

# Morphological Characteristics of Wild Plants as Medicines Traditional Muna Tribe

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**Abstract** Plant species scattered in various parts of the world have their benefits and properties as traditional medicinal ingredients by several tribes in Indonesia, one of which is the Muna tribe in Muna Regency. This research specifically examines the morphological characteristics of wild plants as traditional medicinal ingredients for the Muna people in Watopute District using a qualitative descriptive method consisting of surveys and interviews by selecting informants by Snowball Sampling. The survey results were then analyzed qualitatively and quantitatively. The research identified as many as 43 wild plants used as traditional medicine consisting of 22 orders and 24 families, 5 species from the *Monocotyledoneae* class, and 38 species from the *Dicotyledoneae* class. The most widely used medicinal plant family was *Asteraceae*, with 7 species. The most widely used plant organs were leaves, with 28 species (28%), and the habitus of medicinal plants found was herbs (30%) with morphological observations in the form of roots, stems, leaves, flowers, fruit, and its parts and shape. The research concluded that most Muna people use raw materials from plants as traditional medicines to treat diseases.

**Keywords** Morphology, Medicinal Plants, Muna Tribe

## 1. Introduction

The diversity of plant species that occupy an ecosystem continues to experience degradation along with the increase in human population. Of course, habitat destruction is increasing even though Indonesia has diverse animal and plant biodiversity. Plant diversity is important in maintaining the stability and balance of ecosystems. Still, it is very vulnerable to change in the environment, climate, and human activities [1] and plays an important role in the ecological security of an ecosystem [2].

The diversity of plants spread across Indonesia has various benefits, one of which is that they are used as a traditional medicine. The Philippines has succeeded in identifying as many as 111 medicinal plants spread across 98 species and 49 families to treat 82 types of diseases [3]. In the midst of the rich variety of plant life in Indonesia, there is still a lack of comprehensive data on the count of indigenous plant species suitable for traditional medicinal purposes. Throughout generations, traditional healing methods rooted in wild plants have been employed for the preservation of well-being and the treatment of ailments [4]. It is imperative to safeguard and advance the cultivation of wild plants with medicinal properties to ensure their continued availability for traditional medicine [5].

Wild plants that can be used as medicinal herbs differ between one type and another in classification and morphology and have an important role as health service providers for people in developing countries [6]. Wild plants have had medicinal properties for internal and external diseases for generations and have become alternative medicines for preventing or treating various types of diseases, as has been proven in countries such as Ethiopia, South Africa, and China. State of Ethiopia: wild plants can be used as a tuberculosis drug [7], South African fever reducer and treatment of sexually transmitted diseases [8],[9], and China as an anti-viral drug [10], internal disease [11], and herbs [12].

The morphology of wild plants has long been of interest in the traditional medicine of the Muna tribe, an ethnic group inhabiting the region of Southeast Sulawesi, Indonesia. Wild plants are a rich natural resource with diverse health benefits. The Muna tribe, with its local wisdom, has observed and utilized the morphological characteristics of these wild plants as effective traditional medicine. This article will explain the key morphological characteristics for identification and their benefits in the traditional medicine of the Muna tribe.

Wild plants used in the traditional medicine of the Muna tribe have distinct and easily recognizable morphological characteristics. One of these is the leaf shape, where some wild plants have uniquely shaped leaves or specific patterns that serve as their identifying features. Additionally, the stem and flowers are also important markers in identifying these plants. The Muna tribe has mastered the knowledge of these morphological characteristics and utilizes them to distinguish medicinal plants from others.

The use of wild plants as traditional medicine by the Muna tribe is based on observations of their health benefits. Some wild plants contain active compounds that can alleviate various ailments such as fever, cough, and digestive disorders. The utilization of wild plants as traditional medicine by the Muna tribe underscores the importance of preserving natural environments and biodiversity. The dependency of the Muna tribe on wild plants as a source of medicine highlights the urgency of preserving the habitats of these plants.

