

Ethnopharmacological Study on Traditional Knowledge of Medicinal Plant Used from Secondary Forest in Community at Sekabuk Village, Mempawah District, West Kalimantan, Indonesia

Yui Hashimoto, Fathul Yusro, Yeni Mariani, Farah Diba, and Kazuhiro Ohtani

Abstract

Study for local knowledge about ethnopharmacology especially medicinal plants used by the community is still limited. West Kalimantan possess a tropical rain forest with megabiodiversity. One of the areas where Malay and Dayak people use medicinal plants from the forest is Sekabuk village, Sadaniang Subdistrict, Mempawah District of West Kalimantan, Indonesia. This research has two objectives: first, to summarize the local knowledge of medicinal plants in the Sekabuk village, and second to identify the mechanisms of shared knowledge on used medicinal plants on each ethnic. The research was conducted by in-depth interview and survey for 45 days in the village. The research programme consisted of interviews, plant observations, and a collection of medicinal plants from five different subdistricts sites i.e. Gelombang, Malangga, Pak Nungkat, Sekabuk, and Titi Dahan. The whole plants, part(s) used, and remedy formulations were elicited from healers and voucher specimens were collected for identification and stored at Forestry Faculty, Tanjungpura University. The results showed that there are 66 plants used for medicine. The family of plants consisted of Zingiberaceae, Lamiaceae and Myrtaceae. The leaves were most frequently used (108), followed by roots (47), whole plant (21), top (6), stems and fruits (5), and sap (1). The methods for preparation and administration and the awareness of medicinal plants are different by ethnic groups and the living environments. The difference between the genders did not significant in terms of knowledge about medicinal plants. Meanwhile, A retention of traditional knowledge of medicinal plants was significant in rural of West Kalimantan. The plants used as medicine were clearly different by ethnic groups, Malay and Dayak. The living environments also affect the difference of used plants on basis of plants accessibility.

Keywords: ethnic groups, knowledge distribution, living environments, local knowledge, medicinal plants, West Kalimantan

Introduction

Most of Indonesian people use traditional herbal medicines known as *jamu* to treat diseases. *Jamu* is a term in Javanese language, meaning the traditional medicine from plants, but it is now adopted into Indonesian language with the similar meaning. Recently, *jamu* becomes modern medicine, and related products are manufactured in many industries (Elfahmi *et al.* 2014). Thus, Indonesian have benefit from herbal medicines. On the other hand, people who live in rural and remote areas have employed plants as traditional medicines since earlier time. *Jamu* is distinguished from plant-based traditional medicine. *Jamu* is written the prescriptions in the form called 'serat' or 'primbon' by Javanese people (Riswan *et al.* 2002). By contrast, local knowledge of herbal medicine has accumulated and has been transmitted from age to age by word of mouth and by life style in rural area or among ethnic minorities (Inta *et al.* 2013). In Indonesia, number of uninsured individual reaches approximately 40% of nation, because an official healthcare insurance system for whole nation didn't exist until 2014 (Republik Indonesia 2012). Thus, the local people still use plants as the traditional medicine in substitution for treatment by doctor in healthcare center. Although recently local medicinal knowledge is spreading recognition that it is important in primary healthcare system, inexpensive modern medicine like tablet,

capsule and liquid has spread across rural areas. Subsequently, the loss of their local knowledge has been progressed.

Indonesia has the second biggest biodiversity in the world after the Amazon forests (Elfahmi *et al.* 2014) and more than 300 ethnics domicile (Silalahi *et al.* 2015). Most of studies have focused on inhibitory activities against particular diseases or specific medicinal plants in Indonesia. Although the traditional knowledge of plant usage as medicine has studied by Indonesian researchers, most studies have not been published in international journals. Especially literatures concerning West Kalimantan are extremely rare. The interactions and relationships between the biological and cultural elements of the environment (Bye 1986) and the influence of the cultural and ecological factors on medicinal plant selection by ethnic groups were examined (Joshi and Edington 1990); Junsongduang *et al.* 2014; Silalahi *et al.* 2015). Although the difference in utilization of traditional medicine has been reported on these studies, rare report is available about those in Indonesia. Additionally, most research was carried out in one village where one ethnic group live. In this study we carried out research in one village which has two characteristics: different ethnic groups live and a community locates away from others. This research had two objectives: (1) to summarize the local knowledge of medicinal plants in this

village; and (2) to identify their knowledge shared by all inhabitants or each ethnic group.

Materials and Methods

Research Site

This fieldwork was conducted in Sekabuk village, Sadaniang Sub-district, Mempawah District in West Kalimantan, Indonesia. This village is approximately located 110km from the capital city Pontianak (Fig. 1). Five

communities, Gelombang, Malangga, Pak nungkat, Sekabuk and Titi Dahan live in the village. The indigenous people are Dayak 69%, Malay 21%, Chinese 8%, and other 2%. The population is about 2,000 (BPS 2013). Malay people live in the community, Pak nungkat is separated from other, but other ethnicities such as the Dayak people live together in other communities. Meanwhile, Sekabuk community is maintained in the center of the village, and Gelombang community is apart from other communities with 20 houses.

