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ETHNOPHARMACOLOGICAL STUDY ON THE POTENTIAL HERBAL PLANTS IN THE TRADITIONAL MARKETS OF KUPANG EAST NUSA TENGGARA

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ABSTRACT

Indonesia, a tropical forest country with enormous biodiversity, has a significant potential for herbal plants, which can be used as medicines and natural remedies. These plants are abundant in densely forested areas and can also be found in traditional markets, contributing to economic growth and preserving traditional culture. Traditional markets offer a variety of herbal plants, including ginger, turmeric, galangal, lime, and pepper, which have been used for centuries in Indonesian cuisine. Local communities can easily access these affordable medicinal plants, especially those with limited access to modern health services. However, limited studies have explored the variety and potential economic market values of these plants, particularly in Kupang East Nusa Tenggara. Therefore, we conducted an etnopharmacological study on the potential herbal plants in the traditional markets of Kupang. 25 herbal plant species from 14 families in four traditional markets in Kupang revealed their potential for health and economic benefits. These plants contain various pharmacological components, including anti-oxydant, anti-bacteria, anti-inflammation, and anti-viral properties. Along with health benefits, the circulation of these plants in the traditional markets in Kupang can not only create economic benefits but also can also promote the preservation of indigenous cultural heritage and the sustainability of traditional practices as well as biodiversity conservation.

Keywords: Etnopharmacological; herbal plants; traditional markets; health benefits.

1. INTRODUCTION

Indonesia, one of the largest tropical forest countries with high biodiversity, possesses great potential as a source of thousands of beneficial flora (Von Rintelen et al., 2017). This includes herbal plants that can be used as medicines and natural remedies to improve health quality and cure illnesses (Woerdenbag & Kayser, 2014). Many studies recommend that certain plant species from Indonesian forests can be sources of important chemical substances to kill infectious bacteria or maintain physical health (Sianipar, 2021). Recently, the phenomenon of using herbal plants has increased significantly, both as an alternative to medicine and as an ingredient in the beauty and health industries (Woerdenbag & Kayser, 2014).

These herbal plants not only occur in densely forested areas but also in neighborhood areas that people can easily find. Some other herbal plants that specifically occur in a forested area can be found in a traditional market. As they are affordable and beneficial, the trade of herbal plants in traditional markets creates a significant positive economic rise (Zahra et al., 2020). In a cultural context, they can also function as a means of preserving traditional culture (Weldegerima, 2009). They also trigger people to conserve these herbs and therefore contribute to the preservation of the preservation of genetic diversity (Chandra, 2016).

In traditional markets across the archipelago, a variety of herbal plants can easily be found. It includes some commonly recognized herbals, such as ginger, turmeric,

galangal, lime, pepper, and many more (Sairam, 1998; Duke, 2009). All of these have been used for such a long time by Indonesians, not only to cure illness but also as traditional ingredients for Indonesian cuisines.

Traditional markets as a trading center for local communities can be easily accessed to obtain these herbal plants in various forms, such as fresh, dry, or even processed. This allows the local community, especially those with limited access to modern health services, to obtain these affordable medicinal plants.

In Kupang, the capital of East Nusa Tenggara Province, we can find various herbal plants in several large traditional markets. However, limited studies have been done to explore the variety of these herbal plants and their potential economic market values. More importantly, indigenous knowledge on how these herbal plants are used is also important to explore as important information for customers. Further, the circulation of these herbal plants in traditional markets can promote the preservation of the cultural heritage of indigenous communities and the sustainability of traditional practices.

2. METHODS

2.1 Research Sites

This research is an exploratory study carried out in the traditional markets that are located in Kupang City, East Nusa Tenggara Province. These traditional markets have been the center of trade for the people of Kupang for a long time. The exploration was undertaken around the four main traditional markets, including Oeba Traditional Market, Oebobo Traditional Market, Naikoten Traditional Market, and Oesapa Traditional Market.

2.2 Data Collection

The data was collected within a month, in March 2024. The population of this research is all sellers, or "warung," who sell herbal plants in those four main traditional markets. We employed stratified random sampling to select the 20% sample of each traditional market. We subsequently identified the herbal plants that they sell and conducted an interview with the sellers to gather information.

2.3 Data Analysis

The data was analyzed descriptively. The data was tabulated in a summary table to collect all the detailed information on the herbal plants. It includes Indonesian name, local name, scientific name, habitus, family, pharmacological elements and health benefits and their scientific references, and traditional ways of usage.