This study will focus on analyzing the morphological features of a range of wild plant species utilized as primary components in traditional medicines, as they are believed to possess therapeutic capabilities for various ailments. Despite the empirical effectiveness of these wild plants in treating diverse diseases, there is a lack of comprehensive documentation on their medicinal properties. The Muna people in the Watopute District have traditionally employed these plants as alternative medicinal ingredients for treating illnesses. The anticipated outcome of this research is to contribute valuable insights into the identification of medicinal plant varieties derived from wild sources, thus providing foundational data for the conservation of these wild plants as essential components in traditional medicine.

## 2. Materials and Methods

The study concentrated on wild plants employed as fundamental elements in traditional medicine within the Muna tribe. It was conducted from July to December 2022 in the Watopute District of Muna Regency. The research methodology adopted was both descriptive and qualitative, encompassing survey and interview techniques. The approach included the identification of species and the examination of morphological attributes in all wild plants utilized as raw materials for traditional medicine.

A survey on the morphological characteristics of wild plants used as traditional medicine by the Muna tribe is essential for enriching local knowledge. By conducting an in-depth survey on the morphological traits of wild plants, we can observe, record, and document the local wisdom of the Muna tribe in utilizing natural resources for medicinal purposes. This not only aids in preserving the culture and traditional knowledge of the Muna tribe but also enables a better understanding of the morphological traits of the wild plants they use. Consequently, researchers and pharmaceutical experts can identify the active components within these plants. This information can then be utilized in the development of herbal medicines that are more effective and safe.

In the pursuit of comprehensive insights, informants were meticulously chosen through the snowball sampling method, a strategic approach designed to capture the diverse perspectives embedded within communities. Through this systematic selection process, a rich tapestry of knowledge was unveiled, offering a panoramic view of traditional medicinal practices. With each informant acting as a beacon of wisdom, the research journey unfolded, weaving together narratives that celebrated the symbiotic relationship between humanity and nature.

With a trove of gathered insights in hand, the research data underwent a rigorous examination, blending both qualitative depth and quantitative precision. Through this meticulous analysis, the intricate nuances of traditional medicinal ingredients were revealed, painting a vivid portrait of botanical diversity. From the resilient roots to the delicate blossoms, each facet of plant morphology was scrutinized, yielding a nuanced understanding of their medicinal potency. Root character, stem strength, leaf morphology, floral intricacies, fruit morphology, and seed vitality emerged as vital indicators, each offering a unique lens through which to identify and celebrate the therapeutic potential of wild plants in traditional medicine. Thus, through the fusion of qualitative richness and quantitative rigor, the essence of each wild plant as a traditional medicinal ingredient was illuminated, enriching our collective understanding of the profound synergy between nature and healing.

Data processing and analysis were carried out qualitatively and descriptively to obtain information about plant identity in the form of morphological characteristics. Parts used and how to use Quantitative data analysis

techniques are used to determine the percentage of habitus, which is used as the percentage of habitus. The percentage of habitus is the percentage of a habitus that is used for all existing habits. The percentage of a certain habitus:

$$\Sigma \frac{\text{Certain Habitus}}{\text{All Habitus}} \times 100\%$$

The percentage of plant parts used includes the parts from the top of the plant (leaves) down to the bottom (root). The determination of the percentage is as follows:

Certain share percentages:

$$\Sigma \frac{\text{Certain Parts Are Used}}{\text{All Parts Are Used}} \times 100\%$$

### 3. Result and Discussion

Watopute District falls within the jurisdiction of Muna Regency in Southeast Sulawesi, situated at coordinates 4°47'38.31"S and 122°37'51.50"E (Fig. 1). It is comprised of eight villages: Labaha, Wali, Bangkali, Bangkali West, Dana, Lakapodo, Wakadia, and Matarawa.

