

Plants Used in Traditional Indonesian (*Jamu*) Medicines and Sundanese Foods

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Abstract:

The Indonesian word *jamu*, derived from *djamoe* (old Javanese), means the traditional Indonesian medical system. *Jamu* medicines are prepared by blending Indonesian medicinal plants according to the previously established recipes. Several local names of one plant are present in different languages in Indonesia. For example, there are names in standard Indonesian language (*Bahasa Indonesia*) and local names in Sundanese (West Java), Javanese (Central and East Java), and other languages. Although people in each region recognize a plant by its local name, having several local names for one plant may cause confusion during the investigation of the plants. We collected the local names of 32 Indonesian plants used in *jamu* medicines and assigned them Latin, English, and Japanese names. The plants were classified by their pharmacological effects in empirical uses. This study showed that many plants used in *jamu* medicines are edible and are often consumed as *lalap*, *i.e.*, as raw vegetables, in the Sundanese region. Our approach of assigning Latin names to the local names of Indonesian medicinal plants may provide a basis for investigating the plants for *jamu* medicines by analyzing their constituents and elucidating their pharmacological activities, leading to the development of new pharmaceuticals in the future.

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1. Introduction

The Indonesian word *jamu* is sometimes spelled as *djamoe* (old Javanese, *Kawi*) in the Dutch alphabet. *Jamu* (or *jamu medicine*) is currently known as the traditional Indonesian medical system, which includes drugs that are prepared from freshly collected medicinal plants in Indonesia. These drugs that are prepared according to recipes (or formulae) are designated as *jamu* medicines, which are sometimes simply called *jamu*. Many types of medicinal plants can be found in Indonesia due to its having the second-highest biodiversity in the world. The plants are generally crushed and ground with a stone mortar (*pipisan*) and pestle (*gandik*). *Jamu* medicines are popular among Indonesian people as *jamu* drinks, which are made from the juices of several medicinal plants mixed with honey or palm sugar and sold by *jamu* sellers (*jamu gendong*) or companies. Each *jamu* recipe consists of several plants. The current definition of *jamu* medicines is very broad; they are not limited to traditional medicines that are taken orally, but also include all types of traditional medicines, including drugs that are smeared onto the skin (Takahashi 1988; Riswan and Sangat-Roemantyo 2002). In contrast, modern pharmaceuticals, such as aspirin, are called *obat* (*Bahasa Indonesia*), and they are clearly discriminated from *jamu* medicines.

It is estimated that traditional Indonesian medicine originated and was perfected in the palaces (*keraton*) in Yogyakarta and Surakarta of Central Java under the influence of the Ayurveda of Ancient India. There is a widespread belief that medicinal plants have a curative health-giving capacity. These herbal medicines were called *djampī oesodo* or *jampī ausadha* (*Kawi*). Because *djampī* and *oesodo* mean “prayers” and “health or wellness,” respectively, the combined words mean “prayer for health.”

Indeed, a relief of a Buddhist temple ruin at Borobudur in Central Java shows a woman who seems to be preparing plants using a mortar and pestle in a wooden prayer house while burning incense (Figure 1, panel B), which resembles the current preparation of *jamu* medicines. This scene may be interpreted as a prayer for health using herbal plants (Takahashi 1988). The fact that this temple began to be constructed in the late 8th century, indicates that the preparation of *jamu* medicines appeared to be common at that time. It is considered that *jamu* medicines are derived from *djampī oesodo* and that recipes to blend medicinal plants were maintained in secret in the palace.

Hindu-Buddhist culture declined on the Island of Java because of the Islamic invasion. Some people escaped to Bali bringing with them more than 1,000 recipes written in *Kawi*. However, there are very few reliable written records that are dated. Two manuscripts written in the 18th century in the Surakarta Palace library are the best references on *jamu* medicines: *Serat Kawruh bab Jampī-jampī* (A Treatise on All Manner of Cures; collection of many recipes) and *Serat Centhini* (Book of Centhini).

It is not clear what the principles are for blending medicinal plants to prepare *jamu* medicines, and how to administer *jamu* medicines to patients suffering from symptoms or diseases, because these written documents were lost during the escape to Bali. In contrast, the existing recipes have been orally transferred by *jamu gendong*. Because the recipes of commercially available *jamu* medicines are derived from those by *jamu gendong*, they are kept secret by *jamu* companies.

There are more than 300 languages in Indonesia, and the major languages in Java are Javanese in (central and east part) and Sundanese (west part). When Indonesia became an independent country