3. RESULTS AND DISCUSSION

3.1 Herbal Plants and Pharmacological Benefits

Various approaches can be used to cure illnesses, ranging from modern treatments to traditional treatments using herbal plants. As Indonesia is one of the richest mega-biodiversity, it possesses huge potential regarding herbal plants. Not only in western parts of Indonesia but also in Kupang East Nusa Tenggara, there is huge potential for these herbal plants from a health and economic perspective.

Within a month of exploration, we collected data on the herbal plants occurring in four main traditional markets in Kupang, including Naikoten, Oesapa, Oeba, and Oebobo. Among hundreds of herbal plants in Indonesia, we recorded 25 herbal plant species from 14 families, namely *Amaryllidaceae, Apiaceae, Euphorbiaceae, Lamiaceae, Lauraceae, Myristicaceae, Moringaceae, Myrtaceae, Pandanaceae, Piperaceae, Poaceae, Rutaceae, Schisandraceae, and Zingiberaceae*. These herbal plants are very common among people in Kupang and even in Indonesia because they are widely used on a daily basis in various ways, as a direct cure for illness or as an addition to traditional drinks or foods.

As highlighted in Table 1, these herbal plants possess various types of pharmacological components that can be used in treating, curing, and maintaining

health. The components mainly include anti-oxydant, anti-bacteria, anti-inflammation, and anti-viral, as well as various proteins, minerals, and vitamins. For example, herbal plants from the family *Zingiberaceae*, such as ginger, have various health-beneficial components. It contains Fe, Mg, Ca, vitamin C, flavonoids, phenolic compounds (gingerdiol, gingerol, gingerdione, and shogaols), sesquiterpenes, paradols, anti-inflammatory, anti-apoptotic, anti-tumor activities, anti-pyretic, anti-platelet, anti-tumourigenic, anti-hyperglycaemic, antioxidant, anti-diabetic, anti-clotting, and analgesic properties, cardiotonic, and cytotoxic (Shahrajabian & Cheng, 2020). Gingerol, shogaol, and those various important substances are used to treat numerous illnesses that are mainly related to respiratory illness, muscle illness, and other infectious diseases (Shahrajabian & Cheng, 2020).

Table 1. Depicted Indonesian herbal plants occur in the traditional markets of Kupang East Nusa Tenggara. It highlights herbal plant names (Indonesian, local and scientific names), plant habitus and family, pharmacological elements and health benefits and their scientific references, and traditional ways of using the herbal plants to cure illness.

No	**Indonesian Names** • **Local names** • ***Scientific names*** • ***Family*** • **Habitus**	**Pharmacological Elements and Health Benefits**	**References**	**Traditional Ways of Usage**
1	Bawang Merah • Bawang Merah • *Allium cepa* • *Amaryllidaceae* • Herb	• Onion contains anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycemic, hypotensive, stomachic, and tonic properties. • Used to relieve congestion, especially in the lungs and bronchial tract.	Kumar et al., 2010	Drink or eat
2	Bawang Putih • Bawang Putih • *Allium sativum* • *Amaryllidaceae* • Herb	• Garlic contains high trace mineral content and enzymes; garlic has shown anti-viral, anti-bacterial, anti-fungal, and antioxidant abilities. • Used to cure Alzheimer's disease, cancer, cardiovascular disease (including atherosclerosis, strokes, hypertension, thrombosis, and hyperlipidemias), children's conditions, dermatologic applications, stress, and infections. Some research points to possible benefits in diabetes, drug toxicity, and osteoporosis.	Bongiorno et al., 2008	Drink or eat
3	Bunga Lawang • Pekak • *Illicium verum* • *Schisandraceae* • Tree	• Star anise contains a precursor molecule, acid, an antiviral medication for influenza A and influenza B. • Used as antioxidant, antimicrobial, antifungal, anthelmintic, insecticidal, sedative properties, anti-inflammatory, gastro-protective, expectorant and spasmolytic, and estrogenic effects.	Patra et al., 2020	Drink or eat
4	Cengkeh • Canke, wunga lawing • *Syzygium aromaticum* • *Myrtaceae* • Tree	• Cloves can have antiseptic, antibacterial, antifungal, and antiviral properties. • Clove oil (eugenol) exhibits broad antimicrobial activities against both Gram-positive, Gram-negative, and acid-fact bacteria, as well as fungi. Cloves have antiemetic (relieves nausea and vomiting) and carminative properties. • Used to cure diarrhea, most liver, stomach, and bowel ailments, and as a stimulant for the nerves Traditionally, cloves have been used to treat flatulence, nausea, and vomiting.	Bhowmik et al., 2012	Drink or eat