The majority of residents in Watopute Subdistrict are engaged in agricultural activities related to horticultural crops, plantations, and the livestock sector. The population is predominantly of Muna ethnicity. The enduring influence of deeply ingrained beliefs, passed down through generations and reinforced by local wisdom values, has led the majority of Watopute District's inhabitants to continue depending on wild plant species as essential components for traditional medicines. Through the identification process, the study revealed 43 species of wild plants suitable for use as raw materials in traditional medicine (Tab. 1), spanning 22 orders and 24 families.

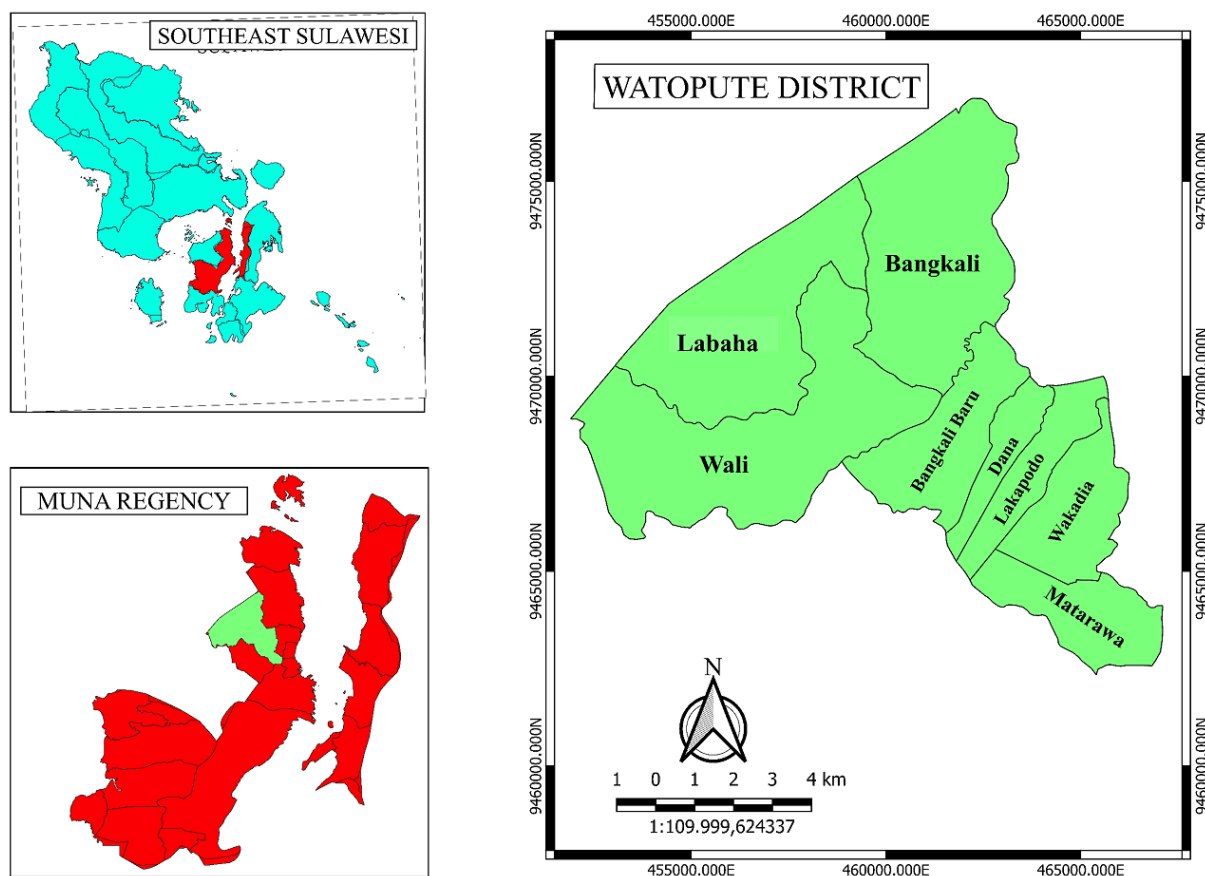


Figure 1. Research Map

**Table 1.** Wild Plants as Traditional Medicines of the Muna Tribe

Latin Name	Habitus	Organs Used	Efficacy
<i>Blumea balsamifera</i> D.	Shrub	Leaf	Stomach, Flu
<i>Chromolaena odorata</i> L.	Shrub	Leaf	Cough, Wounds
<i>Abrus precatorius</i> L.	Shrub	Leaf	TB, Fever
<i>Cleropendrum japonicum</i> L.	Shrub	Leaf	Postpartum
<i>Lantana camara</i> L.	Shrub	Leaf	Stomach
<i>Premna foetida</i> L.	Shrub	Leaf	Worms
<i>Stachytarpheta jamaicensis</i> Vahl.	Shrub	Roots, Leaves	Tonsils, vaginal discharge
<i>Sida rhombifolia</i> L.	Shrub	Roots, Leaves	Asthma, Toothache
<i>Urena lobata</i> L.	Shrub	Leaf	Fever, Swelling
<i>Melastoma polyanthum</i> Bl.	Shrub	Leaf	Diarrhea, Ulcers
<i>Tinospora crispa</i> L.	Shrub	Stem	Malaria seeds
<i>Dendroptoe petandra</i> .	Shrub	Leaf	Kidneys, Tumors
<i>Bambusa vulgaris</i>	Shrub	Stem	Jaundice
<i>Ageratum conyzoides</i> L.	Herbs	Leaf	Cough
