ASIAN JOURNAL OF ETHNOBIOLOGY
Volume 6, Number 1, May 2023
Pages: 65-74

E-ISSN: 2580-4510
DOI: 10.13057/asianjethnobiol/y060108

Plants as herbal medicine at Nguter Traditional Market, Sukoharjo, Central Java, Indonesia

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Manuscript received: 18 January 2023. Revision accepted: 30 May 2023.

Abstract. *Mardiyanto MB, Foresty RS, Arlysia V, Chorunissa ZFN, Nugroho GD, Yasa A, Setyawan AD. 2023. Plants as herbal medicine at Nguter Traditional Market, Sukoharjo, Central Java, Indonesia. Asian J Ethnobiol 6: 65-74.* In Indonesia, herbal medicine (*jamu*) is a traditional medicine found in traditional markets, including the Nguter Traditional Market. This research aims to identify the species of herbs and plants sold at the Nguter Traditional Market and provide readers with useful information should they purchase them. The study was conducted from December 2022 to January 2023 at the Nguter Traditional Market in the Sukoharjo District of Central Java, Indonesia. The method employed involved direct interviews with the market administration staff and 36 herbal medicine traders at the Nguter Traditional Market. Primary data was obtained through interviews, while secondary data was sourced from literature studies. The data were analyzed descriptively. The research revealed that the Nguter Traditional Market sells as many as 40 herbal plant species from 23 families. The most common herbal plants sold at the market include *cipir* (*Psophocarpus tetragonolobus* (L.) DC.), *dawung* (*Parkia timoriana* (DC.) Merr), *kunir* (*Curcuma longa* L.), *jahe* (*Zingiber officinale* Rosc.), and *kencur* (*Kaempferia galanga* L.). The most expensive medicinal plants sold at the market are *mesoyi* (*Cryptocarya massoia* (Oken) Kosterm.), *pekak* (*Illicium verum* Hook.fil.), and *kapulaga* (*Elettaria cardamomum* (L.) Maton), which are sold for IDR 300,000 per kilogram. The stem is the most commonly used part of herbal medicine. Herbal plants are widely used to treat coughs, inflammation, and flu. Overall, the research provides valuable information for readers interested in purchasing herbal medicine at the Nguter Traditional Market.

Keywords: Herbs, *jamu*, medicine, traders, traditional market

INTRODUCTION

Indonesia is one of the countries in Southeast Asia, it has more than 30,000 species of medicinal plants, around 6,000 species of which have various biological activities, and 1,000 species are traditionally used as herbal medicine or were called "*jamu*" (Widyowati and Agil 2018). The term "*jamu*" comes from the Javanese word "*jampi*" (magical herb) (Kurniawan and Ikhsanudin 2020). *Jamu* is a traditional Indonesian medicine made from native sources, such as roots, bark, flowers, seeds, leaves, and fruit (Eff et al. 2020). This traditional medicine is made from a mixture of several plants, called ''*empon-empon*'' to increase body resistance and cure disease (Ramadhani et al. 2021). *Empon-empon* is some species of Zingiberaceae, such as ginger, kencur, turmeric, temulawak, lempuyang, and galangal, used as herbal medicine ingredients (Sulaiman et al. 2022). It is usually consumed to relieve pain and inflammation and even treat chronic diseases like rheumatism and cancer (Harmayani et al. 2019). The Indonesian Basic Health Research (Riskesdas 2018) noted that 59.12% of Indonesians still consume herbal medicine, and more than 95.6% recognize the benefits of herbal medicine for health (Ariantini and Solehah 2021). The herbal medicine species that are widely consumed are ginger (50.36%), kencur (48.77%), and temulawak (39.65%), which are used in the form of liquid concoctions (48.0%) (Kusuma et al. 2020). The Indonesian people utilized traditional herbal medicine for generations until now, so herbal medicine has become part of the culture and is one of Indonesia's assets (Az-Zahra et al. 2021). *Jamu* is widespread in the Indonesian and global markets and easily accessible to consumers through markets. Moreover, the market demand for herbal medicine continues to increase so that herbal medicine increasingly provides economic and clinical benefits (Suparmi et al. 2021).

Jamu is an Indonesian traditional medicine, can be easily obtained in the market, where buying and selling transactions occur. The market reflects the economic and socio-cultural activities of the community (Landra 2019). According to Runtu et al. (2018), there are generally two types of markets: modern and traditional. The modern market is a place to sell at a fixed price, with a self-service system and no bargaining activity. In comparison, traditional markets with a buying and selling bargaining system. These markets are built/managed by the

government, regional government, private sector, state-owned enterprises, and regionally-owned enterprises, including cooperation with the private sector with places of business in the form of shops, kiosks, or tents owned by traders (Soelistiyono et al. 2018). Traditional markets have become an important part of the life of Indonesian people (Nelwan et al. 2017), especially for the lower/middle classes (Landra 2019). The important role of traditional markets is as an outlet for local community products and job opportunities for some people (Purwanto et al. 2021). In general, traditional markets in Indonesia sell daily necessities such as groceries, foodstuffs (seasonings, vegetables, fruit, meat, fish, eggs, etc.), clothing, household appliances such as cutlery, and other necessities (Runtu et al. 2018; Udjianto et al. 2021). However, several traditional markets specifically sell certain commodities or products, such as herbal markets, fruit markets, animal markets, bird markets, etc. Traditional markets that specifically sell herbs or traditional herbal medicines are also called herbal markets or *jamu* markets (Ahmad et al. 2018)

