *Moringa sp.*	Boiled and drank	i. Asthma	Leaves
		ii. Cough	
		iii. Diarrhoea	
		iv. Fever	
33. Mas cotek / *Ficus deltoidea*	Soaked and drops on eyes	Sore eyes	Leaves
	Boiled and drank	Cold	
34. Mengkudu / *Morinda sp.*	Side dish (*Ulam*)	High blood pressure	Leaves
35. Mentayang / *Caesalpinia bonduc.*	Fried, pounded and patched	Chicken Pox	Seed
	Boiled and drank	Malaria	Fruit
36. Misai kucing / *Orthosiphon stamineu.*	Boiled and drank	i. Diabetes	Leaves
		ii. High blood pressure	
37. Nanas batu / *Pinus sp.*	Boiled and drank	Fever	Fruit
38. Patawali / *Tinospora Crispa*	Boiled and drank	i. Heart problem	Stem
		ii. High blood pressure	
		iii. Scabies	
		iv. Wound	
		v. Diabetes	
39. Pegaga / *Cantella asiatica*	Side dish (*Ulam*)	Anaemia	Whole part
	Side dish (*Ulam*)	i. High blood pressure	
		ii. Fever	
		iii. Digestion	

			iv. Diarrhoea	
			v. Cancer	
		or, pounded and drank	Detox	
		or, boiled and drank	i. Digestion	
			ii. Blood circulation	
		Pounded and applied to abscesses	i. Abscesses	
			ii. Rash	Leaves
40.	Peria katak / *Momordica sp.*	Boiled and drank	i. High blood pressure	Leaves
			ii. Diabetes	
			iii. Cholesterol	
41.	Petai / *Parkia* sp.	Side dish (*Ulam*)	Cold	Seed
		Side dish (*Ulam*) or boiled and drank	i. High blood pressure	
			ii. Kidney problem	
			iii. Digestion	
42.	Pinang / *Areca catechu L.*	Chewing	Strengthen teeth	Fruit
		Fruit pounded with leaves and patched	Stomach ache	
		Boiled and drank	Diabetes	
		Fruit pounded with leaves and patched	i. Bloating for children	
			ii. Gastric	Fruit
		Side dish (*Ulam*)	i. Strengthen teeth	
			ii. Anaemia	
		Pounded and applied	Toothache	
		Chewing	Strengthen teeth	
43.	Pudina / *Mentha arvensis*	Pounded and applied to ear	Earache	Leaves
44.	Raja kayu / *Koompassia malaccensis*	Scraped, soaked and drank	i. Stomach ache	Stem
			ii. Dysentery	
			iii. Bloating	
			iv. Allergic	
			v. Toothache	
			vi. Swollen gum	
			vii. Asthma	
			viii. Convulsions	
			ix. Stomach ache	
			x. Gastric	
			xi. Body ache	
45.	Roselle / *Hibiscus sabdariffa*	Soaked and drank	Cancer	Fruit
46.	Rumput Fatimah / *Selaginella lepidophylla*	Boiled and drank	i. Asthma	Leaves
			ii. Body ache	
47.	Sakot Tongus / *Usnea sp.*	Boiled and drank	i. Diabetes	Whole part
			ii. High blood pressure	
48.	Salak / *Sallaca sp.*	Boiled with onion and garlic and drank	i. Gastric	Root
			ii. Body ache	
49.	Sapang / *Caesalpinia sappan*	Boiled and drank	i. Anaemia	Stem
			ii. Asthma	
			iii. Body aches	
			iv. Chest pain	
			v. Cold	
			vi. Internal wounds	
			vii. Postpartum women	

50. Sarang semut / *Myrmecodia pandan*	Boiled and drank or, pounded and drank	i. High blood pressure	Whole part
		ii. Tuberculosis	
		iii. Fever	
		iv. Sinus	
		v. Kidney problem	
		vi. Cancer	
		vii. Diabetes	
		viii. Homicides	
		ix. Headache	
		x. Leukaemia	
	Boiled and drank or added with black sugar cane and drank	Cancer	
51. Senduduk putih / *Melastoma sp.*	Soaked and drank	i. High blood pressure	Bud
		ii. Diabetes	
		iii. Gout	
		iv. Detox	
		v. Gynaecology	
52. Serai / *Cymbopogon citratus*	Boiled and drank	i. Flatulence	Whole part
		ii. Gastric	
		iii. Vomiting	
		iv. Breathless	
53. Serai wangi / *Cymbopogon nardus*	Boiled and bathe	i. Cold	Whole part
		ii. Itching skin	
54. Sigup / *Nicotiana tabaccum*	Add water and patched on wound	i. Bleeding	Leaves
55. Sirih / *Piper betle*	Boiled and drank	i. High blood pressure	Leaves
		ii. Diabetes	
	Or soaked and drank	Cough	
	Boiled and applied to skin	Itching skin	
	Pounded and patched to forehead	Bleeding nose	
	Soaked and applied into eyes	Sore eyes	
	Chewing	Bad breath	
	Boiled and drank	i. Cold	
		ii. Gout	
	Pounded and patched	i. Abscesses	
		ii. Asthma	
	Gargle	Ulcer	
	Side dish	Strengthen teeth	
	Pounded and applied to body part	i. Bad smell	
		ii. Skin disease	
56. Stevia / *Stevia sp.*	Dried, pounded, add water and drank	Diabetes	Leaves
57. Sungkang seribu / *Diospyros foxworthyi*	Soaked and drank	i. Antidote	Stem
		ii. Stomach ache	
58. Tapayas / *Carica papaya*	Boiled and drank, as side dish or added into dish	i. High blood pressure	Flower
.		ii. Malaria	
		iii. Migraine	
		iv. Kidney problem	
	Boiled and drank	Chikukunya	
59. Tawawoh / *Blumea balsamifera*	Boiled and bathe or steam bath	Cold	Stem and leaves

