

Ethnobotanical Study of *Oke Sou*: Traditional Herbal Drink from Lako Akediri Village in West Halmahera, Indonesia

ジャワ島（インドネシア）伝統の薬草
ドリンク“Oke Sou”。伝承されてきた
製法・成分を分析したところ新薬の開
発につながる可能性が見えてきた。

Anisatu Z. Wakhidah^{1*}, Marina Silalahi², Nisyawati³

¹ Student & researcher, Department Biology, Faculty of Mathematics & Science, Universitas Indonesia

² Lecture & researcher, Faculty of Education & Teacher Training, Department of Biology Education, Universitas Kristen Indonesia,

³ Senior Lecture & researcher, Department Biology, Faculty of Mathematics & Science, Universitas Indonesia



Abstract

Oke sou is a herbal drink from Lako Akediri village in West Halmahera, to maintain health of women's reproductive function. This drink is consumed when women get their first menstruation. This is the first study of *Oke sou* to document all plant species used in preparation of the herbal drink. It describes phytochemical content of the most cited plant based on the study of literature. Ethnobotanical data were collected using semi-structured interviews with indigenous medical practitioners and local women (30 respondents). Plant specimens were collected from the habitat, made into herbarium voucher, and then identified. We recorded as many as 66 plant species from 59 genera belonging to 37 families are used in making the *oke sou*. The most frequently mentioned plants (>5 respondents) are (number of respondents; part used), *Cananga odorata* (Lam.) Hook.f. & Thomson (10; bark), *Curcuma longa* L. (8; rhizome), *Cymbopogon citratus* (DC.) Stapf. (7; stem), *Kaempferia galanga* L. (7; rhizome), *Myristica fragrans* Houtt. (7; fruit and seeds), *Syzygium aromaticum* (L.) Merr. & L.M. Perry (7; leaf & flower), *Cynometra cauliflora* L. (6; bark), and *Tamarindus indica* L. (6; bark). These plants are already well studied regarding phytochemical content in maintaining women's reproductive health. Therefore, the results of this study can be used as a reference for the development of medical products based on local knowledge.

Keywords ethnobotany, oke sou, herbal drink, women, West Halmahera

Introduction

Today in Indonesia, traditional herbal drinks are still used. These drinks have become a part of living culture to maintain body health or beauty care, such as *jamu*. *Jamu* is a traditional herbal drink from Java that has been used for a long time. This herbal drink can consist of a single or some mixed medical plants⁽¹⁷⁾. It is used to treat certain diseases and to maintain good health.

Not only in Java, traditional herbal drinks are also found in other regions such as Bali. Sujarwo et al. (2015) found that the Bali community, especially in

ancient villages, still produce and consume *loloh* to prevent and treat various ailments. *Loloh* is the most common herbal drinks in Bali which generally prepared as decoctions of some medical plants.

Traditional herbal drinks are also found in the eastern region of Indonesia, precisely at Lako Akediri village, District West Halmahera, North Moluccas. This herbal drink is made from various kind of plants at Lako Akediri village. It is believed efficacious to maintain health of girls' reproductive function and to eliminate body odor of them. Villagers at Lako Akediri call that herbal drink by the

name of *oke sou*.

In Indonesia, the knowledge of traditional medicine is usually passed down orally⁽⁴⁾. This is true in the inheritance of knowledge about the composition of plants used in *oke sou* herbal drink. Oral inheritance of knowledge is highly vulnerable to disappear because of no documentation can be inherited⁽²²⁾. Moreover, research on *oke sou* herbal drink has not ever been implemented. Therefore, an inventory about its diversity of plant species is quite important to be conducted.

There are two objectives of this research. First, to inventory all plant species used in preparing *oke sou* herbal drink. Second, to describe and to explain phytochemical content of the most frequently mentioned plants used in *oke sou* herbal drink at Lako Akediri village, West Halmahera, North Moluccas - Indonesia.

