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Submission date: 06-Jun-2023 04:08PM (UTC+0700)
Submission ID: 2110179057
File name: Diversity_of_herbal_medicine_in.pdf (1.44M)
Word count: 6295
Character count: 34746

BIODIVERSITAS
Volume 24, Number 4, April 2023
Pages: 2013-2022

ISSN: 1412-033X
E-ISSN: 2085-4722
DOI: 10.13057/biodiv/d240410

Diversity of herbal medicine in Mamasa District, West Sulawesi, Indonesia

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Manuscript received: 31 October 2022. Revision accepted: 5 April 2023.

Abstract. *Tambaru E, Ura' R, Tuwo M. 2023. Diversity of herbal medicine in Mamasa District, West Sulawesi, Indonesia. Biodiversitas 24: 2013-2022.* This study aimed to identify the species of traditional medicinal plants, the parts processed as medicine and the processing methods of the plants used in traditional medicine. This research was conducted in Mellangkenapadang Village and Paladan Village, Sesenapadang District, Mamasa Regency. This research method was descriptive exploratory. Qualitative data collection was carried out using the cruising method. Sampling of medicinal plants in the site was carried out using the Participatory Rural Appraisal method, an assessment process involving active roles of the community. The results showed that the number of medicinal plants growing in Mellangkenapadang Village and Paladan Village, Sesenapadang District, Mamasa Regency were 49 species belonging to, 30 families, the most widely used being Asteraceae, and 22 orders, the most widely used being Solanales. The number of medicinal plant species used in Mellangkenapadang Village was 46 species. The most frequently used plant was guava (93.33%) and the lowest pumpkin, pineapple, spoon leaf, and airplant (3.33%). Meanwhile, in Paladan Village, 43 species were used; the most frequently used was painted nettle (96.67%) and the least were airplant and galangal (3.33%). The most widely used plant part as traditional medicine was leaf (59.18%) and the least used were stems (2.04%) and seeds (2.04%). The processing of medicinal plants was mostly boiling (55.10%) and the least burning (2.04%). Medicinal plant knowledge needs to be preserved for the younger generation so that it can be used sustainably in the future. This can be done by conserving biodiversity and preserving the plant's genetic material for pharmaceutical development.

Keywords: Benefit, plants, traditional medicine

INTRODUCTION

Medicinal plants represent an alternative treatment to various diseases. In Indonesia studies related to the use of medicinal plants are growing rapidly. Medicinal plants are a relevant resource for the treatment of several diseases, given the cultural context, access, reliability and low cost (Flor and Barbosa 2015). The awareness to go back to nature, especially in the health sector, encourages the use of medicinal plants. The use of plants for health has finally become part of the culture of the people passed down from generation to generation (Huang et al. 2018; Inoue et al. 2019; Ateljevic 2020; de Oliveira et al. 2021). The use of medicinal plants is intended to improve physical and mental health. In line with the development of existing modern medicine, traditional medicine is considered necessary to be further developed, looking at changes in nature and people's lifestyles (Luo et al. 2019; Mukherjee 2019; Nurdin et al. 2019; Vandebroek et al. 2020). According to Sacco et al. (2021), local people have a deep understanding of the benefits of various types of local plants.

Medicinal plants have an important role in treating and preventing disease, especially for people in remote areas (Uzun and Koca 2020; Pikulthong et al. 2022). Ethnobotany is important for pharmacological research and drug development. Ethnobotanical research in the region has focused on rural populations (Alqethami et al. 2017). Traditional community knowledge from generation to generation is a very helpful first step to find out a medicinal plant (Weckmüller et al. 2019; Schultz et al. 2020; Saensouk and Saensouk 2020). The medicinal knowledge of local specialists assists in the prevention and treatment of illnesses based on traditional medicine empiricism (Amorin et al. 2021). The traditional knowledge system is essential in plant resource conservation and utilization, and environmental management (Suwardi et al. 2020).