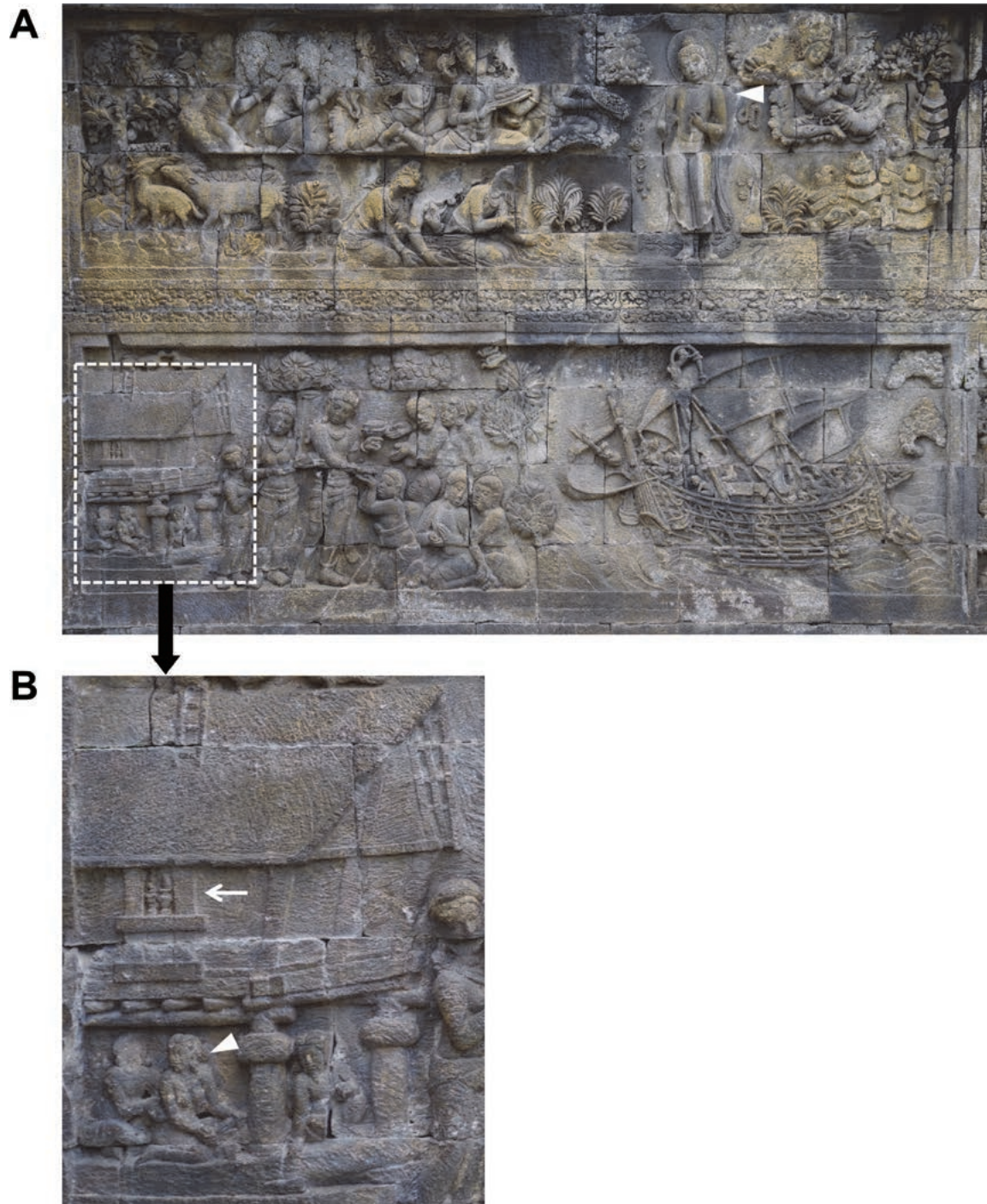


Figure 1. Narrative Relief Panel No. 86 of the First Gallery of Borobudur Temple

(A) **Upper main wall:** A scene in the story *Lalitavistara*, i.e., the life of Buddha. In the Nairāṇjanā River, Buddha (arrowhead) is performing ablution. **Lower main wall:** A scene in the story *Avadana*, i.e., one of the Buddhists' stories. (Right) A ship carrying treasures. (Left) Giving alms to the poor and a wooden prayer house. (B) **The wooden prayer house** (magnified): There is an altar with burning incense (arrow) in the prayer house. A woman (arrowhead) is preparing something with a mortar and pestle; she is speculated to be praying for health as she crushes and blends herbal plants.

Source: Borobudur Visual Archives, Art Research Center, Ritsumeikan University.

after the Second World War, *Bahasa Indonesia* (BI) was determined as the standard Indonesian language, which is derived from the Malaysian language spoken in Riau, a province in Sumatra. The word *jamu* is assigned to all the traditional Indonesian medicines, which include herbal medicines that are kept in the palace and folk medicines used outside of the palace.

In the present study, we aimed to summarize BI names and collect two major local names (Javanese and Sundanese) of medicinal plants and assign the relevant Latin (scientific) names to them, as well as English and Japanese names. We then examined whether these medicinal plants are eaten as vegetables in the Sundanese region. Finally, studies on *jamu* medicines in the future were discussed by comparing them with those on traditional Japanese (*kampo*) medicines.

2. Methods

The names of the 32 typical plant species used in *jamu* medicines were collected from books (Takahashi 1988; Beers 2001) and databases (Museum of Materia Medica, Toyama University; Nara Institute of Science and Technology). Local names were collected by the Indonesian co-authors of this article. Indonesian names in BI, Javanese, and Sundanese were collected, and then Latin, English, and Japanese names were assigned to the plants. Latin names were confirmed using the accepted names listed in the WFO Plant List (WFO 2024). These plants were classified into three groups (A to C) with regard to their pharmacological activities and numbered accordingly. Edible plants were listed by literal searching or visiting the Sundanese region¹.

3. Results and Discussion

(1) Plants Used for Analgesic *Jamu* Medicines

Many medicinal plants collected in Indonesia are known as “*crude drugs*” for preparing *jamu* medicines. In this article, the term “*jamu* medicine” is used to describe a drug prepared by blending several plants. According to the previously established recipe, several medicinal plants are empirically blended to prepare a *jamu* medicine. The typical medicinal plants that show analgesic effects are listed in Table 1. Analgesics generally reduce pain and show anti-inflammatory effects.

When local plant names in Javanese and Sundanese were collected, they often differed from BI names (Table 1). Among them, turmeric (see A6) and common ginger (A7), both of which belong to the ginger family (Zingiberaceae), are crude drugs that are frequently used in anti-inflammatory *jamu* medicines.