One market with the main herbal medicine sales in Indonesia is the Nguter Traditional Market. The Nguter Traditional Market is located in Sukoharjo District, Central Java, Indonesia, and has been established since 1965 (Nuraini and Kurnianingsih 2021). The Nguter Traditional Market sells various *empon-empon*, spices, and instant herbs. *Empon-empon* and spices are ingredients used to make traditional or herbal medicine (Sumarni et al. 2019). The habits and culture of the Indonesian people, especially the Javanese, to drink herbal medicine to maintain health and for treatment (Astuti et al. 2021) made herbal medicine demanded by the public until recently. In addition, according to Ahmad et al. (2018), various herbs or medicinal plants traded will represent the diversity of an area. Therefore, the purpose of this research is to observe the species of herbs and plants sold and provide information for readers if they want to find herbs and plants that are suitable for sale.

MATERIALS AND METHODS

Study area

This study was conducted from December 2022 to January 2023. The study site is located at the Nguter Traditional Market, a traditional market managed under the Department of Trade, Cooperatives, and SMEs, Sukoharjo District, Central Java, Indonesia. In the Nguter Traditional Market, various types of merchandise are sold, such as herbs, clothing, groceries, meat, vegetables, and other traditional merchandise. The Nguter Traditional Market is located along Street Solo - Wonogiri, Nguter, Sukoharjo District, in Central Java, Indonesia. Its location is at coordinates 7°44'26.6"S, 110°52'36.2"E (Figure 1). The Nguter Traditional Market has great potentially developed to be the herbal medicine market.

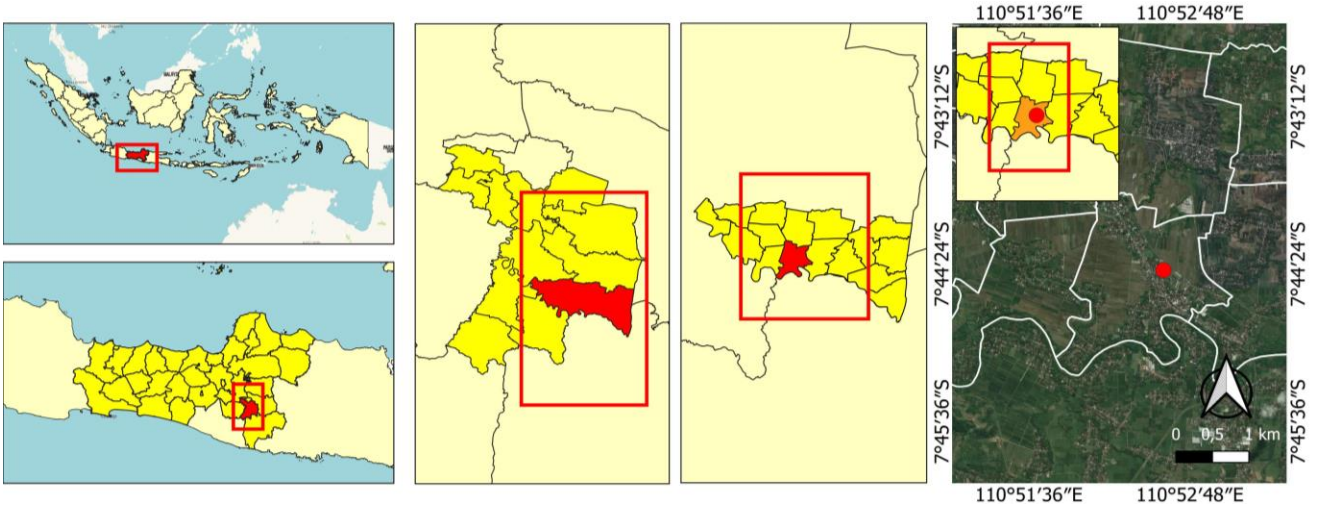

Figure 1. Map of the study site at the Nguter Traditional Market, Sukoharjo, Central Java, Indonesia

Figure 2. A. Nguter Traditional Market Building, B. Herbal medicine stall in the Nguter Traditional Market

Data collection procedures

The data searching in this study is divided into primary and secondary data. Primary data was obtained through interviews and questionnaire spreading (Isthiaq et al. 2022) to herbal medicine traders and an administrator in Nguter Traditional Market (36 persons). Data collection included local names, parts of plants, the basic ingredients for herbal medicine, the benefits of the plants, the herbal medicine process, supply, and prices of the medicinal plants. Meanwhile, secondary data was obtained through literature studies to support the field data research. In addition, a few sample of the herbal medicine sold in the Nguter Traditional Market made documentation.

Data analysis

Data analysis was done by identifying medicinal plants to find their scientific names and explaining the data descriptively, then arranging them in tables, pictures, and graphs.