No	**Indonesian Names** • **Local names** • ***Scientific names*** • ***Family*** • **Habitus**	**Pharmacological Elements and Health Benefits**	**References**	**Traditional Ways of Usage**
5	Daun jeruk • Daun Jeruk • *Citrus hystrix* • *Rutaceae* • Tree	• Citrus leaves contain phytochemicals possessing antibacterial, antifungal, anticancer, chemo-preventive, antioxidant, anticholinesterase, cardio-protective, and hepatoprotective effects.	Abirami et al., 2014	Drink or eat
6	Daun Kemangi • Daun Kemangi • *Ocimum basilicum* • *Lamiaceae* • Shrub	• Common basil is used to cure kidney problems, as a hemostasis in childbirth, earache, menstrual irregularities, arthritis, anorexia, treatment of colds and malaria, fevers, coughs, flu, asthma, bronchitis, influenza, and diarrhea. It has anti-cancer activity, radio-protective activity, anti-microbial activity, anti-inflammatory effects, immunomodulatory activity, anti-stress activity, anti-diabetic activity, anti-pyretic activity, anti-arthritic activity, and anti-oxidant activity as a prophylactic agent and in cardiovascular disease.	Shahrajabian & Cheng, 2020	Drink , eat, or rub
7	Daun pandan • Bonak • *Pandanus amaryllifolius* • *Pandanaceae* • Shrub	• Pandan contains flavonoids and phenolic compounds. Used to cure diuretics, headaches, fevers, arthritis, etc. • Used to exhibit several bioactivities such as antiviral, antioxidant, anti-hyperglycemic, anticancer, and antimicrobial activities, including food preservatives and their industrial applications.	Bhuyan & Sonowal, 2021	Drink or eat
8	Daun Seledri • Daun sop • *Apium graveolens* • *Apiaceae* • Shrub	• Celery contains anti-bacterial, anti-fungal, and anti-inflammatory effects. • It is used to prevent cardiovascular disease by lowering blood glucose and serum lipids, decreasing blood pressure, and strengthening the heart. Also, a powerful antioxidant property has been attributed to compounds such as vitamins A and C.	Kooti et al., 2015	Drink, eat, or rub
9	Daun Seraih • Hasafa • *Cymbopogon citratus* • *Poaceae* • Shrub	• Lemon grass contains a considerable group of flavonoids, essential oils, phenolic compounds, and other phytochemical constituents that possess pharmacological activities such as anti-obesity, anti-bacterial, anti-fungal, anti-nociceptive, anti-oxidant, anti-diarrheal, and anti-inflammatory properties that could enhance health. • Owing to its volatility and lemon-like aroma, citronella oil is used as deodorant in cosmetics, toiletries, insecticides (bio-pesticides), and spent grass in agriculture, pharmaceuticals, and chemical industries.	Oladeji et al., 2019	Drink or eat
10	Daun Sirih • Ruke Mana • *Piper betle* • *Piperaceae* • Climber	• Betle leaves are routinely used as a chewing agent to restrict offensive breath, and they contain tannins, chavicol, phenyl, propane, sesquiterpene, cyneole, alkaloid, sugar, and some essential oils. They have various medicinal values, including digestive, appetizer, aromatic, and expectorant, stimulant, antibacterial, euphoria-inducing, anti-protozoan, carminative, anti-fungal, and aphrodisiac, etc. • Used to harden the gum, conserve the teeth, and prevent indigestion, bronchitis, constipation, and congestion.	Shah et al., 2016	Drink, eat, or rub
11	Jahe • Halia	• Ginger is an important plant with several medicinal and nutritional values. It contains Fe, Mg, Ca, vitamin	Shahrajabian & Cheng,	Drink, eat, or rub

