
湖南大学学报（自然科学版）
Journal of Hunan University (Natural Sciences)

第 50 卷 第 1 期
2023 年 1 月

Available online at http://jonuns.com/index.php/journal/index

Vol. 50 No. 1
January 2023

Open Access Article https://doi.org/10.55463/issn.1674-2974.50.1.18

# Natural Availability of Medicinal Plants Used by the SAD Community in the Bukit Duabelas National Park Area, Indonesia

**Ardi Novra[1]*, Agus Syarif[2], Ahmad Nur Budi Utama[2], Istiqomah Malinda[2], Uce Lestari[3]**

[1] Faculty of Animal Science, University of Jambi, Indonesia

[2] Faculty of Economics and Business, University of Jambi, Indonesia

[3] Faculty of Health and Medical Sciences, University of Jambi, Indonesia

* Corresponding author: ardinovra@unja.ac.id

*Received: December 21, 2022 / Revised: January 13, 2023 / Accepted: January 19, 2023 / Published: February 28, 2023*

**Abstract:** This article describes the natural availability of medicinal plants used in the community health behavior of Suku Anak Dalam (SAD) in the Bukit Dua Belas National Park (BDNP) area. The SAD community, also known as the Kubu, Orang Rimba, or Orang Ulu, are a minority (marginal) ethnic group who live in remote areas and have minimal interaction with the outside world and maintain a primitive way of life amidst modernization. This level of availability is important in decision-making in the socio-economic empowerment program of the SAD indigenous community through the commercialization of medicinal plants. The survey research was conducted for 2 months in the Air Hitam District, Sarolangun Regency, Jambi Province. Data were collected through field observation and interviews with sources of information from the leader of the SAD group, usually called Tumenggung. The data analysis method used simple mathematical techniques to identify the determinants of the level of sustainability of the supply of medicinal plants. The research results showed that the types of medicinal plants classified as shrubs had a higher sustainable supply from nature. This group of medicinal plant species also has the opportunity to be cultivated so that it can be integrated with efforts to empower the SAD community both in the area (in-sites) and around the BDNP (ex-sites). The preservation of medicinal plants of the SAD community in the BDNP area is still maintained, except for several types of medicinal plants belonging to certain trees that require conservation efforts through protection and ecosystem enrichment. Based on the supply of medicinal plants, it can be concluded that a particular strategy is needed for each medicinal plant in developing its economic value, which is grouped into conservation and cultivation efforts, both in situ and ex situ.

**Keywords:** Bukit Duabelas National Park, indigenous people, medicinal plants, Suku Anak Dalam, sustainability.

# 印度尼西亞武吉杜贝拉斯國家公園地區伤心社區使用的藥用植物的自然可用性

**摘要**：他的文章描述了武吉杜瓦贝拉斯国家公园(发展局)地区内在儿童部落(伤心)社区健康行为中使用的药用植物的自然可用性。伤心社区，也被称为库布、红毛猩猩林巴或红毛猩猩，是一个少数（边缘）族群，他们生活在偏远地区，与外界的互动极少，在现代化中保持着原始的生活方式。这种可用性水平对于伤心土著社区通过药用植物商业化的社会经济赋权

计划的决策非常重要。该调查研究在占碑省萨罗兰贡县亚依淡区进行了两个月。数据是通过实地观察和采访来自伤心小组（通常称为图猛宫）的领导人的信息来源收集的。数据分析方法使用简单的数学技术来确定药用植物供应可持续性水平的决定因素。研究结果表明，归类为灌木的药用植物类型具有更高的来自自然界的可持续供应。这组药用植物物种也有机会被种植，以便与在该地区（场内）和发展局周围（场外）赋予伤心社区权力的努力相结合。发展局地区伤心社区的药用植物的保护仍然得到维护，但属于某些树木的几种药用植物需要通过保护和生态系统丰富来进行保护。根据药用植物的供应情况，可以得出结论，每种药用植物在发挥其经济价值时都需要采取特定的策略，这分为原生境和非原生境的保护和栽培工作.