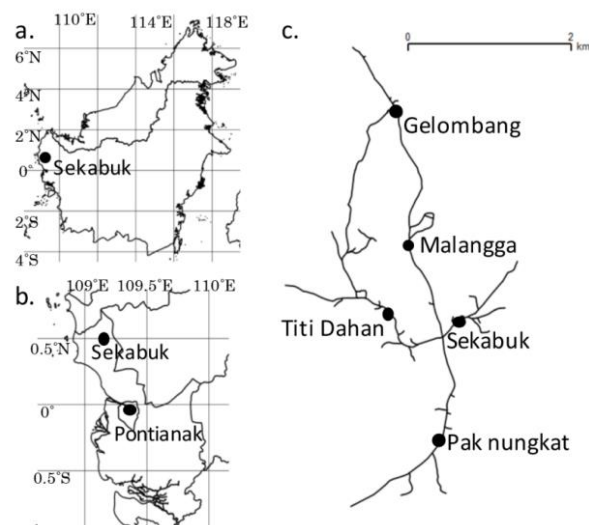


Figure 1. Research Site in Sekabuk Village Mempawah District West Kalimantan.

Data Sampling

Fieldwork was carried out at Sekabuk village Mempawah District West Kalimantan. The communities in this village still used the medicinal plants from the forest for their daily use and treat the diseases. The work consisted of interviews, plant observations, and a collection of medicinal plants in five different sites: Gelombang, Malangga, Pak Nungkat, Sekabuk, and Titi Dahan. Ethnobotanical data was collected through semi-structured interviews twice. During the first round of the survey, we interviewed 66 family units at Gelombang (n=9), Malangga (n=7), Pak nungkat (n=30), Sekabuk (n=5), and Titi Dahan (n=15). The informants were asked about their knowledge of the plants to treat diseases, the used parts, the modes of preparation and administration, the collection sites, and the plant types (native or cultivated). During the second survey, we interviewed 100 local people at Gelombang (n=5), Pak nungkat (n=34), Sekabuk (n=25), and Titi Dahan (n=36). Whereat we could not get cooperation from the people of Malangga community. We proceeded with the investigation without Malangga data. Awareness rate of medicinal plants were collected using a questionnaire – a checklist consisted of 66 species' names which were mentioned in the first fieldwork. The

interviewees were randomly selected, and there were no meetings prior to the sampling. The plants were collected, pressed and then dried in the field, and the voucher specimens were later deposited at the Tanjungpura University. The vernacular names were collected through the help of local people. Scientific names of plants were expressed based on *The Plant Names Index* (IPNI 2005). The Welch's test was used to determine whether there were significant differences between known medicinal plants.

Results and Discussion

Characteristics of Medicinal Plants

A total of 66 different species were recorded for medicinal uses. They belonged to 34 families and were used to treat 46 ailments (Appendix 1). Five out of the 66 species were not identified yet, but the family name for two out of the 5 unidentified species were identified. In terms of the number of species used, Zingiberaceae and Lamiaceae (n=7) were the most used families followed by Myrtaceae (n=5). Zingiberaceous plants exist in about 50 genera and 1,300 species worldwide, distributed mainly in South and Southeast Asia. Plants of this family contain various type of

essential oils, including terpenes, alcohols, ketones, flavonoids, carotenoids and phytoestrogens (Chen *et al.* 2008). Many of lamiaceous plants are used as many medicinal plants because of their rich and fragrant essential oils which are principally composed of monoterpenes (Yamane *et al.* 2010).

Type of Medicinal Plants

Medicinal plants were collected in the forest by individuals or by their family members. Medicinal herbs were either cultivated by the residents (53%) or harvested from the wild (46%) (Fig. 2). In other words, native plants were reported rather than cultivated plants: 82% (Giday *et al.* 2003), 58% (Kichu *et al.* 2015) respectively. Fig. 2 revealed

that ratio of native and cultivated plants were different by community. It shows that cultivated plant rate is high in Titi Dahan and Pak nungkat. People of these communities have the habit of transplanting near homes to use as medicine, because the utilization rate of these medicinal plants is also high. On the other hand, it was indicated that native plant rates is high in Gelombang and Sekabuk. Sekabuk community reported low frequency of use of medicinal plants for everyday use. The residents do not have the custom of cultivating medicinal plants, so that they did not report on their daily use. In the case of Gelombang, it is associated that this community is located near the mountain. There was a tendency to use a plant that grows wild in mountains.

