Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Integration of Indigenous Knowledge and Modern Science: An Ethnopharmacological Study of Lansano (*Pterocarpus indicus* Willd.) as a Traditional Medicine in West Sumatra

Nurhasnah*[1], Media Roza[2], Lince Meriko[3], Indah Kencanawati[4], Lufri[5], Abdul Razak[6]
[1,2]Universitas Islam Negeri Imam Bonjol Padang
Jl. Prof. Mahmud Yunus Lubuk Lintah, Anduring, Kuranji District, Indonesia
[3]Kanazawa University
Kakuma-machi, Kanazawa, Ishikawa 920-1164, Japan
[4]Institut Agama Islam Negeri Kerinci
Jl. Kapten Muradi Sungai Liuk, Pesisir Bukit, Kota Sungai Penuh, Jambi, Indonesia
[5,6]Universitas Negeri Padang
Jl. Prof. Dr. Hamka, Air Tawar, Padang City, West Sumatera, Indonesia
*Corresponding author: nurhasnah_tipa@uinib.ac.id

Article Information

Article History:
Received: June 16, 2025
Revised: November 11, 2025
Published: November 30, 2025

Keywords:
Ethnoscience, Lansano plant *Pterocarpus indicus* Willd., Medicinal plants, Ethnopharmacology

ABSTRACT

This study explores ethnoscientific practices surrounding Lansano (*Pterocarpus indicus* Willd.), a medicinal plant traditionally used in West Sumatra, Indonesia. Qualitative ethnographic methods, including direct observation and semi-structured interviews, were used with 50 respondents from various regions, including Padang, Pariaman, Solok, Sijunjung, Pasaman, Padang Panjang, and Pesisir Selatan. Participants included local healers, herbal practitioners, and community members known to use Lansano for medicinal purposes. This study employed a quantitative ethnobotanical approach with two main parameters: Use Value (UV) and Informant Consensus Factor (ICF). This study revealed a significant relationship between traditional practices and scientific evidence in the use of Lansano as an herbal medicine. This study is the first step in integrating Lansano ethnobotanical practices with bioactive data for the development of local culture-based phytopharmaceuticals. Use Value (UV) analysis showed that the leaves had the highest utilization value (UV = 0.70), followed by the roots (0.44), sap (0.36), and stems (0.30). Meanwhile, Informant Consensus Factor (ICF) analysis showed a complete consensus (ICF = 1.00) among informants regarding the use of lansano for various ailments, with the highest frequency of use for mouth ulcers, followed by diarrhea, menstrual pain, and burns. These results confirm that lansano has high ethnopharmacological value and is widely believed to be a primary traditional medicine in West Sumatra.

How to Cite: Nurhasnah, Roza, M., Meriko, L., Kencanawati, I., Lufri, & Razak, A. (2025). Integration of Indigenous Knowledge and Modern Science: An Ethnopharmacological Study of Lansano (*Pterocarpus indicus* Willd.) as a Traditional Medicine in West Sumatra. *Al Jahiz: Journal of Biology Education Research*. 6(2), 377–399. DOI: https://doi.org/10.32332/al-jahiz.v6i2.11005.

Published by: Al-Jahiz: Biology Education Research Journal
Website: https://e-journal.metrouniv.ac.id/index.php/Al-Jahiz/index

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

INTRODUCTION

Indonesia, being so rich in biodiversity and cultural heritage, has an enormous portfolio of indigenous medicinal knowledge and local cultural customs (Arfianawati et al., 2016; Lufri, 2019; Nisaâ et al., 2015). This heritage is under threat from erosion caused by modernization, lack of documentation, and scientific validation. Documentation and scientific analysis of such knowledge are essential, not just to guarantee cultural inheritance but also to evaluate potential pharmaceutical resources of global importance.

In recent decades, the rapid expansion of modernization and globalization has contributed to the erosion of traditional ecological and ethnobotanical knowledge across Indonesia. Empirical studies reveal that younger generations possess markedly lower familiarity with local medicinal plants compared to their elders, reflecting the weakening of intergenerational transmission systems (Beltrán-Rodríguez et al., 2014; Rinto et al., 2023). For instance, research among the Rejang tribe in Bengkulu recorded a knowledge index of only 39.09% among individuals aged 15–30 years, indicating a substantial decline in ethnobotanical understanding (Rinto et al., 2023). Comparable tendencies have been observed in other Indonesian communities, where traditional plant-based medicinal practices persist but face growing challenges due to limited documentation and changing lifestyles (Rahman et al., 2016). This alarming pattern underscores the urgency of systematically documenting, scientifically validating, and revitalizing indigenous medicinal practices, such as those related to lansano, to ensure their sustainability within both cultural and scientific frameworks.

This study sits in West Sumatra, among the Minangkabau community, where conventional knowledge remains very much rooted in daily life. Out of the many medicinal plants, lansano (*Pterocarpus indicus* Willd.) has been recognized, processed, and utilized continuously by the community (Rahman et al., 2016; Wanjohi et al., 2020). Empirical findings from field interviews indicate that Minangkabau families commonly use the bark, leaves, and roots of lansano to treat fever, digestive disorders, wounds, postpartum recovery, and diabetes. Field observations further revealed that the plant is readily available throughout the year, as it grows in home gardens, secondary forests, and along village roadsides, making it more accessible than many other medicinal species that are often seasonal or scarce.

Previous ethnobotanical and ethnopharmacological studies in Indonesia and West Sumatra in particular focused on the therapeutic value of traditionally used plants, but the majority were

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

descriptive and lacked phytochemical and pharmacological validation. *Pterocarpus indicus* Willd. Has been identified through research to have antiviral, anti-inflammatory, antimicrobial, and wound-healing activities (Dewi et al., 2018; Naeluvar & Eryani, 2023; Senthilkumar et al., 2020). There is still a noticeable study gap in connecting Minangkabau ethnomedicinal activity with scientific validation of local samples; nevertheless, these articles are restricted to in vitro or animal models.

The two empirical and scientific reasons for Lansano's prioritization are both historical and evidentiary. Empirically, it is the most frequently cited medicinal plant among Minangkabau ethnobotanical traditions, named by more than half of the informants interviewed in this study (56%), demonstrating its prominence in traditional medicine. Scientifically, its broad pharmacological activities (anti-inflammatory, analgesic, antihyperglycemic, and antimicrobial) increase its potential as a candidate for the development of phytopharmaceuticals. This single synergy of cultural relevance and pharmacological potential distinguishes lansano from other local plants.

Therefore, this study aims to integrate classical Minangkabau knowledge of Lansano with modern phytochemical and pharmacological analyses. By bridging indigenous wisdom and contemporary scientific approaches, this research embodies the integration of traditional knowledge and modern science. In this way, it contributes both to the preservation of cultural heritage and to innovation in evidence-based herbal medicine practices. While this research is off to an excellent beginning, one restriction is the pharmacological study's preliminary nature. To maximize Lansano's therapeutic potential, further studies should be encouraged to extend clinical trials, investigate dosage standardization, and explore broader uses.

RESEARCH METHOD

Research Design

This study uses approach ethnobotany quantitative approach with a qualitative support analysis. Two main parameters used are Use Value (UV) for measuring the level of interest in Lansano in practice treatment traditional, and Informant Consensus Factor (ICF) for evaluating consensus use of lansano in category disease certain (Phillips & Gentry, 1993; Trotter & Logan, 1986).