60. Terang mata / *Peperomia Pellucida L.*	Added into soup	i. Eye problem	Whole part
		ii. *Blood problem*	Fruit
		iii. Diabetes	
61. Tongkat Ali / *Eurycoma longifolia*	Boiled and drank	Tonic	Root
62. Ulam raja / *Cosmos caudatus*	Side dish (*Ulam*)	i. Cold	Whole part
		ii. Blood circulation	
		iii. Tonic	
		iv. Digestion	Shoots
		v. Blood problem	

The most common parts of plants used in the preparation for medication purposes are their leaves (12.1%), followed by stems (4.7%), whole parts (4.3%), fruits (2.7 %), rhizomes (2.0%), roots (1.6%), gel (1.2%), while seeds, buds and flowers were one per cent respectively.

Commonly, the medicinal plants can be taken orally or used externally. As for preparation for treat, plants are boiled and drunk or taken as drinks by soaking the plants part. Some of the plants can be taken directly as salad or locally known as *ulam* (or some called it '*makan mentah*'), as well as being added in dishes. Besides that, some plants can be taken after they were blended and pounded. Externally, plant parts are applied directly to the human body to be treated. Pounded and blended plants' part usually patched on the needed human part or use in bath. Special for the *Kayu Resdung,* it has to be taken by inhaling its smoke. Sirih (*Piper battle*) is suggested to be taken by gargling to cure ulcer. Whereas, plants like *Aloe vera* and *Sansevieria sp.* is usually used by rubbing the gel on the parts to be treated.

As a product traded at the local market, the medicinal plants are quite easy to get. Survey showed that the selling price of medicinal plants at the study site is at the range of RM0.50 to RM80.00. The most expensive plant is Sungkang seribu (*Diospyros foxworthyi*) with the price of RM80.00 per stems. It was followed by the popular introduced plants Mahkota Dewa (*Phaleria papuana*) with RM30.00 per seedling, Pokok Aru (*Casuarina sp*.) (RM25.00 per seedling) and the Raja Kayu (*Koompassia malaccensis*) (RM20.00 per slice). Other plants are sold at the price of RM20.00 and below with the cheapest plant is the famous endemic plants, Tawawoh (*Blumea balsamifera*) (RM0.50 per bundle). This in a way shows that, in this context the willingness to pay for medicinal plants by the urban communities is as high as RM80.00.

DISCUSSION

Cultivation of more than 50 percent of the species from the total number of medicinal plants sold at the study sites shows the awareness of the traders to the demands of the biomedicine products by the urban society. This is a good sign of conservation culture as well as to decrease harvesting activities in the natural environment. However, introducing too many new species, such as Mahkota Dewa (*Phaleria papuana*), Jerangau merah (*Baesenbergia stenophylla*) and Belalai gajah (*Clinacanthus nutans*), might affect the values and abundance of the endemic species. Species cultivation does not hindering the harvesting of forest resources. Still, it is a good alternative to reduce the activities.

The total number of traded medicinal plants in Kota Kinabalu area could be influenced by the current health problems. Most of the plants are related to high blood pressure and diabetes, the highest disease suffered by Malaysia society. The plants are not only taken for treatment, but to prevent disease. The question is how effective is the material and it the material safe to be used? Some of the traders showing their attendance certificate of short courses organised by the Ministry of Health to convince customers of their knowledge. However, that is not a guarantee for product safety. This is also due to the lack of pharmaceutical study on majority plants.

Urban society of Kota Kinabalu applied medicinal plants internally as well as externally. According to the preparation of the medicinal plants, whole parts of the plants are considered valuable. From its shoot to its root, all are used for various purposes. In economic view, this is considered as optimum utilization of resources.

Survey shows that there is no standard price for each plant species sold as medicine. The dependence on medicinal plants affect their prices. Due to overwhelming demands for some medicinal plants, traders offers higher price. From the finding, it is can

be learned that the urban society is willing to pay as much as RM80.00 per plant. It is a great opportunity for some local traders to get income. Medicinal plants are also available at the lowest price. Some of the traders allowed bargain system, as well as offering price according to customer's ability to pay.

CONCLUSION

Medicinal plant is still relevant as a need for urban society in Kota Kinabalu, Sabah. Hence, the trade of the biomedicine have to be retained to fulfil their needs. The list of medicinal plants traded at those *tamus* in Kota Kinabalu has been listed, together with the information of its uses. From the discussion, we had learned that more attention should be given to the impact of the species' values and abundance, between endemic and introduced species. Besides that, authority has to put a brief concern to enhance the trader's knowledge to ensure the effectiveness and safety of traded species, as well as starting regular pharmaceutical studies as value-added knowledge to the traders and urban society.

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