**关键词**：武吉杜阿贝拉斯國家公園, 原住民，藥用植物, 苏库阿纳达拉姆, 可持續性.

## 1. Introduction

Indonesia is also inhabited by about 300-700 ethnic groups which produce a diversity of cultures, traditions, and local wisdom that differ from one ethnicity to another or from one region to another. One of the local wisdom possessed by ethnic Indonesians is to use natural biological resources to fulfill their life needs, including as a source of food and maintaining their health, known as medicinal plants [1]. In countries where health care is predominantly based on allopathic medicine, or where traditional medicine is not yet included in the national health system, traditional medicine is often referred to as "complementary," "alternative" or "non-conventional" [2]. Traditional medicine and biodiversity can be seen from the strong tradition of natural healing methods using biological medicinal plants and animal species, natural environmental conditions, spring air or natural scenery. The series of folk medicine, and professional medical (Chinese and Greek), and biomedical systems contain thousands of drugs made from leaves, plants, roots, bark, animals, mineral substances, and other materials found in nature [3]-[4].

Jambi Province with an area of ± 5,343,700 ha has diverse medicinal plant resources and abundant ethnic diversity to continue to be explored and developed into new economic sources. The central area of Sumatra with the Batanghari River (± 3,322 km or 4 times the Musi River) as the longest river in Sumatra "cuts" Sumatra Island into two parts from upstream to downstream and has a long historical value as a symbol of glory [5]. The catchment area or Batanghari watershed (± 4.9 million ha) is the second largest in Indonesia, which for hundreds of years has been inhabited by various Malay ethnicities such as the Kerinci, Batin, Penghulu, and Suku Anak Dalam (SAD) [6]. Many traditions have developed, including medical behavior and good health in communities, including marginalized communities such as the SAD in the usage of medicinal plant resources in the BDNP conservation area.

The SAD community in and around the BDNP area is an indigenous community that lives in a marginal and backward situation. The interdependence between the sustainability of the environment and the sustainability of the human species needs full recognition and the development of new public health practices [7], which can increasingly translate into policies and actions the recognition that the sustainable use of finite natural resources is a major determinant of health [8]. Concession forest management policies such as Forest Concession Rights (FCR) and Industrial Plantation Forest (IPF) have become a momentum for a crisis of legitimacy, and SAD's authority in determining forest area management as well as expansion of oil palm plantations and transmigration programs have caused SAD's living space to become increasingly narrow [9]. The life of the Orang Rimba or Kubu Tribe (another name for the SAD) with a culture of life (hunter sand gatherers) and a nomadic life. At the end of the 18th century, this community met foreigners who were carriers of smallpox, which later spread and became a severe epidemic. Fear and trauma of social relationships with outsiders encourage this community to seek healing drugs from forest plants with the support of knowledge of traditional medicine from their ancestors [10].

The richness of biodiversity and ethnic diversity as well as the relationship between traditional communities and the long-established environment are great potential that need to be managed for mutual prosperity. The development of ethnoscience, which comes from the Greek word "Ethnos" that means nation and "Scientia" that means knowledge [11], is a unique knowledge possessed by a nation with the aim of describing the environment as seen by the community being studied. The basic assumption is that the environment is cultural because the same environment in general can be seen and understood differently by people with different cultural

backgrounds [12]. Through the ethnoscience approach, it is hoped that we will be able to predict people's behavior in various activities related to the environment. The influence of public opinion on the environment is part of the mechanism that produces real behavior from the community itself in creating changes in their environment. People's lives are strongly influenced by nature and nature provides whatever people need from housing to farming god to breathe.

Ethnoecology examines the ways in which traditional societies use ecology and live in harmony with their natural and social environment [13]. Ethnoecological study with its branches is beneficial not only for socio-cultural developments in certain localities where studies are conducted [14]. Decision-makers, planners, and executors could learn and obtain various information from ethnoecological studies on how socio-cultural development programs are successfully carried out. The life of traditional society is generally very close to nature, and humans observe nature well, recognize its characteristics so that they know how to respond to it. In the field of health, it is known as ethnomedicine (ethnomedicine), which is the study of health and health care in traditional communities involving traditions and beliefs held by local communities or ethnic groups. Traditional medical practices are still carried out using medicinal plants, prayers, mantras, dances, or ceremonies and other practices that tend to be carried out in traditional societies. Many studies on the use of medicinal plants have been carried out, including medicinal plants in the Pelayang Raya Village reaching 96 species with 49 families [15], Tabun Village as many as 39 species with 33 families, and most numerous *Sapindaceae family* [16], including 39 medicinal plants, and 30 types of use alone and combined with others in the form of potions. The results of the Biota Medika Expedition stated that the types of medicinal plants found in the BDNP included 137 species consisting of 101 medicinal plants and 27 medicinal fungi [17].