<i>Crassocephalum crepidioides</i>	Herbs	Leaf	Headache
<i>Emilia sonchifolia</i> D.C	Herbs	Leaf	Fever
<i>Synedrella nodiflora</i> L	Herbs	Leaf	Wound
<i>Celosia argentea</i> L.	Herbs	Leaf	Shortsighted
<i>Acalipha indica</i>	Herbs	Leaf	Diarrhea
<i>Euphorbia hirta</i> L.	Herbs	Leaf	Cataract
<i>Peperomia pellucida</i> Kunth.	Herbs	Leaf	Gout, Fever
<i>Kalanchoe pinnata</i> (Lam.) Pers.	Herbs	Leaf	Fever
<i>Physalis angulata</i> L.	Herbs	Leaves, Fruit	Diabetes, Heart
<i>Kyllinga monocephala</i> Rottb.	Herbs	Seed	Pimple
<i>Eleutherine bulbosa</i>	Herbs	Leaf	Diabetes
<i>Imperata cylindrical</i> L.	Herbs	Root	Kidneys, Worms
<i>Dillenia serrata</i> Thumb.	Tree	Stem	Postpartum
<i>Pterocarpus indicus</i> Willd.	Tree	Bark	Malnutrition
<i>Sesbania grandiflora</i> Pers.	Tree	Leaf	Fever
<i>Alstonia scholaris</i> R. Br.	Tree	Stem Sap	Toothache
<i>Muntingia calabura</i> L.	Tree	Leaf	Kidneys, Hypertension
<i>Hibiscus tiliaceus</i> L.	Tree	Stem	Cancer and Cough
<i>Eugenia mallacensis</i> L.	Tree	Bark	Gynecological Tumors
<i>Areca catechu</i> L.	Tree	Roots, Seeds	Shortness of Breath, Cough
<i>Tournefortia montana</i>	Bush	Leaf	Jaundice
<i>Crotalaria pallida</i> Aiton.	Bush	Fruit	Worms
<i>Flemingia strobilifera</i> L.	Bush	Leaf	Postpartum
<i>Ipomea quamoclit</i> L.	Bush	Leaf	Worms
<i>Drynaria quercifolia</i> J.Sm	Bush	Rhizome	Jaundice, Lower Bowel Disease
<i>Lygodium circinatum</i> Burm.	Bush	Rhizome	Tired
<i>Bidens pilosa</i> L.	Terna	Leaf	TB, fever
<i>Phyllanthus niruri</i> L.	Terna	All Organs	Streamlining Blood Circulation
<i>Arcangelisia flava</i> Merr.	Liana	Root	Sore Eyes, Jaundice

