

Exploration and Economic Value of Medicinal Plants as Traditional Herbal Ingredients in Bangselok, Madura, Indonesia

Sonny Kristianto, Jati Batoro, Sri Widyarti and Sutiman Bambang Sumitro

Biology Department, Faculty of Mathematics and Natural Sciences

Brawijaya University

Malang, 65145, Indonesia

sonny.kristian@gmail.com, jati_batoro@yahoo.co.id, swid@ub.ac.id, sutiman@ub.ac.id

Abstract

Jamu is a traditional medicine based on the wisdom of the local community can be used as an alternative to the treatment of several symptoms of the disease, one of which is pain, fever. The purpose of the research is to know the type and use of medicinal plants, the content of active compounds as well as prospective traditional herbal medicine for the community. Direct interview method with purposive sampling technique. In this study, 22 types of medicinal plants were found in bangselok villages. Processing medicinal plants as traditional herbal medicine using traditional methods include, boiled, pounded, embalmed. Family Zingiberaceae is a plant that is often used as a traditional jamu material by the bangselok community. Family Zingiberaceae contains active compounds, including flavonoids, tannins, saponins and steroids that can relieve several diseases including fever and pain, in addition to the family plant, Zingiberaceae found around the house and easy to cultivate. Traditional jamu is an ancestral heritage and is an economic driver for bangselok people.

Keywords

Exploration, Plant Herbal Medicine, Herb Ingredients, Economic Value, Bangselok Society

Introduction

Since ancient times the Indonesian nation has known traditional medicine that utilizes foliage, stems, roots, seeds, flowers, fruits and other medicinal plants including spices that are the product of the Indonesian nation. Traditional medicine using medicinal plants is one of the efforts for preventive prevention, curative, rehabilitative, and health improvement (promotive) (Rakotoarivelo et al. 2015) for Tackling public health problem in society.

The use of medicinal plants for health has been done for generations and is part of the culture inherited by the ancestors of the Indonesian people. Methods used, how materials are ed, the availability of materials in the environment, equipment used, and means of manufacture related to the traditions of local communities that have the uniqueness of each region or tribe.

Jamu is traditional medicine in Indonesia based on the knowledge and wisdom of local people, one of them bangselok community, Madura. Some plants are used as a formulation of jamu making for traditional medicine (Saepudin, Rusmana, and Budiono 2016). Combination of plant use in the making of jamu based on the type of disease or complaint of sufferers (Handayani 2008). Jamu is used by the public to relieve some people such as fever, cough, pain and to maintain stamina in the body. The content of active compounds such as flavonoids, steroids, tannins and saponins found in plants has a role to play in the success of traditional medicine. in addition, jamu is one of the home industry and a source of income for the bangselok community.

Research Methods

Ethnobotany observation

This study was carried out in Bangselok district in Sumenep Region of the Republic of Indonesia. Data collection was obtained through semi-structured interviews with informants who knew or used plants as medicine. This technique is commonly used in ethnobotanical studies (Pieroni et al. 2007). Interviews were conducted with selected informants

including about 10% of the total heads of family units (32 informants) to determine and explore the traditional knowledge regarding the utilization of medicinal plant species, their usefulness, the utilized part, mode of preparation, or method of processing the plants. Respondents are traditional herbal medicine makers, age of the informants ranged from 50 to more than 65 years. The interview activities were carried out in their entirety using a questionnaire. Informant selection was based on the Snowball Sampling technique, by determining the key person. A key-person is one who possesses strong power within society. The subsequent informants are determined by the direction of the previous respondents.