Material and Methods

Study Area

The study was conducted at Lako Akediri Village (Fig. 1), on May - June 2014 and October 2014. Lako Akediri Village (Fig. 2) is geographically lied on coastal area E 27°22'17.323" – E 127°37'5.214" and N 0°58'13.505" – N 1° 8'5.332". Total area of Lako Akediri Village is 10 hectares, which located at an altitude 31 meters above sea level with average rainfall 15 mm/month⁽¹⁶⁾. The population in 2014 was 344 people; 175 males and 169 females. The number of households was 85. As many as 98% of the people at Lako Akediri Village come from Sahu tribe, while the rest are ethnic immigrants, such as Buton, Bugis, and Sasak. The agricultural plants at Lako Akediri Village are tubers, corn, coconuts, clove, and nutmeg⁽¹⁶⁾.

Ethnobotanical Data Collection

The ethnobotanical data in this research consists of interview results and list of used plant species. Interview data were collected using semi-structured interviews method that conducted individually

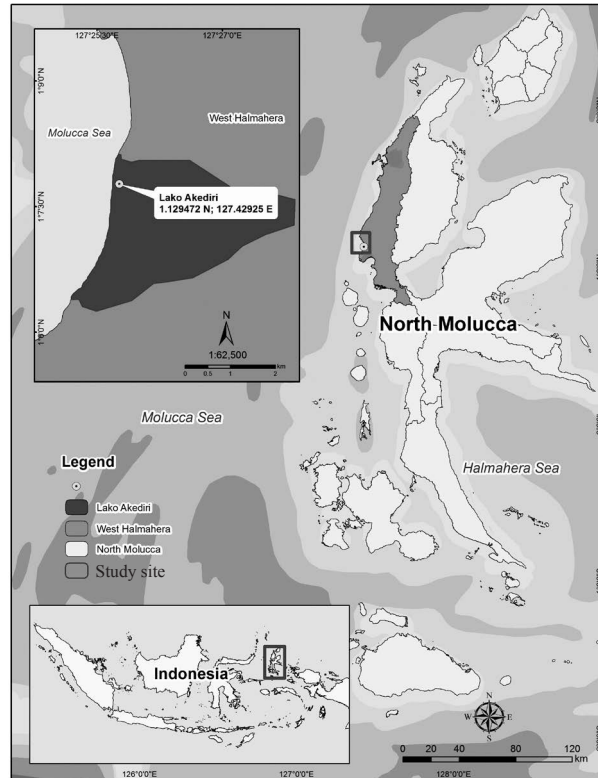


Fig 1. Study site at Lako Akediri Village, Sub District Sahu, District West Halmahera, North Moluccas – Indonesia

(Courtesy of Lesmana, A.B. 2015)



Fig 2. Lako Akediri Village on Sub District Sahu

(Photo by Wakhidah A.Z. 2014)

on key respondents and general respondents. Key respondents are persons who are considered having more knowledge about *oke sou* herbal drink, such as

indigenous medical practitioners. General respondents are local women who ever participated in producing *oke sou* herbal drink with age range of 12–60 years old (30 respondents).

Plant specimens were collected from the habitat together with key respondents. Then plant specimens were made into herbarium voucher. After that specimens were identified at Laboratory of Plant Taxonomy in Department of Biology, Universitas Indonesia.

Data Analysis

Data were analyzed using quantitative and qualitative approaches. Quantitative analysis was conducted to obtain total plant species and families, also to know the most frequently mentioned plants and parts used in *oke sou* herbal drink. Qualitative analysis was aimed to determine phytochemical content in most frequently mentioned plants used in *oke sou* herbal drink at Lako Akediri village.

