Ethnopharmacology of Repong Damar: Local Traditions and Potential for Novel Drug Discovery in Bukit Barisan Selatan National Park

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Abstract: Ethnopharmacological knowledge reflects the adaptive relationship between humans and biodiversity, serving as an essential foundation for discovering bioactive compounds and developing sustainable medicines. This study aimed to identify ethnopharmacological practices that are still actively maintained by the local community in Karya Penggawa Subdistrict, Pesisir Barat Regency, Lampung Province; to document the plant species utilized; and to identify the diseases treated through biodiversity resources within the Repong Damar ecosystem. Using an ethnographic approach, data were collected from July to October 2025 through in-depth interviews, observations, and documentation involving respondents selected via snowball sampling. The findings confirmed that traditional healing practices remain preserved, with eight out of the forty plant species identified in the study area being recognized for their medicinal properties. Frequently used plant parts included bark, fruit peel, and leaves, predominantly prepared through decoction (75%), mainly for treating gastritis, as well as infectious diseases such as fever and diarrhea, and metabolic disorders, particularly hypertension and diabetes mellitus. Only about 20% of the biodiversity was utilized, indicating selective yet empirically grounded knowledge. These results highlight Repong Damar as both a reservoir of indigenous wisdom and a potential source of pharmacological innovation. Further phytochemical and pharmacological studies are recommended to support bioprospecting efforts and integrate ethnopharmacology into sustainable health development in Indonesia.

1 INTRODUCTION

A mixed agroforestry garden dominated by the cat's eye resin tree (*repong damar*). The *Repong Damar* system located in the Traditional Zone of the Balai Kencana Resort, Bukit Barisan Selatan National Park (BBSNP), represents a distinctive agroforestry landscape in Lampung, Indonesia. This traditional land-use system integrates *Anthoshorea javanica* with a variety of other plant species that provide ecological, economic, and sociocultural benefits to local communities (Pratama and Jasmiadi, 2023; Purwoko *et al*., 2025). Beyond serving as a source of resin, food, and timber, *Repong Damar* also functions as a repository of medicinal plants that support community health through traditional healing practices (Michon *et al*., 2022; Hairiah *et al*., 2023). Its ecological resilience and social continuity make *Repong Damar* a living model of community-based forest management rooted in local wisdom and biodiversity conservation.

Traditional knowledge related to the medicinal use of plants has been passed down orally through generations of Lampungnese traditional communities. This ethnopharmacological knowledge encompasses plant identification, plant parts utilized, preparation methods, and therapeutic applications. For example, *Kidney tea plant* leaves are used to reduce fever, while the bark of stinky bean (*Parkia speciosa)* is traditionally employed to treat diabetes (Yulistyarini *et al*., 2019; Mardhiana *et al*., 2022). However, such indigenous knowledge is rapidly eroding due to modernization, socio-economic transformation, and a declining interest among younger generations in traditional practices. The gradual loss of this knowledge threatens not only cultural continuity but also the potential discovery of novel bioactive compounds from local biodiversity.

To date, ethnopharmacological studies specifically focusing on the utilization of biodiversity within the repong damar ecosystem in the Balai Kencana Traditional Zone of BBSNP remain limited. Previous studies have predominantly focused on the ecological and economic functions of the agroforestry system, leaving a substantial knowledge gap regarding its ethnopharmacological dimension. This research, therefore, offers novelty by providing the first systematic documentation and scientific analysis of traditional medicinal plant use within this unique socio-ecological landscape. By integrating ethnopharmacological investigation with ecological and cultural perspectives, the study contributes new insights into how biodiversity and traditional knowledge interact to sustain local health systems and community resilience.

