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Macroscopic, Microscopic, and Phytochemical Screening Analysis of Medicinal Plants in Nagari Lasi, West Sumatra

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Abstract

Indonesia is one of the countries titled "Megabiodiversity", which has a high level of biodiversity, including medicinal plants. Medicinal plants utilize various parts of plants, such as roots, leaves, stems, and fruits for prevention, treatment, and pain relief. Nagari Lasi has great potential in the diversity of medicinal plants, but their utilization by the community is still limited due to a lack of knowledge. This study aims to identify the content of bioactive compounds in medicinal plants through macroscopic, microscopic, and phytochemical screening. The methods include organoleptic observation, macroscopic and microscopic analysis, and phytochemical tests. Of the 150 plant samples, the results showed that 78 samples contained alkaloids, 115 samples contained phenolics, 129 samples contained flavonoids, 75 samples contained steroids, 21 samples contained triterpenoids, and 119 samples contained saponins. This study provides basic information regarding the phytochemical content of medicinal plants in Nagari Lasi as a first step in developing traditional medicine.

Keywords: Medicinal Plants; Macroscopic Analysis; Microscopic Analysis; Phytochemical Screening.

INTRODUCTION

Indonesia is known as one of the countries with the title "Megabiodiversity" because of its location as a tropical country between the Asian and Australian Continents (Rosmini, Zainuddin, & Aini, 2022). This geographical position makes Indonesia have a very high level of biodiversity (Marganingrum & Santoso, 2019). Among these biological riches, medicinal plants are one of the riches utilized by the community for traditional medicine (Weking, Cornelia, Hafsah, & Rahma Lestari, 2023). However, until now, only around 7,500 plant species have been identified as medicinal plants (Cahyaningsih, Magos Brehm, & Maxted, 2021).

Medicinal plants have various parts that can prevent, treat, or relieve diseases, such as roots, leaves, stems, fruits, or other excretory products (Saleh & Kamisah, 2021). Each plant has different chemical content and properties (Zengin et al., 2020). These properties come from secondary metabolite compounds naturally produced by plants, including alkaloids, flavonoids, saponins, terpenoids, and tannins (Raden Roro Upiek Ngesti Wibawaning Astuti, Illahi, Umri, & Falah, 2023).

The use of medicinal plants in Indonesia has been going on since ancient times and is believed to be able to cure various diseases and improve the quality of health (Roseva Sari Br Bangun & Sabariah Bangun, 2021). The advantages of medicinal plants over chemical drugs include minimal side effects and more affordable costs (Jamal, 2023). Therefore, their use remains popular among people from various backgrounds (Kintoko et al., 2023). However, the pattern of utilization of medicinal plants differs across regions in Indonesia, depending on the types of plants available, the plant parts used, and the processing methods, which are often influenced by local culture (Rahayu, Ibo, Arimukti, & Susiarti, 2020).

Canduang District, located in Agam Regency, West Sumatra, is one of the areas with great potential for medicinal plant diversity. Located on the slopes of Mount Merapi at an altitude between 780 to 2,891 meters above sea level, this area has very fertile soil, rich in weathered volcanic material (Rais, 2021). Nagari Lasi, a village in Canduang Subdistrict with an area of 15.34 km², is a fertile area with the potential to produce a variety of plants, especially medicinal plants.

The Nagari Lasi community's interaction with medicinal plants is still based on traditional knowledge passed down from generation to generation. Unfortunately, the utilization of medicinal plants in this area is not optimal, most likely due to the lack of knowledge about the content of chemical compounds and the specific benefits of the plants around them. Scientific research related to the content of compounds in medicinal plants in Nagari Lasi is also very limited. In fact, information about the bioactive components of

plants is an important first step to identify their pharmacological potential (Poojar et al., 2017).

Therefore, this study was conducted to identify the content of bioactive compounds in medicinal plants in Nagari Lasi through macroscopic, microscopic, and phytochemical screening. This research is expected to provide scientific information that supports the utilization of local plants as a source of traditional medicine.

MATERIALS AND METHODS

Tools

Microscope (Yazumi), digital scale (Kern), hotplate (Maspion), a set of glassware such as 500 ml beaker glass (Iwaki), 50 ml beaker glass (Iwaki), 50 ml beaker glass (Iwaki), 50 ml measuring cup (Iwaki), test tube (Iwaki), drip plate, test tube rack, mortar, stampher, filter paper, drip pipette, spatula, stirring rod, tweezers, knife, object glass, cover glass, cotton swab and others.

Materials

Plants, chloroform (Merck®), chloroform ammonia 0.05 M (Merck®), concentrated HCL (Merck®), HCL 2 N (Merck®), H2SO4 2 N (Merck®), methanol (Merck®), metal powder mg (Merck®), FeCl3 5% (Merck®), reagents mayer, dragendroff (Merck®), Liebermann-Burchard (Merck®), and aquadest (Merck®).

Procedures

Selection and Sampling

This study collected medicinal plant samples from homes and surrounding areas in Nagari Lasi. Sample selection was based on a preliminary survey with local communities to identify plants often used as medicine.

Sample Preparation

The plants that have been taken are then further examined, part of the plant that will be used as a sample is the leaf organ of the plant.

Organoleptical examination

Organoleptical examination of medicinal plants or samples is carried out using the five senses in humans to observe shape, color, and smell n (Novitasari, Nashihah, & Zamzani, 2021).

Macroscopic Examination

Macroscopic examination of medicinal plants or samples is carried out by direct visual observation by observing the characteristics of the outer parts of the sample (Novitasari et al., 2021). This macroscopic test can be done using a magnifying glass or without using tools and certain chemicals (Sari, 2023).

Microscopic Examination

Microscopic examination begins with cutting the sample transversely or longitudinally using a sharp knife to obtain a thin sample. Then, the sample is transferred to an object glass and aquadest is added. Next, cover the sample with a cover glass and observe the anatomy on the plant using a microscope (Nakkliang, Areesantichai, & Rungsihirunrat, 2022).

Phytochemical Screening

Phytochemical screening is an examination to determine the content of compounds in a plant sample, including alkaloids, flavonoids, tannins, saponins, and steroids/triterpenoids (Itam, Elin, & Arifin, 2020).

Working procedure

Samples were weighed as much as 4 g and then cut into small pieces, put into a test tube and extracted with methanol. After that, the fresh sample extract was added with 5 mL chloroform and 5 mL aqudest and stirred well and then left for a moment until two layers were formed, namely the chloroform layer and the water layer. The top layer is water used for flavonoid, saponin and phenolic examination. The bottom layer is chloroform used for examination of triterpenoid and steroid compounds.