RESULTS AND DISCUSSION

Short history of Nguter Traditional Market

Nguter Traditional Market is known as a Javanese herbal (*jamu*) market because the majority sell herbal medicine in the Nguter Village, Sukoharjo, Central Java, Indonesia (Figure 2). According to Gardjito et al. (2018), the Nguter Traditional Market is known as a market in Indonesia devoted to herbal medicine. Based interview with an administrator, the Nguter Traditional Market before 1938 had no traders selling herbal medicine; after one year, Mrs. Yoso Hartono moved to Nguter Village, and he started selling herbal medicine such as kencur rice, turmeric tamarind, bitterness, and other processed herbal medicine at the Nguter Traditional Market. Other herbal medicine traders followed her success in selling herbal medicine in the village of Nguter and its surroundings. After that, the herbal medicine trade increased rapidly until now, and the Nguter Traditional Market is known as the herbal medicine market. Seven herbal products are widely sold in stalls: WISNU JKW (Joglo Kresno Wisnu), Gujati, Sabdopalon, Bisma, Anoman, Puntodewo, and Narododi. Mrs. Yoso Hartono died in 1983, and his children could continue this business.

The commodity arrangement at the Nguter Traditional Market is a zoning system to make it easier for buyers. Nguter Traditional Market has two floors; the 1st floor has 69 stalls measuring 3x4 m and 142 stalls measuring 2x2 m, while the 2nd floor has 41 stalls measuring 3x4 m, 173 stalls measuring 2x2 m, and an additional 41 stalls for new tenant traders. The main services of Nguter Traditional Market are service and cleanliness so that this market becomes a comfortable and enjoyable shopping place.

Respondent characteristics

Respondents in this study were herbal medicine traders, totaling 36 people with an age range of 20-70 (Table 1). Most respondents are female because most sellers are women and are more active in obtaining information related to plants for health. According to Ismarani (2013), women know more about the benefits of plants because of the many benefits of herbal medicine for beauty, maintaining body fitness, and slimness.

Diversity of medicinal plants in Nguter Traditional Market

Observation data of medicinal plants in the study site was reported 23 families of herbal plants sold in the Nguter Traditional Market with the number of species of each family difference. Families with one species were found in Apiaceae, Faboideae, Lamiaceae, Meliaceae, Menispermaceae, Myristicaceae, Oleaceae, Phyllanthaceae, Poaceae, Rosaceae, Rutaceae, Santalaceae, Schisandraceae, Solanaceae, Thymelaeaceae, and Usneaceae. The families with two species were found Acanthaceae and Apocynaceae. The family with three species are Lauraceae, Myristicaceae, and Piperaceae; the family with four species is Fabaceae; and the family with six species is Zingiberaceae (Figure 3).

Diversity of herbal plants in Nguter Traditional Market

The total number of herbal medicines sold in the Nguter Traditional Market is 40 species. The medicinal plants sold are supplied from several areas in Central Java, namely Boyolali, Wonogiri, Sukoharjo, and Purworejo. Herbal plants that are often found in every trader, namely winged bean/*cipir* (*Psophocarpus tetragonolobus* (L.) DC.), *dawung* (*Parkia timoriana* (DC.) Merr), turmeric/*kunir* (*Curcuma longa* L), ginger/*jahe* (*Zingiber officinale* Rosc.), and *kencur* (*Kaempferia galanga* L). The plant parts used for herbal medicine include roots, stems, leaves, flowers, fruits, and seeds. The herbal medicine sold in this market is usually herbal decoction. In addition, processed herbal medicine relieves colds, coughs, and inflammation, treats female problems, increases appetite, and many more (Table 2). Based on the selling price of each species of herbal medicine, the price range is IDR 20,000/kg to IDR 300,000/kg (Table 2). Several medicinal herb species sold in the Nguter Traditional Market have been documented (Figure 4).

Table 1. Characteristics of herbal medicine sellers in Nguter Traditional Market, Sukoharjo, Central Java, Indonesia (n=36)

Variable	Count	Percetage
Age		
20-30	1	3%
31-40	4	11%
41-50	10	28%
51-60	18	50%
61-70	3	8%
Gender		
Male	7	19%
Female	29	81%
Education		
Elementary	2	6%
Junior High School	9	25%
Senior High School	20	56%
University	5	14%

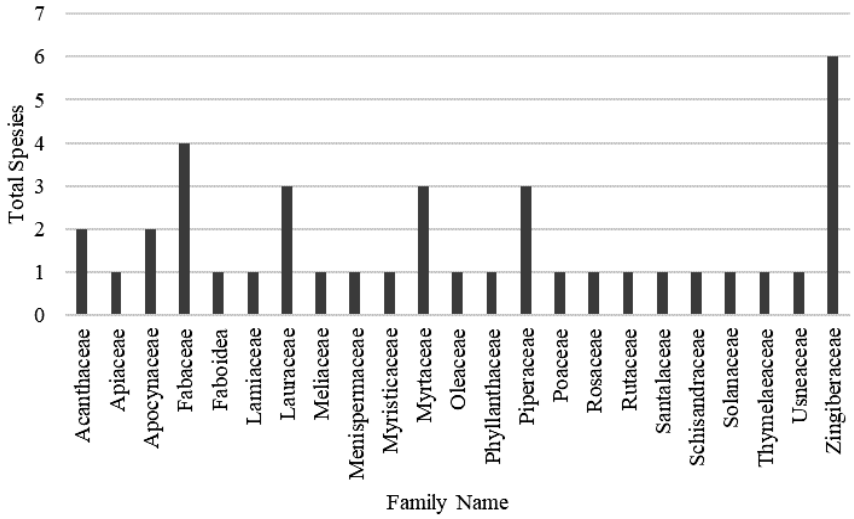

Figure 3. The number of species in the herbal plant families at the study site

Part of medicinal plants

The utilization percentage of medicinal plant parts sold in Nguter Traditional Market barks 24%, leaves 21%, roots 18%, seeds 16%, flowers 13%, and fruits 18% (Figure 5).