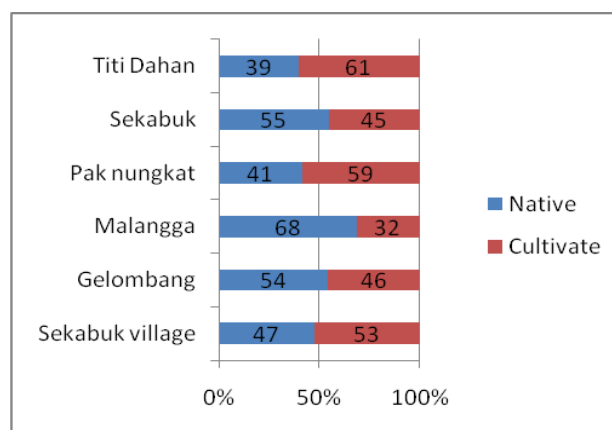


Figure 2. The proportion of medicinal plants which were cultivated and gathered in wild.

Table 1. The number of use reports and their ratio (%) of total uses for medicinal plant, used parts, preparation and administration by each community of Sekabuk village.

		Gelombang		Malangga		Pak nungkat		Sekabuk		Titi Dahan	
Parts used	All	2	(6.5%)	3	(13.6%)	7	(8.5%)	2	(16.7%)	7	(16.3%)
	Fruits	0	(0.0%)	0	(0.0%)	3	(3.7%)	0	(0.0%)	2	(4.7%)
	Leaves	21	(67.7%)	12	(54.5%)	52	(63.4%)	5	(41.7%)	18	(41.9%)
	Roots	5	(16.1%)	7	(31.8%)	16	(19.5%)	5	(41.7%)	14	(32.6%)
	Sap	0	(0.0%)	0	(0.0%)	1	(1.2%)	0	(0.0%)	0	(0.0%)
	Stems	0	(0.0%)	0	(0.0%)	3	(3.7%)	0	(0.0%)	2	(4.7%)
	Top	3	(9.7%)	0	(0.0%)	0	(0.0%)	0	(0.0%)	0	(0.0%)
	Total	31	(100.0%)	22	(100.0%)	82	(100.0%)	12	(100.0%)	43	(100.0%)
Preparation	Fresh	27	(87.1%)	20	(90.9%)	80	(97.6%)	12	(100.0%)	41	(97.6%)
	Dry	3	(9.7%)	2	(9.1%)	0	(0.0%)	0	(0.0%)	1	(2.4%)
	Heat	1	(3.2%)	0	(0.0%)	1	(1.2%)	0	(0.0%)	0	(0.0%)
	Burn	0	(0.0%)	0	(0.0%)	1	(1.2%)	0	(0.0%)	0	(0.0%)
	Total	31	(100.0%)	22	(100.0%)	82	(100.0%)	12	(100.0%)	42	(100.0%)
Application method	Decoction	20	(64.5%)	15	(68.2%)	35	(42.7%)	8	(66.7%)	29	(67.4%)
	Mash	9	(29.0%)	4	(18.2%)	37	(45.1%)	3	(25.0%)	8	(18.6%)
	Press	1	(3.2%)	3	(13.6%)	4	(4.9%)	0	(0.0%)	5	(11.6%)
	Directly	1	(3.2%)	0	(0.0%)	6	(7.3%)	1	(8.3%)	1	(2.3%)
	Total	31	(100.0%)	22	(100.0%)	82	(100.0%)	12	(100.0%)	43	(100.0%)
Application way	Internal	24	(77.4%)	18	(81.8%)	46	(56.1%)	9	(75.0%)	34	(79.1%)
	External	7	(22.6%)	4	(18.2%)	36	(43.9%)	3	(25.0%)	9	(20.9%)
	Total	31	(100.0%)	22	(100.0%)	82	(100.0%)	12	(100.0%)	43	(100.0%)

Table 2. Frequency of plant parts used, preparation and application way for medicinal applications by each community of Sekabuk village.

		Gelombang		Malangga		Pak nungkat		Sekabuk		Titi Dahan	
		Internal	External	Internal	External	Internal	External	Internal	External	Internal	External
Whole plant	Fresh	2	0	3	0	6	1	1	1	4	2
	Dry	0	0	0	0	0	0	0	0	1	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0
Fruits	Fresh	0	0	0	0	2	1	0	0	2	0
	Dry	0	0	0	0	0	0	0	0	0	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0
Leaves	Fresh	10	7	9	2	22	28	4	1	13	5
	Dry	3	0	1	0	0	0	0	0	0	0
	Heat	1	0	0	0	1	0	0	0	0	0
	Burn	0	0	0	0	1	0	0	0	0	0
Roots	Fresh	5	0	4	2	11	5	4	1	12	2
	Dry	0	0	1	0	0	0	0	0	0	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0
Sap	Fresh	0	0	0	0	0	1	0	0	0	0
	Dry	0	0	0	0	0	0	0	0	0	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0
Stems	Fresh	0	0	0	0	3	0	0	0	2	0
	Dry	0	0	0	0	0	0	0	0	0	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0
Top	Fresh	3	3	0	0	0	0	0	0	0	0
	Dry	0	0	0	0	0	0	0	0	0	0
	Heat	0	0	0	0	0	0	0	0	0	0
	Burn	0	0	0	0	0	0	0	0	0	0