No	Indonesian Names • Local names • *Scientific names* • *Family* • Habitus	Pharmacological Elements and Health Benefits	References	Traditional Ways of Usage
	• *Zingiber offcinale* • *Zingiberaceae* • Herb	C, flavonoids, phenolic compounds (gingerdiol, gingerol, gingerdione, and shogaols), sesquiterpenes, and paradols. • Used to treat various symptoms, including vomiting, pain, and cold symptoms. It has anti-inflammatory, anti-apoptotic, anti-tumor activities, anti-pyretic, anti-platelet, anti-tumourigenic, anti-hyperglycaemic, antioxidant, anti-diabetic, anti-clotting, analgesic, cardiotonic, and cytotoxic properties. It is also used for arthritis, cramps, sprains, sore throats, rheumatism, muscular aches and pains, vomiting, constipation, indigestion, hypertension, dementia, fever, and infectious diseases. Gingerol and shogaol, in particular, are known to have anti-oxidant and anti-inflammatory properties.	2020	
13	Jeruk Nipis • Nipis Jeruk • *Citrus aurantifolia* • *Rutaceae* • Tree	• It contains high amounts of photochemical and bioactive compounds such as flavonoids, limonoids, phenols, carotenoids, minerals, and vitamins. • Used in traditional medicine as an antiseptic, antiviral, antifungal, anthelmintic, astringent, diuretic, mosquito bite repellent, for the treatment of stomach ailments such as constipation, headaches, arthritis, colds, coughs, and sore throats, and as an appetite stimulant.	Enejoh et al., 2015	Drink, eat, and rub
14	Kapulaga • Kapulaga • *Amomum compactum* • *Zingiberaceae* • Herb	• Cardamon contains flavonoids, saponins, essential oils, steroids, and triterpenoids. • It is used as a medicinal plant that has diverse pharmacological activities, such as antifungal, antibacterial, antioxidant, gastroprotective, anti-inflammatory, immunomodulatory, anti-cancer, anti-asthmatic, and acute renal failure.	Alkandahri et al., 2021	Drink or eat
15	Kayu Manis • Kayu *Manis* • *Cinnamomo veru* • *Lauraceae* • Tree	• Cinnamomum species possess antimicrobial, antidiabetic, antioxidant, anti-inflammatory, anti-cancer, and neuroprotective effects.	Sharifi-Rad et al., 2021	Drink or eat
16	Kelor • Kelor • *Moringa oleifera* • *Moringaceae* • Tree	• Moringa contains essential amino acids, carotenoids in leaves, and components with nutraceutical properties, supporting the idea of using this plant as a nutritional supplement or constituent in food preparation.It has a very wide range of vital antioxidants, antibiotics, and nutrients, including vitamins and minerals. • Almost all parts of Moringa can be used as a source of nutrition with other useful values.	Razis et al., 2014	Drink or eat
17	Kemiri • Kemiri • *Aleurites moluccanus* • *Euphorbiaceae* • Tree	• Candlenut contains coumarinolignoid, C-glycosyl-flavone, phorbol diester, sterol, diterpene, triterpene, coumarin, and aliphatic hydrocarbon derivatives. Additionally, extracts and secondary metabolites from this species exhibited interesting biological properties, including antibacterial, cytotoxic, anti-inflammatory, and antinociceptive effects. • Used to cure headaches, fever, asthma, injuries, stomach ulcers, and tumors.	Hakim et al., 2022	Drink or eat