- *Alkaloid Compound Test*
  4 g of leaves were macerated with 10 mL of 0.05 M chloroform-ammonia, then stirred and filtered. A total of 2 mL of filtrate was added 1 mL of 2 N sulfuric acid, shaken and allowed to stand so that two layers were formed, namely the acid and chloroform layers. The acid layer is taken and transferred into another test tube then add a few drops of Mayer reagent. A positive reaction is characterized by the presence of a white precipitate that is alkaloid.
- *Steroid/Triterpenoid Compound Test*
  The chloroform layer is taken and dripped on the drip plate hole and allowed to dry. The first drip plate hole is added to the Liebermann Burchard (LB) reagent. The formation of red or purple indicates the presence of triterpenoids, if the formation of green or blue green rings indicates the presence of steroids. If a red or purple red and green or blue green ring is formed simultaneously in the drip plate, it indicates positive triterpenoids and steroids.
- *Flavonoid Compound Test*
  A layer of water as much as 1 mL is taken and put into a test tube, concentrated hydrochloric acid is added and several grains of magnesium powder, the formation of orange to red color indicates the presence of flavonoids in the sample.
- *Phenolic Compound Test*
  A 1 mL layer of water is put into a test tube, 5% iron (III) chloride solution is added, if a dark green or blue color is formed, indicating the presence of phenolic compounds in the sample.

- *Saponin Compound Test*
  A 1 mL layer of water is put into a test tube and shaken. If the formation of foam that does not disappear for 5 minutes after the addition of a few drops of HCl 2 N then this indicates the presence of saponins in the sample.

Data Analysis
Data were analyzed descriptively and the results were presented in tables and diagrams. The percentage of plants based on family, organ parts used, and processing methods were calculated using simple statistical formulas.

RESULTS AND DISCUSSION

This research was conducted in Nagari Lasi, Canduang District, Agam Regency, West Sumatra Province. Surveys were conducted in three jorongs, namely Lasi Mudo, Lasi Tuo, and Pasanehan to identify the diversity of medicinal plants. Samples included plants used by the community as well as potentially medicinal plants that have not been utilized. The research methods included preliminary survey, organoleptic examination, macroscopic, microscopic, and phytochemical screening.

Utilization of Medicinal Plants
The survey of the Nagari Lasi community identified 45 plants that are often used in traditional medicine, such as cinnamon, turmeric, tapak liman, ruku-ruku, gotu kola, red ginger, and cat whiskers. These plants come from 31 families, with the Zingiberaceae family being the most dominant (13%). The most utilized part of the plant is the leaves (69%), and the most common processing method is boiling (58%).

Leaves are often used because the chemical content and water content in the leaves are more, the leaves are also a place of photosynthesis where it is believed to contain organic substances that can treat diseases and the soft nature of the leaves makes it easier and more practical to use (Kasih, Fajar, Eka, & Rani, 2024).

In addition to plants that have been utilized, 105 plants from various families were found that have potential as medicinal plants, but have not been utilized by the community. The Asteraceae family is the most commonly found plant group (9.52%). The lack of utilization of these plants is due to the limited knowledge of the community, which tends to rely on hereditary information without a scientific basis. Therefore, this research is important to support the identification of the pharmacological potential of local plants so that the community can optimize their utilization.

Table 1. Types of Plants Utilized by the Community in Nagari Lasi.

No.	Family	Plant name		Part of Plant Used	Processing Method	Utilization
		Scientific name	Local name			
1	Lauraceae	*Cinnamomum verum*	Kayu manih	Leaf	A few cinnamon leaves are boiled and then drunk	Lower blood sugar levels
2	Costaceae	*Costus speciousus*	Si Tawa	Tuber	Tubers are soaked in cold water, then applied to the body	Vaginal discharge and fever medicine
3	Zingiberraceae	*Curcuma domestica*	Kunyik	Rhizome	Turmeric can be used by mashing it, dissolving it in hot water	Smooth menstruation, Lower high blood pressure
4	Asteraceae	*Elephantopus scaber*	Tapak Liman	Leaf	Boil tapak liman leaves and then strain	Digestive disorders
5	Rutaceae	*Citrus aurantifolia* Swinge	Asam kapeh	Fruit	Orange fruit can be squeezed and the juice drunk	Cough
6	Lamiaceae	*Ocimum tenuiflorum*	Ruku-Ruku	Leaf	The leaves are boiled then the boiled water is drunk	Fever relief
7	Zingiberraceae	*Alpinia galanga*	Langkueh	Rhizome	Boiled with water, drunk	Cold medicine
8	Apiaceae	*Centella asiatica*	Pagago	Leaf	Gotu kola leaves can be cooked as vegetables	Lower uric acid
9	Euphorbiaceae	*Ricinus communis*	Jarak	Leaf	Castor leaves are moistened with water and applied to the body	Fever relief
10	Asteraceae	*Enhydra fluctuans*	Cikarau	Leaf	Utilized with the leaves boiled, boiled water is drunk	Fever relief
11	Acanthaceae	*Andrographis paniculata*	Sambiluto	Leaf	The leaves are boiled then the boiled water is drunk	Lower blood pressure
12	Poaceae	*Panicum auritum*	Sikumpai	Leaf	Leaves can be utilized by soaking first	Fever relief