The urgency of the research lies in the critical need to identify and document indigenous ethnopharmacological practices before they are irreversibly lost. As socio-cultural shifts and land-use changes accelerate, the preservation of local medicinal knowledge becomes increasingly pressing. Systematic

documentation of these practices not only safeguards intangible cultural heritage but also provides a scientific foundation for the development of evidence-based herbal medicines and participatory conservation policies. Moreover, this research strengthens the link between biodiversity conservation, cultural sustainability, and human well-being by highlighting the pharmacological potential of plants within Repong Damar. In doing so, it underscores the essential role of traditional knowledge in supporting both biodiversity preservation and the discovery of novel natural drugs. Accordingly, this study aims to confirm the existence of ethnopharmacological practices within the traditional culture of the Lampung community in the Traditional Zone of Balai Kencana Resort, BBSNP; identify the plant species utilized in these ethnopharmacological practices; and determine the types of diseases treated through the use of biodiversity within the Repong Damar ecosystem.

2 METHODS

The research was conducted from September to October 2025 in the *Repong Damar* area located within the Traditional Zone of the Balai Kencana Resort, BBSNP. The *Repong Damar* in this traditional zone is divided into two clusters: (1) areas granted utilization access through a cooperation agreement with BBSNP, and (2) areas without formal utilization permits.

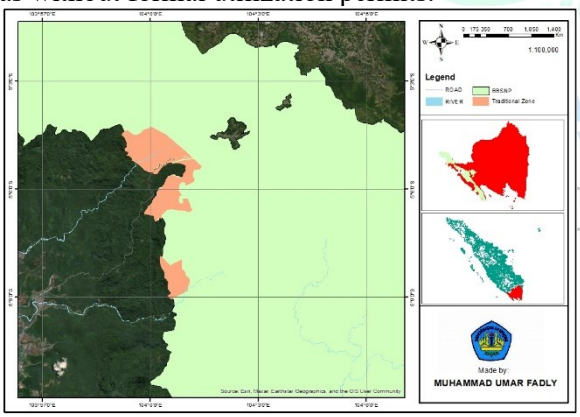

Figure 1. Location of Repong Damar in the Traditional Zone of Balai Kencana Resort

Sampling was conducted using the snowball sampling technique, an approach considered appropriate for ethnobotanical studies where traditional knowledge is typically held by a limited number of individuals, such as community elders, customary leaders, and traditional healers, who serve as key knowledge holders. This method enables researchers to identify hidden respondents and collect in-depth data that are often inaccessible through probability sampling techniques The process continued iteratively until data saturation was achieved, which was indicated by the absence of new information on plant species, medicinal uses, and preparation methods from successive interviews, as well as the lack of additional informant referrals and no further informant recommendations were provided.

Data collection was primarily carried out through in-depth interviews with individuals possessing local knowledge about the utilization of plant diversity within the *Repong Damar* ecosystem. Key informants were selected purposively and included customary leaders, traditional healers, and damar farmers who have long interacted with this agroforestry system. Through the recommendations of initial informants, a network of credible respondents was established, resulting in a more comprehensive dataset. The interviews followed a semi-structured and open-ended format, allowing for flexibility in exploring detailed information on traditional plant use, preparation methods, and therapeutic applications.

In addition to interviews, ethnographic observation was employed to enrich the understanding of human–environment interactions within the *Repong Damar* system. This observation not only documented existing vegetation types but also captured daily community practices in the sustainable use of biological resources. The researcher's participation in local activities, such as damar planting rituals and informal discussions, provided valuable insights into the cultural values and environmental ethics underpinning community-based conservation. Consequently, ethnographic observation complemented interview data by offering a holistic depiction of the relationship between local communities and the *Repong Damar* landscape.

All collected data from interviews and observations were systematically documented and analyzed for publication in scientific manuscripts, research reports, and popular articles focusing on biodiversity utilization within the ethnopharmacological context. This documentation serves as an essential step in preserving traditional knowledge that is at risk of being lost due to modernization, while also

Table 1. Plant species, plant parts, preparation methods, and diseases treated in ethnopharmacological practices.