Traditional medicine, particularly herbal medicine, encompasses a healing approach that leverages the medicinal attributes found in plants and their corresponding medicinal formulations. These formulations commonly utilize the complete plant or specific plant elements as the active constituents. Medicinal plant preparations can manifest in diverse forms, including ground plant material, powders, extracts, tinctures, fatty oils, or essential oils. The production of medicinal plant juices involves a sequence of procedures, which includes fractionation, purification, and concentration processes.

Rooted deeply in cultural ethos, traditional medicine embodies an ancient wisdom that acknowledges the profound interplay between the cosmos, humanity, and the divine. Within this intricate tapestry, the practice of traditional medicine becomes enmeshed in the spiritual fabric of local communities. In the Indonesian archipelago, this sacred art takes the form of Jamu, resonating with the essence of "traditional Javanese medicine" and herbal remedies. Across diverse landscapes, each region unveils its unique trove of medicinal treasures, meticulously harvested in harmony with the philosophical underpinnings and cherished cultural norms of its people. These botanical elixirs, steeped in tradition, serve as conduits for addressing an array of human ailments, resonating with the profound belief that humanity is but a thread intricately woven into the vast cosmic tapestry.

Embraced by generations, traditional medicine in Indonesia is more than mere herbal concoctions; it is a profound testament to the symbiotic relationship between nature and humanity. Anchored in reverence for the interconnectedness of all existence, this holistic approach to healing is a sacred dance with the rhythms of the universe. With each sip of Jamu, one imbibes not just a potion but a legacy of ancestral knowledge, a communion with the divine, and a reaffirmation of humanity's intrinsic bond with the cosmos. Through the lens of traditional medicine, Indonesians find solace in the belief that their well-being is not isolated but intricately interwoven with the cosmic currents that ebb and flow throughout the universe.

For generations, the people of Muna Island, particularly

those belonging to the esteemed Muna Tribe in Watopute District, Muna Regency, have relied on the healing properties of medicinal plants to combat a myriad of ailments. Embedded within their cultural heritage, the use of these botanical remedies is not merely a practice but a sacred tradition passed down through the ages. However, amidst the encroaching tide of progress, the very sanctity of these medicinal plants faces an existential threat. Vast swathes of forest, once teeming with life and healing, have succumbed to the relentless march of agricultural expansion and transformed into sprawling corn farms. In the wake of this rampant land clearance, the delicate balance between tradition and modernity is perilously disrupted, leaving these invaluable medicinal plants on the precipice of extinction.

As the once lush forests give way to fields of corn, the ancestral knowledge encoded within these medicinal plants is at risk of fading into oblivion. With each acre cleared, the rich tapestry of biodiversity that sustains both ecosystems and cultural practices is unraveled. The looming specter of extinction casts a somber shadow over the Muna Tribe's age-old traditions, threatening to sever the vital connection between community health and the natural world. Urgent action is needed to preserve not only the physical landscapes but also the intangible heritage that defines the identity of the Muna people. The delicate balance between cultivation and conservation lies the hope of safeguarding not just medicinal plants but the very soul of Muna Island's cultural landscape.

Moreover, public trust in traditional medicine is bolstered by the belief that it carries fewer side effects than conventional medicine and the conviction that natural products are safer and superior to synthetic ones. Consequently, the notion of returning to nature is gaining popularity among the public due to its greater assurance. The types of plant families found (Fig. 2) were *Arecaceae*, *Liliaceae*, *Cyperaceae*, *Poaceae*, *Asteraceae*, *Malvaceae*, *Elaeocarpaceae*, *Fabaceae*, *Euphorbiaceae*, *Verbenaceae*, *Menispermaceae*, *Melastomaceae*, *Myrtaceae*, *Solanaceae*, *Convolvunaceae*, *Piperaceae*, *Crassulaceae*, *Dilleniaceae*, *Loranthaceae*, *Amaranthaceae*, *Apocynaceae*, *Boraginaceae*, *Polypodiaceae*, *Lygodiaceae*.