No.	Family	Plant name		Part of Plant Used	Processing Method	Utilization
		Scientific name	Local name			
13	Malvaceae	*Hibiscus rosa-sinensis*	Bungo Rayo	Flower	Flower is taken and squeezed with additional water, filtered, and drunk	Fever reducer and cough suppressant
14	Menispermaceae	*Cyclea barbata*	Daun Cincau	Leaf	Leaves are utilized by squeezing and then leaving to solidify	Heatiness, fever
15	Zingiberraceae	*Zingiber officinale var. amarum*	Sipadeh	Rhizome	Boiled with water and drunk	Cough
16	Poaceae	*Cymbopogon citrates* (L.) Rendle	Sarai	Stem	Some lemongrass stems are boiled with water for ± 10 minutes, then the boiled water is drunk	Gout, febrifuge, cough relief
17	Myrtaceae	*Psidium guajava* L	Paraweh	Leaf	Select a few leaves then crush and boil with water then strain	Diarrhea, cough and cholesterol lowering medicine
18	Crassulaceae	*Kalanchoe pinnata*	Si Dingin	Leaf	The leaves can be processed by grinding them finely, then rubbing them into the head area	Diarrhea, fever reduction, and gastric pain
19	Anonaceae	*Annona muricata*	Durian balando	Leaf	Soursop leaves are boiled, then the boiled water is set aside for drinking	Cholesterol
20	*Plantaginaceae*	*Plantago major*L.	Daun Sendok	Leaf	Leaves can be utilized by grinding then applying to the skin	Uric acid
21	Apocynaceae	*Catharanthus roseus*	Tapak dara	Leaf	Utilized with the leaves boiled then the boiled water is drunk	To relieve muscle pain and sore throat
22	Zingiberraceae	*Zingiber officinale var. rubrum*	Sipadeh merah	Rhizome	Boiled with water and drunk	To relieve colds, flu
23	Zingiberaceae	*Curcuma zedoaria*	Tamu kunci	Rhizome	Boiled with water and drunk	Lowers stomach acid
24	Clusiaceae	*Garcinia mangostana*	Manggih	Rind	Can be processed by mashing and dissolving in hot water	Lower cholesterol levels
25	Phyllanthaceae	*Sauropus androgynus*	Katuak	Leaf	Leaves can be utilized by boiling and processed as vegetables	Facilitate breastfeeding
26	Piperaceae	*Piper betle*	Siriah	Leaf	Several betel leaves are boiled for ± 10 minutes, then the boiled water is drunk	Medicine for bleeding gums, diarrhea, toothache
27	Apiaceae	*Apium graveolens*	Selederi	Leaf	Utilized with the leaves boiled then the boiled water is drunk	High blood pressure medication
28	Caricaceae	*Carica papaya*	Kalikih	Leaf	Papaya leaves are boiled, then the boiled water is set aside for drinking	Medicine for stomach pain during menstruation
29	Myrtaceae	*Syzygium polyanthum*	Salam	Leaf	A few bay leaves are boiled and drunk	Lower cholesterol, and uric acid
30	Rubiaceae	*Morinda citrifolia* L	Mengkudu	Fruit	Cut into small pieces and crush then drink	Hypertension, cholesterol, rheumatism
31	Cucurbitaceae	*Momordica charantia*	Pario	Leaf	Several bitter melon leaves are squeezed without water, then the water that comes out of the leaves is drunk	Cough
32	Balsaminaceae	*Impatiens balsamina* L.	Pacar air	Leaf	The leaves are boiled then the boiled water is drunk	Flatulence
33	Sapotaceae	*Manilkara zapota*	Sawo	Fruit	Sawo fruit can be utilized by mashing and can be eaten directly	Diarrhea

No.	Family	Plant name		Part of Plant Used	Processing Method	Utilization
		Scientific name	Local name			
34	Basellaceae	*Anredera cordifolia*	Binahong	Leaf	The leaves are boiled then the boiled water is drunk	Cough
35	Piperaceae	*Piper crocatum* Ruiz et Pav.	Siriah merah	Leaf	The leaves are boiled then the boiled water is drunk	Hypertension, cough, ulcer
36	Lamiaceae	*Orthosiphon aristatus*	Kumis Kucng	Leaf	The leaves are boiled for about 10 minutes, the boiled water is set aside to drink	Stone urination
37	Asteraceae	*Sonchus wightianus*	Tempuyung	Leaf	The leaves are boiled then the boiled water is drunk	Treats gout
38	Zingiberaceae	*Kaempferia galanga*	Kencur	Rhizome	Kencur can be processed by pounding it, dissolving it with hot water and then drinking it	Diarrhea
39	Piperaceae	*Peperomia pellucida*	Siriah cina	Leaf	Leaves can be processed by pounding then filtering and drinking the water	Poisoning and abdominal pain
40	Malvales /columniferae	*Muntingia calabura*	Seri	Leaf	The leaves are boiled then the boiled water is drunk	Gout and cough
41	Xanthorrhoeaceae	*Aloe vera*	Lidah Buayo	Leaf	Aloe vera is taken, then the gel is grated and filtered, then drunk	Medicine for burns, hot oil and chest pain
42	Fabaceae	*Moringa oleifera*	Kelor	Leaf	Moringa leaves can be processed by pounding, dissolved in hot water	Diabetes medication, rheumatism
43	Melastomaceae	*Melastoma malabathricum* L.	Sikaduduak	Leaf	On wounds, the leaves are pounded. Leaf cooking water can treat other health problems	Diarrhea, wounds, vaginal discharge, improve digestion, improve breast milk
44	Araceae	*Rhapidophora pinnata*	Ekor naga	Leaf	The leaves are boiled then the boiled water is drunk	Cough, anemia, soreness
45	Phyllanthaceae	*Phyllanthus urinaia* Linn.	Meniran	All Plant Parts	Meniran + a spoonful of cat's whisker leaves boil 2 cups of water to 1 cup for 10 minutes	Kidney stones

Organoleptic examination

Organoleptic examination showed that all samples were fresh leaves or haksel, generally green. Some leaves have a distinctive aroma, such as kaffir lime leaves, which contain essential oils.

Macroscopic examination

Macroscopic examination provides information on the morphological characteristics of the leaves, including shape, tip, margin, base, and leaf blade. Some differences were found between observations and literature, and most were found in leaf shape, which may be caused by genetic differences, environmental factors, or sample size (Wahyuni, Afidah, & Suryanti, 2022).

Microscopic Examination

Microscopic examination is carried out to observe identifying fragments on the leaves, which characterize a plant and also support macroscopic examination (Novitasari et al., 2021). There are differences between observations and literature. This can be caused by the thickness of the sample slices so that the identifying fragments are less visible, besides that genetic and environmental factors also contribute to differences in the anatomical structures observed. Different genetic factors will cause different appearances and changes in this appearance depend on how much environmental changes occur in the growing environment of the plant genotype (Fitrianto, Samiyarsih, Rohma, & Dwi Sasongko, 2020).

Table 2. Results of Macroscopic and Microscopic Examination of Medicinal Plants.