Used Plant Parts

The leaves were most frequently used (108), followed by roots (47), whole plant (21), top (6), stems and fruits (5), and sap (1) in Sekabuk village (Table 1). This is the similar result as reported in many other ethnomedicinal studies in Asia (Pahnyaphu *et al.* 2011; Kadir *et al.* 2012; Inta *et al.* 2013; Junsongduang *et al.* 2014; Kichu *et al.* 2015). The leaves are more easily harvested compared to the other parts and the harvesting process is less damaging to the health of the plant itself (Tetali *et al.* 2009). The second most commonly used parts are the roots, because local people preferred plants of Zingiberaceae family in this village. Additionally, roots contain high concentration of bioactive compounds related to their function as reservoir (Srithi *et al.* 2009).

Preparation and Administration

The most common preparation method in Dayak communities (Gelombang, Malangga, Sekabuk and Titi Dahan) was taking as fresh (87.1~100.0%), followed by decoction (64.5~68.2%), mash (12.2~25.0%), press (0.0~13.6%), and directly (0.0~8.3%). Meanwhile, it is indicative that inhabitants in Pak nungkat used two methods

at a similar rate; decoction (42.1%) and mash (45.1%) (Table 2).

The most frequently used administration routes in Dayak communities was internal (75.0~81.8%) rather than external (18.2~25.0%) in Table 2. Several studies have similar results (Giday *et al.* 2003; Rokaya *et al.* 2010; Kichu *et al.* 2015). In our study, the mode for internal application was 'drink' and 'eat', while the external application was 'gargle', 'paint', 'put' and 'squirt'.

In the case of administration, people in Pak nungkat had a different trend. Malay people had a similar rate in the mode of administration: internal (56.1%) and external (43.9%). Looking at the relationship between the used parts and administration (Table 2), Dayak communities used fresh leaves for internal administration (4~13) rather than external (1~7). Malay community preferred fresh leaves for external (28) as well as for internal (22).

Awareness of Medicinal Plants in each Community

Table 3 summarizes the medicinal plants that were recognized by more than 60% of inhabitants in each community. We analyzed the reorganization of medicinal plants commonly by focusing attention on community. In Sekabuk village, 11 species have been widely known.

Table 3. Awareness rate of medicinal plants that are well-recognized in each community.