Results

Plant species used in “oke sou” herbal drink

The investigation recorded as many as 66 plant species from 59 genera used for preparation of *oke sou* herbal drink (Table 1). These plants belong to 37 families which are Acanthaceae, Fabaceae, and Lamiaceae being the most represented families (6 plant species each family). There are eight plant species that most frequently mentioned by respondents (plant species; part used): *Cananga odorata* (Lam.) Hook.f. & Thomson (bark), *Curcuma longa* L. (rhizome), *Cymbopogon citratus* (DC.) Stapf. (stem), *Kaempferia galanga* L. (rhizome), *Myristica fragrans* Houtt. (fruit and seeds), *Syzygium aromaticum* (L.) Merr. & L.M. Perry (leaf & flower), *Cynometra cauliflora* L. (bark), and *Tamarindus indica* L. (bark).

The plant parts, which are harvested to prepare *oke sou* herbal drink, are bark, leaves, stems, rhizomes, flowers, fruits, seeds (Fig. 3). Bark is being the most frequently used part in preparing *oke sou* herbal drink

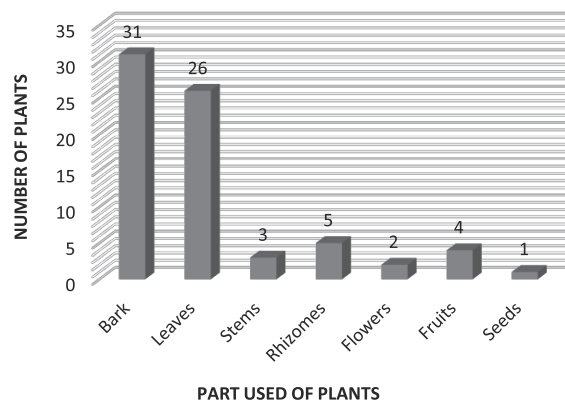


Fig 3. Number of species and plant parts used in preparing *oke sou* herbal drink

(31 species). Meanwhile, the least frequently used part is rhizomes. The data showed that aerial parts (79%) are preferred than underground parts (21%). This may be because of the easier accessibility in picking plant source and the greater quantity of aerial parts than underground parts⁽¹⁾⁽⁷⁾.

Preparation of “oke sou” herbal drink

The preparation of *oke sou* herbal drink is started by classifying the same part of the picked plants, such as leaves with leaves, bark with bark, or root with root. Then, each group is crushed separately. The collisions were given water and then squeezed in a clean cloth - same as the technique in making juice-. After that, the juice of each part of the picked plants is all mixed, then boiled until boiling. When boiled, *oke sou* herbal drink is mixed with herb spices to improve the acceptability of this herbal drink. Usually the choices of herb spices are *Coriandrum sativum* L., *Piper nigrum* L., *Curcuma longa* L., *Zingiber officinale* Roscoe., *Cymbopogon citratus* (DC.) Stapf., *Kaempferia galanga* L., *Myristica fragrans* Houtt., and *Syzygium aromaticum* (L.) Merr. & L.M.Perry. The *oke sou* herbal drink is ready to be consumed when its color becoming as brown as the color of strong tea.

Oke sou herbal drink is only taken by a girl when getting her first menstruation in traditional ceremony

Table 1. Plants used in preparing *oke sou* herbal drink at Lako Akediri Village, Sub District Sahu, District West Halmahera, North Moluccas–Indonesia. The life form, vernacular name, part used, and number of informants are also provided.