No.	Local Name	Scientific Name	Plant Part Used	Disease Treated	Preparation Method	Category
1	Kidney tea plant	*Orthosiphon aristatus*	Leaves, Roots	Fever	Boiled	Antipyretic
2	Sai Bebak	*Padbruggea dasyphylla Miq.*	Bark	Fever	Boiled	Antipyretic
3	Linsuh	*Baccaurea lanceolata*	Fruit	Hypertension	Unprocessed	Anti-hypertensive
4	Sepangluh	*Staurogyne elongata*	Leaves	Sore throat	Boiled, Stir-fried	Anti-inflammatory
5	Duku	*Lansium domesticum*	Fruit Peel	Fever, Diarrhea, Gastritis	Boiled	Anti-pyretic, Anti-diarrheal, Anti-gastritis
6	Sungkai	*Peronema canescens*	Leaves	Sore throat	Crushed	Anti-inflammatory
7	Stinky bean	*Parkia speciosa*	Bark	Diabetes	Boiled	Anti-diabetic

providing a scientific foundation for community-based conservation strategies. Ultimately, this research aims to contribute to the preservation of local knowledge and the sustainable management of biodiversity within the *Repong Damar* agroforestry system.

3 RESULTS AND DISCUSSION

In the *Repong Damar* area located within the Traditional Zone of Balai Kencana Resort, Bukit Barisan Selatan National Park (BBSNP), local communities utilize the available biodiversity as a source of traditional medicine. This utilization reflects ethnopharmacological practices, which involve the application of indigenous knowledge in processing and using plants or their specific parts to maintain health and treat various diseases. Such practices illustrate the close interrelationship between the community and the forest ecosystem, where local wisdom serves as the foundation for both the conservation and sustainable use of biological resources. **Tables 1 and 2** present the identified plant species used in traditional healing practices, along with the specific plant parts employed in these ethnopharmacological applications.

The *repong damar* area in the traditional zone of Balai Kencana Resort, Bukit Barisan Selatan National Park (BBSNP), harbors high biodiversity. The survey identified 56 plant species, seven of which are utilized by local communities as medicinal plants. This finding indicates that *repong damar* not only provides economic value through resin and fruit production but also serves as a reservoir of local knowledge and a source of traditional medicinal materials. These results are consistent with Susanti (2018), who emphasized that the *repong damar* agroforestry system maintains a diverse range of medicinal plant species that play an essential role in the health and well-being of surrounding communities (Prayoga *et al*. 2024 and Cherrada *et al*. 2024).

Based on **Table 1**, leaves are the most frequently used plant parts for medicinal purposes. This preference is due to their easy availability, rapid regrowth, and high content of bioactive compounds. The use of leaves is observed in several species, such as *Orthosiphon aristatus* (Kidney tea plant), *Staurogyne elongata* (sepangluh), and *Peronema canescens* (sungkai). The most common preparation method is decoction, where the leaves are boiled, and the resulting extract is consumed as a traditional remedy, particularly for fever treatment. This pattern aligns with the findings of Rahayu *et al*. (2019), who reported that communities in the private forests of Sumatra also favor leaves as medicinal ingredients due to their abundance and ease of processing.

Table 2. Medicinal properties and species used in ethnopharmacological practices for treatable diseases

No.	Category	Disease	Plant Source Species	Plant Part Used	Disease Category
1	Antipyretic	Fever	- *Orthosiphon aristatus* - *Lansium domesticum* - *Padbruggea dasyphylla Miq*.	- Leaves, Roots - Fruit Peel - Bark	Infectious
2	Antihypertensive	Hypertension	*Baccaurea lanceolata*	Fruit	Non-Infectious
3	Anti-inflammatory	Inflammation	*Staurogyne elongata*, *Parkia speciosa*	Leaves	Infectious
4	- Antidiarrheal - Anti-gastritis	-Diarrhea -Gastritis	*Lansium domesticum*	Fruit Peel	Functional
5	Antidiabetic	Diabetes	*Parkia speciosa*	Bark	Non-infectious