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Research Location

A study conducted in seven areas in West Sumatra is: Padang, Pariaman, Solok, Sijunjung, Pasaman, Padang Panjang, and the South Coast. The selection location is based on two considerations:

a. Sociocultural – this area is known as its own Minangkabau community, which still practices traditional treatment.
b. Geographically – Lansano grows widely in the yard, forest, and as shade roads in the area, so that its utilization is relatively sustainable.

The location map study presented in Figure 1, for clarity, shows the research area coverage.

Figure 1. Distribution of Research Locations in West Sumatra

Informants and Respondents

Respondents were selected using a purposive sampling technique based on predetermined inclusion criteria. The process of identifying and recommending informants was conducted through a combination of approaches, including consultations with customary leaders and local

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

institutions, as well as direct field observations. The selected respondents comprised three main groups:

a. Traditional healers: active practitioners who provide plant-based treatments and are recognized by the local community for their medicinal expertise.
b. Customary or religious leaders: individuals holding cultural and social authority, possessing in-depth knowledge related to the Lansano tradition and its associated practices.
c. General community members: individuals who utilize Lansano in their daily lives, identified through recommendations from local leaders and confirmed through field verification.

To strengthen the comparative understanding, it was observed that traditional healers demonstrated the most comprehensive and detailed knowledge, particularly regarding the preparation and application of Lansano-based remedies. Customary or religious leaders exhibited a broader cultural and symbolic understanding of Lansano within traditional belief systems, whereas the general community mainly possessed basic knowledge limited to its everyday uses.

Table 1. Profile of Research Respondents

Region (District/City)	Sub-district/Village	Traditional Healer (n)	Traditional Figure (n)	General Public (n)	Total
Padang	Kel. Lubuk Begalung, Kel. Kuranji	2	1	5	8
Pariaman	Desa Naras, Desa Cubadak Air	2	1	4	7
Solok	Nagari Koto Baru, Nagari Cupak	3	2	5	10
Sijunjung	Nagari Tanjung Bonai Aur, Nagari Sumpur Kudus	2	2	2	6
Pasaman	Nagari Lubuk Sikaping, Nagari Rao	3	2	4	9
Padang Panjang	Kel. Guguk Malintang, Kel. Tanah Pak Lambik	1	1	3	5
South Coast	Nagari Painan, Nagari Kambang	1	1	3	5
Total		**14**	**10**	**26**	**50**

Of the total 50 respondents, consisting of 14 traditional healers, 10 customs figures, and 26 community members (Table 1). Key informants (n=24: healers + leaders) have more knowledge about variation use lansano, while general respondents (n=26) generally know the method of processing simple (for example, stew skin stem or leaf young).

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Data Collection

a. Semi-structured interviews were used for digging into the local knowledge, practice processing, and perception of benefit lansano.
b. Observation directly carried out in the activities processing plants, including manufacturing ingredients and methods of consumption.
c. Documentation (photos, notes) field) supports data validity.

Data Analysis

a. Qualitative data was analyzed with the technique of open coding and axial coding to identify the main theme related to practice treatment lansano. The theme of the coding results was then linked with the category disease.
b. Quantitative data is analyzed using UV and the ICF index. UV is calculated to measure market interest in each part plant, while ICF is used to evaluate consensus respondents in the category disease (Phillips & Gentry, 1993) :

$$UV = \frac{\Sigma U}{N}$$

Description:

U = the number of uses mentioned by the informant for a plant part

N = total number of informants (in this study = 50 people)

Meanwhile, to find out the use of plants for certain disease categories, use the Consensus Factor (ICF) (Trotter & Logan, 1986) :

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Description:

N_{ur} = total number of usage reports for disease category

Nt = number of species used for the disease category (here 1, ie, *Lansano)*

The qualitative and quantitative studies were combined in a complementary manner to provide contextual understanding and empirical validation. In-depth interviews and participant observation were used to identify emergent themes about lansano use, while quantitative indices such as Use Value (UV) and Informant Consensus Factor (ICF) were calculated to measure the relative importance and agreement of use among informants (Faruque et al., 2018; Tuasha et al., 2018). The quantitative results were then applied to the qualitative themes, allowing narrative

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

patterns of lansano use to be supported by measurable evidence while also confirming the robustness of the qualitative findings (Leonti, 2022).

Secondary Data

Literature secondary collected based on the inclusion criteria (Table 2),

Table 2. Secondary Data Inclusion Criteria

Category	Inclusion criteria
Publication Type	Scientific articles published in National and International Journals and proceedings
Publication Year	2013-2025
Field	Science, physics, chemistry, and biology
Types of research	Empirical and theoretical
Research Subjects	Lansano plant (*Pterocarpus indicus* Willd.)

Data obtained through the Scopus, PubMed, and Google Scholar databases using the keywords *"Pterocarpus indicus", "lansano ethnopharmacology",* and *"Minangkabau traditional medicine"*.

Field data reflecting Minangkabau ethnomedicinal knowledge were systematically integrated with findings from secondary pharmacological literature. The integration involved matching disease categories identified through community interviews with bioactive compounds previously reported in pharmacological studies. Through this comparative process, the study established scientific evidence supporting the relevance of lansano (*Pterocarpus indicus* Willd.) as a potential phytopharmacological candidate, thereby bridging indigenous empirical practices with modern biomedical validation (Beltrán-Rodríguez et al., 2014; Leonti, 2022; Rahman et al., 2016).

RESEARCH RESULTS

Utilization of Traditional Lansano

The lansano plant (*Pterocarpus indicus* Willd.) is a medicinal plant that grows abundantly in West Sumatra. This plant has been widely used by local people for medicinal purposes since their ancestors. The use of lansano as a medicinal plant is supported by interviews and direct observations conducted by researchers. Documentation of the interviews and observations can be seen in Figures 2 and 3.

Figure 2. Interview Documentation

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Figure 3. Observation Plant Lansano

The use of lansano, based on the results of interviews and researcher observations in more detail can be seen in table 3.

Table 3: Utilization of Lansano (*Pterocarpus indicus* Willd.) by Region in West Sumatera

Area	Plant Parts	Profit	How to Use and Process	Interview References
Pariaman	Leaf	- Diarrhea, headache, cough, cancer, diabetes, mouth ulcers, menstrual disorders, antioxidant, beautifies hair, maintains immunity	- Boil lansano leaves with salt to treat diarrhea and headaches (boil for 15 minutes) - Use boiled leaf water to gargle to treat mouth ulcers.	Interview with traditional herbal practitioners
Sijunjung	Leaf	- Canker sores, mouth ulcers, fever, antibacterial, prevent diabetes, inflammation, anti-inflammatory	- Boil lansano leaves with palm sugar to relieve fever and flu. - Gargle with water soaked in lansano leaves for mouth ulcers and canker sores.	Interview with a traditional medicine expert
Padang Panjang	Leaf	- Treating mouth ulcers, hair care, curing fever, coughs, and cancer	- Make a paste of Lansano leaves to treat hair. - Boil the leaves to make a concoction for digestive disorders and mouth ulcers.	Field observation at the traditional healing house
East Pasaman	Leaf	- Treats mouth ulcers, burns, prevents hair loss, and relieves menstrual pain	- Boiled lansano leaves to treat mouth ulcers and diarrhea. - Use lansano leaf paste for burns and hair loss.	Interviews with residents
South Solok	Leaves, Bark	- Kidney stones, canker sores, boils, hair care, diabetes, hypertension, PMS pain, skin	- Using lansano bark to treat kidney stones (with cat's whisker leaves and keji beling leaves). - Lansano leaf decoction for mouth ulcers and skin care	Interviews with herbal healers and the community
Padang	Leaf	- Reduces fever, cares for hair, relieves fever,	- Boil lansano leaves and drink the decoction for fever and	Observation and interviews at the herbal clinic