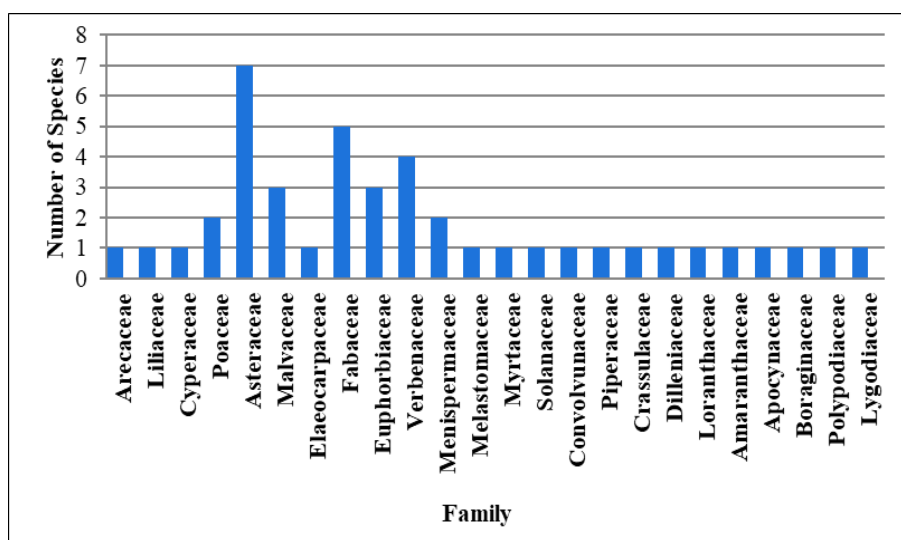


Figure 2. Medicinal Plant Species

In the quest for healing, the botanical riches unearthed encompass a diverse array of plant families, each bearing the potential to alleviate ailments and restore vitality. From the stately palms of *Areaceae* to the delicate blooms of *Asteraceae*, the tapestry of medicinal flora paints a vibrant mosaic of biodiversity. Amongst the verdant landscape, the familiar faces of *Cyperaceae* and *Poaceae* stand tall, interwoven with the lesser-known treasures of *Elaeocarpaceae* and *Menispermaceae*. As the catalog of healing plants expands, so too does humanity's reverence for the intricate web of life that sustains us, reaffirming our profound connection to the natural world.

A prevailing belief endorses natural remedies as inherently safer and superior to their synthetic counterparts, fostering a collective confidence in their efficacy. Consequently, there's a palpable shift towards embracing nature's bounty as individuals seek reassurance in the timeless wisdom of traditional healing modalities. This resurgence of interest in nature-based therapies reflects a broader societal inclination towards holistic well-being and a profound yearning for a harmonious coexistence with the natural world.

The types of wild plant families used as raw materials for traditional medicine (Fig. 2) are known that the people in Watopute District utilize several types of plants, most of whom are in the *Asteraceae* family, as many as 7 species and the least are in the families *Liliaceae*, *Cyperaceae*, *Elaeocarpaceae*, *Melastomaceae*, *Myrtaceae*, *Solanaceae*, *Convolvunaceae*, *Piperaceae*, *Crassulaceae*, *Dilleniaceae*, *Loranthaceae*, *Amaranthaceae*, *Apocynaceae*, *Boraginaceae*, *Polypodiaceae*, and *Lygodiaceae* which only have 1 plant species. There are 7 (seven) plants based on the organs used (Fig. 3) as raw materials for traditional medicine, namely roots, stems, leaves, fruit, seeds, rhizomes, and sap.