The tradition of using medicinal plants in people's lives is perpetuated orally through generations (Wanjohi et al. 2020; Amorin et al. 2021). Lack of knowledge related to the use of biodiversity is caused by the inability to transfer and document knowledge of traditional medicine to the younger generation so that information related to the use of diversity of medicinal plants is lost (Sousa et al. 2012; Prakash et al. 2021; Pikulthong et al. 2022). The younger generation is one of the parties that contributes to the loss of traditional knowledge due to a lack of interest in the properties and methods of cultivating medicinal plants (Gallois and Reyes-García 2018; Caballero-Serrano et al. 2019; Aziz et al. 2020). Studies on medicinal plants and how to use them by the people of Mamasa Regency have

never been carried out, although health efforts through the use of traditional medicines from plants have been known to the Mamasa people since ancient times until now. Information and publications are needed to complete the medicinal plant database for future research and development of medicinal potential (Wanjohi et al. 2020; Miranda 2021). The use of plants to treat a disease has been proven a lot, so the knowledge about the use of medicinal plants needs to be explored again from the community, especially in Mamasa so that the knowledge will not be lost and the use of medicinal plants can be maintained and developed.

The people of Mamasa Regency, West Sulawesi Province, are a culturally diverse society but have similarities in efforts to overcome health problems, namely using traditional medicines. This is inseparable from their heritage in using traditional medicines from nature (Syamsiah et al. 2021). Sesenapadang is a sub-district in Mamasa Regency where people still maintain their customs and traditions in the utilization of natural resources in the form of plants for the treatment of various diseases. The people of Sesenapadang District prefer to use traditional medicine than modern medicine because the number of community health centers (*puskesmas*) is very limited, let alone hospitals due to their relatively remote areas. Several other factors affecting the community's use of traditional medicine are age, gender, education, employment, income, attitudes and beliefs (Ervina and Ayubi 2018; Rahman 2022). The local knowledge of the community in Mamasa Regency regarding the use of plants as a source of raw materials for traditional medicine has been studied by previous researchers in Pana District (Syamsiah et al. 2021), Tondok Bakaru Village (Ang et al. 2022) and Mambi District (Rahman 2022). This study aimed to document the diversity and use of medicinal plants in Sesenapadang District, especially in two villages, namely Mellangkenapadang Village and Paladan Village because that information has never been reported. This knowledge can then be passed on to the next generation and used as a source of germplasm for pharmaceutical raw materials.

MATERIALS AND METHODS

This study used a descriptive method (survey), i.e., a study to obtain facts from existing symptoms and seek factual information from a group or area conducted on a number of individuals or units, either by census or by using samples (Asrat et al. 2020; Kothari 2020; Santosa and Yulianti 2020).

Study area

This research was carried out in Sesenapadang Sub-district, Mamasa District, West Sulawesi, Indonesia. Research data collection was carried out in two villages, namely Mellangkenapadang Village (3°5'36.17"S, 119°24'17.49"E) at an altitude of 1463 meters and Paladan Village (2°59'34.65"S, 119°24'17.49"E) at an altitude of 1313 meters (BPS-Statistics of Mamasa Regency 2021) (Figure 1) from November 2021-January 2022.

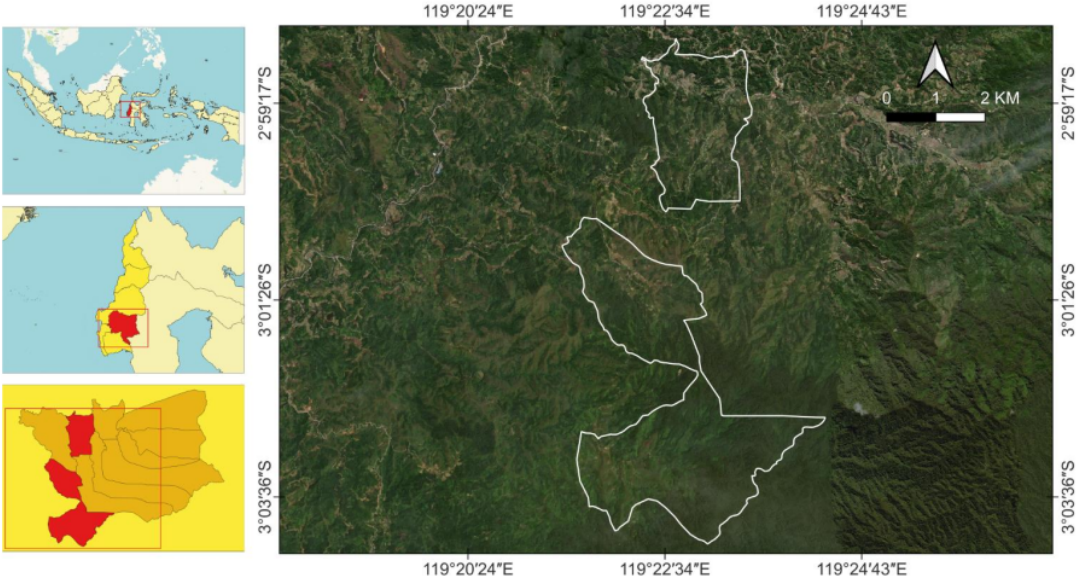

Figure 1. Mellangkenapadang Village and Paladan Village, Sesenapadang Sub-district, Mamasa District, West Sulawesi, Indonesia