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Area	Plant Parts	Profit	How to Use and Process	Interview References
		antibacterial, treats mouth ulcers, and diarrhea	digestive disorders. - Use the decoction as a mouthwash.	
West Pasaman	Leaves, Roots	- Hair loss, fever, inflammation, PMS pain, canker sores	- Using a decoction of the leaves to prevent hair loss and relieve PMS pain. - Lansano roots are processed to treat fever.	Interviews with indigenous people
South Coast	Leaves, Bark	- Relieves fever, digestive medicine, and diabetes	- Boil lansano leaves to treat fever and digestion. - Lansano bark is used to treat diabetes.	Field observations and interviews with herbal medicine users

Data was collected based on interviews and observations of 50 respondents in several areas in West Sumatra.

Table 4. Data On Disease Categories That Can Be Treated With Lansano Plants

Disease Category	Number of Uses (Nur)	Number of Species (Nt)	ICF Value
Ulcer	65	1	1.00
Diarrhea	44	1	1.00
Menstrual Pain	40	1	1.00
Burns	38	1	1.00
Diabetes	20	1	1.00
Hypertension	15	1	1.00
Kidney stones	22	1	1.00

Scientific Validation of Traditional Use

Laboratory studies confirmed the presence of flavonoids, saponins, tannins, and alkaloids in Lansano, which exhibit antibacterial, antioxidant, anti-inflammatory, and hypoglycemic effects. Details of the chemical constituents and therapeutic activities of Lansano (*Pterocarpus indicus* Willd.) can be seen in Table 5.

Table 5: Chemical Content and Therapeutic Activity of Lansano (*Pterocarpus indicus* Willd.)

NO	Plant Parts	Main Chemical Content	Therapy Activities	Reference
1	Leaf	Flavonoids, Tannins, Saponins, Alkaloids	Decreased blood glucose levels in male mice (*Mus musculus)*	(Firmansyah et al., 2022)
2	Leaf	Safonin, Flavonoids, Tannins, and Steroids	Antibacterial against *Shigella dysenteriae*	(Indriani et al., 2023)
3	Bark	Terpenoids, Alkaloids, Flavonoids, Tannins, Phenols	Antimalarial activity against *Plasmodium falciparum* strain 3D7	(Retnosari et al., 2023)
4	Tree bark	Alkaloids, Flavonoids, Saponins, Tannins, Steroids	Standardization of infusion extracts to meet quality requirements	(Utami et al., 2023)

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

NO	Plant Parts	Main Chemical Content	Therapy Activities	Reference
5	Ethanol Leaf Extract	Flavonoids, Tannins, Alkaloids, Saponins	Antioxidant activity, Antibacterial against *Escherichia coli*	(Dewi et al., 2018; Djamain et al., 2020; Hartati et al., 2016; Sinay & Watuguly, 2019)
6	Leaf Extract	Flavonoids, Tannins, Alkaloids, Saponins, Phenols	Insecticidal activity against *Aphis gossypii*	(Mahardika, 2014; Nurhasnah, 2018; Syafitri et al., 2023)

Synthesis: Bridging Traditional Knowledge and Modern Knowledge

There is a strong overlap between ethnoscience and the modern scientific understanding of Lansano. This convergence suggests that indigenous knowledge systems can form the basis for developing pharmacologically validated herbal medicines. Community empirical knowledge, when combined with scientific validation, opens up opportunities for product development, such as phytopharmaceuticals and organic pesticides.

Table 6. Original Reconstruction Science with Scientific Knowledge of The Lansano Plants

Aspect	Indigenous Knowledge of the People of West Sumatra	Modern Science	Scientific References
Local Name & Identity	Known as *Lansano,* this plant is considered culturally and environmentally valuable.	Known as *Pterocarpus indicus* Willd., one of the tropical hardwood tree species with pharmacological potential.	(Khan & Omoloso, 2003; Syahputra et al., 2021a)
Utilization	Wood for building, leaves and bark for treating wounds and skin diseases, and animal feed.	Leaf and bark extracts contain flavonoid and tannin compounds and exhibit antibacterial, antioxidant, and insecticidal activities.	(Armedita et al., 2018; Indriani et al., 2023; Khan & Omoloso, 2003; Yulianti, 2013)
Processing Method	The leaves or bark are boiled, ground, and then applied to the wound; there is no standard dosage used, as it is based on inheritance from generation to generation.	Using solvent extraction methods (ethanol, methanol), followed by laboratory analysis (phytochemistry, bioactivity, toxicity).	(Abdurrozak & Syafnir, 2021; Armedita et al., 2018; Cahyono, 2016)
Social & Cultural Values	Viewed as a protective tree with symbolic value—planted for conservation and reforestation.	Considered an important species for land rehabilitation and biodiversity conservation.	(Syahputra et al., 2021a)
Conservation & Availability	Illegal logging causes scarcity; communities begin to replant independently.	Conservation programs are carried out through nurseries, reforestation, and research into sustainable cultivation techniques.	(Syahputra et al., 2021a)

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

Aspect	Indigenous Knowledge of the People of West Sumatra	Modern Science	Scientific References
Innovative Potential	Not yet systematically documented; still limited to local experiences.	The potential as an active ingredient for phytopharmaceuticals and botanical pesticides is being developed in further research.	(Abdurrozak & Syafnir, 2021; Cahyono, 2016; Yulianti, 2013)

DISCUSSION

Utilization of Traditional Lansano

Based on Table 3, it can be concluded that people in West Sumatra use the lansano plant, including its stems, leaves, bark, and roots, for alternative medicine. However, the leaves are the most common medicinal use. Furthermore, the stems, bark, roots, and even the sap of the lansano plant can also be used medicinally.

The Pariaman region utilizes the lansano plant, including its leaves, roots, stems, and sap. Lansano leaves are boiled with salt to treat diarrhea, regulate menstruation, and relieve headaches. Lansano leaves are boiled with palm sugar to treat digestive problems, coughs, and cancer. Mouth ulcers are treated by gargling with boiled lansano water.

Then, in the Sijunjung and Padang areas, the leaves and sap of the lansano plant are used to treat boils, mouth ulcers, fever, inflammation, as an antibacterial, for diabetes, mouth ulcers, and for kidney stones. Lansano leaves are boiled with palm sugar. The sap is extracted and applied to the injured area.

The Padang Panjang, East Pasaman, and Dhamasraya regions use lansano leaves to prevent and treat various ailments such as mouth ulcers, kidney stones, fever, diarrhea, boils, burns, relieve menstrual pain, and prevent hair loss. Hair loss can be prevented by making a paste of lansano leaves and applying it to the scalp. Make lansano: Make a paste by pounding the leaves until smooth, then boil for 1 minute and let cool slightly. Apply this lansano leaf paste gently to the burn. Then make a decoction and infusion of lansano leaves to drink and consume regularly and periodically according to the disease experienced.