Empowerment or commercialization of medicinal plants in the BDNP area requires a special strategy to be sustainable and have a positive impact on the social economy of the SAD community while still paying attention to the preservation of nature and the environment. Sustainability is largely determined by the availability of supplies of natural medicinal plants as production inputs, and in general, each type has a different level of availability in nature. This level of availability is highly dependent on many factors, including the type and part of the medicinal plant used, the condition of the habitat of the medicinal plant life ecosystem, the method and frequency of collection that can be carried out and other factors. Based on the description above, preliminary research was conducted, which aims to see the level of sustainability of the availability of SAD medicinal plants in the BDNP area as the basis for developing a strategic plan for empowering medicinal plants and the SAD community.

## 2. Materials and Methods

The survey research was conducted for 2 months in the Air Hitam District, Sarolangun Regency, Jambi Province. The main steps of the research process are summarized in Figure 1.

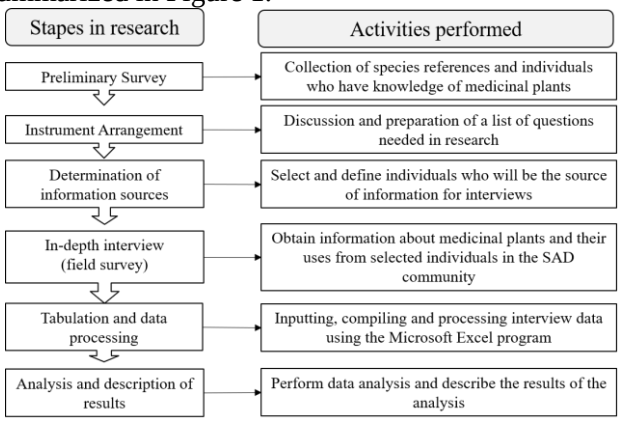


Fig. 1 The research main steps

Data were collected through field observations and interviews with the selection of sources of information carried out by purposive sampling, with the criteria being the SAD leaders who are aware of health behavior and skills in processing traditional medicinal plants in the life of the SAD community. Interviews with traditional leaders known as Tumenggung were conducted repeatedly with guidelines and a database derived from the medicinal plant book compiled by the Bukit Duabelas National Park Authority. Guidelines for collecting field data using a questionnaire which is divided into several components, namely the introduction of medicinal plants, the production process and their use, and availability in the BDNP area (Appendix 1). The method of analyzing the accumulated tabulated data in the Microsoft Excel program uses a simple mathematical approach to identify the determinants of the level of sustainability of the supply of medicinal plants.

## 3. Results and Discussion

### 3.1. SAD Community Medicinal Plant Usage Behavior

Medical plants can be defined as the plants that possess therapeutic properties or exert beneficial-pharmacolical effect on the human or animal body [18]. Traditional and folk medicines are the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illnesses [19]. The knowledge of the development of ideas related to the usage of medicinal plants with awareness has increased the ability of

pharmacists and physicians to respond to the challenges that have emerged with the spreading of professional services in facilitation of man's life [20]. Medicinal plants for the SAD community as one of the indigenous tribes who live in the Bukit Duabelas National Park area are used for treatment and other purposes such as health care, body care, and meeting the needs of other parties (Figure 2).

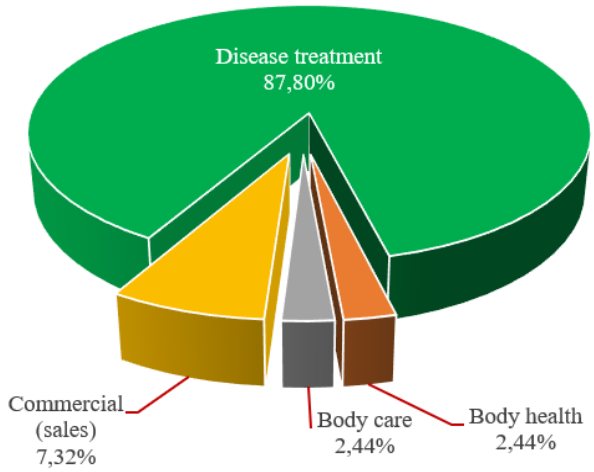


Fig. 2 Usage of SAD community medicinal plant

Most medicinal plants used by the SAD community are for treating certain diseases, while a small portion is for the maintenance of health and the care of body parts. Some types of plants are considered medicinal plants by this community even though they are not used. The collection of medicinal plants is carried out to meet the needs of external parties and is used to meet other needs such as food by bartering or selling to parties in need.