Benefits of herbal medicine

Based on the benefit of medicinal plants, the percentage of species diversity for treating coughs, inflammation, and flu by 30%, treating female problems by 17%, maintaining heart health, lowering cholesterol, and digestive disorders have the same by 9%, treating fever was by 8%, lowering blood pressure by 6%, treating urinary tract infections were 4%, and asthma by 2% (Figure 6).

Discussion

In this study, 40 species and 23 families of medicinal plants were found in the Nguter Traditional Market. In addition, a study by Silalahi et al. (2015) in the Kabanjahe Traditional Market in North Sumatra, Indonesia, found 344 species and 90 families of medicinal plants. Irwanta et al. (2015) also found 126 species consisting of 54 families of medicinal plant species traded in the Pati District, Central Java, Indonesia. In another study, in 5 main markets in Antananarivo, Madagascar, Africa, 89 species of medicinal plants were found (Randriamiharisoa et al. 2015). Furthermore, 160 species and 57 families of medicinal plants were found in research conducted at several traditional markets in Loja Province, Ecuador, South America (Tinitana et al. 2016). Finally, research by Nguyen et al. (2019) showed 99 species and 57 families of medicinal plants from research in several traditional markets in Son La Province, Vietnam. Some of these studies show that the Nguter Herbal Medicine Market has a low diversity of medicinal plants.

The herbal plant families found in the study were dominated by Zingiberaceae (Table 2). The Zingiberaceae family is intensively cultivated in home gardens, especially in Indonesia, as medicinal plants, herbs, spices, and for economic purposes (Zahara et al. 2018). These results follow research conducted by Iskandar et al. (2020), which states that plant species from the Zingiberaceae family are widely used as raw materials for herbal medicine in Central Java, Indonesia. Zingiberaceae is widely used for medicinal purposes because of its properties that can cure many diseases. According toIvanović et al. (2021), plant species belonging to the Zingiberaceae family can be a good natural source of antioxidant components widely used in the pharmaceutical, food, nutraceutical, and cosmetic industries. Therefore, plants are widely used, affecting their demand for goods and availability. In addition, antioxidants are important in increasing the body's immunity, repairing cell damage, and preventing disease.

The plant part most widely used in herbal medicine is the stem, including the bark, with a percentage of 24% (Figure 5). Therefore, many parts of the plant stem are sold because they contain properties or natural chemical compounds that suit customers' needs. In addition, processing the bark into herbal or traditional medicine is not difficult, namely by simply boiling or brewing it after washing and drying. The second most widely used part of several plant species is the leaves (Figure 5). Leaves are the main place for metabolic processes, so the content of complex compounds in the leaves is relatively large. Several studies have stated that plant parts, namely fruits and leaves, are naturally perishable products with a relatively short post-harvest shelf life (El Khetabi et al. 2022). However, most of the products at the Nguter Traditional Market are sold in dry form, so they have a relatively long shelf life and can be supplied from anywhere (Jusu and Sanchez, 2013). In addition, taking leaves from live plants for traditional medicinal ingredients does not damage or kill plants, so plant leaves can be harvested sustainably (Iskandar et al. 2020).

Table 2. Diversity of medicinal plants sold at Nguter Traditional Market, Sukoharjo, Central Java, Indonesia