The pharmacological effects of each plant are presented in Table 2. The indications of these plants to symptoms and diseases are empirically known. The plants are effective against a variety of symptoms (*e.g.*, fever and cough) associated with infection by bacteria, viruses, or parasites.

¹ Edible plants were checked by Mariko ARATA on the basis of her fieldwork in Indonesia.

Table 1. Names of *jamu* plants used as analgesics

No.	Bahasa Indonesia	Javanese name	Sundanese name	Latin name*	Family	English name	Japanese name	Used as <i>jamu</i> medicines	Edible
A1	<i>Semanggi gunung</i>	<i>Semanggi</i>	<i>Antanan beurit</i>	<i>Hydrocotyle sibthorpioides</i> Lam.	Araliaceae	Lawn marshpennywort	<i>Chidomegusa</i>	Yes	Yes
A2	<i>Eceng, Eceng padi</i>	<i>Wewehan, Eceng</i>	<i>Eceng leutik</i>	<i>Pontederia vaginalis</i> Burm.f.	Pontederiaceae	Heart-shape false pickerelweed	<i>Konagi</i>	Yes	Yes
A3	<i>Ganyong merah</i>	<i>Ganyong</i>	<i>Ganyol beureum</i>	<i>Canna indica</i> L.	Cannaceae	Achira	<i>Shokuyokanna</i>	Yes	Yes
A4	<i>Tempuh wiyang</i>	<i>Jawi rawa</i>	<i>Jonge</i>	<i>Emilia sonchifolia</i> (L.) DC.	Asteraceae	Lilac tassel flower	<i>Usubeninigana</i>	Yes	Yes
A5	<i>Dau kentut</i>	<i>Kasembukan</i>	<i>Kahitutan</i>	<i>Paederia foetida</i> L.	Rubiaceae	Stink vine	<i>Hekusokazura</i>	Yes	Yes
A6**	<i>Kunyit</i>	<i>Kunir</i>	<i>Koneng</i>	<i>Curcuma longa</i> L.	Zingiberaceae	Turmeric	<i>Ukon</i>	Yes	Yes
A7**	<i>Jahe</i>	<i>Jahe, Jae</i>	<i>Jahe</i>	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Ginger	<i>Shoga</i>	Yes	Yes
A8	<i>Kacang koro, Kratok, Kekara</i>	<i>Kacang koro</i>	<i>Kacang roay</i>	<i>Phaseolus lunatus</i> L.	Phaseolus	Lima bean	<i>Raimame</i>	Yes	Yes
A9	<i>Sintrong</i>	<i>Sintrong</i>	<i>Sintrong</i>	<i>Crassocephalum crepidioides</i> S. Moore	Asteraceae	Ebolo, Thickhead, Redflower ragleaf, Fireweed	<i>Benibanaboro-giku</i>	Yes	Yes
A10	<i>Peterseli</i>	<i>Peterseli</i>	<i>Seli</i>	<i>Petroselinum crispum</i> (Mill.) Fuss	Apiaceae	Parsley	<i>Paseri</i>	Yes	Yes
A11	<i>Sirih tanah</i>	<i>Suruh lanang, Cabean</i>	<i>Karuk</i>	<i>Piper sarmenthosum</i> Roxb.	Piperaceae	Wild Betel	<i>Haigoshō</i>	Yes	No
A12	<i>Temu mangga</i>	<i>Kunir putih</i>	<i>Koneng joho</i>	<i>Curcuma mangga</i> Valetton & Zijp	Zingiberaceae	Mango ginger	<i>Shiro-ukon</i>	Yes	No
A13	<i>Sembung</i>	<i>Sembung lelet</i>	<i>Sembung utan</i>	<i>Blumea balsamifera</i> (L.) DC.	Asteraceae	Ngai camphor	<i>Takasagogiku</i>	Yes	No
A14	<i>Talas sente, Sente</i>	<i>Sente, Senteh</i>	<i>Taleus sente</i>	<i>Alocasia macrorrhizos</i> (L.) G. Don	Araceae	Giant taro	<i>Indokuwaziimo</i>	Yes	No

* Accepted names in the WFO Plant List are indicated.