Ethnobotanical data collection

Field observations were carried out using the cruise method (Brezzi et al. 2017; Nerani et al. 2017), resulting in quantitative and qualitative data (Pandey and Pandey 2015; Yang and Meng 2020). Sampling of medicinal plants was conducted using the Participatory Rural Appraisal method, namely an assessment process with the active involvement and role of the community (Salatta 2016; Alves et al. 2017; Sandham et al. 2019). Sixty respondents were selected using a purposive sampling method, 30 from Mellangkenapadang Village and 30 from Paladan Village. Community involvement was obtained through instructor interviews with residen who were guided by a questionnaire to find out the number of plant species that had been used for treatment. Respondents were herbal users and local philosophers (Pikulthong et al. 2022), aged between 25-75 years, two of whom are *batra* or shaman (Sare in Mellangkenapadang Village and Tandi in Paladan Village) or local philosophers. Samples of plant species that had been photographed were taken for further identificat n at the Botanical Laboratory, Department of Biology, Faculty of Mathematics and Natural Sciences, Hasanuddin University, Makassar, Indonesia.

Data analysis

Medicinal plant data obtained through research results and interviews were processed descriptively by grouping, tabulating, and presenting in a histogram (Timang et al. 2014; Wahidah and Husain 2018). Furthermore, the data were analyzed to get an overview of the species of medicinal plants that grow in Paladan and Mellangkenapadang Villages, and their use as traditional medicine for the community.

RESULTS AND DISCUSSION

The social characteristics of respondents

The social characteristics of respondents in the use of traditional medicinal plants are given in Table 1. The respondents in each village consisted of 16 males and 14 females. In Paladan Village, male respondents used more medicinal plants (7-35 species/individual) than the females (7-12). In Mellangkenapadang Village, the largest portion of respondents were 36-45 years old (14 respondents or 46.67%), while in Paladan Village, 45-71 years old (17 respondents or 56.67%). From each village, two people work as Batra (Shaman) aged 56-63 years. Age is an important factor in accumulating knowledge about the utilization and use of medicinal plants (Caballero-Serrano et al. 2019). The elderly members of the community still have high cultural awareness and hold fast to the teachings given by their ancestors (Aziz et al. 2020). Knowledge and experience of the elderly are disseminated to the younger generation (Flor and Barbosa 2015; Schultz et al. 2020; Amorin et al. 2021). Other than the saman, the housewives used more traditional medicine (7-34 species/individual) than other professions. One of the women in Mellangkenapadang Village works as a *batra* (shaman) and a housewife, using 34 species of plants as raw materials for traditional medicines. The role of women in the conservatio f biodiversity and traditional knowledge is important (Caballero-Serrano et al. 2019).

Diversity of medicinal plants found in Mellangkenapadang Village and Paladan Village

The medicinal plants in Mellangkenapadang Village and Paladan Village, consisted of 49 species belonging to 30 families and 22 orders (Table 2). Forty six species were found in Mellangkenapadang Village and 43 species were found in Paladan Village. Family Asteraceae had the highest number of species, i.e., five: *Ageratum conyzoides* L., *Gynura crepidioides* Benth., *Vernonia amygdalina* Delile, *Eupatorium* ratum L., *Tithonia diversifolia* (Hemsle A. Gray. The plants used were mostly wild plants (herbs, trees, and shrubs) growing near villages because they are sy to find. Sometimes some cultivated plants were also used for medicinal purposes (Ambu et al. 2020).