Figure 1. Location of Studi Area

Results and Discussion

History of Jamu in Madura

The term "herbal medicine" is derived from the Ancient Javanese "jampi" or "usodo" which means healing using medicinal herbs as well as prayers and ajians. In the middle ages (15-16 AD), the term usodo was rarely used, while the term jampi became increasingly popular among the palace. Then the term "jamu" began to be introduced to the public by traditional medicine physicians. Jamu, which was originally only known in the palace environment, has started to come out of the palace environment, although it is still used in limited environments. However, after botanists publish writings on the variety and benefits of plants for treatment, it can be enjoyed by all walks of life. Then, household-made jamu began to develop into industry in early 1900 (Mangestuti et al. 2007). Herbal medicine is an original natural ingredient herb product used for health maintenance, disease prevention, disease treatment, health recovery, fitness, and beauty. Herbs are made from natural ingredients, in the form of parts of plants such as rhizomes (roots), leaves, bark, and fruit. There is also the use of materials from the body of animals, such as goat bile or crocodile tangkur (Robiyatul Adawiyah, Umiyah 2015). The raw material of this natural remedy can come from biotic and abiotic natural resources. Biotic resources include renic bodies, flora and fauna as well as marine biota, while abiotic resources include land, water and space resources and include the potential that exists in them (Handayani 2008).

Local Wisdom Bangselok Society

Sumenep Regency has an area of 2,093, 47 km² with a population of 1,076,805 inhabitants. In Sumenep there is a kingdom that stood in the year 1781, the development of this kingdom influenced by Islamic culture and Thiongha, one of the development of traditional medicine of Madura society. Traditional medicine is used by the public to cure some diseases such as cough, fever, pain and to maintain health. This traditional medicine becomes the wisdom of local people of Madura and preserved until now. Bangselok is the center of traditional jamu making in Sumenep Regency. Based on the results of the interview that traditional Jamu making still apply local wisdom using traditional methods and equipment (Figure 2). According Rahayu (Rahayu 2006) treatment in society can not be separated from local wisdom of local areas.



Figure 2. Methods of making Jamu (a)Boiling Herbs Equipment (b)(Mudjijono, Isni Herawati, Siti Munawaroh 2014)

The process of making traditional jamu using equipment made of clay (Figure 2b), as well as using traditional methods such as mashing, squeezing and boiling (Figure 2a). The development of traditional herbal medicine is aimed to break the traditional herbal medicine into smaller parts so as to expand the surface and accelerate the dissolving of active compounds when boiled. Boiling aims to dissolve active compounds in traditional herbal medicine (R. et al. 2016). Traditional herbal medicine is a result of cultivation or acquired from wild plants around the house.

Inventory of medicinal plants in District Bangselok

Based on the results of the interview that the inventory of medicinal plants used as traditional herbal medicine by the Bangselok community there are 22 plant species (table 1). The plant used as a medicinal plant is family Zingiberaceae. Some medicinal plants are found around the grounds of home such as family Oxalidaceae, Euphorbiaceae, Rutaceae, Menispermaceae, Lamiaceae, Moraceae, Malvaceae. The plant parts used as traditional herbs are leaves, stems, roots, flowers, fruits, and rhizome. The leaf part is used as a traditional medicine because it has a water content of 70-80%, where the accumulation of photosynthesis is suspected to have substances that heal the disease [16]. The leaves are a part of the plant that is easily acquired and easily mixed [17]. The rhizome part is often used by people of the community for Jamu because the rhizome has many content such as flavonoids, saponin, and essential oils [18].

Table 1. Inventory of medical plant in district Bangselok

No	Local Name	Family	Species	Part of Plant	Use
1	Chabi Jhamo	Piperaceae	<i>Piper retrofractum</i> Vahl	Fruits	Aphrodisiacs, contraceptives, herbal medicine, lumbago, fever, stomach ulcers
2	Konkeh	Zingiberaceae	<i>Boesenbergia pandurata</i> (Roxb.) Schlecht.	Rhizome, Leaves	Sari rapet, fertilizer womb, herbal medicine, gout, puerperal fever, digestion, thrush
4	Konyi' pote	Zingiberaceae	<i>Curcuma zedoaria</i> (Berg.) Roscoe.	Rhizome	Whitish, smooth digestion, cancer
5	Lampojang	Zingiberaceae	<i>Zingiber zerumbet</i> (L.) J. E. Smith	Rhizome	Appetite, fever
6	Laos	Zingiberaceae	<i>Alpinia galanga</i> (L.) Swartz	Rhizome	Aprodisiac, Smooth blood, Rheumatism, contraception,
7	Bangle/ Pandhiang	Zingiberaceae	<i>Zingiber purpureum</i> Roxb.	Rhizome	Overweight, worms, fever
8	Temo Celleng	Zingiberaceae	<i>Curcuma aeruginosa</i> Roxb.	Rhizome	Leucorrhoea, intestinal worms, appetite enhancer
9	Temo Giring	Zingiberaceae	<i>Curcuma heyneana</i> Val. & v. Zijp.	Rhizome	Appetite enhancer
10	Temo Pao	Zingiberaceae	<i>Curcuma mangga</i> Val.	Rhizome	Fever, cancer, vaginal discharge, indigestion
11	Blimbing Buluh	Oxalidaceae	<i>Averrhoa carambola</i> L.	Fruits	Cough