** Listed in the Japanese Pharmacopoeia.

Table 2. Pharmacological effects of *jamu* plants used as analgesics

No.	Bahasa Indonesia	Latin name	Parts used as <i>jamu</i> medicines	Indications; Empirical effects*
A1	<i>Semanggi gunung</i>	<i>Hydrocotyle sibthorpioides</i> Lam.	Root, stem, leaf, flower	Sore throat, hepatitis, hypertension, and neuro-inflammation
A2	<i>Eceng, Eceng padi</i>	<i>Pontederia vaginalis</i> Burm.f.	Whole plants	Stomachache, toothache, and liver disease; antioxidant
A3	<i>Ganyong merah</i>	<i>Canna indica</i> L.	Tuber	Acute hepatitis, hypertension, and inflammation of the urinary tract; antipyretic and anti-diuretic
A4	<i>Tempuh wiyang</i>	<i>Emilia sonchifolia</i> (L.) DC.	Leaf, root	Respiratory tract infection, e.g., pneumonia and influenza; infection due to wounds and ulcer
A5	<i>Daun kentut</i>	<i>Paederia foetida</i> L.	Whole plants	Stomachache, diarrhea, and flatulence; diuretic
A6**	<i>Kunyit</i>	<i>Curcuma longa</i>	Rhizome, leaf	Rheumatoid arthritis, osteoarthritis, and inflammation; antipyretic
A7**	<i>Jahe</i>	<i>Zingiber officinale</i>	Rhizome	Stomachache, headache, migraine, common cold, arthritis, joint pain, hypertension, and hypercholesterolemia
A8	<i>Kacang koro, Kratok, Kekara</i>	<i>Phaseolus lunatus</i> L.	Seed, leaf	Skin diseases, abdominal pain
A9	<i>Sintrong</i>	<i>Crassocephalum crepidioides</i> S. Moore	Leaf	Diarrhea, stomachache, headache, and tonsillitis
A10	<i>Peterseli</i>	<i>Petroselinum crispum</i> (Mill.) Fuss	Leaf	Cancer and inflammation; antioxidant
A11	<i>Sirih tanah</i>	<i>Piper sarmentosum</i> Roxb.	Leaf	Asthma, cough, and bronchodilation; Analgesic, mucolytic; diuretic
A12	<i>Temu mangga</i>	<i>Curcuma mangga</i>	Rhizome, leaf	Cancer, inflammation, and diarrhea
A13	<i>Sembung</i>	<i>Blumea balsamifera</i> (L.) DC.	Leaf, root	Rheumatoid arthritis, menstrual pain, and diarrhea
A14	<i>Talas sente, Sente</i>	<i>Alocasia macrorrhizos</i> (L.) G. Don	Rhizome, petiole	Joint pain and cough

* Typical symptoms and diseases are shown.

** Listed in the Japanese Pharmacopoeia.

(2) Plants Used for Obesity and Diabetes Mellitus and Their Names

The typical medicinal plants used to treat obesity and diabetes mellitus are listed in Table 3, and their pharmacological effects are shown in Table 4.

Several plants that exhibit anticancer effects were included (Table 2, A11 and A14; Table 4, B3 and B5; Table 6, C7). It is well-known that the anticancer drug paclitaxel (also known as taxol) is derived from the bark of Pacific yew (*Taxus brevifolia*) and inhibits mitosis (Huizing et al. 1995; Mantle et al. 2000). Constituents in plants with anticancer effects may lead to the development of new anticancer drugs.

Table 3. Names of *jamu* plants that show hypoglycemic and anti-diabetic effects

No.	Bahasa Indonesia	Javanese name	Sundanese name	Latin name*	Family	English name	Japanese name	Used as <i>jamu</i> medicines	Edible
B1	<i>Pepaya</i>	<i>Ketes, Pepaya</i>	<i>Gedang</i>	<i>Carica papaya</i> L.	Caricaceae	Papaya	<i>Papaiya</i>	Yes	Yes
B2	<i>Genjer</i>	<i>Genjer</i>	<i>Genjer</i>	<i>Limncharis flava</i> (L.) Buchenau	Butomaceae	Yellow velvetleaf	<i>Kibana-omodaka</i>	Yes	Yes
B3	<i>Jengköl</i>	<i>Jengköl</i>	<i>Jengköl</i>	<i>Archidendron pauciflorum</i> (Benth.) I.C.Nielsen	Fabaceae	Djenkol, Jengköl Jering	<i>Jirinmame</i>	Yes	Yes
B4	<i>Kedondong</i>	<i>Dondong</i>	<i>Kadongdong</i>	<i>Spondias dulcis</i> G. Forst.	Anacardiaceae	June plum, Golden apple	<i>Tamagonoki</i>	Yes	Yes
B5	<i>Sukun</i>	<i>Sukun</i>	<i>Sukun</i>	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Moraceae	Breadfruit	<i>Pannoki</i>	Yes	Yes
B6	<i>Terung pipit</i>	<i>Pokak</i>	<i>Takokak</i>	<i>Solanum torvum</i> Sw.	Solanaceae	Turkey berry	<i>Suzumenasubi</i>	Yes	Yes
B7	<i>Cincau hijau</i>	<i>Camcao, Cincau</i>	<i>Tawuluh</i>	<i>Cyclea barbata</i> Miers.	Menispermaceae	Cinco		Yes	Yes
B8	<i>Ciplukan, Cepulukan</i>	<i>Ceplukan, Ceplik sari</i>	<i>Cecendetan</i>	<i>Physalis angulate</i> L.	Solanaceae	Cutleaf groundcherry	<i>Hirohahurin-hozuki</i>	Yes	No

* Accepted names in the WFO Plant List are indicated.

Table 4. *Jamu* plants that show hypoglycemic and anti-diabetic effects

No.	Bahasa Indonesia	Latin name	Parts used as <i>jamu</i> medicines	Indications; Empirical effects*
B1	<i>Pepaya</i>	<i>Carica papaya</i> L.	Leaf, fruit, flower, bark, seed	Liver cirrhosis, constipation, diabetes mellitus
B2	<i>Genjer</i>	<i>Limnocharis flava</i> (L.) Buchenau	Leaf, flower	Wounds; antioxidant, hypoglycemic and wound healing
B3	<i>Jengkol</i>	<i>Archidendron pauciflorum</i> (Benth.) I. C. Nielsen	Bean	Cancer, diabetes mellitus; anti-diuretic and laxative
B4	<i>Kedondong</i>	<i>Spondias dulcis</i> G. Forst.	Leaf, fruit	Anemia, diarrhea, and hyperlipidemia; activation of immune systems; vitamins B, C, and A are abundant.
B5	<i>Sukun</i>	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Fruit, leaf	Kidney failure, hypercholesterolemia, hypertension, cancer, hypertension, and hyperuricemia (high uric acid concentration)
B6	<i>Terung pipit</i>	<i>Solanum torvum</i> Sw.	Fruit	Anemia, diabetes mellitus, and male contraception; vitamin A is abundant.
B7	<i>Cincau hijau</i>	<i>Cyclea barbata</i> Miers.	Leaf	Mouth sores; hypoglycemic effect
B8	<i>Ciplukan, Cepulukan</i>	<i>Physalis angulate</i> L.	Leaf, fruit, whole plant	Diabetes mellitus, hypertension, and inflammation

* Typical symptoms and diseases are shown.