Meanwhile, in South Solok, they utilize the bark and leaves of the lansano plant. Similarly, in West Pasaman, the leaves, flowers, sap, roots, and bark of the lansano plant are used to treat and prevent hair loss, reduce fever, and act as an anti-inflammatory, as well as relieve pain, especially menstrual cramps, treat mouth ulcers, treat stomach ulcers, and reduce toothache pain. The leaves and flowers of the lansano plant are processed to maintain skin health and treat boils.

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

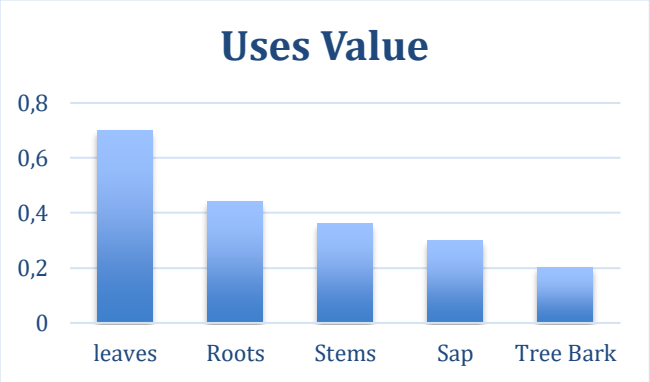

Figure 4. UV Value of Lansano Use Based on Plant Part

The results showed that Lansano (Pterocarpus indicus Willd.) leaves had the highest UV value (0.70), followed by roots (0.44), stems (0.36), sap (0.30), and bark (0.20). These UV values not only reflect the frequency of mention and intensity of use by informants but also provide insight into the cultural priority given to specific plant parts. The leaves were the most commonly used part because they were considered effective for various health complaints, such as mouth ulcers, diarrhea, and minor wounds. Relatively high UV values in the roots and sap indicate more specific uses, such as for sexually transmitted diseases, menstrual pain, toothache, and burns.

UV values can be used as an ethnopharmacological index to determine priorities in phytochemical and pharmacological tests. Plant parts with consistently high UV values, such as leaves, should be the primary focus for bioactivity testing because they have been culturally validated as effective and are known to contain abundant secondary metabolites (e.g., flavonoids, tannins, saponins). Conversely, the roots and sap, despite having lower UV values, are still important for further investigation because their specific uses may indicate the presence of unique or rarely found bioactive compounds found in other parts.

The consistent high UV values across informants and across regions indicate that the use of Lansano leaves is deeply rooted in culture and reflects a well-established mechanism for transmitting local knowledge. However, this pattern could also be due to sample homogeneity or limited variation in medicinal practices within the Minangkabau communities studied. Ethnobotanical studies in Southeast Asia and India have shown similar findings, with high UV values (≥0.80) in certain plant parts, particularly the leaves, which are widely used for common ailments. For example, research in Bima, Indonesia, identified leaves as the part with the highest UV values for diarrhea and wounds (ALBAR et al., 2025), while a study in Mizoram, India, also reported consistently high UV values in leaves for treating skin diseases and infections (Ralte et al.,

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

2024). This consistent pattern across regions confirms that high UV values can reflect both strong cultural relevance and limited diversification of plant parts' use in traditional medicine.

Thus, the UV analysis in this study not only confirms the cultural importance of Lansano leaves but also emphasizes the need for further, integrative research. Such further research should include targeted phytochemical testing of the part with high UV (the leaves), as well as cross-regional comparative studies to determine whether similar usage patterns also occur in other regions or are characteristic of Minangkabau culture.

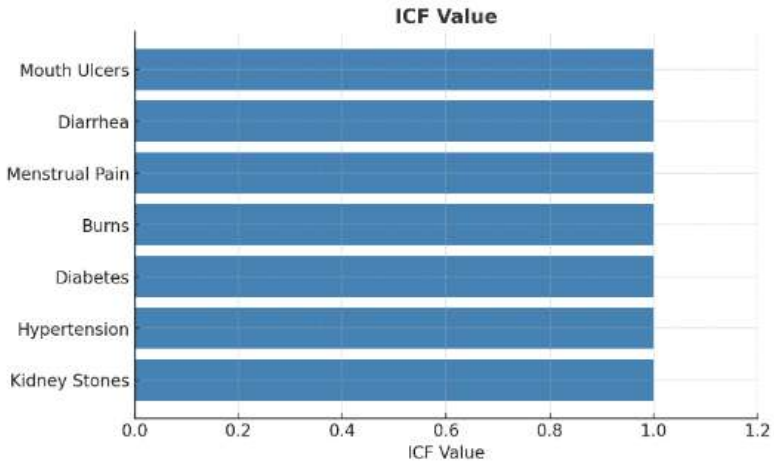

Figure 5. ICF Value of Types of Diseases that Can Be Treated with Lansano

The ICF calculation (Figure 5) showed a value of 1.00 for all disease categories studied, from mouth ulcers and diarrhea to menstrual pain, burns, diabetes, hypertension, and kidney stones. This maximum value indicates complete consensus among informants regarding the use of Lansano (Pterocarpus indicus Willd.) as a traditional medicine. This high level of agreement underscores the importance of Lansano in the traditional Minangkabau medicine system and confirms the cultural relevance of this species. Within the framework of ethnopharmacology, an ICF approaching 1.00 typically indicates a species with significant cultural value and high potential for prioritization in pharmacological research.

With a uniform ICF value, Lansano has the potential to be a priority candidate for phytochemical screening and bioactivity testing across various disease groups. However, because the ICF does not differentiate contributions between locations or groups, further analysis using Use Value (UV) and Relative Frequency of Citation (RFC) values is essential. If these consistent, high values are evenly distributed across the study area, this reflects the homogeneity of medical knowledge among the Minangkabau people. Conversely, if it is dominant in a particular group, it

means that ethnomedical knowledge related to Lansano is more locally concentrated and needs to be understood within the local socio-cultural context. Uniform and maximal ICF values may also be due to several technical and methodological factors, including sample homogeneity (informants coming from the same cultural background), disease categories with a narrow number of taxa (low Nt), or a limited number of alternative species used by the community to indicate a particular disease.

This finding aligns with ethnobotanical studies in Mizoram, India (Ralte et al., 2024) and Polavaram Mandal, India (Singh et al., 2024), which reported high ICF values (≥0.94) for certain disease categories dominated by a single main species. Similar results were also reported in Langgudu, Bima, Indonesia (ALBAR et al., 2025) and Khatling Valley, Himalaya (Hussain et al., 2023), reinforcing the interpretation that ICF values approaching 1.00 indicate not only strong cultural relevance but also limited species diversity used in traditional medicine practices.

Thus, the ICF results in this study not only confirm the important position of Lansano in traditional medicine systems but also provide practical guidance for further research. Prioritization of phytochemical testing can focus on consistently occurring disease indications (e.g., mouth ulcers, burns, and diabetes), while the distribution of UV and RFC values can help identify whether these usage patterns are universal or locally specific. This analysis will enhance the relevance of ethnobotanical results for the scientific and sustainable development of local biodiversity-based medicines.

Overall, the combination of high UV values in leaves and maximum ICF across all disease categories demonstrates that lansano is a species with strong cultural, social, and medical significance. The pharmacological potential of lansano, particularly in the leaves and roots, needs further exploration through bioactive compound isolation and in vitro and in vivo testing. This could open up opportunities for the development of scientifically based traditional medicines rooted in the local wisdom of West Sumatra.