No	Indonesian Names • Local names • *Scientific names* • *Family* • Habitus	Pharmacological Elements and Health Benefits	References	Traditional Ways of Usage
18	Kencur • Siku • *Kaempferia galangal* • *Zingiberaceae* • Herb	• Sand ginger is used to treat cholera, contusions, constipation, stomachaches, menstrual disorders, and dyspepsia. • It is used to treat several ailments, e.g., fever, amoebiasis, bruises, dandruff, furuncles, headaches, rheumatism, toothaches, abdominal pain, colds, and chest pain.	Srivastava et al., 2019	Drink or eat
19	Ketumbar • Ketumbar • *Coriandrum sativum* • *Apiaceae* • Shrub	• Spices have been recognized to possess several medicinal properties (diuretic, expectorant, laxative, anti-bacterial, anti-pyretic, etc.) and have been effectively used in the indigenous systems of medicine.	Rajeshwari & Andallu, 2011	Drink or eat
20	Kunyit • Kunyit • *Curcuma longa* • *Zingiberaceae* • Herb	• Turmeric is used in a variety of curing activities, such as anti-inflammatory, anti-viral, anti-oxidant, anti-cancer, anti-bacterial, anti-asthmatic, anti-arthritis, anti-diabetic, anti-venom, anti-obesity, wound healing, depression and anxiety, and other activities.	Rathore et al., 2020	Drink, eat, or rub
21	Lengkuas • Laos • *Alpinia galangal* • *Zingiberaceae* • Herb	• Galangal is utilized in herbal medicines for treatment against diseases like hemorrhoids, abnormal menstruation, abdominal discomfort, and inflammation.	Das et al., 2020	Drink, ear, or rub
22	Merica • Merica • *Piper nigrum* • *Piperaceae* • Climber	• *Piper nigrum* also has anti-inflammatory, analgesic, anticonvulsant, and neuroprotective effects. Antimicrobial activity was against a wide range of pathogens via inhibition of biofilm, bacterial efflux pumps, bacterial swarming, and swimming motilities. • It has an anticancer effect against a number of cell lines from the breast, colon, cervical, and prostate.	Takooree et al., 2019	Drink or eat
23	Pala • Kohipun, Palang • *Myristica fragrans* • *Myristicaceae* • Tree	• Nutmeg has hypolipidaemic and hypocholesterolemic effects, antimicrobial, antidepressant, aphrodisiac, memory-enhancing, antioxidant, and hepatoprotective properties.	Jaiswal et al., 2009	Drink, eat, rub
24	Salam • Daun Salam • *Syzygium polyanthum* • *Myrtaceae* • Tree	• Bay leaf has valuable therapeutic potential, including antidiabetic, antihypertensive, antimicrobial, antioxidant, anticancer, antitumor, antidiarrheal, acetylcholinesterase, inhibitory, and dental plaque inhibition properties.	Ismail & Ahmad, 2019	Drink or eat
25	Temulawak • Temulawak • *Curcuma xanthorrhiza* • *Zingiberaceae* • Herb	• Javanese turmeric is used to cure common fever, infection, lack of appetite, fatigue, liver complaints, and gastrointestinal disorders. • It exhibits wide-ranging pharmacological activities, including anticancer, antioxidative, anti-inflammatory, antimicrobial, and antidiabetic activities, in addition to a protective effect on multiple organs.	Simamora et al., 2022	Drink or eat

3.2 Herbal Plant Habitus

From those 14 herbal plant families and 25 species, those have a variety of life forms (habitus) when people cultivated

them. It is depicted that trees and herbs dominate the habitus proportion with more than 35%, while shrubs and climbers account for less than a quarter of the total habitus forms (Figure 1). Each habitus represents some herbal plants. The tree habitus includes *Illicium verum*, *Syzygium aromaticum*, *Citrus hystrix*, *Citrus aurantifolia*, *Cinnamomo verum*, *Moringa oleifera*, *Aleurites moluccanus*, *Miyristica fragrans*, and *Syzygium polyanthum.* Although they have tree habitus, different medicinal parts of these herbal plants are used, such as leaves, fruits, and barks (Figure 3). The least habitus of the observed herbal plants are climbers from the family *Piperace*, such as *P. nigrum* and *P. betle.* Other habitus of the herbal plants are also highlighted in Table 1.

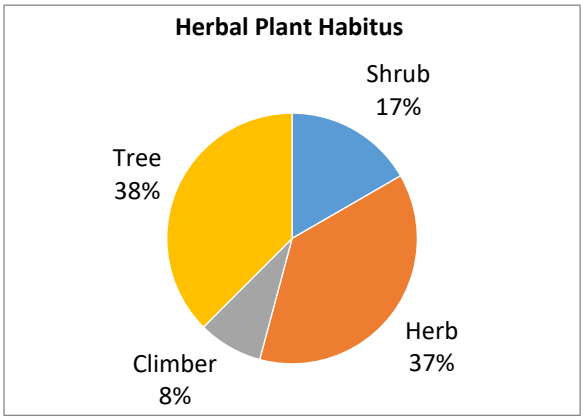

Figure 1. Depicted different life forms (habitus) of the herbal plants. It includes 38% of trees, 37% of herbs, 17% of shrubs, and 8% of climbers, respectively.