Table 1. The social characteristics of respondents in the use of traditional medicinal plants

Respondent characteristics		Mellangkenapadang Village		Paladan Village	
		Number of individuals	Number of species used	Number of individuals	Number of species used
Gender	Male	16	6-31	16	7-35
	Female	14	7-34	14	7-12
Age (Years)	25-35	5	6-9	5	7-11
	36-45	14	6-10	8	8-10
	46-71	11	7-34	17	7-35
Education	Elementary graduated	12	6-34	15	7-35
	Junior high school graduated	9	7-10	5	7-9
	Senior high school graduated	10	7-31	5	8-11
	University graduated	1	8	5	10-31
Job	Housewife	12	7-34	12	7-11
	Farmer	11	6-9	10	7-12
	Teacher	3	7-11	3	10-13
	Batra (Shaman)	2	31-34	2	31-35
	Self-employed	2	7	1	9
	Government employees	0	0	2	11-12

Table 2. The local names, scientific names, families, used parts the health problems treated, preparation and administration methods, and the number of users of medicinal plants in Mellangkenapadang Village and Paladan Village, Mamasa District, Indonesia

Indonesian name/ Mamasa Local Name	Family	Scientific name	Used part	Health problems treated	Preparation and administration methods	No. of users of each species from 30 respondents	
						Villages	
						Mellangkenapadang	Paladan
Dicotyledons							
Bandotan/ Tangmengam-muk	Asteraceae	*Ageratum conyzoides* L.	Leaf	Wound, Ulcer	Squeezed, smeared, kneaded with hot water and swallowed	18	15
Ginura/ Dopang	Asteraceae	*Gynura crepidioides* Benth.	Leaf	Wound	Squeezed, smeared	7	5
Klorofil/ Klorofil	Asteraceae	*Vernonia amygdalina* Delile	Leaf	Diabetes, Wound	Boiled, squeezed then smeared	11	16
Kirinyu/ Bunga-bunga baruk	Asteraceae	*Eupatorium odoratum* L.	Leaf	Wound	Squeezed, smeared	4	10
Insulin/ Bunga paik	Asteraceae	*Tithonia diversifolia* (Hemsley) A. Gray	Leaf	Wound	Squeezed then smeared	7	10
Kumis Kucing/ Kumis Kucing	Lamiaceae	*Orthosiphon stamineus* (Blume) Miq.	Leaf	Kidney	Boiled	7	2
Hiptis/ Tallang-tallang	Lamiaceae	*Hyptis capitata* Mart & Gal	Leaf	Ulcer, heatiness	Boiled, Squeezed, and compressed	5	6
Kemangi/ Kamangi	Lamiaceae	*Ocimum bacilicum* L.	Whole plant	Body odor and bad breath, high blood sugar levels	Smeared, chewed, eaten	4	9
Miana/ Balinangko	Lamiaceae	*Coleus scutellarioides* (L.) Benth	Leaf	Cough	Squeezed, drunk	24	29
Daun Sendok/ Sawi-Sawi	Plantaginaceae	*Plantago major* Linn.	Leaf	Kidney, hepatitis	Boiled, drunk	1	3
Tomat/ Tammate'	Solanaceae	*Lycopersicon esculentum* Mill.	Leaf Fruit	Cough, Sprue	Boiled, drunk, smeared	3	5
Keji Beling/ Pecah Beling	Acanthaceae	*Strobilanthes crispus* BL.	Leaf	Kidney, hypertension	Boiled, drunk	8	5
Tembelekan/ Kassi-kassi	Verbenaceae	*Lantana camara* L.	Leaf	Ulcer, wound, hepatitis	Boiled, drunk kneaded, stuck, squeezed	7	8
Kembang sepatu/ Kembang sepatu	Malvaceae	*Hibiscus rosa-sinensis* L.	Leaf Sap	Fever, toothache	Compressed, dripped	2	-
Daun Gedi/ Daun Gedi	Malvaceae	*Abelmoschus manihot* L.	Leaf	Diabetes, hypertension, urinary infection	Boiled	3	5
Jambu Biji/ Dambu	Myrtaceae	*Psidium guajava* L.	Young leaves Fruit	Stomachache, Dengue disease	Squeezed, drunk, Eaten	28	21
Daun salam/ Daun salam	Myrtaceae	*Syzygium polyanthum* (Wigh) Walp.	Leaf	Hypertension, gout pain	Boiled and drunk	8	4
Pare/ Paria	Cucurbitaceae	*Momordica charantia* Linn	Leaf	Measles, cough	Squeezed, drunk	2	4
Labu/ Boyo	Cucurbitaceae	*Cucurbita moschata* Duch.	Fruit	Diabetes, hypertension	Boiled and drunk	1	3
Kopi Arabika/ Kawa jember	Rubiaceae	*Coffea arabica* L.	Young leaves	Fever	Kneaded, smeared	-	4
Kopi Robusta/ Kawa rebusta	Rubiaceae	*Coffea robusta* L.	Old leaves	Hypertension	Kneaded, drunk	10	6
Ubi kayu/ Dora' kayu	Euphorbiacea	*Manihot esculenta* Crantz	Leaf	Hepatitis	Boiled and drunk before a meal	2	4