Family	Scientific name	Local Name	Herbal Ingredients	Part used	Making process	Benefit	Supply	Price
Acanthaceae	*Andrographis paniculata* (Burm.f.) Wall. ex Nees	*Sambiroto*	Bitter	Leaves, stems	Boiled	Relieves cold and lowers blood pressure	Boyolali, Wonogiri, Sukoharjo, Purworejo	20,000/kg
Acanthaceae	*Strobilanthes crispa*	*Keji Beling*	Herbs	Leaf	Boiled	Treat diabetes	Wonogiri	30,000/kg
Apiaceae	*Foeniculum vulgare* Mill.	*Adas*	Herbs	Stems, leaves, seeds	Boiled	Relieve cough, prevent cancer, treat heart disease	Boyolali, Wonogiri, Sukoharjo, Purworejo	60,000/kg
Apocynaceae	*Parameria laevigata* (Juss.) Moldenke	*Kayu Rapet*	Herbal Spice Cebokan	Bark	Washed, dried, then boiled with boiling water	Eliminates leucorrhoea, Sari rapet female genitals, improves blood circulation, dysentery, wounds	Sukoharjo	110,000/kg
Apocynaceae	*Alyxia Stellata* (JRForst. & G. Forst.) Roem. & Schult.	*Pulosari*	Herbs	Bark	Brewed	Overcome irregular menstruation, canker sores, coughs, and increased appetite.	Sukoharjo	60,000/kg
Fabaceae	*Psophocarpus tetragonolobus* (L.) DC.	*Cipir*	Bitter	Seed	Boiled	Treats inflammation and ulcers, medicine sore	Boyolali, Wonogiri, Sukoharjo, Purworejo	25,000/kg
Fabaceae	*Parkia timoriana* (DC.)Merr	*Dawung*	Saffron-colored rice	Seed	Pounded, then boiled	Treat inflammation, relieve pain stomach, fever medicine	Boyolali, Wonogiri, Sukoharjo, Purworejo	60,000/kg
Fabaceae	*Senna Alexandrina* Mill.	*Jati Cina*	Herbs	Leaf	Brewed	Lose weight, treat gout and constipation, and treat the skin.	Sukoharjo	50,000/kg
Fabaceae	*Biancaea sappan* (L.) Tod.	*Secang*	Herbs	Bark	Boiled, brewed	Overcoming inflammation, blood sugar, diarrhea, malaria drugs	Boyolali, Wonogiri, Sukoharjo	25,000/kg
Fabaceae	*Clitoria ternatea* L.	*Bunga telang*	Beverages, teas, herbal remedies	Flower	Boiled	Relieve symptoms of depression, reduce inflammation	Wonogiri	180,000/kg
Lamiaceae	*Orthosiphon aristatus* (Blume) Miq.	*Kumis kucing*	Herbs	Leaf	Dried soaked in boiling water	Resolve anyang-anyangan, diabetes, and rheumatism	Wonogiri	15,000/kg
Lauraceae	*Cinnamomum zeylanicum* Blume	*Manis jangan*	Herbs	Stem	Boiled	Fight HIV, reduce blood pressure, prevent cancer, fight infection	Wonogiri	100,000/kg
Lauraceae	*Cryptocarya massoia* (Oken) Kosterm.	*Mesoyi*	Saffron-colored rice	Stem	Boiled	Treat inflammation, abdominal pain, and fever	Wonogiri, Purworejo	300,000/kg
Lauraceae	*Litsea cubeba* (Lour.) Press.	*Krangean*	Herbs	Seeds, stems	Boiled	Launching defecation and treat cough	Wonogiri	60,000/kg
Meliaceae	*Swietenia mahagoni* (L.) Jacq.	*Mahoni*	Herbs	Seed	Pounded, then boiled	Lowers cholesterol, maintain heart health and increase appetite	Wonogiri, Boyolali, Sukoharjo, Purworejo	40,000/kg
Menispermaceae	*Tinospora cordifolia* (Willd.) Miers	*Brotowali*	Herbs	Stem	Boiled	Overcome fever, dysentery, skin problems, to diabetes	Wonogiri	50,000/kg
Myristicaceae	*Myristica fragrans* Houtt.	*Pala*	Herbal medicine, cooking seasoning	Seed	Brewed	Relieve stomach acid, toothache, overcome nausea and colds, diarrhea	Wonogiri	150,000/kg
Myrtaceae	*Syzygium aromaticum* (L.) Merr. & Perry	*Cengkeh*	Herbal Medicine,	Flower	Boiled	Maintain oral health, help stop diarrhea, and relieve stomach pain or nausea. Increase immunity	Wonogiri	210,000/kg