Plant families and species	Life form	Vernacular Name	Part Used	Number of Informants
Family: Acanthaceae				
<i>Graptophyllum pictum</i> (L.) Griff	clump	<i>kabi-kabi merah</i>	leaf	1
<i>Graptophyllum pictum</i> 'Roseum variegatum'	clump	<i>kabi-kabi putih</i>	leaf	1
<i>Hemigraphis alternata</i> (Burm. F) T. Anderson	herb	<i>lire buntal</i> (♀)	leaf	4
<i>Hemigraphis rependa</i> (L.) Hall. F	herb	<i>lire panjang</i> (♂)	leaf	1
<i>Justicia gendarussa</i> Burm. F.w	herb	<i>gandarusa</i>	leaf	3
<i>Ruellia simplex</i> C. Wright.	herb	<i>Puli</i>	leaf, stem	2
Family: Anacardiaceae				
<i>Mangifera</i> sp.	tree	<i>mangga dodol</i>	bark	5
Family: Annonaceae				
<i>Annona muricata</i> L.	tree	<i>nangka belanda</i>	bark	5
<i>Cananga odorata</i> (Lam.) Hook.f. & Thomson	tree	<i>kenanga</i>	bark	10
Family: Apiaceae				
<i>Coriandrum sativum</i> L.	herb	<i>surai</i>	leaf, seed	2
Family: Apocynaceae				
<i>Alstonia scholaris</i> R. Br.	tree	<i>hange</i>	bark	4
Family: Asteraceae				
<i>Blumea balsamifera</i> (L.) DC.	herb	<i>madikapu</i>	leaf	1
<i>Wollastonia biflora</i> (L.) DC.	herb	<i>cinga-cinga</i>	leaf	1
Family: Bombacaceae				
<i>Durio zibethinus</i> L.	tree	<i>durian</i>	bark	3
Family: Burseraceae				
<i>Canarium amboinense</i> Hoch.	tree	<i>kenari</i>	bark	1
Family: Clusiaceae				
<i>Garcinia mangostana</i> L.	tree	<i>manggis</i>	bark	5
Family: Combretaceae				
<i>Terminalia catappa</i> L.	tree	<i>ngusu</i>	bark	2
Family: Commelinaceae				
<i>Tradescantia spathacea</i> Sw.	herb	<i>bia-bia</i>	leaf, flower	3
Family: Convolvulaceae				
<i>Merremia peltata</i> (L.) Merr.	herb	<i>koge</i>	bark	1
Family: Cyperaceae				
<i>Scleria</i> sp.	shrub	<i>cakagole</i>	bark	1
Family: Euphorbiaceae				
<i>Homalanthus novoguineensis</i> (Warb.) K. Schum.	tree	<i>gidilule</i>	bark	1
<i>Jatropha curcas</i> L.	clump	<i>balacai putih</i>	leaf	5
<i>Macaranga tanarius</i> (L.) Müll.Arg.	tree	<i>same</i>	bark	1
<i>Mallotus apelta</i> (Lour.) Müll.Arg.	tree	<i>lufiti</i>	leaf	4
Family: Fabaceae				
<i>Albizzia saponaria</i> (Lour.) Miq	tree	<i>fau-fau</i>	bark	1
<i>Cynometra cauliflora</i> L.	tree	<i>mano mano</i>	bark	6
<i>Pongamia pinnata</i> (L.) Pierre	tree	<i>hatehira</i>	bark	4
<i>Pterocarpus indicus</i> Wild.	tree	<i>ligua</i>	bark	2
<i>Sesbania grandiflora</i> Pers.	tree	<i>Turi</i>	bark, leaf	2
<i>Tamarindus indica</i> L.	tree	<i>asam jawa</i>	bark, leaf	6
Family: Lamiaceae				
<i>Callicarpa rubella</i> Lindl.	herb	<i>ngaai madudera</i>	bark	4
<i>Coleus scutellarioides</i> Bth.	herb	<i>mayana</i>	leaf	5
<i>Leucas zeylanica</i> (L.) R.Br.	herb	<i>gofu hairani</i>	leaf	2
<i>Orthosiphon grandiflorus</i> Bold.	shrub	<i>kumis kucing</i>	leaf	4
<i>Premna serratifolia</i> (Blanco) Benth.	tree	<i>gumira</i>	bark	3
<i>Vitex pinnata</i> L.	tree	<i>gofasa</i>	bark	2
Family: Lauraceae				
<i>Cassytha</i> cf. <i>filiformis</i>	climber	<i>tali kuning</i>	stem	2
Family: Lygodiaceae				
<i>Lygodium</i> sp.	herb	<i>gumoho</i>	leaf	1
Family: Magnoliaceae				
<i>Michelia champaca</i> L.	tree	<i>cempaka</i>	bark	4