No.	Plant	Macroscopic	Microscopic
1	Cinnamon Leaf	Cinnamon leaves are single leafed, with an elliptical leaf shape, tapered leaf tips, blunt leaf bases, curved leaf bones, and flat leaf edges. The surface of cinnamon leaves is smooth.	Lower epidermis and parasitic type stomata (40x magnification).
2	Taro Leaf	Taro leaves are single leaves with shield-shaped leaflets, pointed leaf tips, notched leaf bases, flat leaf edges, pinnate leaf bones.	Frayed-type hair cover, epidermis and stomata (10x magnification).
3	Leaves of Laughter	The tawa has a single leaf with a lanceolate shape, which has a tapered leaf tip, blunt leaf base.	Epidermis (10x magnification).
4	Turmeric Leaf	Turmeric leaves are classified as single leaves with a lanceolate leaf shape, tapered leaf tips, blunt leaf bases and pinnate leaf bones.	Epidermis, palisade and stoma of parasitic type (10x magnification).
5	Piladang Leaf	Piladang has an ovoid leaf blade shape with pointed leaf tips, margins, notched leaf bases and pinnate leaf bones.	On the leaves there are glandular hairs with an elongated shape and contain a purple substance (10x magnification).
6	Kitolod Leaf	Kitolod leaves are single-leafed with an inverted lanceolate leaf shape, pointed leaf tips, serrated leaf edges, and pinnate leaf bones.	Epidermis, palisade, stomata and trichomes (10x magnification).
7	Tapak Liman Leaf	Tapak Liman leaves are single leaf type with an ovoid shape, rounded leaf tips with serrated leaf edges and notched leaf bases.	Transport bundles have spiral-type thickenings, animocytic-type stomata and trichomes (10x magnification).
8	Patik mas leaf	Patik mas leaves are single-leafed with tapered leaf tips, tapered leaf bases, flat edges and pinnate leaf bones.	Stomata with animocytic type (10x magnification).
9	Pandan Leaves	Pandanus is a single leaf with a ribbon shape, with a tapered leaf tip with flat leaf edges and parallel leaf bones.	Upper epidermis, palisade and parasitic type stomata, trichomes (10x magnification).
10	Kaffir lime leaves	Kaffir lime has compound leaves with leaflets with an ovoid shape. Kaffir lime leaves have blunt tips and bases, serrated leaf edges. The surface of the leaf is smooth and darker in color than the lower surface of the leaf.	Stomata with animocytic type (10x magnification).
11	Lime Leaf	Lime leaves are compound type leaves having an elliptical shape, blunt leaf tips, margins, and pinnate leaf bones. The surface of the lime leaf is not smooth.	Epidermis and stomata (10x magnification).
12	Sembung Leaf	Single leaf type with elliptical shape, pointed leaf tip, toothed leaf edge, and pointed leaf base with pinnate leaf bones. The leaf surface is hairy.	Epidermis with animocytic type stomata (10x magnification).
13	Dahlia Leaf	Dahlia is a compound leaf with an elliptical shape, with a pointed tip, serrated leaf edges with pinnate leaf bones.	Epidermis, palisade, animocytic type stomata and trichomes (10x magnification).
14	Ruku-Ruku Leaf	Ruku - ruku has elongated oval leaves that are pointed, blunt leaf bases and pinnate leaf bones.	Stomata and hair cover with scale type (10x magnification).
15	Galangal Leaf	Galangal leaves are short-stemmed single leaves with an elongated lanceolate leaf shape, pointed leaf tips, blunt leaf bases, flat leaf edges and pinnate leaf bones.	There are parenchyma, stomata and epidermis (10x magnification).
16	Leaves Red shoots	Red shoot leaves are single leaves with lanceolate shape, flat edges, tapered tips, glossy leaf surface, pinnate leaf bones.	Upper epidermis (10x magnification).
17	Gotu kola leaf	Gotu kola has a single leaf with a kidney-like shape with, rounded leaf tips with margins, notched leaf bases, fingered leaf bones.	Epidermis and stomata (10x magnification).
18	Horse whip leaf	Horse whip has leaves that are rounded like an ovoid, the base of the leaf is narrowed, the tip is tapered, the edge of the leaf is serrated.	Stomata with diasitic type (10x magnification).
19	Leaves Flower broke a thousand	It has round leaves and serrated leaf edges with a rough surface texture with pinnate leaf bones.	There are stomata (40x magnification)
20	Spoon Leaf	Spoon leaves are single leaflets that are long-stemmed, ovoid to lanceolate in shape, the base of the leaf is pointed, the leaf edge is flat, the leaf tip is rounded or blunt, the lower surface appears to have a prominent leaf bone. The leaf bone curves towards	There are epidermis and stomata of anisocytic type (10x magnification).

No.	Plant	Macroscopic	Microscopic
		the tip.	
21	Castor Leaf	Castor leaves are single-leafed. The leaf shape is heart-like. The leaf bones are fused. Leaf tip is pointed, leaf margin is serrated.	Animocytic type stomata (10x magnification).
22	Cikarau Leaf	Cikarau has oval leaves with pointed leaf tips and serrated leaf edges.	Stomata with hatler cell shape (40x magnification).
23	Jali Leaf - jali	Jali leaves have a pointed tip, with flat leaf margins, with an elongated leaf shape, rough leaf surface and the main leaf bone protruding on the leaf ridge.	Epidermis, wood vessels and stomata of diasitic type (10x magnification).
24	Dragon Tail Leaf	Dragon tail leaf is a single leaf with an elongated oval shape, divided leaves, has an incision and a tapered leaf tip.	Upper epidermis (10x magnification).
25	Sambiluto Leaf	Sambiluto has leaves in the form of sheets, lanceolate oval leaf shape, pointed leaf base, flat, tapered leaf tip.	Lower epidermis with stomata and hair cover (10x magnification))
26	Sugarcane Leaf	Sugarcane plants have leaves that are parallel leaf bones, arrow-shaped like lancets and the surface of sugarcane leaves is rough.	Epidermal cells, fan cells, stomata with hatler-shaped closing cells (10x magnification)
27	Lantana Leaf	Lantana has round, egg-shaped leaves, a pointed leaf base, a pointed leaf tip, serrated leaf margins and a rough upper leaf surface.	Stomata and covering hairs (40x magnification)
28	Purple Liver Leaf	Purple heart has leaves that are oblong or elliptical, with pointed leaf tips, the upper surface of the leaf is dark purple while the lower part is light purple. Purple heart leaves are covered by soft downy hairs.	Parenchyma and pigment cells (40x magnification).
29	Grapefruit Leaves	Grapefruit has ovoid leaves with blunt leaf tips, flat leaf edges, pinnate leaf bones, leaf surface color which at the top is more intense green than the bottom.	Sclerenchyma (10x magnification).
30	Sikumpai Leaf	Sikumpai has oval leaves and serrated leaf margins, blunt leaf tips, serrated leaf margins.	Stomata, epidermis, and collenchyma (40x magnification).
31	The leaves of the botanical flower	Hibiscus has single leaves that are ovoid, serrated leaf edges with pointed leaf tips, blunt leaf bases and pinnate leaf bones.	Epidermis and transport bundles (40x magnification).
32	Leaves of grass jelly	Grass jelly leaves have an oblong leaf type with an oval shape. Leaf edges are not serrated, leaf bones are pinnate, leaf tips are pointed.	Transport bundles, collenchyma, parenchyma (40x magnification).
33	White Ginger Leaf	Ginger leaves have lanceolate leaves with sharp tips, pinnate leaf bones of a lighter green color that is clearly visible. The tip of the leaf is pointed, while the base is blunt.	Epidermis and stomata of the parasitic type (40x magnification).
34	Lemongrass Leaf	Lemongrass has long leaves with parallel leaf bones, tapered leaf tips, hairy top surface.	Epidermis with hatler-type stomata (40x magnification).
35	Guava Leaf	Guava has single leaves, elongated round leaves, rounded leaf bases, flat edges, pointed tips, slightly slippery leaf upper surfaces, and pinnate leaf bones.	Epidermis and stoma (40x magnification).
36	Cocor duck leaf	Chillies have thick, juicy single leaves with serrated leaf margins. The leaf bones are pinnate. Blunt leaf tip	Walls are rippled and stomata are animocytic (40x magnification).
37	Soursop Leaf	Soursop has a single leaf with an oval or elongated shape, pointed base, flat edges, tapered leaf tips, pinnate leaf bones, the mother leaf bone is clearly visible.	Sclerenchyma (10x magnification).
38	Pumpkin Leaf	Pumpkin has a single leaf, the shape of the leaf is round, the edges of the leaf are rippled, while the base of the leaf is rounded and hairy. The bones of pumpkin leaves are fingered.	Transport bundles, xylem and phloem, epidermis, trichomes, and stomata (10x magnification).
39	Nona leaves eat betel	Miss eating betel has a single leaf, elongated ovate in shape, pointed at the tip, flat leaf margins.	Epidermis and trichomes (10x magnification).
40	Lavender Leaf	Lavender has an oval leaf shape, serrated leaf edges, pinnate leaf bones.	Trichomes (40x magnification).
41	Jelantir Leaf	Jelantir has a single leaf that is shaped like an oval, with pinnate leaf bones.	Epidermis, trichomes, stomata (10x magnification)