Sirsak/ Sarikaya	Annonaceae	*Annona muricata* Linn.	Leaf	Gout pain	Boiled and drunk	6	4
Alpukat/ Alpokat	Lauraceae	*Persea americana* Mill.	Leaf	Hypertension	Boiled and drunk	2	-
Putri malu/ Putri malu	Mimosaceae	*Mimosa pudica* L.	Root	Cough	Boiled and drunk	2	-
Cocor Bebek/ Cocor bebek	Crassulaceae	*Bryophyllum pinnatum* (Lam.) Oken	Leaf	Fever	Kneaded, compressed	1	1
Pegagan/ Panggaga	Apiaceae	*Centella asiatica* (L.) Urban	Whole plant	Fever, hypertension, acne	Boiled and drunk kneaded, smeared	11	14
Binahong/ Binahong	Basellaceae	*Andredera cordifolia (*Ten.) Steenis	Leaf	Hypertension, acne, wound	Boiled and drunk, pounded, smeared	10	17
Bunga Pukul 9/ Bunga pukul 9	Portulacaceae	*Portulaca grandiflora* Hook.	Whole plant	Sore throat, bruise	Boiled and drunk pounded, stuck	-	6
Daun Asam Kecil/ Pesi'	Oxalidaceae	*Oxalis corniculata* L.	Whole plant	Heatiness	Kneaded, squeezed, swallowed/eaten	7	4
Nangka/ Na'ka'	Moraceae	*Arthocarpus integra* Merr.	Leaf	Cholesterol	Boiled and drunk	2	-
Sirih/ Baulu	Piperaceae	*Piper betle* L.	Leaf	Wound, bad breath, birth control, acne	Boiled, used for bathing, placed on the affected parts of the body, dripped	19	20
Jeruk Nipis/ Lemo	Rutaceae	*Citrus aurantifolia* (Christm & Panz..) Swingle	Leaf Fruit	Stomachache, cough	Boiled and drunk, squeezed	19	20
Benalu/ Lelean dassi	Loranthaceae	*Dendrophthoe pentandra* (L.) Miq.	Leaf	Cancer	Boiled and drunk	5	6
Monocotyledons							
Jahe/ Laiya	Zingiberaceae	*Zingiber officinale* Roxb.	Rhizome	Cough	Boiled, mixed with other plants/ingredients	3	2
Bangle/ Bangle	Zingiberaceae	*Zingiber purpureum* Roxb.	Rhizome	Stomachache, hepatitis, Rheumatism	Chewed, eaten Grated, added with boiled water and honey, drunk	3	3
Kunyit/ Kuni'	Zingiberaceae	*Curcuma domestica* Val.	Rhizome	Cough, scabies	Grated, squeezed, mixed with honey and drunk, smeared	4	3
Temulawak/ Tammulawak	Zingiberaceae	*Curcuma xanthorrihiza* Val.	Rhizome	Hepatitis, constipation	Grated, squeezed and drunk	4	1
Lengkuas/ Li'kuak	Zingiberaceae	*Alpinia galanga* (L.) Wild	Rhizome	Rheumatism	Kneaded and stuck	2	-
Pisang/ Punti	Musaceae	*Musa paradisiaca* L.	Sap	Ulcer	Squeezed, drunk	4	7
Sereh/ Sarre	Poaceae	*Cymbopogon citratus* (DC.) Stapf.	Stem	Cholesterol	Pounded, boiled, drunk	8	-
Jagung/ Dalle	Poaceae	*Zea mays* L.	Young fruit	Chickenpox	Grated and stuck	7	10
Alang-Alang/ Rea	Gramineae	*Imperata cylindrica* (L.) Beauv.	Root	Kidney, hypertension	Boiled and drunk	2	4
Pinang/ Kalosi	Arecaceae	*Arecha catechu* Linn.	Young fruit	Cataract, burns	Burned, pounded, boiled and drunk	3	3
Talas/ Babak	Araceae	*Xanthosoma sagittifolium* (L.) Schott	Sap	Hemorrhagia	Smeared	3	6
Lidah Buaya/ Lidah Buaya	Liliaceae	*Aloe vera* L.	Sap	Thicken the hair	Smeared	2	2
Hanjuang/ Tabang	Liliaceae	*Cordyline fruticosa* (L.) A. Chev	Leaf	Wound	Chewed and stuck	1	-
Nenas/ Panden	Bromeliaceae	*Ananas comosus* Merr.	Leaf Fruit	Measles, Constipation	Boiled and drunk eaten	-	3
Pandan/ Pandan	Pandanaceae	*Pandanus amaryllifolius* Roxb.	Leaf	Neurogical disease	Boiled and drunk	+	+