Plant families and species	Life form	Vernacular Name	Part Used	Number of Informants
Family: Malvaceae				
<i>Kleinhovia hospita</i> L.	tree	<i>liwui</i>	bark	2
Family: Meliaceae				
<i>Xylocarpus moluccensis</i> (Lam.) M. Roem	tree	<i>lolesou</i>	bark	3
Family: Moraceae				
<i>Ficus cf. ribes</i>	tree	<i>senang</i>	leaf	1
<i>Ficus fistulosa</i> Reinw. Ex Blume	tree	<i>Coro</i>	bark	4
<i>Ficus hispida</i> Linn.	tree	<i>tagalolo</i>	bark	3
Family: Myristicaceae				
<i>Myristica fragrans</i> Houutt.	tree	<i>Pala</i>	fruit, seed	7
Family: Myrtaceae				
<i>Psidium guajava</i> L.	tree	<i>giawas</i>	leaf	6
<i>Syzygium aqueum</i> (Burm.f.) Alston.	tree	<i>gora</i>	leaf	3
<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry	tree	<i>cengkeh</i>	leaf, flower	7
Family: Oxalidaceae				
<i>Averrhoa bilimbi</i> L.	shrub	<i>belimbing wuluh</i>	bark, fruit	2
Family: Phyllanthaceae				
<i>Breynia cernua</i> (Poir.) Müll.Arg.	tree	<i>gagilamo</i>	bark	3
<i>Phyllanthus</i> sp.	herb	<i>balakama seed</i>	leaf	3
Family: Piperaceae				
<i>Piper nigrum</i> L.	climber	<i>rica jawa</i>	fruit	2
<i>Piper sarmentosum</i> Roxb.	herb	<i>tofure</i>	leaf	1
Family: Poaceae				
<i>Cymbopogon citratus</i> (DC.) Stapf.	herb	<i>gramakusu</i>	stem	7
Family: Ranunculaceae				
<i>Nigella sativa</i> Linn.	herb	<i>jinta hitam</i>	fruit	5
Family: Rhamnaceae				
<i>Alphitonia moluccana</i> Teijsm. & Binn. Ex Brais.	tree	<i>raurika</i>	bark	2
Family: Rubiaceae				
<i>Morinda citrifolia</i> L.	tree	<i>kome</i>	bark	1
Family: Rutaceae				
<i>Melicope latifolia</i> (DC.) T.G. Hartley	shrub	<i>sawuyo</i>	leaf	2
Family: Selaginellaceae				
<i>Selaginella</i> sp.	herb	<i>rutu-rutu</i>	leaf	4
Family: Solanaceae				
<i>Physallis peruviana</i> L.	herb	<i>dagameme</i>	leaf	4
Family: Sonneratiaceae				
<i>Sonneratia alba</i> Sm.	tree	<i>posi-posi / soki bulat</i>	bark	3
Family: Zingiberaceae				
<i>Boesenbergia rotunda</i> (L.) Mansf.	herb	<i>tumbukunci</i>	rhizome	1
<i>Curcuma longa</i> L.	herb	<i>kuning</i>	rhizome	8
<i>Curcuma zanthorrhiza</i> Roxb.	herb	<i>tumbulawak</i>	rhizome	1
<i>Kaempferia galanga</i> L.	herb	<i>bataka</i>	rhizome	7
<i>Zingiber officinale</i> Roscoe.	herb	<i>guraka</i>	rhizome	4

of welcoming maturity girl. The ceremony is held for 3, 7, or 9 days depending on length of menstruation period and decision of the girl's family. During that time, the girl takes *oke sou* herbal drink 3 times a day. Usually she drinks as much as 8.1 liters of *oke sou* herbal drink during this ceremony.