Scientific Validation of Traditional Use

Lansano has organs consisting of roots, stems, leaves, flowers, fruit, and seeds. Injured stems produce a dark red exudate called "kino" or sap. This sap has always been used in traditional medicine. The type of disease often treated with Lansano sap is canker sores. The ability of Lansano sap to cure diseases is thought to be due to the presence or content of certain active compounds in Lansano sap that can cure diseases such as canker sores. One active compound that

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

can cure diseases is flavonoids. The benefits of flavonoids include protecting cell structure, increasing the effectiveness of vitamin C, being anti-inflammatory, preventing osteoporosis, and acting as an antibiotic. (Haris, 2011) .

Flavonoids are one of the most abundant natural compounds in plant tissues. Several medicinal plants containing flavonoids have been reported to have antioxidant, antibacterial, antiviral, anti-inflammatory, antiallergic, and anticancer activities. Although it has been used as a natural ingredient in traditional medicine by the Wanath Hamlet community, the active flavonoid content in lansano sap and its levels are unknown. Lansano (Pterocarpus indicus Willd.) with the same ICF value, namely 0.8, is usually used for canker sores by applying the sap to the affected area. The lansano plant has been proven effective as an antibacterial.

Lansano (Pterocarpus indicus Willd.) exhibits pharmacological potential that supports some of its traditional uses. A local study reported that ethanol extract of Lansano leaves significantly reduced blood sugar levels in rabbits after glucose preloading, with a stronger effect at a concentration of 70% compared to 30% extract, $p < 0.05$ (Aditias, 2013). Furthermore, the ethanol extract of the leaves also exhibited in vitro α-glucosidase inhibitory activity, with an IC_{50} of 1,789.67 ± 51.63 μg/mL, although much weaker than acarbose (the control), which had an IC_{50} of ~216.01 μg/mL (Tan, 2015).

Regarding antibacterial activity, a gel formulation of ethanol extract of Lansano leaves against Staphylococcus aureus produced an inhibition zone of ~8 mm with 0.09 mg of extract, although the direct extract (9 mg) produced a 16 mm inhibition zone (Djamain et al., 2020). Isolation of specific compounds from the leaves, such as flavone glycosides ("ptevon-3-D-glycoside") and stigmasterol, has also been carried out, with good antioxidant activity (DPPH assay), supporting that phenolic and flavonoid compounds may play a role in tissue protection and wound healing (Hartati et al., 2016b). In addition, Pterocarpus indicus Willd. Stem bark extract demonstrated antimalarial activity against Plasmodium falciparum strain 3D7, with an IC_{50} of 0.65 μg/mL for the 96% ethanol extract, 4.0 μg/mL for the ethyl acetate extract, and 7.14 μg/mL for the n-hexane extract, suggesting that both lipophilic and phenolic compounds in the extracts may be important (Retnosari et al., 2023).

Risks and Community Practices

Despite Lansano's widespread and long-standing use in traditional medicine, some risks associated with its use remain unresolved. Interviews revealed that most communities rely on

empirical experience passed down through generations, followed by standardized doses or scientifically validated methods. There is no consistent measurement system, and doses are often determined intuitively, which can result in either insufficient or excessive doses, potentially leading to ineffectiveness or toxicity.

Furthermore, preparation and administration methods vary widely, even within the same region. Some users combine Pterocarpus indicus Willd. (Lansano) with other herbal remedies without understanding the potential for synergistic or antagonistic interactions. Available studies on P. indicus mainly focus on its antioxidant, antibacterial, antiplasmodial, and hypoglycemic properties, but reports on adverse effects, toxic doses, or contraindications remain scarce. To date, no peer-reviewed studies have documented specific toxicological thresholds (e.g., LD_{50} values) or clinically significant side effects for P. indicus in humans. In contrast, other species within the same genus, such as Pterocarpus marsupium, have been investigated more thoroughly; an acute oral toxicity study reported no observable adverse effects at doses up to 5000 mg/kg body weight in animal models, indicating an LD_{50} greater than 5 g/kg (Koyagura et al., 2022). The absence of equivalent toxicological data for P. indicus raises concerns, especially among vulnerable populations such as children, pregnant women, and individuals with chronic illnesses, and underscores the need for systematic safety evaluations alongside efficacy studies.

These findings underscore the importance of community-based educational outreach and training programs. By integrating scientific findings into local knowledge systems, communities can be empowered to use Lansano more safely and effectively. Health agencies, communities, and researchers should collaborate with local leaders to increase awareness, safe practices, and a basic understanding of pharmacological principles.

Synthesis: Bridging Traditional and Modern Knowledge

A comparative analysis of the indigenous knowledge of the people of West Sumatra and modern scientific knowledge on the use of the local plant Lansano (Pterocarpus indicus Willd.) shows a close relationship between traditional knowledge and contemporary scientific findings. Traditional communities have utilized parts of the Lansano tree, such as leaves and bark, as medicine for skin diseases and minor wounds, through simple methods such as boiling or pounding the ingredients. This is in line with scientific research that found that Lansano leaves and bark contain bioactive compounds such as flavonoids and tannins that have antibacterial and antioxidant activities. Although the methods and approaches are different, traditional is empirical

Al-Jahiz: Biology Education Research Journal
ISSN 2722-5070 (Print) ISSN 2722-5275 (Online)
Vol. 6 No. 2 July-December 2025
Available online at:
http://e-journal.metrouniv.ac.id/index.php/Al-Jahiz

and passed down orally, while scientific is through laboratory tests and standard methods; both support each other in proving the pharmacological potential of Lansano.

Furthermore, both local knowledge and scientific research recognize the importance of Pterocarpus indicus Willd. (Lansano) conservation, particularly given the threat of overexploitation. Local knowledge notes population decline due to illegal logging, prompting community initiatives to independently replant. Modern research reinforces this by recommending in situ and ex situ conservation strategies, such as establishing community-managed nurseries, integrating Lansano into agroforestry systems, and developing sustainable harvesting guidelines for medicinal plant parts (Syahputra et al., 2021). These approaches ensure that Lansano's medicinal potential can be developed without accelerating population decline. Furthermore, recent studies highlight innovations such as the use of Lansano extracts as environmentally friendly botanical pesticides (Yulianti, 2013), demonstrating that integrating local and modern science not only supports conservation but also strengthens a holistic framework for sustainable medicinal resource management.

CONCLUSION

This study demonstrates that lansano (*Pterocarpus indicus* Willd.) occupies an important position in the traditional medicine practices of communities in West Sumatra. This study reveals a significant relationship between traditional practices and scientific evidence in the use of Lansano as a herbal medicine. While traditional knowledge provides a valuable foundation, the integration of scientific methods is crucial to ensure safety, efficacy, and sustainability. Lansano holds promise as a source of bioactive compounds for future drug development, provided further research, clinical testing, and standardization are conducted. This study is the first step in integrating Lansano ethnobotanical practices with bioactive data for the development of local culture-based phytopharmaceuticals.

Use Value *(UV)* analysis showed that the leaves had the highest utilization value (UV = 0.70), followed by the roots (0.44), sap (0.36), and stems (0.30). This finding confirms that the leaves are the most frequently used part of the plant for various health complaints. Meanwhile, the Informant Consensus Factor *(ICF)* analysis showed full consensus (ICF = 1.00) among informants regarding the use of lansano for various diseases, with the highest frequency of use for mouth ulcers, followed by diarrhea, menstrual pain, and burns. These results confirm that lansano has

high ethnopharmacological value and is widely believed to be a primary traditional medicine in West Sumatra.