12	Brotowali	Menispermaceae	<i>Tinospora crispa</i> (L.) Miers ex Hook. f. & Thoms.	Leaves, Stem	Diabetes, rheumatism, itching, diarrhea.
13	Cermeh	Euphorbiaceae	<i>Phyllanthus acidus</i> (L.) Skeels	Leaves	Streamlining breast milk, cough medicine
14	kapoh	Sterculiaceae	<i>Ceiba pentandra</i> (L.) Gaertn.	Leaves	Cough medicine, asthma
15	Jheruk Pecel	Rutaceae	<i>Citrus aurantifolia</i> (Christm. & Panz) Swingle	Skin Fruits	Cough medicine
16	Mengkudu/ Koddhu'	Rutaceae	<i>Morinda citrifolia</i> L.	Leaves, Fruits	Smoothen breast milk, diabetes, gout, rheumatism, osteoporosis
17	Kates Rambei	Caricaceae	<i>Carica papaya</i> L.	Leaves, Root	Streamlining breast milk, appetite
18	Sage	Papilionaceae	<i>Abrus precatorius</i> L.	Leaves	Asthma, appetite
19	Jeih	Zingiberaceae	<i>Zingiber officinale</i> Roxb	Rhizome	Aphrodisiac, fever
20	Kemangih	Lamiaceae	<i>Ocimum sanctum</i> L.	Leaves	Antiseptic, thrush, fever
21	Bunga sepatu/ merebheng	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.	Leaves	Lung disease
22	Meniran	Euphorbiaceae	<i>Phyllanthus urinaria</i> L.	Leaves	Fitness and health

Table 2. List of medicinal plants as a traditional herbal ingredient

No	Local Name	Species	Compound content	Reference
1	Jahe	<i>Zingiber officinale</i> Roxb	gingerols, shogaols, and paradols, quercetin, zingerone, gingerenone-A, and 6-dehydrogingerdione, β -bisabolene, α -curcumene, zingiberene, α -farnesene, and β -sesquiphellandrene	[18](Ravindran and Babu 2016)
2	Lempuyang	<i>Zingiber zerumbet</i> (L.) J. E. Smith	Zerumbone, kaempferol, α -pinene, β -pinene, Δ^3 -carene, camphor, β -caryophyllene, ar-curcumene, humulene oxide, humulene dioxide, linalool, borneol, α -terpineol, flavone	(Zakaria et al. 2011)
3	Bangle	<i>Zingiber purpureum</i> Roxb	saponin, flavonoid, atsiri oil, tanin, steroid, triterpenoid, sabinene, terpinen-4-ol, Cassumunarin A B C, zerumbone, butadiene, limonene	(Verma 2018)(Chanwitheesuk, Teerawutgulrag, and Rakariyatham 2005)
4	Temu Pao/Mangga	<i>Curcuma mangga</i> Val.	alkaloid, flavonoid, tanin, kurkuminoid dan terpenoid, zerumin A, β -sitosterol, curcumin, demethoxycurcumin and bisdemethoxycurcumin	(Malek et al. 2011)
5	Temu Putih	<i>Curcuma zedoaria</i> (Berg.) Roscoe.	kurkumin, atsiri oil dan flavonoid, terpenoid, tanin, saponin, alkaloid, terpinoid, dan steroid, Epicurzerene, monoterpenoids, curcumenene, curzerenone, 1,8-cineole, debromofiliforminol	(Dosoky and Setzer 2018)(Tariq et al. 2016)
6	Temu Giring	<i>Curcuma heyneana</i> Val. & v. Zijp.	flavonoid, kurkumin, fenolik, atsiri oil, steroid, terpenoid, saponin dan tannin, curcumin, 1,8-cineole/limonene, isocurcumenol, curcumanolides A, B	(Sofian et al. 2017)(Xu and Chang 2007)