3.3 Traditional Usage Methods

Prior to the modern advancement of treatment methods, traditional ways of curing existed among people. As the herbal plants can be easily cultivated and found in many areas, from neighborhoods to forested areas, many people utilize the herbal plants as direct cures or health maintenance. Traditionally, as depicted in Figure 2, there are three major ways to utilize the herbal plants for illness treatment, namely by drinking, eating, and rubbing.

The ways to drink, eat, or rub the herbal plants are varied, ranging from direct use to adding the herbal plants as additional ingredients for food or drink. For example, curing water to treat respiratory illnesses such as cough can be made from a combination of cinnamon bark, ginger, citrus, lemon grass, and pepper (Enejoh et al., 2015; Shahrajabian & Cheng, 2020; Takooree et al., 2019). This approach is familiar among Indonesian people, including local communities in rural areas. Some others can also be eaten, either in direct ways or as ingredients in numerous Indonesian foods. For rubbing or peeling approaches, it applies to external wounds to prevent bacterial infections, such as turmeric (Rathore et al., 2020).

In more detail, variety of traditional ways can be used to prepare the herbal plants prior to consumption or application to treat illness. The most commonly used ways is direct eaten with or without a mixture of other ingredients. Sometimes, before being consumed or swallowed, medicinal-plant parts are crushed. Furthermore, medicinal-plant parts are boiled with water or without other ingredients and then being drunk. Rubbing or peeling method for external uses, medicinal-plant parts are crushed and then being rubs on the external wounds. Sometimes, the smoke of burned medicinal-plants is inhaled.

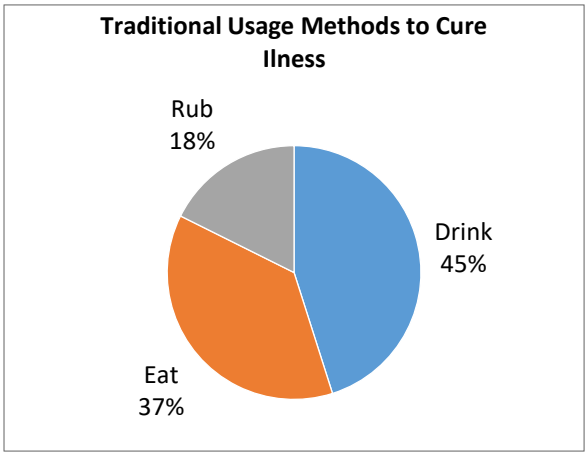

Figure 2. Depicted the three main traditional ways to utilize the herbal plants for illness treatment, namely by 45% of drinking, 37% of eating, and 18% of rubbing.

3.4 Medicinal-Parts of Herbal Plants

Not all parts of each herbal plant are traded and can be used. Only medicinal

parts of each plant are sold in the traditional markets in Kupang. The specific parts of each plant are used to cure illnesses. For example, ginger leaf cannot be used, but rhizome is used instead (Sairam, 1998; Duke, 2009).

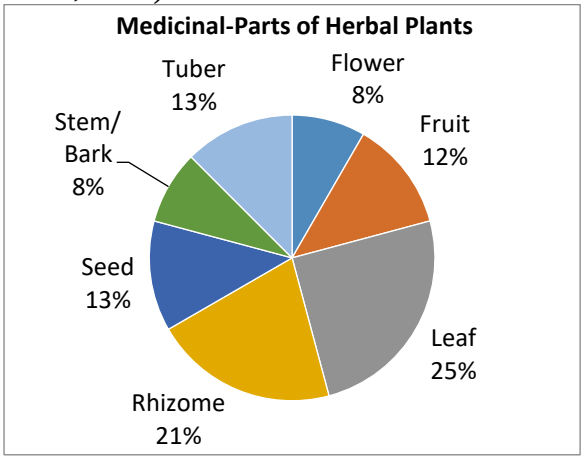

Figure 3. Depicted the specific part of the herbal plants called medicinal-parts that contains pharmacological elements, including 25% of leaf, 21% of rhizome, 13% of seed and tuber, 12% of fruit, and 8% of bark/bark and flower.

3.5 Potential Local Economic Market Values of Herbal Plants

Most of the herbal plant species are observed in the four main traditional markets in Kupang. Only one herbal plant species was not found in the Oebobo and Oeba traditional markets. This herbal plant is Bunga Lawang (local name: *Pekak*) or *Illicium verum* from the family *Schisandraceae*. However, this herbal plant can be found in neighborhood areas around Kupang.