These findings provide an important basis for efforts to develop evidence-based traditional medicine. The bioactive potential of lansano needs to be followed up with pharmacological and toxicological research, as well as the isolation of active compounds to support the development of phytopharmaceuticals. Furthermore, lansano conservation is crucial given the high level of community dependence on this plant. Integrating local knowledge with modern scientific research can encourage the use of lansano as a candidate for Indonesia's leading herbal medicine with global competitiveness. Further research is needed to conduct clinical trials to confirm the efficacy and safety of lansano in the treatment of various diseases and to identify the appropriate dosage.

REFERENCE

Abdurrozak, M. I., & Syafnir, L. (2021). Uji Efektivitas Ekstrak Etanol Daun Angsana (Pterocarpus Indicus Willd) sebagai Biolarvasida terhadap Larva Nyamuk Culex Sp. *Jurnal Riset Farmasi*, 33–37.

Aikenhead, G. S. (2000). Renegotiating the culture of school science. Improving Science Education: The Contribution of Research, 245–264.

Arfianawati, S., Sudarmin, S., & Sumarni, W. (2016). Model pembelajaran kimia berbasis etnosains untuk meningkatkan kemampuan berpikir kritis siswa. Jurnal Pengajaran MIPA, 21(1), 46–51.

Armedita, D., Asfrizal, V., & Amir, M. (2018). The antibacterial activity of leaves ethanol extract, stem bark, and latex of angsana (pterocarpus indicus willd.) Towards bacterial growth streptococcus mutans as in vitro. ODONTO: Dental Journal, 5(1), 1–8.

Cahyono, F. D. (2016). Pengaruh pemberian ekstrak air daun angsana terhadap makroskopis dan histopatologi organ hati dan otot mencit pada uji toksisitas subkronis. Widya Mandala Catholic University Surabaya.

Darmastuti, R., & Sari, D. K. (2011). Kekuatan Kearifan Lokal dalam Komunikasi Kesehatan. Jurnal Komunikator, 3(2), 233–244.

Dewi, B., Angelina, M., Meilawati, L., Hartati, S., Dewijanti, I., Santi, M., Desti, H., & Sudiro, M. (2018). Antiviral Effect of Pterocarpus indicus Willd Leaves Extract Against Replication of Dengue Virus (DENV) In Vitro. Journal of Tropical Life Science, 8(1), 55–61. https://doi.org/10.11594/jtls.08.01.10

Dewi, B. E., Angelina, M., Meilawati, L., Hartati, S., Dewijanti, I. D., Santi, M. R., Desti, H., & Sudiro, M. (2018). Antiviral Effect of Pterocarpus indicus Willd Leaves Extract Against Replication of Dengue Virus (DENV) In Vitro. Journal of Tropical Life Science, 8(1).

Dharmawan, F. R. (2013). Pengujian aktivitas hipoglikemik ekstrak air daun angsana (pterocarpus indicus willd) terhadap histopatologi sel hati tikus diabetes aloksan.[CD-ROM]. Widya Mandala Catholic University Surabaya.

Djamain, N. S., Anggia, V., & Fachrunisa, N. (2020). Uji Aktivitas Antibakteri Gel Ekstrak Etanol Daun Angsana (Pterocarpus indicus Willd.) Terhadap Bakteri Staphylococcus aureus. Jurnal

Insan Farmasi Indonesia, 3(1), 124–131.

Fabricant, D. S., & Farnsworth, N. R. (2001). The value of plants used in traditional medicine for drug discovery. Environmental Health Perspectives, 109(SUPPL. 1), 69–75. https://doi.org/10.1289/ehp.01109s169

Firmansyah, F., Waris, M. A. A., & Salmiati, S. (2022). Pengaruh Pemberian Ekstrak Daun Angsana (Pterocarpus indicus Willd) Terhadap Penurunan Kadar Glukosa Darah Mencit Jantan (Mus musculus). Fito Medicine: Journal of Pharmacy and Sciences, 13(2), 60–68.

Haris, M. (2011). Penentuan kadar flavonoid total dan aktivitas antioksidan dari daun beluntas (Plucea indica L). FMIPA UNSRAT Manado, 95115.

Hartati, S., Angelina, M., Meilawati, L., & Dewijanti, I. D. (2016). Isolation and characterization of compounds from the leaves of Pterocarpus indicus Willd and their antioxidant activity. Annales Bogorienses, 20(1), 13–18.

Heinrich, M. (2010). Ethnopharmacology in the 21st century - grand challenges. Frontiers in Pharmacology, JUN(June), 1980–1982. https://doi.org/10.3389/fphar.2010.00008

Indriani, E. F., Rahmadita, A. N., Ulhaq, R. D., Rizkiani, R., Malik, N. V., & Risnawati, R. (2023). Effectiveness Test of Angsana Leaf (Pterocarpus Indicus) as an Antibacterial Shigella dysenteriae. Jurnal Media Analis Kesehatan, 14(2), 159–169.

Khan, M. R., & Omoloso, A. D. (2003). Antibacterial activity of Pterocarpus indicus. Fitoterapia, 74(6), 603–605.

Lufri, R. Y. (2019). Student Psychological Responses to English For Biology Course in Biology Department of Universitas Negeri Padang.

Mahardika, I. (2014). Efektivitas pemberian ekstrak air daun angsana (Pterocarpus Indicus Willd) dan metformin terhadap histopatologi sel hepar tikus diabetes yang diinduksi aloksan. Widya Mandala Catholic University.

Malla, A. M., Dar, B. A., Isaev, A. B., Lone, Y., & Banday, M. R. (2023). Flavonoids: A reservoir of drugs from nature. Mini Reviews in Medicinal Chemistry, 23(7), 772–786.

Mehmood, A., Javid, S., Khan, M. F., Ahmad, K. S., & Mustafa, A. (2022). In vitro total phenolics, total flavonoids, antioxidant and antibacterial activities of selected medicinal plants using different solvent systems. BMC Chemistry, 16(1), 64.

Naeluvar, L., & Eryani, A. (2023). Effect of Angsana Bark Extract (Pterocarpus Indicus) on Re-Epithelialization in Experimental Rats (Sprague-Dawley) Incision Wound Model. Asian Journal of Healthy and Science, 2(4), 176–182. https://doi.org/10.58631/ajhs.v2i4.41

Nisaâ, A., Sudarmin, S., & Samini, S. (2015). Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa. Unnes Science Education Journal, 4(3).

Nurhasnah, N. (2018). Potensi Antimikroba Dari Bakteri Endofit Pada Tumbuhan Angsana (Pterocarpus indicus Willd). Penelitian Dasar Pengembangan Program Studi (PDPS). Padang.

Nurmila, N., Sinay, H., & Watuguly, T. (2019). Identifikasi dan analisis kadar flavonoid ekstrak getah angsana (Pterocarpus indicus Willd) di dusun Wanath kecamatan Leihitu kabupaten Maluku Tengah. Biopendix: Jurnal Biologi, Pendidikan Dan Terapan, 5(2), 65–71.

Phillips, O., & Gentry, A. H. (1993). The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Economic Botany, 47(1), 15–32. https://doi.org/10.1007/BF02862203

Pratiwi, S. T. (2008). Mikrobiologi Farmasi. Jakarta: Penerbit Erlangga. Hal.