Gelombang	(%)	Pak nungkat	(%)	Sekabuk	(%)	Titi Dahan	(%)
<i>Rhodomyrtus tomentosa</i> Hassk.	100	<i>Kaempferia galanga</i> L.	73	<i>Leonurus sibiricus</i> L.	92	<i>Eurycoma longifolia</i> Jack	91
<i>Ageratum conyzoides</i> L.	100	<i>Kalanchoe pinnata</i> Pers.	71	<i>Orthosiphon aristatus</i> (Blume) Miq.	88	<i>Rhodomyrtus tomentosa</i> Hassk.	83
<i>Eurycoma longifolia</i> Jack	100	<i>Orthosiphon aristatus</i> (Blume) Miq.	71	<i>Zingiber officinale</i> Roscoe	84	<i>Leonurus sibiricus</i> L.	80
N/A	100	<i>Melastoma malabathricum</i> L.	70	<i>Eurycoma longifolia</i> Jack	84	<i>Ageratum conyzoides</i> L.	77
<i>Morinda citrifolia</i> L.	80	<i>Parkia</i> sp	70	<i>Rhodomyrtus tomentosa</i> Hassk.	80	<i>Orthosiphon aristatus</i> (Blume) Miq.	77
<i>Zingiber officinale</i> Roscoe	80	<i>Zingiber purpureum</i> Roscoe	69	<i>Psidium guajava</i> L.	79	<i>Piper betle</i> L.	76
<i>Psidium guajava</i> L.	80	<i>Piper betle</i> L.	69	<i>Imperata cylindrica</i> P.Deauv.	79	<i>Morinda citrifolia</i> L.	75
<i>Leonurus sibiricus</i> L.	80	<i>Syzygium polyanthum</i> Thwaites	68	<i>Kalanchoe pinnata</i> Pers.	78	<i>Psidium guajava</i> L.	75
<i>Styrax</i> sp	80	<i>Morinda citrifolia</i> L.	66	<i>Morinda citrifolia</i> L.	76	<i>Paederia foetida</i> L.	74
<i>Ricinus communis</i> L.	80	<i>Alpinia galanga</i> Willd.	65	<i>Alpinia galanga</i> Willd.	75	<i>Imperata cylindrica</i> P.Deauv.	74
<i>Orthosiphon aristatus</i> (Blume) Miq.	80	<i>Hibiscus rosa-sinensis</i> L.	65	<i>Aglaonema nitidum</i> Kunth	75	<i>Cassia alata</i> L.	74
<i>Centella asiatica</i> Urb.	80	<i>Ageratum conyzoides</i> L.	64	<i>Piper betle</i> L.	75	<i>Ricinus communis</i> L.	74
<i>Ocimum basilicum</i> L.	80	<i>Syzygium aqueum</i> Alston	63	<i>Elephantopus scaber</i> L.	74	<i>Aglaonema nitidum</i> Kunth	73
<i>Dillenia excelsa</i> Martelli	80	<i>Physalis angulata</i> L.	63	<i>Ageratum conyzoides</i> L.	74	<i>Melastoma malabathricum</i> L.	72
<i>Callicarpa longifolia</i> Lam.	80	<i>Psidium guajava</i> L.	63	<i>Paederia foetida</i> L.	71	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	72
<i>Kaempferia galanga</i> L.	60	<i>Zingiber officinale</i> Roscoe	62	<i>Cassia alata</i> L.	71	<i>Zingiber officinale</i> Roscoe	71
<i>Euphorbia thymifolia</i> L.	60	<i>Euphorbia thymifolia</i> L.	61	<i>Ricinus communis</i> L.	71	<i>Styrax</i> sp	71
<i>Physalis angulata</i> L.	60	<i>Curcuma xanthorrhiza</i> D.Dietr.	61	<i>Annona muricata</i> L.	71	<i>Ocimum basilicum</i> L.	70
<i>Elephantopus scaber</i> L.	60	<i>Ricinus communis</i> L.	61	<i>Kaempferia galanga</i> L.	68	<i>Syzygium polyanthum</i> Thwaites	69
<i>Parkia</i> sp	60	<i>Coffea</i> sp	61	<i>Ocimum basilicum</i> L.	67	<i>Annona muricata</i> L.	68
<i>Paederia foetida</i> L.	60	<i>Momordica charantia</i> L.	61	<i>Melastoma malabathricum</i> L.	64	<i>Callicarpa longifolia</i> Lam.	67
<i>Vitex negundo</i> L.	60			<i>Parkia</i> sp	64	<i>Vitex negundo</i> L.	66
<i>Alpinia galanga</i> Willd.	60			<i>Syzygium polyanthum</i> Thwaites	64	<i>Kaempferia galanga</i> L.	64
<i>Carica papaya</i> L.	60			<i>Vitex negundo</i> L.	63	<i>Alpinia galanga</i> Willd.	64
<i>Syzygium polyanthum</i> Thwaites	60			<i>Justicia gendarussa</i> Brum.f.	61	<i>Momordica charantia</i> L.	64
<i>Piper betle</i> L.	60			N/A	61	<i>Kalanchoe pinnata</i> Pers.	63
<i>Annona muricata</i> L.	60			<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	61	N/A	63
<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	60					<i>Parkia</i> sp	61
<i>Saccharum</i> sp	60						
<i>Curcuma xanthorrhiza</i> D.Dietr.	60						
<i>Flagellaria indica</i> L.	60						

Among them, eight species were popular as medicinal plants throughout Indonesia; *Alpinia galanga* Willd., *Kaempferia galanga* L., *Orthosiphon aristatus* (Blume) Miq., *Morinda citrifolia* L., *Piper betle* L., *Psidium guajava* L., *Syzygium aqueum* Alston, and *Zingiber officinale* Roscoe

(Bahari 2013; Ningrum and Murtie 2013). Nine species were well known in Dayak communities, Gelombang, Sekabuk and Titi Dahan. *Leonurus sibiricus* L., called 'Kacang mah' was recognized among Dayak people by 80%, while Malay people rarely know this plant name nor the usage as

medicine. Dayak said this local name is from the Chinese language and it is widespread in Dayak community because many Dayaknese have married Chinese people. Four medicinal plants were reported to be frequently used only in Pak nungkat. We discovered that these plants have been in the Malay people for generations. Three communities other than Gelombang used two of the same plants for medicine. Only in Gelombang, the five plants were highly recognized, but it cannot be concluded that these five plants are used primarily in Gelombang as medicinal plants because we were only able to interview five people in Gelombang. Among the two plants that were frequently used in the three communities besides Gelombang, *Melastoma malabathricum* L. has been previously researched as a plant that has been used among Gelombang and has also been highly recognized in Sekabuk village. The other plant, *Kalanchoe pinnata* Pers. has been cultivated in every community except Gelombang.

We summarized plant families in which plants have an awareness rate of 60% or more in Table 4. It was clearly that Dayak communities have unique tendency. Gelombang, Sekabuk and Titi Dahan most prefer to use Lamiaceae family, followed by Zingiberaceae and Myrtaceae.