(3) Other Medicinal Plants and Their Names

Some medicinal plants included in *jamu* medicines are effective against diarrhea, stomach pain, and constipation caused by digestive tract disorders. The plants are listed in Table 5, and their pharmacological effects are summarized in Table 6.

Similar to the above-mentioned tables, quite different words are used for each plant. For example, Banana is differently called *Pisang* (BI), *Gedang* (Javanese), and *Cau* (Sundanese) (see Table 5, C5).

Bayam (*Amaranthus tricolor* L.; C3) is called Chinese spinach, and its leaves are eaten as a vegetable. Some strains of *Bayam* are also used for decorating gardens because of their colorful leaves. Recently, genome-wide single nucleotide polymorphisms (SNPs) have been analyzed (Hoshikawa et al. 2023). *Bayam jepang* (literally *Japanese bayam*) is spinach (*Spinacia oleracea* L.), which is another species in the Amaranthaceae family that is solely eaten as a vegetable.

Table 5. Names of *jamu* plants that show other effects

No.	Bahasa Indonesia	Javanese name	Sundanese name	Latin name*	Family	English name	Japanese name	Used as <i>jamu</i> medicines	Edible
C1	<i>Pegagan</i>	<i>Pane gowang, rendeng</i>	<i>Antanan</i>	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Indian pennywort	<i>Tsubokusa</i>	Yes	Yes
C2	<i>Bengkuang</i>	<i>Bengkoang</i>	<i>Bangkuang</i>	<i>Pachyrhizus erosus</i> (L.) Urb.	Fabaceae	Jicama	<i>Kuzuimo, Hikama</i>	Yes	Yes
C3	<i>Bayam</i>	<i>Bayem</i>	<i>Bayem</i>	<i>Amaranthus tricolor</i> L.	Amaranthaceae	Chinese spinach	<i>Hiyu, Hiyuna, Hageito</i>	Yes	Yes
C4	<i>Cincau hitam</i>	<i>Janggalan</i>	<i>Camcau edi</i>	<i>Platostoma palustre</i> (Blume) A. J. Paton	Lamiaceae	Chinese mesona	<i>Senso</i>	Yes	Yes
C5	<i>Pisang</i>	<i>Gedang</i>	<i>Cau</i>	<i>Musa balbisiana</i> Colla, <i>Musa</i> sp.	Musaceae	Banana	<i>Banana</i>	Yes	Yes
C6	<i>Kecombrang</i>	<i>Kecombrang</i>	<i>Honje</i>	<i>Etilingera elatior</i> (Jack) R. M. Sm.	Zingiberaceae	Red ginger lily, torch ginger	<i>Tochijinja, Kantan</i>	Yes	Yes
C7	<i>Kacang tandh</i>	<i>Kacang brol</i>	<i>Kacang peda</i>	<i>Arachis hypogaea</i> L.	Fabaceae	Peanut	<i>Rakkasei</i>	Yes	Yes
C8	<i>Kastuba</i>	<i>Godong racun, Racunan</i>	<i>Kastuba</i>	<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	Euphorbiaceae	Poinsettia	<i>Poinsechia</i>	Yes	Yes
C9	<i>Sagu, Rumbia</i>	<i>Ambulung, Kersulu</i>	<i>Sagu, Kirai</i>	<i>Metroxylon sagu</i> Rottb.	Arecaceae	True sago palm	<i>Sagoyashi</i>	Yes	Yes
C10	<i>Talas belitung</i>	<i>Kimpul</i>	<i>Taleus hideung</i>	<i>Xanthosoma sagittifolium</i> (L.) Schott	Araceae	Tannia, Yautia, American Taro	<i>Kokoyamu</i>	Yes	No

* Accepted names in the WFO Plant List are indicated.

Table 6. *Jamu* plants that show various effects

No.	Bahasa Indonesia	Latin name	Parts used as <i>jamu</i> medicines	Indications; Empirical effects*
C1	<i>Pegagan</i>	<i>Centella asiatica</i> (L.) Urb.	Leaf	Diarrhea, depression; anti-aging, anti-stress, anxiolytic, and anti-seizure
C2	<i>Bengkuang</i>	<i>Pachyrhizus erosus</i> (L.) Urb.	Tuber	Hyperuricemia; anti-menopause, skin whitening
C3	<i>Bayam</i>	<i>Amaranthus tricolor</i> L.	Leaf	Anemia
C4	<i>Cincau hitam</i>	<i>Platostoma palustre</i> (Blume) A. J. Paton	Leaf	Malaria
C5	<i>Pisang</i>	<i>Musa balbisiana</i> Colla, <i>Musa</i> sp.	Fruit, root	Constipation and diarrhea
C6	<i>Kecombrang</i>	<i>Etlingera elatior</i> (Jack) R. M. Sm.	Flower, stem	Cough; antioxidant
C7	<i>Kacang tanah</i>	<i>Arachis hypogaea</i> L.	Leaf, seed	Cancer; hemostatic
C8	<i>Kastuba</i>	<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	Leaf	Inflammation; to normalize the menstrual cycle, to increase breast milk production and lactagogum; hemostatic, and emetic
C9	<i>Sagu, Rumbia</i>	<i>Metroxylon sagu</i> Rottb.	Trunk (stem)	Hypertension (starch from stem)
C10	<i>Talas belitung</i>	<i>Xanthosoma sagittifolium</i> (L.) Schott	Tuber	Burns, insect bites, furuncle, and carbuncle

* Typical symptoms and diseases are shown.