Redha, A. (2013). Flavonoid: struktur, sifat antioksidatif dan peranannya dalam sistem biologis.

Retnosari, D., Purnobasuki, H., & Supriyanto, A. (2023). Antimalarial Activity of Crude Bark Extract of Pterocarpus indicus Willd. against Plasmodium falciparum Strain 3D7. Tropical Journal of Natural Product Research, 7(9).

Senthilkumar, N., Shalini, T. B., Lenora, L. M., & Divya, G. (2020). Pterocarpus indicus Willd: A Lesser Known Tree Species of Medicinal Importance. Asian Journal of Research in Botany, 3(4), 20–32.

Sinay, H., & Watuguly, T. (2019). Identifikasi dan Analisis Kadar Flavonoid Ekstrak Getah Angsana (Pterocarpus indicus Willd). 5(2), 65–71.

Syafitri, R. A., Martha, S. A., Ismaniar, N., Puteri, A., Muslim, M., & Risnawati, R. (2023). Pengaruh kandungan senyawa bioaktif ekstrak daun angsana (Pterocarpus indicus) sebagai insektisida nabati terhadap larva nyamuk Aedes aegypti (L.) vektor dengue di Banjarmasin. Jurnal Kajian Ilmiah Kesehatan Dan Teknologi, 5(1), 18–25.

Syahputra, G. S., Astuti, M. A., Piter, P., & Arbain, D. (2021a). Kajian Etnofarmasi dan Fitokimia Tumbuhan Obat Kampung Adat Urug, Kecamatan Sukajaya, Kabupaten Bogor, Jawa Barat. Jurnal Tumbuhan Obat Indonesia, 14(1), 15–35.

Syahputra, G. S., Astuti, M. A., Piter, P., & Arbain, D. (2021b). Kajian Etnofarmasi Dan Fitokimia Tumbuhan Obat Kampung Adat Urug, Kecamatan Sukajaya, Kabupaten Bogor, Jawa Barat. Jurnal Tumbuhan Obat Indonesia, 14(1), 15–35. https://doi.org/10.22435/jtoi.v14i1.3016

Trotter, R. T., & Logan, M. H. (1986). Informant Consensus: A New Approach for Identifying Potentially Effective Medicinal Plants. In Book: Plants and Indigenous Medicine and Diet: Vol. 1st Editio. https://doi.org/https://doi.org/10.4324/9781315060385-6

Utami, S. M., Sari, D. P., & Fatmawati, F. (2023). Standarisasi Ekstrak Infusa Kulit Kayu Angsana (Pterocarpus indicus Willd.). PROSIDING SENANTIAS: Seminar Nasional Hasil Penelitian Dan Pengabdian Kepada Masyarakat, 4(1), 876–885.

Wang, M., Yu, F., Zhang, Y., Chang, W., & Zhou, M. (2022). The effects and mechanisms of flavonoids on cancer prevention and therapy: focus on gut microbiota. International Journal of Biological Sciences, 18(4), 1451.

Yulianti, R. (2013). Standardisasi Ekstrak Etanol Daun Angsana (Pterocarpus Indicus Willd).

Arbain, D., Saputri, G. A., Syahputra, G. S., Widiyastuti, Y., Susanti, D., & Taher, M. (2021). Genus Pterocarpus: A review of ethnopharmacology, phytochemistry, biological activities, and clinical evidence. Journal of Ethnopharmacology, 278, 114316.enus. Journal of Ethnopharmacology, 278, 114316.Abdurrozak, M. I., & Syafnir, L. (2021). Uji Efektivitas Ekstrak Etanol Daun Angsana (Pterocarpus Indicus Willd) sebagai Biolarvasida terhadap Larva Nyamuk Culex Sp. Jurnal Riset Farmasi, 33–37.

Aditias, K. N. (2013). Uji Hipoglikemik Ekstrak Etanolik Daun Angsana (Pterocarpus indicus Willd) pada Kelinci Jantan Terbebani Glukosa dengan Pembanding Glibenklamid secara

Spektrofotometri Visible. Universitas Muhammadiyah Purwokerto.

Albar, H., Juhriah, J., & Santosa, S. (2025). Ethnobotany of medicinal plants by the community in Langgudu Sub-district, Bima District, West Nusa Tenggara, Indonesia. Biodiversitas Journal of Biological Diversity, 26(1).

Arfianawati, S., Sudarmin, S., & Sumarni, W. (2016). Model pembelajaran kimia berbasis etnosains untuk meningkatkan kemampuan berpikir kritis siswa. Jurnal Pengajaran MIPA, 21(1), 46–51.

Armedita, D., Asfrizal, V., & Amir, M. (2018). The antibacterial activity of leaves ethanol extract, stem bark, and latex of angsana (pterocarpus indicus willd.) Towards bacterial growth streptococcus mutans as in vitro. ODONTO: Dental Journal, 5(1), 1–8.

Beltrán-Rodríguez, L., Ortiz-Sánchez, A., Mariano, N. A., Maldonado-Almanza, B., & Reyes-García, V. (2014). Factors affecting ethnobotanical knowledge in a mestizo community of the Sierra de Huautla Biosphere Reserve, Mexico. Journal of Ethnobiology and Ethnomedicine, 10(1), 14. https://doi.org/10.1186/1746-4269-10-14

Cahyono, F. D. (2016). Pengaruh pemberian ekstrak air daun angsana terhadap makroskopis dan histopatologi organ hati dan otot mencit pada uji toksisitas subkronis. Widya Mandala Catholic University Surabaya.

Dewi, B. E., Angelina, M., Meilawati, L., Hartati, S., Dewijanti, I. D., Santi, M. R., Desti, H., & Sudiro, M. (2018). Antiviral Effect of Pterocarpus indicus Willd Leaves Extract Against Replication of Dengue Virus (DENV) In Vitro. Journal of Tropical Life Science, 8(1).

Djamain, N. S., Anggia, V., & Fachrunisa, N. (2020). Uji Aktivitas Antibakteri Gel Ekstrak Etanol Daun Angsana (Pterocarpus indicus Willd.) TERHADAP BAKTERI Staphylococcus aureus. Jurnal Insan Farmasi Indonesia, 3(1), 124–131.

Faruque, M. O., Uddin, S. B., Barlow, J. W., Hu, S., Dong, S., Cai, Q., Li, X., & Hu, X. (2018). Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban district of Bangladesh. Frontiers in Pharmacology, 9(FEB). https://doi.org/10.3389/fphar.2018.00040

Firmansyah, F., Waris, M. A. A., & Salmiati, S. (2022). Pengaruh Pemberian Ekstrak Daun Angsana (Pterocarpus indicus Willd) Terhadap Penurunan Kadar Glukosa Darah Mencit Jantan (Mus musculus). Fito Medicine: Journal Pharmacy and Sciences, 13(2), 60–68.

Haris, M. (2011). Penentuan kadar flavonoid total dan aktivitas antioksidan dari daun beluntas (Plucea indica L). FMIPA UNSRAT Manado, 95115.

Hartati, S., Angelina, M., Meilawati, L., & Dewijanti, I. D. (2016a). Isolation and characterization of compounds from the leaves of Pterocarpus indicus Willd and their antioxidant activity. Annales Bogorienses, 20(1), 13–18.