Based on the results of the interview there are 6 plants used as a traditional herbal medicine by the community Bangselok, among others (table 2), Ginger (*Zingiber officinale* Roxb), Lempuyang (*Zingiber zerumbet* (L.) J. E. Smith), Bangle (*Zingiber purpureum* Roxb), Temu Mango/Pao (*Curcuma mangga* Val), white Temu (*Curcuma zedoaria* (Berg.) Roscoe), Temu Giring (*Curcuma heyneana* Val. & V. Zijp). (*Zingiber officinale* Roxb) Ginger rhizome contains essential oils, Gingerol, Shogaol and Zingiberen (table 2) [20]. Gingerol is a phenolic compound

that acts as an anti-inflammatory, gengerol can inhibit the activity of Cyclofluorine and lipoxxygenase in arakhidonat acid resulting in a decrease in the number of prostaglandins and Leukotrien [11]. (Zingiber Zerumbet (L.) J. E. Smith) rhizomes containing active compounds include kaempferol, quercetin, curcumin and essential oils [21]. Rhizome of the clay has anti-inflammatory activity, Zingiber Zerumbet extract is able to inhibit the working of the enzyme cyclooxygenase, lipoxxygenase, myeloperoxidase and nitric oxide synthase [29]. (Zingiber purpureum Roxb) rhizome has the efficacy to reduce fever, pain and constipation. Rhizome Zingiber purpureum contains saponins, flavonoids, essential oils, tannins, steroids, triterpenoids, antioxidants and phenolic compounds [23]. The phenolic compounds in the rhizome of the bangle can inhibit the activity of inhibiting inflammation by inhibiting the enzyme cyclooxygenase (COX) and lipooxygenase as well as inhibitory release of histamine [30]. (Curcuma mango Val.) Rhizome Curcuma Mango contains essential oils, alkaloids, flavonoids, tannins, curkuminoids and terpenoids (table 2). The mango Curcuma phenolic compound is capable of inducing glutation-Stransverase (GST) activity, an enzyme that plays a role in the detoxification of foreign compounds in the body, and is able to suppress oxidative stress [31]. (Curcuma Zedoaria (Berg.) Roscoe) Rhizome Curcuma Zedoria contains curcumin compounds, essential oils and flavonoids, terpenoids, tannins, saponins, alkaloids, terpinoids, and steroids [26]. Curcumin activity as an anti-inflammatory is to inhibit the production of prostaglandins through inhibition of the activity of cyclooxygenase enzyme [30]. Rhizoma C. Zedoaria shows significant $p < 0.001$ anti-inflammatory, when compared to the control with standard drugs (Indomethacin 10 mg/kg. I. P and Rimalaya Forte 200 mg/kg). Petroleum extract ether 200 and chloroform 400 mg/kg this C. Zedoaria extract demonstrates maximum anti-inflammatory activity in hours 2 to 6 [32]. (Curcuma heyneana Val. & V. Zijp) Rhizoma Curcuma Heyneana function to improve blood circulation. Rhizoma Curcuma Heyneana has content of flavonoids, curcumin, phenolic, essential oils, steroids, terpenoids, saponins and tannins [28]. Rhizoma Curcuma Heyneana contains dihydrosuberanol and demethoxycurcumin compounds that have activity as antioxidant [33] and zedoarindiol compounds have an anti-inflammatory effect and inhibit iNOS, COX-2 and pro-inflammatory cytokines [34].