Myrtaceae	*Eucalyptus alba* Reinw. ex Blume	*Cupliksari*	Herbs	Flower	Boiled	Relieves coughs, stuffy nose, and headaches	Wonogiri	15,000/kg
Myrtaceae	*Melaleuca leucadendra* (L.) L.	*Kayu Putih*	Herbs	Leaf	Boiled	-	Wonogiri	20,000/kg
Oleaceae	*Jasminum sambac* (L.) Aiton	*Melati*	Herbal Spice Cebokan	Flower	Washed, dried, boiled with water	Eliminate leucorrhoea, Sari rapet female genitals	Sukoharjo	50,000/kg
Phyllanthaceae	*Phyllanthus urinaria* L.	*Meniran*	herbal medicine	Leaf	Boiled	Reduce cholesterol	Purworejo	30,000/kg
Piperaceae	*Piper retrofractum* Vahl	*Cabe Jawa*	Herbs	Fruit	Cut into small pieces, then boiled	Fever, flatulence, heartburn, vomiting, distraction digestion, stimulate appetite eat, and impotence.	Wonogiri	100,000/kg
Piperaceae	*Piper betle* L	*Sirih*	Herbal Spice Cebokan	Leaf	Washed, dried, blanched with boiling water	Eliminate leucorrhoea, Sari rapet female genitals	Sukoharjo	60,000/kg
Piperaceae	*Piper cubeba* L.fil.	*Kemukus*	Herbs	Seed	Brewed	Overcoming asthma, eliminating bad breath, sputum laxative, dysentery medicine	Sukoharjo	200,000/kg
Poaceae	*Imperata cylindrica* (L.) P. Beauv.	*Alang-alang*	Herbs	Root	Boiled	Reduce cholesterol	Purworejo	30,000/kg
Rosaceae	*Rosa damascena* Mill.	*Mawar*	Herbal Spice Cebokan	Flower	Washed, dried, then boiled with boiling water	Eliminate leucorrhoea, Sari rapet female genitals	Sukoharjo	160,000/kg
Rutaceae	*Citrus hystrix* DC.	*Daun jeruk*	Herbs	Leaf	Boiled	Smooth digestion, and treat flu.	Purworejo	200,000/kg
Santalaceae	*Santalum album* L	*Kayu Cendana*	Herbal Spice Cebokan	Stem	Washed, dried, then boiled	Eliminate leucorrhoea, female genital traction, and prevent dysentery.	Sukoharjo	160,000/kg
Schisandraceae	*Illicium verum* hook. fil.	*Pekak*	Herbs	Fruit	Boiled	Facilitate defecation/ small, prevent flu, treat aches	Wonogiri	300,000/kg
Solanaceae	*Physalis angulata* L	*Ceplukan*	Herbs	Leaf	Boiled	Calming at the same time speed up the healing process	Wonogiri	35,000/kg
Thymelaeaceae	*Phaleria macrocarpa* (Scheff.) Boerl.	*Mahkota Dewa*	Herbal medicine, herbal tea	Fruit	Brewed	Reducing cholesterol, migraines, for the body's immune system, diabetes medication	Purworejo	55,000/kg
Usneaceae	*Usnea* sp.	*Rasuk Angin*	Herbs	Root	Boiled	Prevent urinary and respiratory tract infections	Wonogiri	50,000/kg
Zingiberaceae	*Curcuma longa* L.	*Kunir*	Sour turmeric	Root	Washed, pounded	Treat inflammation, reduce menstrual pain, increased power hold on	Boyolali, Wonogiri, Sukoharjo, Purworejo	20,000/kg
Zingiberaceae	*Elettaria cardamomum* (L.) Maton	*Kapulaga*	Herbs	Seed	Boiled	Lower cholesterol and maintain heart health	Boyolali, Wonogiri, Sukoharjo, Purworejo	300,000/kg
Zingiberaceae	*Zingiber officinale* Rosc.	*Jahe*	Herbs	Root	Pounded, then boiled	Warms the body, strengthens the immune system, lose weight body	Boyolali, Wonogiri, Sukoharjo, Purworejo	25,000/kg
Zingiberaceae	*Curcuma zanthorrhiza* Roxb.	*Temulawak*	Herbs	Root	Pounded, then boiled	Maintain stomach health	Boyolali, Wonogiri, Sukoharjo, Purworejo	30,000/kg
Zingiberaceae	*Kaempferia galanga* L.	*Kencur*	Saffron-colored rice	Root	Pounded, then boiled	Treat cough, add appetite, relieve colds and inflammation	Boyolali, Wonogiri, Sukoharjo, Purworejo	20,000/kg
Zingiberaceae	*Zingiber zerumbet* (L.) Roscoe ex Sm.	*Lempuyang*	Herbs	Root	Shredded, then boiled	Overcoming constipation, overcoming joint inflammation, overcoming appetite, overcoming diabetes	Sukoharjo	20,000/kg

Figure 4. Some plants are used as herbal medicine at the Nguter Traditional Market, Sukoharjo, Central Java, Indonesia. A. *Rasuk Angin* (*Usnea* sp.), B. *Kumis Kucing* (*Orthosiphon aristatus*), C. *Dawung* (*Parkia timoriana*), D. *Secang* (*Biancaea sappan*), E. *Manis Jangan* (*Cinnamomum zeylanicum*), F. *Kapulaga* (*Elettaria cardamomum*), G. *Kencur* (*Kaempferia galanga*), H. *Mesoyi* (*Cryptocarya massoia*), I. *Jahe* (*Zingiber officinale*), J. *Sambiroto* (*Andrographis paniculata*), K. *Keji Beling* (*Strobilanthes crispus*), L. *Adas* (*Foeniculum vulgare*), M. *Cupliksari* (*Eucalyptus alba*), N. *Cipir* (*Psophocarpus tetragonolobus*), O. *Kayu Cendana* (*Santalum album*), P. *Temulawak* (*Curcuma zanthorrhiza*), Q. *Kunyit* (*Curcuma longa*), R. *Cabe Jawa* (*Piper retrofractum*), S. *Kayu Putih* (*Melaleuca leucadendra*), T. *Ceplukan* (*Physalis angulata*)

Based on the research results, the processing plants' method to make herbal medicine at the Nguter Traditional Market is generally by boiling/boiling (Table 2). The Nguter community chooses processing by boiling because this processing knowledge is obtained from generation to generation. The community also believes boiling processing is more efficacious than other methods. Boiling is believed to be more effective because it is generally used as internal medicine treatment and has a fast reaction; boiling can dissolve all the nutritious substances in the plants' ingredients into the boiled water (extraction process) (Sumarni et al. 2019). In addition, processing by boiling is also said to be safer because it can kill contaminant microorganisms found in plants (Milana and Juliar 2022).