Phytochemical profile

All the most frequently mentioned plants are well studied and their phytochemical profile, along with pharmacological activities, are shown in Table 2. The common pharmacological activities related to efficacy of *oke sou* herbal drink are antimicrobial, antifungal, aromatherapy, antioxidant, and anti-cancer. From *Canangan odorata* (Lam.) Hook.f. & Thomson, 65 different chemical compounds with

more than 13 pharmacological activities have been isolated. This plant is effective to maintain cleanliness of vagina area due to its antimicrobial activity that contains essential oil, ethyl acetate ethanolic, methanolic, cyclohexane, and clorofrom⁽²⁵⁾. The other plants that also contain antimicrobial activity are *Kaempferia galanga* L., *Syzygium aromaticum* (L.) Merr. & L.M. Perry. and *Tamarindus indica* L.^{(2)(6) (16) (27)}.

Some plants have essential oil which efficacious to reduce body odor, such as camphene (*Cananga odorata* (Lam.) Hook.f. & Thomson)⁽²⁶⁾, geraniol (*Cymbopogon citratus* (DC.) Stapf.)⁽²⁸⁾, myristicin (*Myristica fragrans* Houtt.)⁽¹⁰⁾, and eugenol (*Syzygium aromaticum* (L.) Merr. & L.M. Perry.)⁽¹⁰⁾. These chemical compounds have pharmacological activi-

Table 2. The most frequently mentioned plant species (>5 respondents) to prepare oke sou herbal drink and their phytochemical profile and pharmacological activities at Lako Akediri Village, Sub District Sahu, District West Halmahera, North Moluccas - Indonesia.

Plant Species	Phytochemical profile	Pharmacological activities
<i>Cananga odorata</i> (Lam.) Hook.f. & Thomson	bornyl acetate (leaves); camphene (leaves, flowers); geraniol (leaves, flowers); geranyl acetate (flowers); limonene (leaves, flowers, fruits); (E,Z)-farnesal (leaves) 1-epi-cubenol (flowers); caryophyllene epoxide (leaves); spathulenol (leaves); <i>t</i> -cadinol (leaves); α -amorphene (leaves, flowers); α -ylangene (leaves, flowers); methyl anthranilate (flowers) ⁽²⁶⁾ ; lirioidenine, sampangine (bark) ⁽¹⁹⁾ ; methylisoeugenol, benzyl benzoate (flower) ⁽¹⁷⁾	aromatherapy, anti-microbial, anti-inflammatory, antivector ⁽²⁶⁾ antifungal, anti-mycobacterial, antimalarial ⁽²⁸⁾ ⁽¹³⁾
<i>Curcuma longa</i> L.	curcumin; dimethoxy curcumin; bisdemethoxy curcumin; sodium curcumin (rhizomes) ^{(19) (9)}	anti-carcinogenic ⁽⁸⁾ anti-bacteria, anti-HIV, antioxidant, anti-inflammatory, anti-tumor ⁽⁹⁾
<i>Cymbopogon citratus</i> (DC.) Stapf.	d-Limonene, geraniol (leaves) ⁽²⁸⁾ ; α -citral, β -neral, myrcene (leaves) ⁽¹³⁾	aromatherapy ⁽²⁷⁾ ; antibacterial ⁽¹²⁾
<i>Kaempferia galanga</i> L.	α -pinene, camphene, carvone, benzene, eucalypto, borneol, methyl cinnamate, ethyl- <i>p</i> -methoxycinnate (rhizomes) ⁽²⁶⁾ ; β -phyllandrene, α -terpineol, ethylcinnate, dihydro β -sesquiphyllandrene (rhizomes) ⁽²¹⁾	anticancer, antimicrobial activity, antioxidant ⁽²⁷⁾
<i>Myristica fragrans</i> Houtt.	macelignan (fruits) ⁽⁵⁾ ; ethanolic (seeds) ⁽²⁶⁾ ; myristicin (fruits) ⁽¹⁰⁾ ; malabaricone B, malabaricone C (fruits) ⁽¹⁴⁾	anti-bacterial ⁽⁵⁾ ; aphrodisiac ⁽²⁵⁾ ; antifungal ⁽¹⁴⁾ ; aromatherapy ⁽¹⁰⁾
<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry.	eugenol, eugenyl acetate, benzyl alcohol (leaves) ^{(12) (15)} , ethanolic (seeds) ⁽²⁵⁾	antioxidant ⁽¹²⁾ ; antimicrobial, antifungal ⁽¹⁵⁾ ; aphrodisiac ⁽²⁴⁾
<i>Cynometra cauliflora</i> L.	methanolic (fruits) ⁽²⁶⁾ ; tannin, saponin, flavonoid (leaves, stems, barks); terpenoid (leaves, stems) ⁽⁵⁾	anti-cancer ⁽²⁶⁾ ; antioxidant ⁽⁴⁾
<i>Tamarindus indica</i> L.	acetone, methanol (seeds) ⁽¹¹⁾ ; alkaloids, flavonoids, saponins, tannins (fruits) ⁽⁶⁾ ; glycosides, cardiac glycosides (seeds) ⁽²⁾	antibacterial ⁽¹¹⁾ ; antimicrobial ^{(6) (2)} ; antifungal hypoglycaemic, cytotoxic effects, cholesterolemic ⁽²⁾