(4) *Lalap* are Vegetables in the Sundanese Region

Medicinal plants are often eaten as vegetables or spices to improve health. Medicinal plants used by the Sundanese in West Java were previously reported (Roosita et al. 2008). In the Sundanese community, people prefer to eat *lalap* (Sundanese), which means raw vegetables, and sometimes steamed or boiled vegetables. When raw or cooked vegetables are served with *sambal* (*i.e.*, Indonesian chili sauce), this dish is called *sambal lalap*. Outside West Java, *lalap* is called *lalap* or *lalapan* (BI).

During the collection of the Sundanese names of medicinal plants, we noticed that many *jamu* plants are eaten as *lalap* or used as spices by the Sundanese. When edible plants were listed in Table 7, 26 species among the 32 species that we investigated (81%) were edible. The edible parts of the plant are eaten raw or cooked. The pharmacological activities of *lalap* seem to be beneficial for human health.

Table 7. Edible plants that are used in *jamu*

No.	Bahasa Indonesia	Sundanese name	Latin name	Parts used as <i>jamu</i> medicines	Edible parts as <i>lalap</i>	Edible parts except <i>lalap</i>
A1	<i>Semanggi gunung</i>	<i>Antanan beurit</i>	<i>Hydrocotyle sibthorpioides</i> Lam.	Root, stem, leaf, flower	Leaf (raw)	Leaf (cooked)
A2	<i>Eceng, Eceng padi</i>	<i>Eceng leutik</i>	<i>Pontederia vaginalis</i> Burm.f.	Whole plants	Leaf, stem (boiled, steamed)	Leaf (cooked)
A3	<i>Ganyong merah</i>	<i>Ganyol beureum</i>	<i>Canna indica</i> L.	Tuber		Tuber (cooked)
A4	<i>Tempuh wiyang</i>	<i>Jonge</i>	<i>Emilia sonchifolia</i> (L.) DC.	Leaf, root	Leaf (raw)	
A5	<i>Daun kentut</i>	<i>Kahitutan</i>	<i>Paederia foetida</i> L.	Whole plant	Leaf (steamed together with other leaves)	Leaf (cooked)
A6	<i>Kunyit</i>	<i>Koneng</i>	<i>Curcuma longa</i>	Rhizome, leaf	Leaf, flower (raw)	Rhizome [as spice], leaf (cooked)
A7	<i>Jahe</i>	<i>Jahe</i>	<i>Zingiber officinale</i> Roscoe	Rhizome		Rhizome [as spice]
A8	<i>Kacang koro, Kratok, Kekara</i>	<i>Kacang roay</i>	<i>Phaseolus lunatus</i> L.	Seed, leaf	Seed, leaf (raw)	Seed (boiled)
A9	<i>Sintrong</i>	<i>Sintrong</i>	<i>Crassocephalum crepidioides</i> S. Moore	Leaf	Leaf (raw)	Leaf (boiled or cooked)
A10	<i>Peterseli</i>	<i>Seli</i>	<i>Petroselinum crispum</i> (Mill.) Fuss	Leaf	Leaf (raw)	Leaf (cooked)
B1	<i>Pepaya</i>	<i>Gedang</i>	<i>Carica papaya</i> L.	Leaf, fruit, flower, bark, seed	Leaf [often eaten together with cashew leaves to offset bitterness of papaya leaves and astringency of cashew leaves]	Fruit, young fruit (cooked)
B2	<i>Genjer</i>	<i>Genjer</i>	<i>Limncharis flava</i> (L.) Buchenau	Leaf, flower	Leaf, stem (boiled)	Leaf (cooked), stem (cooked)
B3	<i>Jengkol</i>	<i>Jengkol</i>	<i>Archidendron pauciflorum</i> (Benth.) I. C. Nielsen	Bean	Young bean (raw)	Bean (fried, cooked)
B4	<i>Kedondong</i>	<i>Kadongdong</i>	<i>Spondias dulcis</i> G. Forst.	Leaf, fruit	Leaf (raw)	Fruit
B5	<i>Cincau hijau</i>	<i>Tawuluh</i>	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Leaf		Fruits, seed (cooked, fried)
B6	<i>Sukun</i>	<i>Sukun</i>	<i>Solanum torvum</i> Sw.	Leaf, fruit, whole plant	Fruit (raw)	Fruits (cooked)
B7	<i>Terung pipit</i>	<i>Takokak</i>	<i>Cyclea barbata</i> Miers.	Fruit, leaf	Fruit (raw)	Leaf (jelly)
C1	<i>Pegagan</i>	<i>Antanan</i>	<i>Centella asiatica</i> (L.) Urb.	Leaf	Leaf (raw)	Leaf (cooked)
C2	<i>Bengkuang</i>	<i>Bangkuang</i>	<i>Pachyrhizus erosus</i> (L.) Urb.	Tuber		Tuber (raw)
C3	<i>Bayam</i>	<i>Bayem</i>	<i>Amaranthus tricolor</i> L.	Leaf	Leaf (boiled, steamed)	Leaf (cooked)
C4	<i>Cincau hitam</i>	<i>Camcau edi</i>	<i>Platostoma palustre</i> (Blume) A. J. Paton	Leaf		Leaf (jelly)
C5	<i>Pisang</i>	<i>Cau</i>	<i>Musa balbisiana</i> Colla, <i>Musa</i> sp.	Fruit, root		Flower bud (cooked)
C6	<i>Kecombrang</i>	<i>Honje</i>	<i>Eclingera elatior</i> (Jack) R. M. Sm.	Flower, stem	Flower (raw)	Flower bud and stem (cooked)
C7	<i>Kacang tanah</i>	<i>Kacang peda</i>	<i>Arachis hypogaea</i> L.	Leaf, seed	Leaf (boiled, steamed)	Seed (boiled, fried, cooked)
C8	<i>Kastuba</i>	<i>Kastuba</i>	<i>Euphorbia pulcherrima</i> Willd. ex Klotzsch	Leaf	Leaf (boiled, steamed)	Leaf (boiled)
C9	<i>Sagu, Rumbia</i>	<i>Sagu, Kirai</i>	<i>Metroxylon sagu</i> Rottb.	Trunk (stem)		Starch from stem (cooked)