Table 3. Traditional herbal herbs to relieve fever and pain

No	Herbs	Method of Use	Time	Equipment
1	15 gram <i>Zingiber officinale</i> Roxb, 15 gram <i>Curcuma mangga</i> Val., 12 gram <i>Curcuma zedoaria</i> (Berg.) Roscoe, 3 gram <i>Zingiber zerumbet</i> (L.) J. E. Smith	Mash all ingredients add 100 mL of boiled water then squeeze	5 minute	mortar and pestle
2	5 gram <i>Zingiber officinale</i> Roxb, 5 gram <i>Curcuma mangga</i> Val., 4 gram <i>Curcuma zedoaria</i> (Berg.) Roscoe, 2 gram <i>Zingiber purpureum</i> Roxb	Cut into small pieces add 800 mL of water then boil at 100 °C	15 minute	Pottery
3	5 gram <i>Curcuma mangga</i> Val., 4 gram <i>Curcuma zedoaria</i> (Berg.) Roscoe, 3 gram <i>Curcuma heyneana</i> Val. & v. Zijp.	Cut into small pieces add 800 mL of water then boil at 100 °C	15 minute	Pottery

Bangselok people make jamu by using plants around the house to relieve several diseases, one of which is fever and pain. There are several traditional herbal herbs of the bangselok community that are used to relieve fever and pain (table 3). Plants used as traditional medicine have an active compound content that can relieve fever and pain. According to the informant, from the various types of jamu he made, curcuma mango rhizomes are always in it. According Dosoky (Dosoky and Setzer 2018), curcuma mango benefits can treat various diseases as well as health disorders. Curcuma mango and kencur have been used as one of the components of phytofarmaka. According Yunbao (Liu and Nair 2012) mango curcuma is widely used as herbal herb because it is efficacious to cool, cleanse, dry, eliminate itching, and cure tingling. In addition, it is also useful as anti-inflammatory, anti-inflammatory, anti-oxidant, anti-microbial, cancer prevention, anti tumor, and lower blood fat and cholesterol levels, as well as as a blood purifier. According Sanatombi (Rajkumari and Sanatombi 2018) curcuma mango rhizomes combined with other ingredients such as kencur, ginger, temulawak, temureng, lempuyang, cardamom, adas and sambiloto can overcome flatulence. Traditional jamu for bangselok community has cultural value and is an ancestral heritage that must be preserved. In addition, traditional jamu becomes one of the income for the local community, so in bangselok area, many stand home industry jamu.

Development of Jamu Industry in Madura

Sumenep regency there are various regions that are producers of jamu. Even in bangselok sub-district, Sumenep sub-district is home to jamu merchants. According (Mudjijono, Isni Herawati, Siti Munawaroh 2014), in 1900 there have been many pop-ups of the jamu industry in Indonesia, one of which is in Sumenep Regency, Madura. They make jamu with quality and hygienic ingredients that can overcome various diseases by using five superior plants, such as pegagan (*Centella asiatica*), temulawak (*Curcuma xanthorrhiza* roxb), sambiloto (*Andrographis paniculataburms. f-ness*), kencur (*Kaempferia galangal*, Linn.) and jahai (*Zingiber officinale* roxb). According Zulfa (Agustina and Fitrianti 2020) that the medicines circulating in the market can be classified into 6 (six) large groups, namely strong jamu, jamu for womanhood, beauty jamu, jamu tolak angin, jamu pegel linu, and other jamu. The functions of various jamu are as follows: (1) Strong and healthy jamu pria is a jamu that serves to maintain the health of the body and improve the vitality of men, (2) Jamu for womanhood is a jamu whose use is intended for the area of womanhood, including menstrual jamu, jamu for whiteness, and jamu rapet wangi. In this group including jamu habis maternity, (3) Jamu kecantikan is a jamu that serves to keep the body healthy and fresh, as well as to care for and keep the skin healthy, smooth, clean, soft and fresh. In this group also includes jamu which is useful for slimming the body and jamu to relieve acne, (4) Jamu tolak angin is a jamu that serves to cure symptoms of wind in the wind such as flatulence, nausea, dizziness, lethargy, and cold hot body, (5) Jamu pegel linu is a jamu that serves to relieve symptoms of pain in the body, pain in the joints, and (6) other jamu, in this group are various types of jamu that do not enter the above group, e.g. jamu for treatment (cough, asthma, ulcers, rheumatism, high blood pressure) and non-medical medicine (add blood, facilitate breast milk, jamu for children, sedatives).