Meanwhile in Pak nungkat, Malay community zingiberaceous plants are used frequently as medicinal plants. Although Myrtaceae also was mentioned as well as other communities, one species belongs to Lamiaceae. In part of 'Characteristics of medicinal plants', it was showed that Zingiberaceae are very widespread in Southeast Asia. Myrtaceous plants are also distributed throughout the tropics, with concentration in Southeast Asia. Many species are cultivated in home gardens to use many economically important food plants, agricultural crops and medicinal plants (Reynertson *et al.* 2008). The only plants mentioned in common to Sekabuk village of the Lamiaceae, *Orthosiphon aristatus* (Blume) Miq. is very famous as medicinal plants in Indonesia. Two species out of lamiaceous plants mentioned in Dayak communities: *Leonurus sibiricus* L. and *Vitex negundo* L. are named by using Chinese language. These plants might be transmitted from Chinese people which live in this village. Although *Vitex negundo* L. was known as medicinal plant in Pak nungkat, *Leonurus sibiricus* L. was relatively unknown. Preparation of this plant as remedy was made using rice wine. Therefore, it is clear that it has not penetrated the ethnic not allowed to drink alcohol as medicinal plant.

Table 4. The top three family of plants that are often used in each community

Gelombang		Pak nungkat		Sekabuk		Titi Dahan	
Lamiaceae	5	Zingiberaceae	5	Lamiaceae	4	Lamiaceae	5
Zingiberaceae	4	Myrtaceae	3	Zingiberaceae	3	Zingiberaceae	3
Myrtaceae	3			Myrtaceae	3	Myrtaceae	3

Gender of Medicinal Plants Knowledge

There was no significant difference between the awareness rate of medicinal plant and the gender, males and females (*t*-test, $P = 0.729$). In general, women were more knowledgeable about medicinal plants than men (Caniago and Siebert 1998; Pahnyaphu *et al.* 2011; Almeida *et al.* 2012; Junsongduang *et al.* 2014). Whereas gender reflects the fact that women tend to be more responsible for family, especially child health care (Caniago and Siebert 1998; Almeida *et al.* 2012; Albuquerque *et al.* 2011) stated that men mentioned more ethnospecies than women did. This ethnic group trended that man collected the medicinal plants from the forest, and when a woman desired a medicinal plant from these areas, she would find a man to collect it. Additionally, their study observed that the anthropogenic areas were the women's main collection sites. In our study, there was no significant difference in collection sites (Table 5). Sekabuk villagers most commonly collected medicinal plants around their house; male (84.9%), female (80.5%). We observed that most of inhabitants earned their living through rice agriculture. In addition, they harvested rubber from trees and also logging wood as their side job. It seems that there is a culture that both men and women work inside and outside the house. Therefore, the knowledge and collection sites of both gender have no significant difference.

Table 5. Collection sites of medicinal plants by each gender in Sekabuk village

Collection sites	% of collection	
	Men	Women
In the village	84.9	80.5
Mountain	2.7	4.2
Forest	8.2	7.6
Rice field	1.4	2.5
Other	2.7	0.0

Conclusions

To conclude, in Sekabuk village, Sadaniang Sub-district, Mempawah District in West Kalimantan, Indonesia, 66 plants were used as medicine. The plants used as medicine were clearly different by ethnic groups, that is Malay and Dayak. Local names of the plants were also different in ethnic groups. Therefore, their knowledge is clearly traditional. Additionally, the living environments effect the difference of used plants due to easiness to obtain plants. Some plants were used in common by each groups. They are widely known in Indonesia, so that this knowledge probably come through media such as books. We will continue the quantitative analysis of the data and will clarify

detailed characteristics of medicinal plant usage in this village.

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Yui Hashimoto
Faculty of Agriculture, Kochi University
Nankoku, Kochi, Japan
Email: yuizou0915@gmail.com

Fathul Yusro
Forestry Faculty, Tanjungpura University
Pontianak, West Kalimantan, Indonesia
Phone: 0561-767673
Email: fathulyusro@gmail.com

Yeni Mariani
Forestry Faculty, Tanjungpura University
Pontianak, West Kalimantan, Indonesia
Phone: 0561-767673
Email: yeni.mariani81@gmail.com

Farah Diba
Forestry Faculty, Tanjungpura University
Pontianak, West Kalimantan, Indonesia
Phone: 0561-767673
Email: farahdiba@fahutan.untan.ac.id

Kazuhiro Ohtani
Faculty of Agriculture, Kochi University
Kuroshio Science Unit, Multidisciplinary Science Cluster
Research and Education Faculty, Kochi University
Email: kazz@kochi-u-ac.jp

Appendix 1. Medicinal Plant Used in Sekabuk Village Mempawah District West Kalimantan Indonesia