The organs most widely used as raw materials for traditional medicine for the Muna people in Watopute District are 28 species of leaves with a 55% proportion, 7

species of stems with a 13% proportion of species, 6 species of roots with a proportion of 12%, seeds and fruit respectively 3 each with a proportion of 6%, and the least used is for rhizomes and sap as much as 2 with a proportion of 4%. The habitus of plants found (Fig. 4) total 6, including trees, herbs, shrubs, and liana.

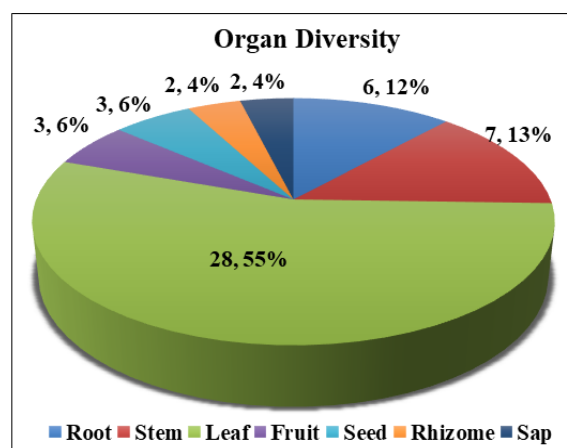


Figure 3. Use of Plant Organ Diversity

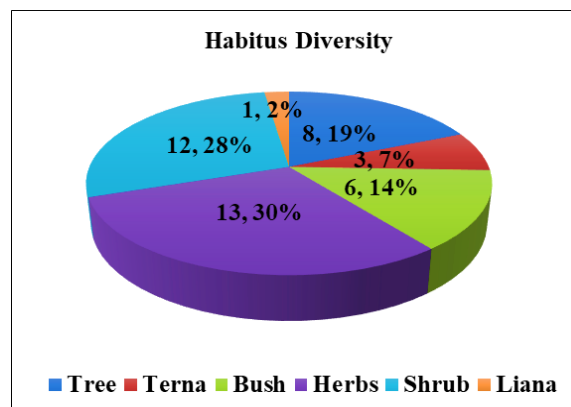


Figure 4. Habitus Diversity

Forty-three wild plant species, categorized into 22 orders and 24 families, serve as raw materials for traditional medicine. This underscores the enduring practice of traditional medicine among the Muna tribe in Watopute District, persisting across generations to address a spectrum of internal and external ailments. These include conditions like coughs, diarrhea, fever, flu, headaches, toothaches, acne, pale yellow skin, malaria, boils, subcutaneous smallpox, worms, leucorrhoea, gout, diabetes, kidney issues, stomach ailments, vomiting blood, asthma, uterine tumors, heart-related concerns, intestinal problems, as well as postpartum and malnutrition remedies. Additionally, these plant-based solutions are applied for conditions such as sore eyes (cataracts), shortness of breath, and promoting blood circulation. The distinction among these wild plants lies in the specific plant organs utilized, spanning roots, stems, leaves, fruit, seeds, rhizomes, and sap.

The morphological features of roots were examined, revealing the presence of taproots and fibrous roots. The assessment of stem morphological characteristics encompassed considerations related to the stem's structure, shape, and surface. Regarding the stems, medicinal plants displayed various types, including perpendicular, vining, nodding, and twisting stems, each exhibiting round shapes such as circular, triangular, and rectangular forms. Additionally, some plants featured stems with wet, woody, or grass-like characteristics.

The historical use of wild plant roots in traditional medicine for treating various ailments is well-established. For instance, in Rwanda, roots serve as a remedy for colic [13]. However, the effectiveness of roots in medicinal plants is also influenced by the microbial resources present in the soil [14]. Furthermore, herbal medicines derived from plant roots in China have demonstrated efficacy in addressing conditions like kidney failure [15].