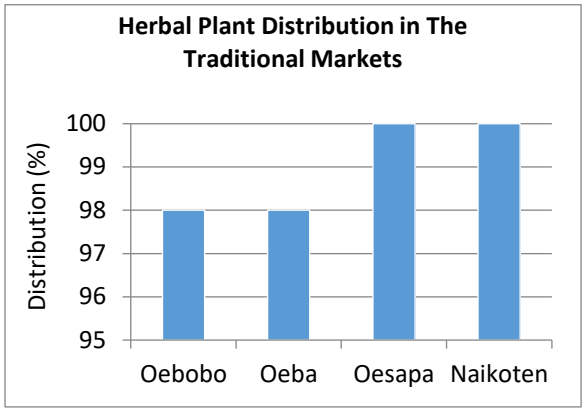

Figure 4. Depicted the distribution of 25 herbal plant species in the traditional markets in Kupang.

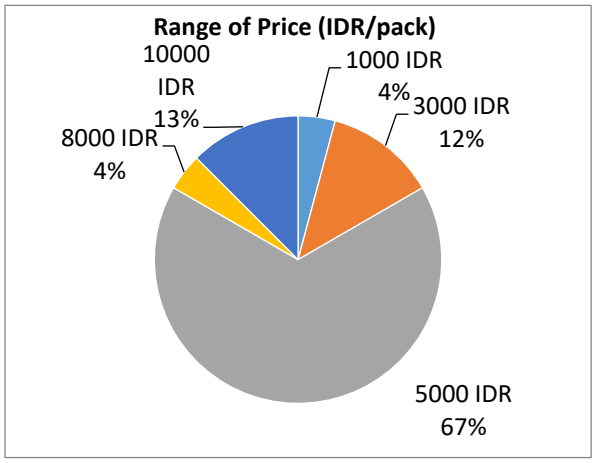

Figure 5. Depicted the range of price of herbal plants in the traditional markets in Kupang. The price ranges from 1,000 IDR/pack to 10,000 IDR/pack.

As all the herbal plants can easily be cultivated without specific cultivation methods and conditions, the price is affordable. People can purchase desirable herbal plants in kilograms or packs. It is common in Kupang that the majority of the sellers in the traditional market sell their goods in packs. It is depicted in Figure 5 that the most expensive price does not exceed 10,000 IDR, only 8,000 IDR per pack. Most of the herbal plants can be purchased for only 5,000 IDR per pack, such as ginger, turmeric, onions, garlic, etc.