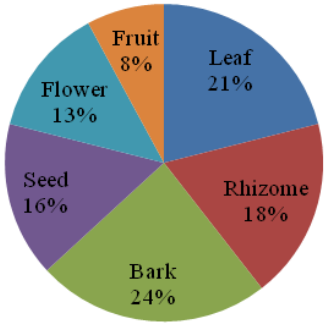

Figure 5. Plant parts used as herbal medicine

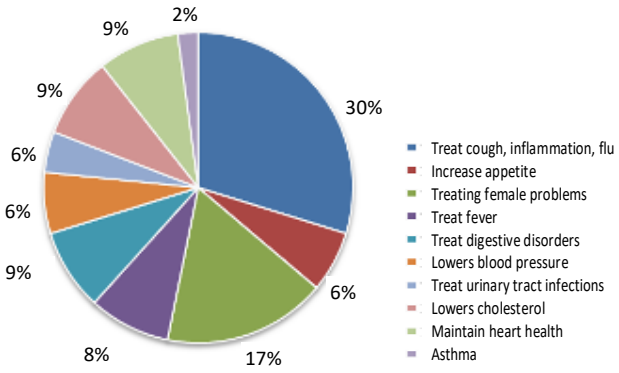

Figure 6. There are many benefits of herbal medicine

According to the research results of Falyauma et al. (2022), the most commonly used processing is by boiling because most respondents consume plants as medicine by drinking. Therefore, almost all the compounds contained in the potion when the potion is drunk. Furthermore, drinking is believed to cure the disease quickly because the compounds will directly enter the digestive tract, and the juices resulting from the boiling will immediately grow and react with the disease. In addition, processing by boiling is very easy and economical because it can be used repeatedly (Harismayanti and Gratitude 2022). Polar, semi-polar, and non-polar compounds will be extracted optimally by boiling and adding heat. That happens because a solvent's polarity indicates the solubility level in a material. Compounds of material are polar if they are more soluble in water, while materials are non-polar if they tend to dissolve in organic solvents (Falyauma et al. 2022).

Boiling also aims to change the permeability of the cell membrane so that secondary metabolites can be released from the cell; the heating process can degrade cell membranes. Sodirun et al. (2016) added that the cell membrane limits the transfer of substances involved in reactions that occur within the cell and the entry of substances from outside the cell. Chemical analysis shows that the cell membrane comprises 60% protein and 40% lipid. Several layers make up the cell membrane; in the middle, a layer of lipids is covered by a protein layer. Several types of protein have a high sensitivity to changes in the surrounding environment. Noncovalent changes in protein molecules' secondary or tertiary structure are often defined as protein denaturation (Anema 2020). Suppose there is a change in the protein molecule, for example, due to changes in pH, temperature, or reactions with other compounds, metals, or ions. In that case, it will reduce its biochemical activity. In addition, the protein will experience coagulation while heated to a 50°C temperature and higher (Tenorio et al. 2016).

This research revealed the many benefits of plants from herbal medicine for the body's health. The greatest benefit obtained is to treat coughs, inflammation, and flu by 30% (Figure 6). These benefits are obtained from plants such as *kencur* (*K. galanga*), *jahe* (*Z. officinale*), *kunyit* (*C. longa*), *dawung* (*P. timoriana*), *cengkeh* (*S. aromaticum*), *kayu putih* (*M. leucadendra*), *adas* (*F. vulgare*), *sambiroto* (*A. paniculata*), *kemukus* (*P. cubeba*), *secang* (*B. sappan*), *rasuk angin* (*Usnea* sp.), and *daun jeruk* (*C. hystrix*). Rhizomes, such as *jahe* (*Z. officinale*), *kencur* (*K. galanga*), and *kunyit* (*C. longa*), contain many useful substances because it is an important part of the plant that functions as a food reserve (Dosoky and Setzer 2018). *Jahe* (*Z. officinale*) contains essential oils with active chemical compounds so that they have properties for preventing and treating various diseases (Mao 2019). The compound species found in *jahe* (*Z. officinale*) include a-sitosterol, caprylic acid, capsaicin chlorogenic acid, phellandrene, gingerol, limonene, oleoresin, sesquiterpene, citral, zingiberene, zingerone, zingiberal, 1,8 cineole, and guanico. These compounds in jahe (*Z. officinale*) can cure diseases, such as 1.8 cineole for fever and dizziness, limonene as a cold medicine, and guanicol as a cough suppressant (Atmojo 2013). *Kencur* plant (*K. galanga*) can be used to treat coughs (Ammar et al. 2021) because it contains essential oils (ethyl p-methoxycinnamate, ethyl cinnamate followed by 3-carene, pentadecane, borneol, bornyl acetate, δ-selinene, camphor and α-pinene) (Kumar 2020). *Kunyit* (*C. longa*) has herbal effects because it contains essential oils, arabinose, fructose, glucose, starch, tannins, curcumin, dimethoxy, curcumin, iron, magnesium, calcium, potassium, and sodium. These ingredients have anti-inflammatory, antioxidant, and maintain stamina properties. *Kunyit* (*C. longa*) powder can treat coughs and colds in toddlers.