No.	Plant	Macroscopic	Microscopic
42	Ajeran Leaf	Ajeran has a lanceolate shape, with a hairy surface, and serrated leaf margins. Leaf bones are pinnate, leaf bases are blunt.	Stomata, epidermis and transport bundles, xylem and phloem (40x magnification).
43	Tapak Dara Leaf	Tapak dara has a single leaf with a shiny leaf surface. The leaf bones are pinnate and the leaf edges are flat.	Stomata of anomocytic type (40x magnification).
44	Sintrong Leaf	Sintrong has oval-shaped leaves with pinnate leaf bones, serrated leaf edges. The tip of the leaf is tapered.	Stomata of anomocytic type (40x magnification).
45	Aloe Vera Leaf	Tongue-in-law has sword-like leaves, flat yellow leaf edges and pointed leaf tips and fibrous leaves and	Epidermis and stomata are animocytic type (40x magnification).
46	Insulin Leaf	Insulin leaves have single and alternate leaves, ovoid leaf shape, serrated edges, tapered leaf tips, pinnate leaf bones, hairy leaf surfaces.	Epidermis and stomata (10x magnification).
47	Long bean leaves	Long beans have compound leaves, oval and alternate, flat leaf edges, blunt or rounded leaf bases, sharp leaf tips and pinnate leaf bones.	Animocytic-type stoamata and vessel tissue (10x magnification).
48	Siamese Pumpk in Leaf	Japan has round leaves with rippled edges, rounded leaf bases and hairy leaf surfaces. With fingered leaf bones	Vascular bundles and animocytic-type stomata (10x magnification).
49	Corn Leaf	Corn has elongated leaves, leaf bones that are parallel to the mother leaf bone, hairy leaf surface.	Epidermis, vascular network and hatler-type stomata (10x magnification).
50	Chinese betel leaf	Chinese betel has a single leaf, with a heart shape and a smooth leaf surface, tapered leaf tip with flat leaf edges.	Vascular bundles, stomata with chloroplasts (10x magnification).
51	Red Ginger Leaf	Red ginger has lance-shaped leaves, with pointed leaf tips, pointed leaf bases, pinnate leaf bones, and flat leaf edges.	Vascular bundles and parenchyma (10x magnification).
52	White Temu leaf	Temu putih has elongated lanceolate leaves with a purple-red color along the central bone, pinnate leaf bones, pointed leaf tips and flat leaf edges.	Polygonal epidermis and parasitic type stomata (40x magnification).
53	Chickpea Leaf	Chickpeas have oval-shaped leaves, pointed leaf tips, flat leaf edges, hairy or fine hair and pinnate leaf bones.	Stomata with chloroplasts and trichomes (40x magnification).
54	Cayenne pepper leaves	Cayenne pepper has a single leaf type that is ovoid with a pointed tip and flat leaf edges and pinnate leaf bones.	Stomata with animotic type (40x magnification)
55	Red Asoka leaf	Asoka has oval-shaped leaves, with a glossy leaf surface, flat leaf edges and pinnate leaf bones.	Epidermis and animocytic type stomata (magnification 40x).
56	Mangosteen Leaf	Mangosteen leaves have a single leaf type, flat leaf edges, shiny upper and lower leaf surfaces, clear leaf capitals and pinnate leaf bones.	Stomata with parasitic type (magnification 40x).
57	7 jurai bean leaves	Seven 7 beans have a compound leaf type, flat edges, tapered tips, downy, pinnate bones.	Lower epidermis with animocytic type stomata (magnification 40x).
58	Adam's leaf of Eve	Adam hawa has single-leafed, oval-shaped, pointed tip, flat leaf edges. The leaf bone type is parallel.	Parenchyma (40x magnification).
59	Katuk Leaf	In katuk leaves, the leaf blade is an elongated ovoid leaf, the base of the leaf is flat, the tip is tapered, the leaf blade is pinnate with the leaf blade on the lower surface protruding.	Cell wall (40x magnification).
60	Coffee Leaves	Coffee has oval-shaped leaves, the base and tips of the leaves are tapered. The leaf bone type is pinnate.	Cell wall (40x magnification).
61	Cocoa Leaf	Cocoa has a single leaf type with a pointed leaf base, pointed leaf tip, flat leaf margins, pinnate leaf bones and has one leaf mother running from the base to the tip of the leaf and is a continuation of the petiole.	Lower epidermis, collenchyma and stomata (40x magnification).
62	Betel Leaf	Betel has leaves that are shaped like an ovoid, the base of the leaf is heart-shaped or slightly rounded, the edge of the leaf is flat, the tip of the leaf is pointed.	Parenchyma (40x magnification).