Meanwhile, **Table 2** shows that the medicinal plants utilized by the community can be categorized into six main therapeutic groups: antipyretic, antihypertensive, anti-inflammatory, antidiarrheal, antigastritic, and antidiabetic. The most frequently treated ailments include fever, sore throat, diarrhea, gastritis, and diabetes. For instance, *Orthosiphon aristatus* and *Padbruggea dasyphylla* are used as antipyretics to reduce fever, while *Baccaurea lanceolata* is employed as an antihypertensive agent. The diverse medicinal uses of these species demonstrate that the community's ethnopharmacological knowledge enables them to classify plants according to their therapeutic functions and apply them effectively in traditional medicine. These

findings are consistent with Rizki *et al*. (2020), who highlighted that local wisdom in Indonesia's tropical forests plays a crucial role in identifying and categorizing medicinal plants based on their pharmacological properties, maintaining its relevance to this day.

The discovery of significant anti-inflammatory activities in various plant species marks a promising avenue for future drug development, especially given the strong association between chronic inflammation and pathological conditions such as diabetes mellitus. Recent reviews highlight that natural products, including polysaccharides, flavonoids, alkaloids and diterpenoids, can modulate key inflammatory signalling pathways such as NF-kB and COX-2, positioning them as attractive candidates for therapeutic intervention in inflammation-driven diseases (Saha, 2025). Further, emerging evidence shows that phytochemicals derived from medicinal plants exhibit potent anti-inflammatory effects in organ systems related to metabolic and cardiovascular diseases (Gonfa *et al*., 2023). The results of this study identify plant species, plant parts, and preparation methods with anti-inflammatory potential, supporting the role of local ethnopharmacological resources as valuable sources for novel pharmaceutical development.

Hypertension is one of the diseases treated using medicinal plants identified in this study, particularly *Baccaurea lanceolata*. This finding highlights the relevance of local ethnopharmacological knowledge in addressing non-communicable diseases at the community level. According to the World Health Organization (WHO), an estimated 1.4 billion adults aged 30–79 are affected by high blood pressure, with the majority living in low- and middle-income countries (WHO, 2024). Epidemiological analyses confirm that uncontrolled hypertension remains a silent killer, significantly increasing risks of stroke, heart attack, heart failure and renal damage (Kario *et al*., 2024). Accordingly, ethnopharmacological research which investigates medicinal plants for blood pressure regulation or vascular inflammation modulation holds high relevance not only for therapeutic innovation but also for global health strategies.

4 CONCLUSIONS

This study confirmed the existence of ethnopharmacological practices within the traditional culture of the Lampung community in the Traditional Zone of Balai Kencana Resort,

Bukit Barisan Selatan National Park (BBSNP). The findings revealed that traditional knowledge remains integral to community health management, as local people utilize biodiversity within the *repong damar* agroforestry system to treat various diseases. In total, 56 plant species were recorded, with seven species identified as medicinal plants used for both infectious and non-infectious diseases.

The most frequently used plant parts were leaves, favored for their accessibility, quick regeneration, and abundance of bioactive compounds. Traditional preparation methods such as boiling and crushing were commonly applied, reflecting practical approaches to extracting medicinal properties. These ethnopharmacological applications were classified into six main therapeutic groups, including antipyretic, antihypertensive, anti-inflammatory, antidiarrheal, anti-gastritic, and antidiabetic, showing that the Lampung community possesses strong empirical knowledge of pharmacological classifications (Sinaga *et al*., 2023).

Furthermore, the discovery of plants with anti-inflammatory and antihypertensive properties indicates substantial potential for future natural drug development. Given the close relationship between inflammation, hypertension, and chronic diseases such as diabetes, these findings underscore the importance of preserving indigenous knowledge as a foundation for sustainable innovation in herbal medicine and biodiversity-based healthcare.

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