Note: +: Medicinal efficacy plants used by the community. -: Medicinal efficacy plants whose benefits are not yet known by the community but have medicinal properties through scientific research

Among Dicotyledons, the order Solanales was found to be the most common at both study locations (Figure 2). The order Solanales had five families, namely the Lamiaceae {*Orthosiphon stamineus* (Blume) Miq., *Hyptis capitata* Mart & Gal, *Ocimum bacilicum* L., and *Coleus scutellarioides* (L.) Benth}, Plantaginaceae (*Plantago major* Linn.), Solanaceae (*Lycopersicon esculentum* Mill.), Acanthaceae (*Strobilanthes crispus* BL.); and Verbenaceae (*Lantana camara* L.). The family Lamiaceae had the most species, i.e., four species (Figure 3).

Based on the habitats the Dicotyledonous medicinal plants in the study sites could be divided into five groups, namely the plants growing in the wild, in home yards, home yards and in the wild, in gardens, and in home yards and gardens. The Dicotyledons were found growing in the wild due to their large number of species, and their vegetative and generative propagation methods. In Mellangkenapadang Village, among the 33 species of medicinal plants used by the community, the highest group was the species growing in the wild (31% or 10 species) and the lowest group was those growing in home yards and in the wild (9% or 3 species). Meanwhile, in Paladan Village, among the 30 species of medicinal plants used by the community, the highest group was the species growing in wild (30% or 9 species), and the lowest was those growing in home yards and in the (10% or 3 species) (Figure 4). Wild plants are widely used because local knowledge of the use and ease of obtaining wild plants is passed down from generation to generation (Suárez 2019; Aziz et al. 2021; de Medeiros et al. 2021; Prakash et al. 2021).

The order in Monocotyledons with the most species was Zingiberales (Figure 5), with two families, namely Zingiberaceae {*Zingiber officinale* Roxb., *Zingiber purpureum* Roxb., *Curcuma domestica* Val., *Curcuma xanthorrhiza* (L.) Wild., and *Alpinia galanga* (L.) Wild.} and Musaceae (*Musa paradisiaca* L.). The Zingiberaceae family had the most species, i.e., 5 (Figure 6).

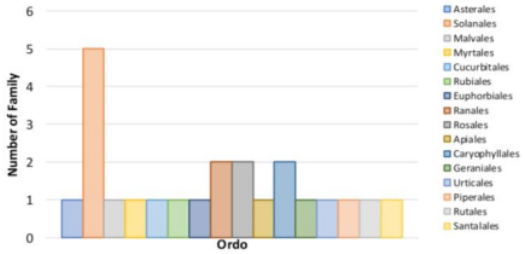

Figure 2. The number of families in each order from Dicotyledonous medicinal plants in Mellangkenapadang Village and Paladan Village, Mamasa District, Indonesia

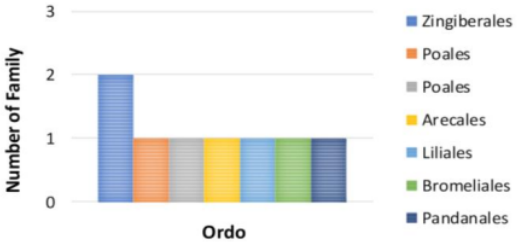

Figure 5. The number of families in Monocotyledonous medicinal plants in Mellangkenapadang and Paladan Villages

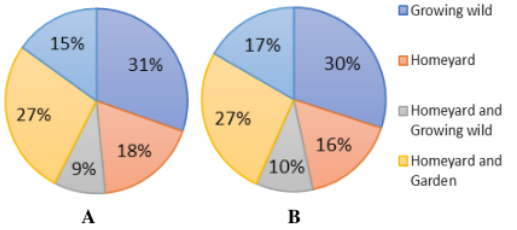

Figure 4. The percentage of habitats of Dicotyledonous medicinal plants in Mellangkenapadang (A) and Paladan (B) Villages