According to Suryanti et al. (2022), *dawung* (*P. timoriana*) phytochemically found alkaloids, saponins, tannins, flavonoids, and triterpenoids by treating the seeds with different extracts using standard procedures. *Dawung* (*P. timoriana*) is efficacious as a medicine for flatulence, while the leaves are efficacious as a cough medicine. *Cengkeh* (*S. aromaticum* is a spice plant that contains phenolic compounds such as eugenol (Parham and Kharazi 2022). Eugenol has active compounds such as flavonoids, saponins, tannins, and essential oils, which make cengkeh (*S. aromaticum*) a source of antioxidants, which are useful as cough medicines, nausea, vomiting, and other ailments (El-Saber Batiha et al. 2020). *Kayu Putih* (*M. leucadendra)* contains active compounds, such as valeric aldehydes, butyrate, benzoate, ceneole, eucalyptol, L pinene, 44-45% cineol, terpineol, and limonene. The essential oil in kayu putih (*M. leucadendra*) provides a mucolytic effect (thinning phlegm), anti-inflammatory, and cough suppressant. The community uses *F. vulgare*, or adas, as

cough medicine. *Adas* (*F. vulgare*) has functioned as an anti-inflammatory, antioxidant, antibacterial, and antifungal because it contains active compounds, such as acetin, rosmarinic acid, aglycons flavonoids, kaempferol, and quercetin. Sambiroto (*A. paniculata*) is often found, and its leaves are used as a medicinal plant because it has several antibacterial ingredients, such as andrographolide, tannins, flavonoids, alkaloids, steroids, saponins, phenols, terpenoids, and glycosides (Brigitta et al. 2021). The content of andrographolide as an immunomodulator and tannins as an antidiarrheal; sambiroto leaves function as anti-inflammatory, anti-inflammatory, and various other benefits.

Kemukus (*P. cubeba*) is a plant with functions as an antioxidant, antiulcer, antibacterial, antifungal, hepato-protector, anticytotoxic, nephroprotective, and antiparasitic so that it can shed phlegm and treat other diseases. *Secang* (*B. sappan*) contains secondary metabolites that act as drugs. The metabolites are brazilin as the main compound, alkaloids, flavonoids, saponins, and tannins (Sucita et al. 2019). This content can be an antioxidant, blood cough medicine, anti-tetanus, and inflammation. *Rasuk angin* (*Usnea* sp.) can be used to treat the respiratory tract because it contains a variety of secondary metabolites. This *Usnea* species contains specific secondary metabolites, such as lecanoric acid and usnic acid, used for antioxidants and antimicrobials. According to Sari et al. (2018), the *rasuk angin* (*Usnea* sp.) also contains usnic acid, with antibacterial, antifungal, and anti-inflammatory properties used as medicine. Finally, *daun jeruk* (*C. hystrix*) is efficacious in relieving headaches, colds, and nasal congestion due to the flu. This is because there is a very dominant citronellal essential oil content. In addition, there are also a small amount of other essential oils, such as citronellol, limonene, and nerol.

The most expensive medicinal plant is *mesoyi* (*C. massoia*), *kapulaga* (*E. cardamomum*), and *pekak* (*I. verum*) at IDR 300.000/kg. *Mesoyi* (*C. massoia*) is a plant endemic to Maluku and Papua, which has many benefits, including as an antimicrobial, anti-inflammatory, antioxidant, and so on, beneficial to human life. However, *mesoyi* (*C. massoia*) is a very difficult plant to cultivate even though the demand in the market is quite high. According to Hastatanti and Noya (2018), *mesoyi* (*C. massoia*) is a plant with a high failure rate, a fairly long harvest period, and harvesting techniques that tend to be destructive by cutting down trees. That causes the price of the *mesoyi* (*C. massoia*) to be more expensive than other medicinal plants. At the same time, *kapulaga* (*E. cardamomum*) has seeds that taste spicy similar to *jahe* (*Z. officinale*) and is used as an aromatic spice to treat stomachache, fever, and cough. However, according to Yasni (2013), data on the production and trade of the *kapulaga* is still very small and has many variations, making it difficult to classify. That resulted in *kapulaga* (E. cardamomum) being expensive compared to other medicinal plants. Likewise, *pekak* (*I. verum*), this plant is considered expensive because it has a high demand in medicine manufacturing. In addition, the flower extraction process carried out on this plant to make essential oil takes a long time, up to 1 year.

This study concluded that 40 species of medicinal plants with 23 families were sold at the Nguter Traditional Market. The herbal plants that dominate in the Nguter Traditional Market are *cipir* (*P. tetragonolobus*), *dawung* (*P. timoriana*), *kunir* (*C. longa*), *jahe* (*Z. officinale*), and *kencur* (*K. galanga*). The most expensive medicinal plant is *mesoyi* (*C. massoia*), *pekak* (*I. verum*), and *kapulaga* (*E. cardamomum*), with a price of IDR 300,000/kg. At the same time, the cheapest herbal medicine is *sambiloto* (*A. paniculata*), *kayu putih* (*M. leucadendra*), *kunir* (*C. longa*), *kencur* (*K. galanga*), and *lempuyang* (*Z. zerumbet*) at IDR 20,000/kg. The part of the herbal medicine most widely used as a basic ingredient for herbal medicine is the stem. The greatest benefits of herbal plants are to treat coughs, inflammation, and flu.

ACKNOWLEDGEMENTS

The researcher would like to thank Ms. Okta, the administration staff of the Nguter Traditional Market, who has provided her knowledge, and all the traders at the Nguter Traditional Market for their availability as research subjects in the discussion of this article.

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