No.	Scientific name	Family	Local name		No. of use-reports	Diseases	Parts used	How to Use
			Malay	Dayak				
1	<i>Ageratum conyzoides</i> L.	Asteraceae	kelemaok	Panjat (pancat) kambing	17	Stomachache; cold; heat	Lf	Drink
2	<i>Aglaonema nitidum</i> Kunth	Araceae	peetan	limpeet	1	Stomachache; fever	Rt	Drink
3	<i>Alpinia galanga</i> Willd.	Zingiberaceae	lengkuas	lengkong	2	Fever	Rt	Put
4	<i>Annona muricata</i> L.	Annonaceae	sirsak/nangka belanda	sirsak/nangka belanda	7	Skin fungus; afterbirth	Lf	Drink
5	<i>Archidendron clypearia</i> (jack) I.C.Nielsen	Leguminosae	kedengkang	tatampak	2	Heat; high fever; fever; goiter; hypertension	Lf	Put
6	<i>Bauhinia</i> sp	Fabaceae	tapak kuda	bameak	3	Headache	Rt	Drink
7	<i>Callicarpa longifolia</i> Lam.	Lamiaceae	tampar besi	tamar basi	11	Strangury	Rt; Lf+Rt	Put; Squir
8	<i>Carica papaya</i> L.	Caricaceae	papaya/kates	papaya	1	High fever; headache	Lf	Drink
9	<i>Cassia alata</i> L.	Leguminosae	ketepeng	lingam	2	Malaria	Lf	Paint
10	<i>Centella asiatica</i> Urb.	Apiaceae	pegage	pegaga	3	Skin fungus	Rt	Drink
11	<i>Cheilocostus speciosus</i> (J.Koenig) C.D.Specht	Costaceae	tabu lego	tabu lego	3	Coastipation	Lf	Drink; wash
12	<i>Coffea</i> sp	Rubiaceae	kopi	kopi	1	Malaria; tiredness(child); cough	Lf	Drink
13	<i>Cordyline fruticosa</i> Göpp.	Agavaceae	renjuang	rinyuang	1	Blood feves	Lf	Drink
14	<i>Curcuma heyneana</i> Valetton & Zijip	Zingiberaceae	kunyit putih	kunyit putih	1	Anemia	Rt	Drink
15	<i>Curcuma xanthorrhiza</i> D.Dietr.	Zingiberaceae	temulawak		2	Gastric	Rt	Drink
16	<i>Dillenia excelsa</i> Martelli	Dilleniaceae	simpur	abuant	1	Injury(blood)	Lf	Put
17	<i>Elephantopus scaber</i> L.	Asteraceae	tutup bumi	cameo	4	Heat; malaria	Lf; Rt	Drink
18	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	-	cumanen/kerak nasi	3	Vaginal discharge	Al	Drink
19	<i>Eurycoma longifolia</i> Jack	Simaroubaceae	pasak bumi/bidara	pasak bumi/bidara	8	Toothache; fever	Al	Put
20	<i>Excoecaria chochinensis</i> Lour.	Euphorbiaceae		balik merah	1	Swelling	Lf	Put
21	<i>Flagellaria indica</i> L.	Flagellariaceae	rotan bini	uwidodok	2	Stomachache; pain; cold; itch	Rt; St	Drink
22	<i>Gnetum gnemon</i> L.	Gnetaceae	dudamak	dadamak	1	Insect bites	Lf	Paint
23	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	gambak	kembang sepatu	2	Fever; malaria	Rt	Drink
24	<i>Imperata cylindrica</i> P.Deauv.	Poaceae	lalang/alang alang	lalang/padang	3	Toothache	Rt	Drink
25	<i>Justicia gendarussa</i> Brum.f.	Acanthaceae	gandarus	gandarus	1	Headache	Lf	Paint
26	<i>Kaempferia galanga</i> L.	Zingiberaceae	cekur	cakur	2	Strangury	Rt	Drink
27	<i>Kalanchoe pinnata</i> Pers.	Crassulaceae	daun tumbuh didaun	pandingin	5	Fever	Rt	Drink
28	<i>Leonurus sibiricus</i> L.	Lamiaceae	-	kacang mah	7	Broken bone	Rt	Drink; paint
29	<i>Lygodium microphyllum</i> (Cav) R.Br.	Schizaeaceae	ribu ribu		6	Cold; afterbirth; pain; fever	Lf	Drink
30	<i>Melastoma malabathricum</i> L.	Melastomataceae	cengkodok	lingkodok	3	Fever; painful; stomatitis	Lf	Drink
31	<i>Momordica charantia</i> L.	Cucurbitaceae	periak	kuria	2	Heat	Rt+Lf	Drink
32	<i>Morinda citrifolia</i> L.	Rubiaceae	cengkudu	lingkudu	3	Toothache; strangury	Lf	Drink
33	<i>Ocimum basilicum</i> L.	Lamiaceae	selaseh	selaseh	3	Diarrhea	Rt	Drink
34	<i>Oldenlandia corymbosa</i> L.	Phyllanthaceae				Chickenpox; fever	Lf	Paint
35	<i>Orthosiphon aristatus</i> (Blume) Miq.	Lamiaceae	kumis kucing	kumis kucing	9	Hypertension	Fw	Drink; eat
						Fever; cold; full stomach	Lf	Drink
						Toothache	Rt	Put
						Strangury	Lf;	Drink