No.	Plant	Macroscopic	Microscopic
63	Hanjuang Leaf	Hanjuang has single leaves that are lanceolate in shape, pinnate in arrangement, smooth surface, rippled edges, and pointed leaf tips and bases.	Parenchyma and collenchyma (10x magnification).
64	Breadfruit Leaf	Sukun has a pointed leaf base, deeply pinnate sharing edges, pointed leaf tips, large upper and lower surfaces, pinnate leaf bones.	Stomata (40x magnification).
65	Cockscomb Leaf	Cockscomb has a single leaf, has an ovoid to elongated leaf blade shape, leaf edges are choppy, has a pointed leaf tip, has a pinnate leaf bone, has a smooth texture.	Parenchyma, trichomes and stomata (40x magnification).
66	Rose Leaves	Roses have compound leaves, which are small and elongated and have tapered and serrated edges.	Sclerenchyma (40x magnification).
67	Jasmine Leaf	Jasmine has ovoid leaves, with pointed leaf tips, rounded leaf bases, flat leaf edges, pinnate leaf bones, prominent on the lower surface of the leaf.	Stomata with animotic type (40x magnification).
68	Peanut Leaf	Groundnuts have compound leaves. Oval leaf shape, blunt tip and base. The leaf bones are pinnate and flat-edged.	Stomata with animotic type (40x magnification)
69	Leek	Leeks have elongated, hollow, pipe-like leaves, and tapered leaf tips.	Animocytic type stomata with chloroplasts (magnification 40x).
70	Celery Leaf	Celery has a single leaf blade, obliquely rhombic or elongated ovate, serrated leaf margins, both surfaces rough. The leaf bones are pinnate.	Hatler type stomata (40x magnification).
71	Mint Leaves	Mint has a round or lanceolate shape, pointed leaf tips, with a serrated and downy leaf surface. The leaf bones are pinnate.	Cell wall (40x magnification).
72	Eggplant Leaves	Eggplants have leaves that are elliptical and tapered at the tip. The base of the leaf is tapered and the sides are incised.	Stomata, trichomes and sclerenchyma (40x magnification).
73	Strawberry Leaf	Strawberries have a round shape. Strawberry leaves have a compound leaf structure. The edges of strawberry leaves are serrated. The upper surface of strawberry leaves is green and downy.	Parenchyma (40x magnification).
74	Boroco Leaf	Boroco has elongated ovate leaves, sharp tip, almost flat smooth serrated edges.	Stomata (40x magnification).
75	Leaf Paper flower	Paper flowers have almost oval-shaped leaves, but the tips are not sharp, pinnate leaves with leaf bones that can be one or five in number. Leaves have flat edges.	Stomata and parenchyma (40x magnification).
76	Kapok Leaf	Kapok leaves have a compound leaf type, with a fingered leaf bone arrangement, a pointed leaf base, and a lanceolate leaf shape.	Stomata of animocytic type (magnification 40x).
77	Jackfruit Leaf	Jackfruit has single-type leaves, with an oval shape, grassy leaf base, tapered leaf tip and flat leaf edges.	Parenchyma (40x magnification).
78	Papaya Leaf	Papaya has a single leaf, with parallel arrangement of bones, rounded leaf shape, pointed leaf tip.	Parenchyma and collenchyma (40x magnification).
79	Star fruit leaves	Belimbing wuluh has compound leaves, with pinnate arrangement, ovoid leaf shape, pointed tip, rounded base, and flat leaf edges.	Sclerenchyma (10x magnification).
80	Basil Leaves	Basil has leaves with ovoid strands, slightly pointed bases, slightly serrated leaf edges, pointed leaf tips, pinnate leaf bones, and both leaf surfaces are slightly rough.	Stomata of animocytic type (magnification 40x).
81	Mustard Leaf	Sweet mustard has oval-shaped leaves. The leaf bones on mustard are pinnate.	Stomata of animocytic type (magnification 40x).
82	Spinach Leaf	Spinach has elongated oval-shaped leaves, with tapered ends. Spinach leaf bones are pinnate, spinach leaf edges are flat.	Stomata of animocytic type (magnification 40x).
83	Kale Leaves	Kale has a leaf shape like an arrow head, the tip of the leaf is pointed.	Parenchyma and parasitic type stomata (10x magnification).
84	Lettuce Leaf	Lettuce has round leaves. Green lettuce leaves have wide and strong petioles, and pinnate leaf bones.	Vascular bundles, parenchyma, collenchyma, animocytic type stomata (10x magnification).
85	Kecipir Leaf	Star beans have leaves that are ovoid with pointed tips, flat leaf edges.	Stomata of animocytic type (magnification 40x).