(5) Comparison of *Jamu* Medicines with Traditional Japanese (*kampo*) Medicines

Traditional Japanese (*kampo*) medicines were included in the traditional Japanese medical system (*i.e.*, *kampo* or *kampo* medicine), which was established in the Edo period. A *kampo* medicine, precisely a *kampo* formula, is usually a combination of crude drugs (primarily medicinal plants). Both *kampo* and *jamu* medicines are prepared by blending crude drugs. As shown in Table 8, the plants used for *jamu* medicines are collected in Indonesia (tropical climate), whereas the plants used for *kampo* medicines are collected in East Asia (temperate climate). Therefore, the plants used for *jamu* medicines are different from those used as *kampo* medicines, which are described by the *Japanese Pharmacopoeia* (currently 18th edition). Only two plants for *jamu* medicines are also used for *kampo* medicines; *Curcuma longa* rhizomes (*Ukon*; A6) and *Zingiber officinale* rhizomes (*Shokyo* and *Kankyo*; A7). The quality of crude drugs for *kampo* medicines is assured by the *Japanese Pharmacopoeia*. The major and characteristic constituents in each plant can be identified using the methods described in the *Japanese Pharmacopoeia*. Constituents and their pharmacological activities have been investigated.

Although *jamu* medicines are commercially available in Indonesia, the recipes are kept secret by the companies who produce them, and their constituents and pharmacological effects have not been well analyzed. As a result, adverse effects, such as nephropathy, are often observed due to overdoses. Therefore, the safety of *jamu* medicines should also be checked, as reported by a systematic review (Liu et al. 2024). With regard to modern pharmacology, it is considered that “if correctly chosen and

Table 8. Comparison of *jamu* and traditional Japanese (*kampo*) medicines

	<i>Jamu</i> medicines	Traditional Japanese (<i>kampo</i>) medicines
Definition	A recipe (formula) that consists of several crude drugs and is used in the traditional Indonesian medical system (<i>i.e.</i> , <i>jamu</i> medicine)	A formula that usually consists of several crude drugs and is used in the traditional Japanese medical system (<i>i.e.</i> , <i>kampo</i> medicine), which originated in China and was developed uniquely in Japan.
Origin	Ayurveda in Ancient India	Medicines of Ancient China (Former Han to Later Han) and Japan
Major sources of crude drugs	Medicinal plants collected in Indonesia	Medicinal plants collected in East Asia, including China, Korea, and Japan
Blending of medicinal plants	According to recipes, which are orally transferred by <i>jamu gendong</i> , or provided by companies (secret recipes)	According to formulae, which are established by the Japanese Pharmacopoeia and the Guidebook of the approval standards for over-the-counter (OTC) <i>kampo</i> products.
Principles of blending and practice to patients	Not established because most written documents are lost.	Established and published as books in Edo Period.
Pharmacopoeia	Not available	Japanese Pharmacopoeia
Typical preparation of medicines	Freshly collected plants are crushed, ground, and then mixed with honey or palm sugar.	Dried plants (<i>i.e.</i> , crude drugs) are extracted with hot water to obtain extracts.
Formulation and crude drug products	Drinks, decoctions, ointments, and powders (as crude drug extracts)	Extract products (as granules, tablets, and capsules), decoctions, and ointments
Selection of recipes/formulae	Selected by <i>jamu gendong</i> who hears patient's complaints, or by patients without prescription.	Prescribed by Japanese medical doctors with physicians' license based on the <i>kampo</i> diagnosis method (the patient's complaints, symptoms) and clinical data. OTC <i>kampo</i> drugs are selected by patients in consultation with a pharmacist.

sensibly used, jamu is effective” (Beers 2001). Similarly to the studies on *kampo* medicines, the major constituents of plants should be analyzed, and the principal constituents which are involved in the pharmacological activity should also be investigated.

The efficacy of a medicinal plant varies depending on the part used. Crude drugs are selected from the parts that contain compounds with high pharmacological activities. For example, licorice *Glycyrrhiza uralensis* Fischer is used in *kampo* medicines. Glycyrrhizin, an active compound of licorice, is abundant in its stolon and root, and the content of glycyrrhizin differs depending on the part of the stolon (Guo et al. 2014). The distribution of active compounds in *jamu* plants is not well studied and should be investigated in the future.

Many pharmaceuticals have been isolated from medicinal plants, such as paclitaxel. For another example, the analgesic aspirin, *i.e.*, acetylsalicylic acid, is developed from salicylic acid by acetylation, and salicylic acid is the active component (*i.e.*, aglycone) of salicin, which is a glucoside in the bark of white willow *Salix alba* L. (Mahdi et al. 2006). It is promising that anticancer and antidiabetic drugs will be developed from Indonesian medicinal plants used for *jamu* medicines.