							Lf+Rt	
36	<i>Paederia foetida</i> L.	Rubiaceae	seguntut	kakantut	3	Malaria	Lf	Drink
37	<i>Panax ginseng</i> C.A.Mey.	Araliaceae	ginseng		2	Feeling of fullness	Lf	Eat
38	<i>Pandanus amaryllifolius</i> Roxb.	Pandanaceae	pandan	pandan	1	Stamina; painful	Rt; Lf	Drink
39	<i>Parkia</i> sp	Fabaceae	kedaong	kadaong	1	Hypertension	Lf	Drink
40	<i>Passiflora foetida</i> L.	Rubiaceae	leletop	songban	4	Full stomach	Sd	Squirt
						Toothache	Rt	Gargle
						Stomachache	Lf	Drink;
								put
41	<i>Phyllanthus urinaria</i> L.	Euphorbiaceae	ambin buah	-	1	Fever, heat	Al	Drink
42	<i>Physalis angulata</i> L.	Solanaceae		gaguntur	3	Diabetes; hypertension; heat	Rt+S t; Rt; Rt+Lf	Drink
43	<i>Piper betle</i> L.	Piperaceae	sirih	karak	7	Feeling of fullness; fever	Lf	Paint
44	<i>Pithecellobium jiringa</i> (Jack) Prain	Leguminosae	jengkol	jengkol	3	Diarrhea(child); pain(baby); fever	Lf	Drink
45	<i>Psidium guajava</i> L.	Myrtaceae	jambu batu	jambu karasik	9	Stomachache; diarrhea	Lf	Drink
						Dengue	Fw	Eat
46	<i>Rhodomyrtus tomentosa</i> Hassk.	Myrtaceae	karimunting	karimunting	5	Stomachache	Rt+Lf	Drink
						Diarrhea(child); pain(baby); fever; stomatitis	Rt	Drink
47	<i>Ricinus communis</i> L.	Euphorbiaceae	jarak merah	korongan	5	Broken bone;	Lf	Put
						Swelling; menstruation	Lf+Rt	Put;
						Vaginal discharge	Rt	drink
48	<i>Saccharum</i> sp	Poaceae/Gramineae	tebu selasih		2	Phlegm; headache	St	Drink
49	<i>Sericocalyx crispus</i> (L.) Bremek.	Acanthaceae		kejibling	1	Kidney	Lf	Drink
50	<i>Sida acuta</i> Burm.f.	Malvaceae	penyapu cina	panipo	5	Stomachache; strangury; toothache	Lf	Drink
51	<i>Styrax</i> sp	Styracaceae	kemenyan	kemenyan	2	Stomachache	St	Drink
52	<i>Syzygium aqueum</i> Alston	Myrtaceae	jambu bereteh		3	Measles; smallpox; ulcer	Lf	Paint
53	<i>Syzygium aromaticum</i> (L.) Merr. & L.M.perry	Myrtaceae	cengkeh	cengkeh	2	Toothache	Fb	Put
54	<i>Syzygium polyanthum</i> Thwaites	Myrtaceae	salam	ubah ubeh	5	Stomatitis	Lf	Eat
						Stomatitis; diarrhea(child); pain(baby); fever	Rt	Drink
55	<i>Vitex negundo</i> L.	Lamiaceae	laban tong san	laban tong san	4	Gastric; fever; cold; full stomach	Lf	Drink
56	<i>Vitex pinnata</i> L.	Lamiaceae	leban	leban	5	Gastric; broken bone	Lf	Squirt
						Heat; asthma	Lf	Drink
57	<i>Vitex trifolia</i> L.	Lamiaceae	gelegundi	-	3	Headache	Lf	Put;
						Acne	Lf	paint
58	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	jahe/liak	jahe/liak	8	Sprain of legs; afterbirth; painful; stomachache	Rt	Put;
59	<i>Zingiber purpureum</i> Roscoe	Zingiberaceae	banglai	banglai	4	Cold; pain; afterbirth	Rt	eat;
60	<i>Zingiber zerumbet</i> (L.) Sm.	Zingiberaceae	lempuyang	saringkuyang	3	Fever; gastric; afterbirth	Rt	drink
61		Euphorbiaceae	menggalai taun	manggala	2	Asthma	Lf	Drink;
								put
62	Unidentified	Amyridaceae	bakum	sare manamu	3	Animal biting	Sp	Paint
63	Unidentified	Asteraceae	-	tainge	6	Pain; sprain of legs	Rt	Put
						Fever; cold; full stomach	Lf	Drink
64	Unidentified	Urticaceae	budae	dagar	4	Anemia; headache	Lf+St	Drink
						Burn injury	Lf	Paint
65	N/A			rautan	3	Fever; stomachache	Lf	Put
66	N/A			tabaang	1	Fever; cold; full stomach	Lf	Drink
						Cold	Lf	Drink

Al = all; Lf = leaves; Rt = roots; Fw = flowers; Fb = flower buds; Sp = sap; St = stem; Sd = seed