The active compound content influences the efficacy of medicinal plants in the plant, where the active compound will appear if the medicinal plant grows in the appropriate climate and soil type [16]. Grandmothers have used medicinal plants as antidotes for the disease for generations, passed down from generation to generation until they finally entered the pharmaceutical world and are scientifically recognized [17]. Plants were chosen by the community because, apart from being used to maintain health, they also have other benefits, such as adding spices and ornamental plants [18].

The observed leaf morphological characteristics were leaf shape, leaf base, leaf tip, leaf edge, leaf surface, and leaf veins. (1) wide in the middle, obscene leaf shape, and lanceolate shape; (2) the widest part is at the bottom of the middle of the leaf blade; (3) the widest part of the leaf is above the middle of the strand, namely the heart shape of the breach; and the shape of the leaves is the shape of the blade; and (4) no part is the widest or from the base to the tip almost the same width, namely the line shape. The use

of leaves as traditional medicine has long been used by Indonesian people, such as the Tengger tribe in Lumajang, which utilizes betel leaves (*Piper betle* L.) to overcome sexual problems [19]. Likewise, in South Sulawesi, they use medicinal plants from the leaves of *Psidium guajava* L. as a medicine for diarrhea [20] and the people of Kalimantan use the leaves of *Dicliptera paniculata* (Forssk.) I. Darbysh to treat broken bones [21].

Leaf bases present in medicinal plants exhibit diverse shapes, including pointed, rounded, blunt, and grooved. The leaf margins fall into two categories: those with independent notches and those with pinnate notches. Leaves with independent incisions display serrations and teeth, while those with pinnate incisions have a smooth, membranous texture. The leaf surfaces can be smooth, glabrous, or hairy.

These leaves, directly employed in traditional medicine, have been utilized by various communities, particularly the Muna tribe, to address health concerns. This preference stems from the belief that wild plants possess superior medicinal properties compared to chemical treatments. Similar sentiments have been expressed in Pidie Regency, where the local population emphasizes the efficacy of medicinal plants over chemical alternatives [22]. In Jayawijaya Regency, Papua, the Dani people have identified and used 16 species of medicinal plants from 12 families, each characterized by simpler properties and applications [23]. Similarly, in the Kemukuman community of South Pulo Breueh, 67 medicinal plants have been identified as remedies capable of treating five different diseases [24].

The flowers observed displayed morphological characteristics either at the tip of the stem or in the leaf axils. Fruit morphology encompasses both false and real fruits. False fruits were categorized as single false fruits, while real fruits were classified as single fleshy true fruits. Certain medicinal plants, like *Medinilla speciosa*, utilize their fruits for their antioxidant properties [25]. In Watopute District, the residents employ the fruit of *Crotalaria pallida* Aiton to address worm infestations in children. Beyond the previously described fruit types, some plants, such as *Punica granatum* L., exhibit medicinal attributes. The fruits of *Punica granatum* L. [26] are known for their antioxidant, anti-inflammatory, anticancer, antibacterial, hepatoprotective, dysentery-alleviating, diarrhea-relieving, helminthiasis-treating, menstrual pain-soothing, and acne-addressing properties [27-29].

High biodiversity with various benefits certainly requires further studies to be able to identify more benefits from wild medicinal plants, as has been done by researchers from various countries, such as *Apocynaceae* plants in China [30], *Rauvolfia caffra* in South Africa [31], and *Tinospora cordifolia* in India [32] by analyzing its phytochemical and pharmacological properties so that it can be used sustainably and efficiently.

## 4. Conclusions

The study results reveal that within the Watopute District of Muna Regency, the morphological characteristics of wild plants employed in traditional medicine by the Muna people encompass 43 species spanning 24 families, 22 orders, and 3 classes. These characteristics are discernible across various plant organs, including roots, stems, leaves, flowers, fruits, and their respective structures. Among the observed families, Asteraceae stands out as the most prevalent, comprising 7 species. Leaves emerge as the predominant plant organ, constituting 28 species (55%), while herbs emerge as the most prevalent plant habitus, encompassing 13 species (30%).

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