4. Conclusion

Medicinal plants have been used for *jamu* medicines and *lalap* (foods) in Indonesia. These plants are candidates for future drugs. A constituent in the plants may be a new drug or a leader compound to develop a new drug. In this context, the assignment of Indonesian local names to Latin names is very important. We expect that the collaboration between Japanese and Indonesian universities will facilitate further investigation of *jamu* medicines using the methods applied to traditional Japanese (*kampo*) medicines.

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References

- Beers, Susan-Jane. 2001. *JAMU: The Ancient Indonesian Art of Herbal Healing*. Hong Kong: Periplus Editions (HK) Ltd.
- The Committee on the Japanese Pharmacopoeia. 2021. Crude Drugs and Related Drugs. In The Ministry of Health, Labour and Welfare (ed.), *The Japanese Pharmacopoeia, 18th ed.* Tokyo: The Ministry of Health, Labour and Welfare. <<https://www.mhlw.go.jp/content/11120000/000904450.pdf>>
- Guo, Zheng-zheng, Yan-long Wu, Ru-feng Wang, Wen-quan Wang, Ying Liu, Xiao-qin Zhang, Shu-rui Gao, Yuan Zhang, and Sheng-li Wei. 2014. Distribution Patterns of the Contents of Five Active Components in Taproot and Stolon of *Glycyrrhiza uralensis*. *Biological and Pharmaceutical Bulletin*, 37(7), 1253–1258. <<https://doi.org/10.1248/bpb.b14-00173>>
- Hoshikawa, Ken, Ya-Ping Lin, Roland Schafleitner, Kenta Shirasawa, Sachiko Isobe, Duc Chinh Nguyen, Ryo Ohsawa, and Yosuke Yoshioka. 2023. Genetic Diversity Analysis and Core Collection Construction for

- Amaranthus tricolor* Germplasm Based on Genome-wide Single-nucleotide Polymorphisms. *Scientia Horticulturae*, 307, 111428. <<https://doi.org/10.1016/j.scienta.2022.111428>>
- Huizing, M.T., V.H. Sewberath Misser, R.C. Pieters, W.W. ten Bokkel Huinink, C.H. Veenhof, J.B. Vermorken, H.M. Pinedo, and J.H. Beijnen. 1995. Taxanes: A New Class of Antitumor Agents. *Cancer Investigation*, 13(4), 381–404. <<https://doi.org/10.3109/07357909509031919>>
- Institute of Natural Medicine, University of Toyama. 2017. *Indonesian Crude Drugs Related in the ETHMEDmm (EN), The Data Base of Ethno-medicines in the World, Museum of Materia Medica*. <<https://ethmed.toyama-wakan.net/SearchEn/Summary/e/70000>> (accessed January 10, 2025)
- Liu, Huilin, Xianjie Fen, Rui Zhang, Shuai Yuan, Yaqi Tian, Ping Luo, Jianrong Chen, and Xu Zhou. 2024. Safety of Medicinal and Edible Herbs from Fruit Sources for Human Consumption: A Systematic Review. *Journal of Ethnopharmacology*, 333, 118429. <<https://doi.org/10.1016/j.jep.2024.118429>>
- Mahdi, J.G., A.J. Mahdi, A.J. Mahdi and I.D. Bowen. 2006. The Historical Analysis of Aspirin Discovery, Its Relation to the Willow Tree and Antiproliferative and Anticancer Potential. *Cell Proliferation*, 39(2), 147–155. <<https://doi.org/10.1111/j.1365-2184.2006.00377.x>>
- Mantle, D., T.W. Lennard and A.T. Pickering. 2000. Therapeutic Applications of Medicinal Plants in the Treatment of Breast Cancer: A Review of Their Pharmacology, Efficacy and Tolerability. *Adverse Drug Reactions and Toxicological Reviews*, 19(3), 223–240.
- Nara Institute of Science and Technology. 2013. KNApSAcK JAMU: IndonesiaHerb Database. <<http://www.knapsackfamily.com/jamu/top.jsp>> (accessed January 10, 2025)
- Riswan, Soedarsono and Harini Sangat-Roemantyo. 2002. Jamu as Traditional Medicine in Java, Indonesia. *South Pacific Study*, 23(1), 1–10. <[http://cpi.kagoshima-u.ac.jp/publications/southpacificstudies/sps/sps23-1/SouthPacificStudies23\(1\)pp1-10.pdf](http://cpi.kagoshima-u.ac.jp/publications/southpacificstudies/sps/sps23-1/SouthPacificStudies23(1)pp1-10.pdf)>
- Roosita, Katrin, Clara M. Kusharto, Makiko Sekiyama, Yulian Fachrurrozi and Ryutaro Ohtsuka. 2008. Medicinal Plants Used by the Villagers of a Sundanese Community in West Java, Indonesia. *Journal of Ethnopharmacology*, 115(1), 72–81. <<https://doi.org/10.1016/j.jep.2007.09.010>>
- Takahashi, Sumiko. 1988. *Jamu: Indoneshia no Dentoteki Chiryoyaku: Rekishi to Shoho no Kaishaku (Jamu: Traditional Indonesian Medicines, History and Interpretation of Formulas)*. Tokyo: Hirakawa Shuppan Inc. (in Japanese)
- WFO 2024. *WFO Plant List, World Flora Online* <<https://wfoplantlist.org>> (accessed January 10, 2025)