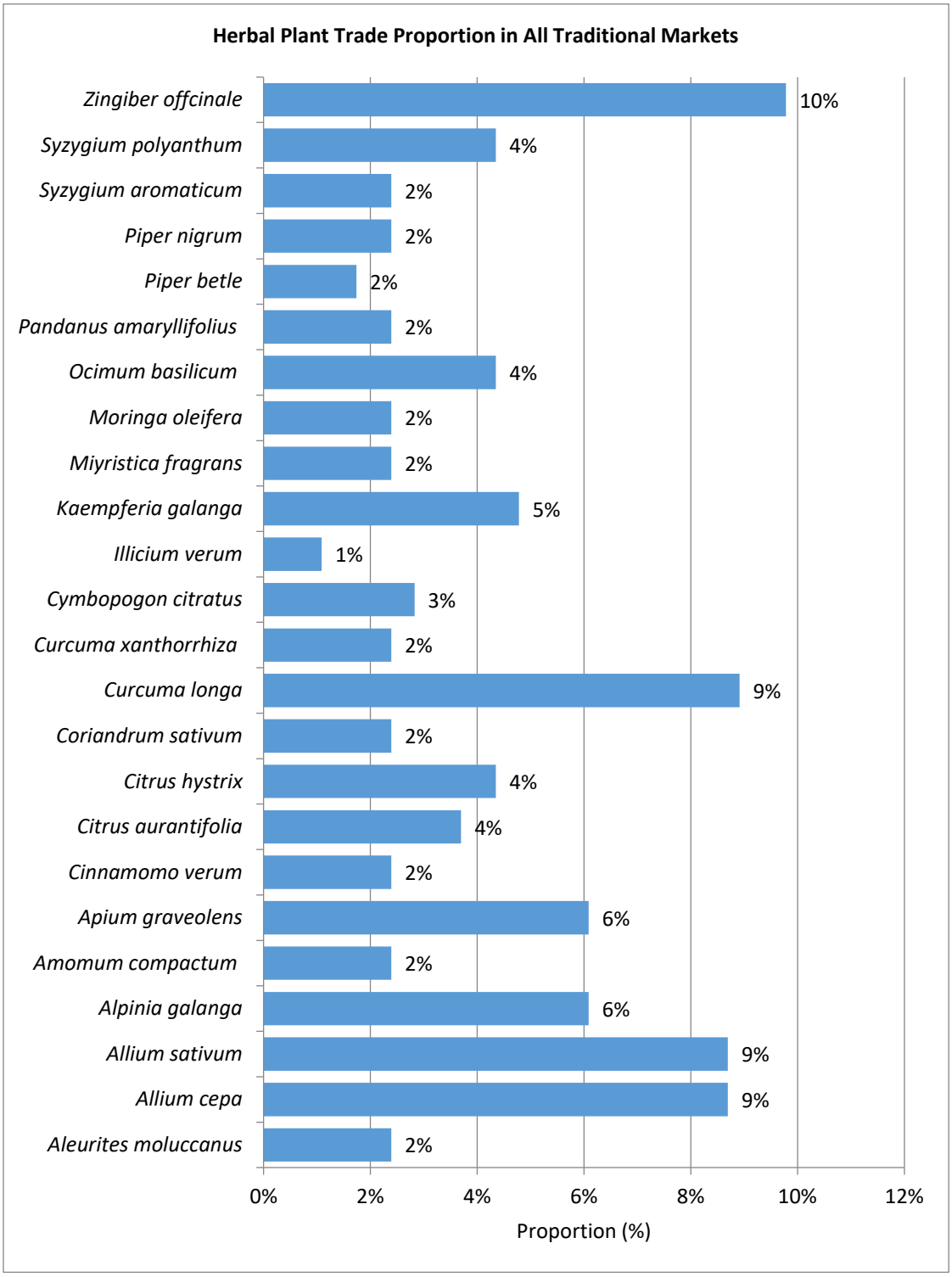

Figure 6. Depicted herbal plant trade proportion in four traditional traditional markets in Kupang. Herbal plants that can be used as ingredients for daily food dominate the list as the most dominant goods sold by sellers. It includes onions, garlic, and ginger, which account for 9–10%, while others have a smaller proportion which account for 1% - 6%.

From the four main traditional markets, herbal plants account for different proportions. According to Figure 6, among all plants, herbal plants that can be used as ingredients for daily food or drink ingredients dominate the market. Herbal plants that can be used as ingredients for daily food dominate the list as the most

dominant goods sold by the sellers, including onions, garlic, and ginger, which account for 9–10%. While others have a smaller proportion which account for 1%-6%. This indicates that most of the people in Kupang purchase these plants mainly for cooking. However, it does not mean that they only use them for cooking. In certain conditions in which they need natural and easy cures for their illness, they can use herbal plants.

With its affordable price, as seen in Figure 5, and its availability in traditional markets, as highlighted in Figure 6, the herbal plant trade possesses huge potential in terms of economic value. It does not only benefit consumers, but it also becomes a source of economic income for sellers because the herbal plants are daily goods. Additionally, as people perceive that using herbal plant to cure illness natural process without side effects, affordable, and does not require doctor prescription (Nugroho et al., 2021), it trigger people to use them often. The herbal plants are also a source of economic income for local farmers around Kupang, as they routinely supply the herbal plants to the sellers. From biodiversity perspective, the farmers who cultivate the herbal plants promote genetic conservation.

4. CONCLUSION

Indonesia's rich megabiodiversity presents significant potential for herbal plants, particularly in Kupang East Nusa Tenggara. A pharmacological study reveals 25 herbal plant species from 14 families in four traditional markets in Kupang with its potential for health and economic benefits. These herbal plants contain various pharmacological components, including anti-oxydant, anti-bacteria, anti-inflammation, and anti-viral properties, as well as other medicinal-components that can be used to curing illness in various ways, ranging from a direct consumption by eating or drinking it to rubbing or peeling for external uses. These herbal plants also possess huge potential economic values as they are affordable and used daily by the people. In addition, with different habitus, these herbal plants can be easily cultivated without specific cultivation methods so that it can promote the preservation of indigenous cultural heritage and the sustainability of traditional practices as well as biodiversity conservation.

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