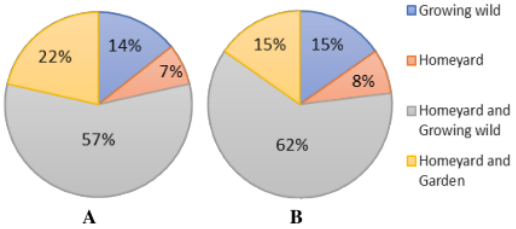

Figure 6. The percentage of habitats of Monocotyledonous medicinal plants in Mellangkenapadang (A) and Paladan (B) Villages

Figure 3. Lamiaceae Family: A.) *Orthosiphon stamineus* (Blume) Miq.; B. *Hyptis capitata* Mart & Gal; C. *Ocimum bacilicum* L., and D. *Coleus scutellarioides* (L.) Benth

Based on the habitats, the Monocotyledonous medicinal plants in Mellangkenapadang Village and Paladan Village can be divided into 4 groups, namely the plants growing in home yards, home yards and in the wild, in gardens, and in home yards and gardens. In Mellangkenapadang Village, 14 species of medicinal plants were used by the community. The highest medicinal plant habitat was the home yards and gardens with 57% or 8 species and the lowest was the home yards and the wild with 7% or 1 species. Meanwhile, in Paladan Village 13 species of medicinal plants were used by the community, the highest habitat for medicinal plants was the home yards and gardens with 62% or 8 species and the lowest was the home yards and the wild with 8% or 1 species (Figure 4). Monocotyledons are often found in home yards and gardens because they are widely grown vegetatively by local people as agricultural and ornamental plants. The most common medicinal plants in the home garden are the fruit-bearing trees, important to the family income (Freitas et al. 2015).

Utilization of medicinal plants by the community in Mellangkenapadang Village and Paladan Village

The number of medicinal plants used by the community in Mellangkenapadang Village was 46, while in Paladan Village was 43. The difference in the use of medicinal plants in the two villages is due to differences in the level of knowledge, culture and environmental conditions where the people live (Aziz et al. 2020; Amorin et al. 2021; Pikulthong et al. 2022). The most widely used medicinal plant by the people of Mellangkenapadang Village was guava *Psidium guajava* L. with 28 users (93.33%) and the most rarely used were pumpkin *Cucurbita moschata* Duch, pineapple *Ananas comosus* Merr., white man's foot *Plantago major* Linn., and airplant *Bryophyllum pinnatum* (Lam.) Oken with 1 user each (3.33%). Meanwhile, the most widely used medicinal plant by the people of Paladan Village was painted nettle *Coleus scutellarioides* (L.) Benth with 29 users (96.7%) and the most rarely used were galangal *Alpinia galanga* (L.) Wild. and airplant *Bryophyllum pinnatum* (Lam.) Oken with 1 user each (3.33%).

Psidium guajava L. was the most common medicinal plant used by respondents in the village of Mellangkenapadang. The leaves of *Psidium guajava* are useful as a medicine for stomachache and the fruit is used as a medicine for Dengue Fever (DHF). Research by Tapundu et al. (2015) in the Seko Tribe community showed that *Psidium guajava* L. was used to treat diarrhea because the young leaves contain tannins to kill the bacteria that cause diarrhea while the old leaves were used as a medicine for diabetes mellitus and ulcers in the Lauje ethnic group (Due et al. 2014). *Coleus scutellarioides* (L.) Benth was used as cough medicine by respondents in Paladan Village; the active compounds contained in *Coleus scutellarioides* (L.) Benth leaf extract are flavonoids, steroids, triterpenoids, saponins and tannins.

The health problem treated with the highest number of traditional medicine plants in Mellangkenapadang Village and Paladan Village was wound (Figure 7). Twelve plant species were useful as wound medicine, eight of which are Dicotyledons {*Ageratum conyzoides* L., *Gynura crepidioides* Benth., *Vernonia amygdalina* Delile, *Eupatorium odoratum* L., *Tithonia diversifolia* (Hemsley) A. Gray, *Lantana camara* L., *Andredera cordifolia* (Ten.) Steenis, and *Piper betle* L.), and four of which are Monocotyledons {*Zingiber officinale* Roxb., *Arecha catechu* Linn., *Xanthosoma sagittifolium* (L.) Schott, and *Cordyline fruticosa* (L.) A. Chev}.