Hartati, S., Angelina, M., Meilawati, L., & Dewijanti, I. D. (2016b). Isolation and Characterization of Compounds from the Leaves of Pterocarpus indicus Willd and Their Antioxidant Activity. Annales Bogorienses-Journal of Tropical General Botany, 20(1), 13–18.

Hussain, J., Mehta, J. P., Singh, A., Bagria, A. S., Singh, H., Nautiyal, M. C., & Bussmann, R. W. (2023). Ethno-medicinal plants of indigenous people: A case study in Khatling valley of Western Himalaya, India. Ethnobotany Research and Applications, 25, 1–19.

Indriani, E. F., Rahmadita, A. N., Ulhaq, R. D., Rizkiani, R., Malik, N. V., & Risnawati, R. (2023).

Effectiveness Test of Angsana Leaf (Pterocarpus Indicus) as Antibacterial Shigella dysenteriae. Jurnal Media Analis Kesehatan, 14(2), 159–169.

Khan, M. R., & Omoloso, A. D. (2003). Antibacterial activity of Pterocarpus indicus. Fitoterapia, 74(6), 603–605.

Koyagura, N., Munge, B., & Vedula, P. (2022). Acute toxicity study and phytochemical screening of Pterocarpus marsupium heartwood. National Journal of Physiology, Pharmacy and Pharmacology, 12(5), 707.

Leonti, M. (2022). The relevance of quantitative ethnobotanical indices for ethnopharmacology and ethnobotany. Journal of Ethnopharmacology, 288, 115008. https://doi.org/10.1016/j.jep.2022.115008

Lufri, R. Y. (2019). Student Psychological Responses to English For Biology Course in Biology Department of Universitas Negeri Padang.

Mahardika, I. (2014). Efektivitas pemberian ekstrak air daun angsana (Pterocarpus Indicus Willd) dan metformin terhadap histopatologi sel hepar tikus diabetes yang diinduksi aloksan. Widya Mandala Catholic University.

Naeluvar, L., & Eryani, A. (2023). Effect of Angsana Bark Extract (Pterocarpus Indicus) on Re-Epithelialization in Experimental Rats (Sprague-Dawley) Incision Wound Model. Asian Journal of Healthy and Science, 2(4), 176–182. https://doi.org/10.58631/ajhs.v2i4.41

Nisaâ, A., Sudarmin, S., & Samini, S. (2015). Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa. Unnes Science Education Journal, 4(3).

Nisaâ, A., Sudarmin, S., & Samini, S. (2015). Efektivitas penggunaan modul terintegrasi etnosains dalam pembelajaran berbasis masalah untuk meningkatkan literasi sains siswa. Unnes Science Education Journal, 4(3).

Nurhasnah, N. (2018). Potensi Antimikroba Dari Bakteri Endofit Pada Tumbuhan Angsana (Pterocarpus indicus Willd). Penelitian Dasar Pengembangan Program Studi (PDPS). Padang.

Phillips, O., & Gentry, A. H. (1993). The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Economic Botany, 47(1), 15–32. https://doi.org/10.1007/BF02862203

Rahman, I. U., Ijaz, F., Afzal, A., Iqbal, Z., Ali, N., & Khan, S. M. (2016). Contributions to the phytotherapies of digestive disorders: Traditional knowledge and cultural drivers of Manoor Valley, Northern Pakistan. Journal of Ethnopharmacology, 192, 30–52. https://doi.org/10.1016/j.jep.2016.06.049

Ralte, L., Sailo, H., & Singh, Y. T. (2024). Ethnobotanical study of medicinal plants used by the indigenous community of the western region of Mizoram, India. Journal of Ethnobiology and Ethnomedicine, 20(1), 2.

Retnosari, D., Purnobasuki, H., & Supriyanto, A. (2023). Antimalarial Activity of Crude Bark Extract of Pterocarpus indicus Willd. against Plasmodium falciparum Strain 3D7. Tropical Journal of Natural Product Research, 7(9).

Rinto, R., Iswari, R. S., Mindyarto, B. N., & Saptono, S. (2023). Bridging the generational gap: Exploring youth understanding on ethnobotanical knowledge and its integration in higher

education curricula. Ethnobotany Research and Applications, 26. https://doi.org/10.32859/era.26.48.1-16

Senthilkumar, N., Shalini, T. B., Lenora, L. M., & Divya, G. (2020). Pterocarpus indicus Willd: A Lesser Known Tree Species of Medicinal Importance. Asian Journal of Research in Botany, 3(4), 20–32.

Sinay, H., & Watuguly, T. (2019). Identifikasi dan Analisis Kadar Flavonoid Ekstrak Getah Angsana (Pterocarpus indicus Willd). 5(2), 65–71.

Singh, K., Chandu, K. D., Thattantavide, A., Gour, V. S., Gairola, S., & Kumar, A. (2024). Indigenous ecological knowledge and the usage of medicinal plants in Polavaram Mandal of Andhra Pradesh, India. Ethnobotany Research and Applications, 29, 1–27.

Syafitri, R. A., Martha, S. A., Ismaniar, N., Puteri, A., Muslim, M., & Risnawati, R. (2023). Pengaruh kandungan senyawa bioaktif ekstrak daun angsana (Pterocarpus indicus) sebagai insektisida nabati terhadap larva nyamuk Aedes aegypti (L.) vektor dengue di Banjarmasin. Jurnal Kajian Ilmiah Kesehatan Dan Teknologi, 5(1), 18–25.

Syahputra, G. S., Astuti, M. A., Piter, P., & Arbain, D. (2021). Kajian Etnofarmasi dan Fitokimia Tumbuhan Obat Kampung Adat Urug, Kecamatan Sukajaya, Kabupaten Bogor, Jawa Barat. Jurnal Tumbuhan Obat Indonesia, 14(1), 15–35.

Tan, E. T. S. (2015). Uji daya inhibisi α-glucosidase ekstrak etanol daun angsana (pterocarpus indicus W.). Widya Mandala Catholic University.

Trotter, R. T., & Logan, M. H. (1986). Informant Consensus: A New Approach for Identifying Potentially Effective Medicinal Plants. In Book: Plants and Indigenous Medicine and Diet: Vol. 1st Editio. https://doi.org/https://doi.org/10.4324/9781315060385-6

Tuasha, N., Petros, B., & Asfaw, Z. (2018). Medicinal plants used by traditional healers to treat malignancies and other human ailments in Dalle District, Sidama Zone, Ethiopia. Journal of Ethnobiology and Ethnomedicine, 14(1), 1–21. https://doi.org/10.1186/s13002-018-0213-z

Utami, S. M., Sari, D. P., & Fatmawati, F. (2023). Standarisasi Ekstrak Infusa Kulit Kayu Angsana (Pterocarpus indicus Willd.). PROSIDING SENANTIAS: Seminar Nasional Hasil Penelitian Dan Pengabdian Kepada Masyarakat, 4(1), 876–885.

Wanjohi, B. K., Sudoi, V., Njenga, E. W., & Kipkore, W. K. (2020). An Ethnobotanical Study of Traditional Knowledge and Uses of Medicinal Wild Plants among the Marakwet Community in Kenya. Evidence-Based Complementary and Alternative Medicine, 2020(1). https://doi.org/10.1155/2020/3208634

Yulianti, R. (2013). Standardisasi Ekstrak Etanol Daun Angsana (Pterocarpus Indicus Willd).