According to data from the Food and Drug Administration (BPOM) in 2019 there are 1,036 traditional medicine industries that have industrial business permits consisting of 129 large-scale industries and 907 small industries such as The Small Industry of Traditional Medicine. From 907 small industries, 35.4% can be classified as household industries with very minimal facilities and resources, while out of 129 large-scale sectors, only 69 sectors (53.49 %) certificate of How to make Good Folk Remedies.

According to the informant maker and seller of herbal medicine said that Madura herbal medicine continues to develop and needs society as alternative medicine. The public's interest in jamu has increased, both the jamu that is drunk directly at the place of the jamu seller, which is brought home. According to consumers, Madura herbal herbal potion is very useful for health or for body fitness, and efficacious to cure various diseases. In addition, Madura herbal remedies do not contain side effects that harm health, because the raw materials are from natural elements of herbs in the form of roots, leaves, stems, and fruit. The results of observations in the field, there is one of the makers and sellers of consumer goods quite a lot who buy or drink that is ready for consumption.

The traditional herbal medicine industry in its development has its constraints. The problem is that the younger generation as its successors are less interested in developing the heritage of ancestral traditions as assets of wealth that must be preserved. In addition, the constraints of the household jamu industry, including small businesses are lack of capital, weakness of production management, and difficulty developing the marketing products.

Conclusion

In District Bangselok, Sumenep regency found 22 types of medicinal plants used for traditional medicine by the community. Family Zingiberaceae is a plant often used as a traditional medicine material. The process of making and processing traditional medicine still uses traditional equipment and methods. There are three traditional herbal potion recipes for fever and pain that have been passed down by ancestors downwards. Flavonoid compounds, tannins, saponins and steroids are found in traditional jamu ingredients used by the bangselok community. in addition, Jamu became one of the income for the bangselok community

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Biographies

Sonny Kristianto is an Associate Professor. He has a Bachelor of Biological Sciences from University Negeri Surabaya, a Master's degree from Airlangga University, and Ph.D Student at Brawijaya University. He has published journal and conference papers. Mr Sonny Kristianto is a lecturer and researcher at Faculty of Language and Sciences, Universitas Wijaya Kusuma Surabaya. His research interests Environmental Biology, Biology Molecular, herbal medicine, ethnobotany.

Jati Batoro is an Associate Professor. He has a Bachelor of Biological Sciences from Brawijaya University, Master's degree from Gadjah Mada University, and PhD from Institute Pertanian Bogor. He has published journal and conference papers. Mr Jati Batoro is a lecturer and researcher at the Biological Department, faculty of Mathematics and Natural Sciences, Brawijaya University, Malang. His research interests Ethnobotany, Plant Taxonomy.

Sri Widayarti is an Associate Professor. She has a Bachelor of Biological Sciences from Airlangga University, Master's degree from Institute Pertanian Bogor, and Ph.D. from Brawijaya University. She has published journal and conference papers. Mrs Widayarti is a lecturer and researcher at the Biological Department, Faculty of Mathematics and Natural Sciences, Brawijaya University. Her research interests Biology cel, Biologi Molecular, immunology.

Sutiman Bambang Sumitro is a Professor. He has a Bachelor of Biological Sciences from Gadjah Mada University, Master's degree from Gadjah Mada University, and PhD from Graduate School of Biology, Nagoya University. He has published journal and conference papers. Mr Sutiman is a lecturer and researcher at the Biological Department, Faculty of Mathematics and Natural Sciences, Brawijaya University, Malang. His research interests Biologi Molekuler, Immunology.