ties as aromatherapy and become basic material in perfume producing. Based on the data (Table 2) there are antifungal activities in some plants used in *oke sou* herbal drink that are effective against *Candida albicans* activity, vaginal discharge agent⁽²⁶⁾.

Discussion

The knowledge of diverse plants that are used in preparation of *oke sou* herbal drink is obtained orally from older indigenous medical practitioners to younger ones, who are their daughters or nieces. Indigenous medical practitioners have dominant role in keeping the information about composition of *oke sou* herbal drink. They have prohibition to bequeath that information to people except to her maternal ancestry. Therefore, not all the villagers at Lako Akediri village know composition of the herbal drink.

Oke sou herbal drink is believed by the people in Lako Akediri efficacious to maintain the health of women's reproductive function. Based on scientific investigations, *oke sou* herbal drink maintains the reproductive health by keeping the cleanness of reproductive organs⁽²⁾⁽⁶⁾⁽¹⁶⁾⁽²⁷⁾⁽²⁶⁾; reducing bad odor on vagina area and girl's body⁽¹⁰⁾⁽²⁶⁾⁽²⁸⁾; protecting the reproductive organs from the risk of cancer⁽⁸⁾⁽²⁹⁾⁽²⁶⁾; and free radicals⁽⁹⁾⁽²⁷⁾⁽⁴⁾. Those efficacies are obtained from diversity of plants that are used in preparing *oke sou* herbal drink. For example, plants that are useful to keep the cleanness of reproductive organs (vagina) are *Cananga odorata* (Lam.) Hook.f. & Thomson⁽²⁶⁾⁽²⁸⁾⁽¹³⁾, *Curcuma longa* L.⁽⁹⁾, *Cymbopogon citratus* (DC.) Stapf.⁽¹²⁾, and *Kaempferia galanga* L.⁽²⁷⁾. Those plants have pharmacological activities such as anti-microbial, anti-fungal, and antibacterial.

Futhermore, the preparation of *oke sou* herbal drink has a boiling stage that aims to extract the phytochemical content in part of plant used⁽²³⁾. The efficacy of *oke sou* herbal drink is better when phytochemical content in plants used can be completely soluble in water. Meanwhile the purposes of plant parts classification - bark with bark, leaves

with leaves, root with root - and crushing them separately is to facilitate the process of squeezing the juice plant.

Conclusion

We recorded as many as 66 plant species from 59 genera used for preparation of *oke sou* herbal drink, with *Cananga odorata* (Lam.) Hook.f. & Thomson being the most frequently mentioned plant by the people at Lako Akediri village. The phytochemical content in used plants have various compounds, but the pharmacological activities can be summarized in common as antimicrobial, antifungal, aromatherapy, antioxidant, and anti-cancer. The results of this study can be used as new reference for the development of medical herbal products based on science, especially for maintaining the health of reproductive functions of women.

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