The preparation and administration methods of medicinal plants

The types of diseases that can be treated by traditional medicinal plants were internal and external diseases, such as wounds and skin diseases, diarrhea, and influenza. The plant parts used by the community as medicine were roots, stems, leaves, fruit, seeds, sap, and rhizomes (Wanjohi et al. 2020). Root was the most widely used part as medicine (29 species or 59.18%), while the least used were the stem and seed (only 1 species or 2.04%) (Figure 8). The local people of Mellangkenapadang and Paladan villages use the leaves of the plant for medicinal ingredients because the leaves are abundant and easier to process than other parts of the plant. The communities can still get a sustainable source of medicinal ingredients by using the leaves. According to Tuasha et al. (2018); Supiandi et al. (2019); and Zhang et al. (2022), the leaf is the most often used part because the leaf is the easiest to obtain than the other plant parts such as flowers, fruits and seeds.

Figure 6. Zingiberaceae family: A. *Zingiber officinale* Roxb.; B. *Zingiber purpureum* Roxb.; C. *Curcuma domestica* Val.; D. *Curcuma xanthorrihiza* Roxb.; and E. *Alpinia galanga* (L.) Wild.

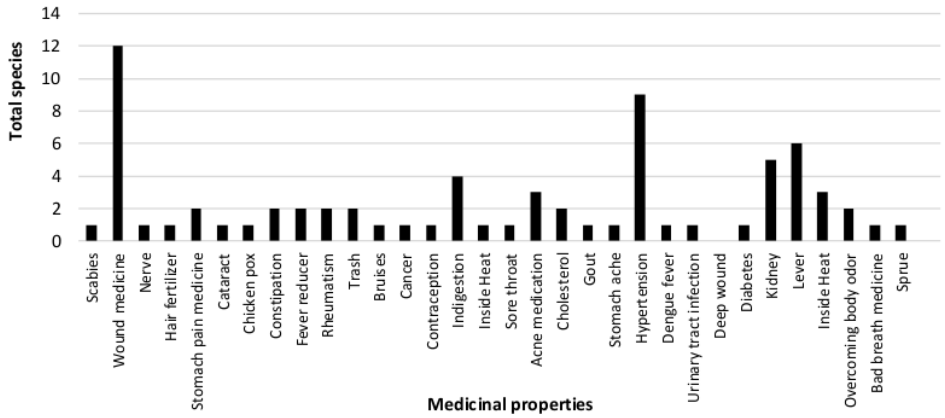

Figure 7. The total species of medicinal plants for each health problem treated in Mellangkenapadang Village and Paladan Village, Sesenapadang District

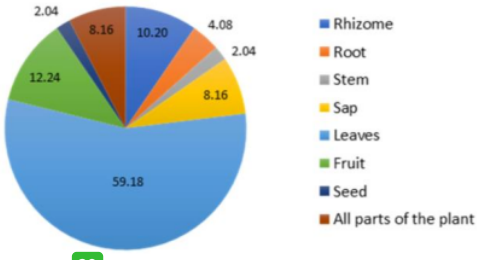

Figure 8. The percentage of plant parts used as traditional medicine

The methods of administering traditional medicinal plants in Mellangkenapadang Village and Paladan Village can be divided into two groups, namely external administration by sticking (14.28%), compressing (4.08%), smearing (18.36%), bathing (2.04%), dripping (2.04%) and washing on the affected part of the body (2.04%), and internal administration by drinking (67.34%), chewing (6.12%), and eating (8.16%). The processing of medicinal plants is done in a simple way, namely boiling (55.10%), pounding (10.20%), grating (6.12%), mixing with other plants/ingredients (12.24%), kneading (18.36%), squeezing (12.24%) and burning (2.04%). The two methods are carried out by the people of Mellangkenapadang and Paladan villages because of the knowledge that has been passed down from parents and is still being practiced today with respect to processing and utilizing medicinal plants in healing diseases. Traditional medicine plant preparation modes vary: boiling, pounding, squeezing, brewing, dredging, c[illegible]ing, burning, grating, and wringing (Aziz et al. 2020). Antioxidants are naturally present in many different parts of a plant: flowers, stems, barks, pods, leaves, fruit, roots, wood, and seeds (Alsarhan et al. 2021). This study concluded that the community in Mellangkenapadang Village and Paladan Village, Sesesenapadang District, Mamasa Regency still preserve the knowledge of traditional medicinal plants and use it in their daily life.

ACKNOWLEDGEMENTS

We would like to thank the Dean of the Faculty of Mathematics and Natural Sciences, Hasanuddin University Makassar and the Mamasa Regency Government of West Sulawesi Province, Indonesia, for their support and permission for us to conduct research.

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