No.	Plant	Macroscopic	Microscopic
86	Mango Leaf	Mangoes have lance-shaped leaves, the edges of the leaves are flat. The leaf bones are pinnate.	Vascular bundles and stomata (10x magnification).
87	Red guava leaf	Red guava has elongated leaves, with blunt leaf tips and bases and flat leaf edges.	Lower epidermis, parenchyma, collenchyma, animocytic type stomata (10x magnification).
88	Banana Leaf	Bananas have leaves that have a lanceolate shape elongated with rounded leaves notched leaf bases, flat leaf edges, pinnate leaf bones.	Stomata of animocytic type (magnification 40x).
89	Leaf Frangipani flower	Frangipani flowers have single-type leaves, lanceolate, tapered leaf base, pinnate leaf bones, flat leaf edges.	Stomata of animocytic type (magnification 40x).
90	Avocado Leaf	Avocados have single leaves, oval to elongated egg-shaped, pointed base, flat edge, tapered tip, pinnate leaf bones.	Vascular tissue (10x magnification).
91	Crown Leaf	Mahkota dewa has single leaf type leaves, with a lanceolate shape, pinnate leaf bones and smooth leaf surfaces and flat leaf edges.	Epidermis, palisade and stomata with hatler shape (magnification 40x).
92	Bandotan Leaf	Bandotan has ovate leaflets, pinnate leaf bones, both leaf surfaces rough, flat leaf bases, serrated edges, and pointed tips.	Parenchyma and trichomes (40x magnification).
93	Bay Leaves	Bay leaves have a single leaf with an oval leaf shape with a pointed leaf base, flat leaf edges, pinnate leaf bones.	Vascular bundles and stomata (40x magnification).
94	Noni Leaf	Noni leaves are oval in shape, and the base of the leaf is pointed. The leaf edges are flat, the leaf bones are pinnate. The leaf surface is smooth.	Trichomes, stomata, vascular bundles (10x magnification).
95	Bitter melon leaves	Bitter melon has single leaves, oval in shape, with a heart-shaped base. The leaf bone is fingered, the leaf tip is pointed.	Parenchyma (40x magnification).
96	Sweet leaves	Star fruit has ovoid leaves, with pointed tips and rounded bases. Star fruit leaves include compound leaves, star fruit leaves have flat leaf edges, star fruit leaves have pinnate leaf bones.	Vascular bundles, epidermis and stomata (10x magnification).
97	Water Leaf	Water henna leaves have a lanceolate shape, with tapered leaf tips and pointed leaf bases. The edges of the leaves are serrated, which are nicks that do not change the shape of the leaf and the leaf bones of water henna are pinnate.	Stomata (10x magnification).
98	Sawo Leaf	Sawo has ovoid leaves, blunt at the tip, tapered at the base, and pinnate at the leaf blade.	Stomata of animocytic type (magnification 40x).
99	Binahong Leaf	Binahong has ovate leaves, pinnate leaf bones, and tapered leaf tips. The base of the leaf is notched.	Stomata of animocytic type (magnification 40x).
100	Red betel leaf	Red betel has a single leaf, ovoid, heart-shaped or slightly rounded base, slightly flat leaf edge, pointed tip, curved leaf bones.	Stomata with animocytic type (magnification 40x).
101	Red Leaf	The leaves of the pomegranate plant are single leaves with short stalks. The shape is oval with a sharp base and blunt tip. The edges of the leaf are flat with pinnate leaf bones.	Vascular bundles, and trichomes (40x magnification).
102	Cat Whisker Leaf	Cat whiskers have an elongated rhombus shape or like a spear tongue, sharp tip, irregular rough serrated strands, tapered leaf tips and leaf bases, fine pinnate leaf bones and little branching.	Sclerenchyma and stomata (40x magnification).
103	Jambu bol leaf	Jambu bol has a single leaf type, lanceolate in shape, and has prominent leaf bones on the leaf surface. The leaf bones are pinnate.	Trichomes (10x magnification).
104	Tempuyung Leaf	Tempuyung leaves are lanceolate, the base of the leaf is narrowed, the edge is serrated, the tip is blunt.	Trichomes and stomata (10x magnification).
105	Mouse leaf	Mouse caladium has round leaves with heart-shaped pointed tips. Thin-leafed. Flat leaf edges, and flat leaf tips.	Vascular bundles, parenchyma (40x magnification).
106	Israeli Grass Leaf	Israeli grass has pointed leaf tips, flat leaf edges, tapered leaf bases, pinnate leaf bones, rough leaf surfaces and this grass is single leaf.	Epidermis and parenchyma (40x magnification).

No.	Plant	Macroscopic	Microscopic
107	Cassava Leaf	Cassava has a single leaf with a finger-shaped leaf bone type, with flat leaf edges.	Collenchyma, parenchyma and stomata (10x magnification).
108	Kanyere Leaf	Kanyere has oval-shaped, flat leaf margins, pinnate leaf bones and blunt leaf bases.	Trichomes, parenchyma and collenchyma (magnification 40x).
109	Clover Leaf	Clover has heart-shaped leaves with flat edges, pinnate leaf bones and pointed leaf tips.	Vascular bundle (40x magnification).
110	Dragon scale leaf	Dragon scales have an oval shape. Dragon scale leaves are thick or fleshy, leaf margins are flat, leaf bases are pointed, leaf tips are blunt.	Sclerenchyma (40x magnification).
111	Sambang getih leaf	Sambang getih has a single leaf, the leaf blade is ovoid, the leaf tip is pointed. The edges of the leaves are serrated and the leaf bones are pinnate.	Pigment cells, covering hair (40x magnification).
112	Pandan suji leaf	Pandan suji has a lanceolate shape and pointed leaf tips, flat leaf edges and parallel leaf bones.	Cell wall (40x magnification).
113	Purple badge leaf	Purple badger has an oval leaf shape. Leaf bones are pinnate, leaf tips are tapered and leaf bases are tapered.	Vascular bundles, stomata with animocytic type (magnification 40x).
114	Pagoda leaf	Pagoda flower leaves are Single leaf, heart-shaped, pointed tip, incised base, curved bones.	Vascular bundles and vascular bundles (10x magnification).
115	Rambutan Leaf	Rambutan has ovoid leaves, flat leaf edges, pointed leaf tips and bases, pinnate leaf bones.	There are stomata (magnification 40x).
116	Durian Leaf	Durian has oval-shaped leaves, rounded leaf bases, tapered leaf tips, smooth leaf surfaces, pinnate leaf bones.	Parenchyma and trichomes (10x magnification).
117	Kersen Leaf	Kersen has leaves with pinnate bones, oval shape and serrated edges.	Parenchyma and trichomes (10x magnification).
118	Ceplukan Leaf	Ceplukan leaves are ovoid, with a pointed base, non-sharp serrated edges, pointed to tapered tips, pinnate leaf bones, the mother leaf bone is clearly visible.	Animocytic type vascular bundles and stomata (10x magnification).
119	Aloe Vera Leaf	Aloe vera is a single leaf, the leaf is thick, the leaf is fleshy, the base of the leaf is blunt and flat, the edge is serrated, the tip is tapered, the base is blunt.	Epidermal cell walls, anomocytic type stomata (magnification 40x).
120	Kencur Leaf	Kencur has leaves with a wide round shape, tapered leaf tips and rounded leaf bases, pinnate leaf bones, flat leaf edges.	Stomata with animocytic type (magnification 40x).
121	Lemon Leaf	Lemon has a single leaf type, oval shape, tapered tip and base.	Parenchyma, vascular bundles, animocytic type stomata with chloroplasts (magnification 40x).
122	Meniran Leaf	Meniran has compound leaves, small leaves, ovoid in shape, pointed leaf base, flat edges, tapered leaf tips. The leaf bones are pinnate type.	Parenchymal tissue (10x magnification).
123	Srikaya Leaf	Srikaya has single leaves, the leaves are elongated elliptical lanceolate, blunt-tipped, flat leaf edges, and shiny leaf surfaces. The leaf bones are pinnate.	Parenchyma and stomata (10x magnification).
124	Saga Leaf	Saga leaves have an oval-shaped compound leaf type, blunt slightly rounded leaf tips and bases with flat leaf edges. Saga leaf bones are pinnate type.	Trichomes (40x magnification).
125	Areca Leaf	Areca nut has rosette-shaped, compound pinnate leaves with serrated leaf tips. Leaf edges are flat.	Epidermis and collenchyma (40x magnification).
126	Basil Leaf	Basil has ovoid leaves, pointed leaf base, flat edge, tapered tip, pinnate leaf blade, slightly rough surface, prominent leaf blade mother.	Epidermis and vascular bundles (40x magnification).
127	Senduduk Leaf	Single leaves with lanceolate leaves, blunt leaf bases, pointed leaf tips, flat leaf edges, hairs on the upper surface of the leaves and curved leaf bones.	Pigment cells, parenchyma, trichomes Epidermis (10x magnification).
128	Tomato Leaves	Tomatoes are compound-leaved with pointed tips, with blunt leaf bases, pinnate leaf bones, on the leaves have fine hairs.	Trichomes, stomata, calcium oxalate crystals Epidermis (40x magnification).
129	Ketapang Leaf	Ketapang has breech ovoid leaves, flat leaf edges, blunt leaf tips and bases. The leaf bones are pinnate.	Collenchyma and stomata of animocytic type (magnification 40x).
130	Peperomia watermelon leaf	Peperomia watermelon is a single leaf with an ovoid leaf shape, tapered leaf tip, rounded leaf base, flat leaf edges and curved leaf bones.	Cell walls and stomata (10x magnification).

No.	Plant	Macroscopic	Microscopic
131	Gamal Leaf	Gamal leaves are compound leaves with an elliptical shape, with pointed leaf tips, flat edges.	Parenchyma, epidermis (magnification 40x).
132	Sri leaves of sustenance	Sri rezeki is a single lanceolate leaf with tapered leaf tips, flat leaf edges, pinnate leaf bones and pointed leaf bases.	Cell wall (40x magnification).
133	Sri gading leaf	Sri gading has single ovate leaves with tapered leaf tips, flat leaf margins, pinnate leaf bones and notched leaf bases.	Epidermis and stomata of animocytic type (10x magnification).
134	Rimbang Leaf	Rimbang is a single leaf with an ovoid leaf shape, pointed leaf tip, notched leaf base. On the surface of rimbang leaves there are hairs.	Star-shaped trichomes (10x magnification).
135	Mulberry Leaf	Mulberry leaves are oval in shape, with serrated leaf edges, pointed leaf tips, blunt leaf bases, and pinnate leaf bones.	Collenchyma, trichomes and stomata (10x magnification).
136	Syngonium leaf	Syngonium is a single leaf shaped like an arrow with a pointed leaf tip, eared leaf base, flat leaf edge.	Epidermis (40x magnification).
137	Tasbih Leaf	The leaves of the tasbih flower have single leaves with an elliptical shape, pointed leaf tips, pinnate leaf bones, and blunt leaf bases.	Parasitic type parenchyma and stomata (magnification 40x).
138	Anthurium Andraenum Leaf	Anthurium Andraenum is single-leafed with an arrow-like shape, pointed leaf tips, flat leaf edges, and eared leaf bases.	Parenchyma (40x magnification).
139	Sweet potato leaves	Sweet potatoes have leaves with tapered tips, flat leaf edges, notched leaf bases and pinnate leaf bones.	Parasitic type vascular bundles and stomata (10x magnification).
140	Moringa Leaf	Moringa leaves are compound leaves with an elliptical shape, with blunt leaf tips and bases, flat leaf edges and fingered leaf bones.	Vascular bundles and stomata (10x magnification).
141	Cucumber Leaves	Cucumber has ovoid leaves with tapered leaf tips, serrated leaf edges, and notched leaf bases and leaf bones.	Epidermis and stomata (10x magnification).
142	Japanese Papaya Leaf	Japanese papaya has leaves that are tapered at the ends with fingered leaf bones.	Stomata of animocytic type (magnification 40x).
143	Telang Flower Leaf	Telang flower leaves have an elliptical leaf shape with blunt leaf tips, flat edges, pointed leaf bases and pinnate leaf bones.	Parenchyma (40x magnification).
144	Brucea javanica leaf	Brucea javanica is a lanceolate compound leaf with tapered leaf tips, serrated leaf edges, and pinnate leaf bones.	Collenchyma, there are stoma (magnification 40x).
145	Kenikir Leaf	Kenikir has compound leaves, with pointed tips, flat leaf margins, and fingered leaf bones.	Stomata of animocytic type (magnification 40x).
146	Begonia rex leaf	Begonia rex is a single leaf with a pointed tip, finely serrated leaf margins, and notched leaf bases.	Cell wall (40x magnification).
147	Neoregelia Leaf	Neoregelia is a leaf with a rosette shape, the tip of the leaf is spiny.	Vascular bundles and stomata (10x magnification).
148	Kirinyuh Leaf	Kirinyuh has leaves with a triangular shape, pointed leaf tips, rompang or flat leaf bases, serrated leaf edges, and curved leaf bones.	Stomata of animocytic type (magnification 40x).
149	Draceana fragrans leaf	Draceana fragrans has ribbon-shaped leaves, with tapered leaf tips, flat leaf margins and parallel leaf bone type.	Epidermis and stomata (40x magnification).
150	Nasturtium Leaf	Nasturtium has leaves with an ovoid shape, flat leaf edges, rounded leaf bases and tips with fingered leaf bones.	Stomata of animocytic type (magnification 40x).

Phytochemical Screening

Phytochemical screening identifies the content of bioactive compounds using specific reagents. Results showed the presence of bioactive compounds in 150 plant samples. The test results showed that 129 samples contained flavonoids, 115 samples contained phenolics, 119 samples contained saponins, 78 samples contained alkaloids, 75 samples contained steroids, and 21 samples contained triterpenoids. These results strengthen the potential of medicinal plants in Nagari Lasi, especially those containing flavonoids, phenolics, and saponins, which are known to have important pharmacological

activities such as antioxidants, anti-inflammation, and immunomodulators.

CONCLUSIONS

This study identified 45 plants utilized by the Nagari Lasi community as traditional medicine, with the Zingiberaceae family as the most dominant (13%). Leaves are the most commonly used plant part (69%), and the most common processing method is boiling (58%). 105 other plants were found to have medicinal potential but not yet utilized, mainly from the Asteraceae family (9.52%). The active compounds detected, such as flavonoids, phenolics, and saponins, showed high pharmacological potential, including as antioxidants and anti-inflammatories. This study provides a scientific basis for developing medicinal plants in Nagari Lasi and highlights the importance of education and further research to utilize local biodiversity as a sustainable source of traditional medicine.

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