They are used in the form of crude drugs, which are dried parts of the medicinal plants (root, stem, wood, bark, leaves, flowers, fruits, seeds, and, in some cases, whole plants) or their extracts [18].

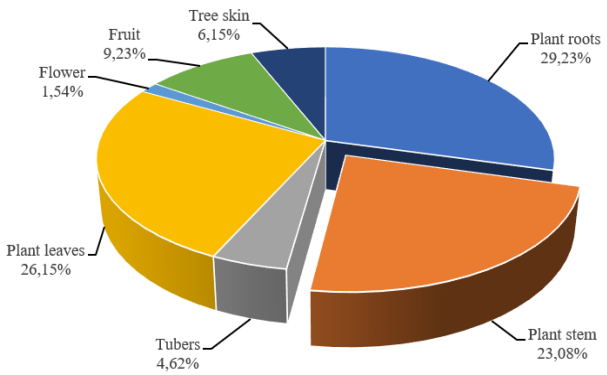


Fig. 3 Parts of medicinal plants used by the SAD community

Part of the medicinal plants used are roots, stems, leaves, rhizomes, tubers, flowers and fruit with various processing methods such as boiled, grated, thin, crushed, squeezed, eaten and drunk directly, used directly, dropped, brewed and juiced [21]. Roots and leaves are the dominant plant parts used in the behavioral treatment of SAD communities. Leaves as the main photosynthetic organ of plants and considered a key component of bioactive synthesis are the parts most widely used for traditional medicine [22]. The three components of medicinal plants that are widely used by the SAD community are roots, leaves, and stems. In one type of medicinal plant, more than one part and even up to 5 parts of medicinal plants can be used (Table 1).

Table 1 Usage of medicinal plant parts (Data processing, 2022)

| No. | Number of part | | Proportions (%) |
|---|---|---|---|
| 1 | Single (1 part) | | 60,98 |
| 2 | Multi-part | | |
| | a. | 2 parts | 24,39 |
| | b. | 3 parts | 4,88 |
| | c. | 4 parts | 7,32 |
| | d. | 5 parts | 2,44 |

This pattern of usage of medicinal plant parts is related to the practice of drug production and collection of medicinal plants by the SAD community. Generally, the production of SAD traditional health products is still single, and if it is in the form of a herb, it is sourced from the same type of medicinal plant. The development of this traditional health product by mixing several types of medicinal plants has not been carried out due to the lack of knowledge and the use of medicinal plants more on experience that has developed down and down in the community.

The processing of medicinal plants by the SAD community is carried out simply , starting from cleaning to gathering. Medicinal plants that only go through a cleaning process can be categorized as types of medicinal plants that are used directly, while those that require a human touch even though they are simple can be categorized as a group of processed medicinal plants. The pattern of handling medicinal plants by the SAD community before being used both as medicine and health products is presented in Figure 4.

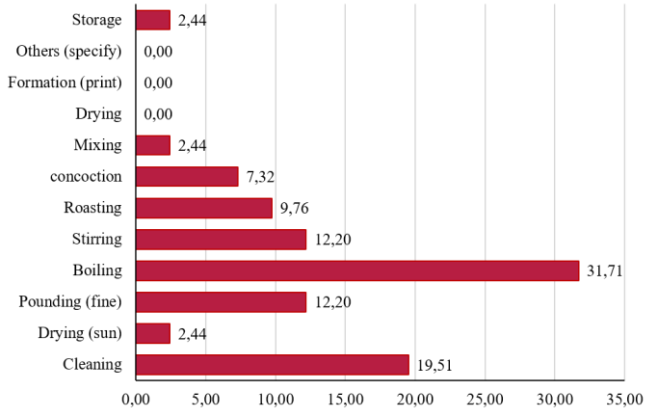


Fig. 4 Simple processing of SAD community medicinal plants

Generally, the processing of medicinal plants by the SAD community is carried out in 2 ways, namely, wet and dry processing. Wet processing through the boiling process of medicinal plants is more dominant than dry

processing using either sunlight (drying) or roasting (without using oil). Only few medicinal plants were prepared with ingredients from various raw materials and then mixed by the SAD community. This again emphasizes that the use of medicinal plants is generally single and not in the ingredients of various types of plants. According by [23], medicinal plants are used by drinking (66.30%), mixed by boiling (29.47%), traditionally processed by the people themselves, while their efficacy is only felt within 1 day (33.70%) and has no effect side (82.14%).

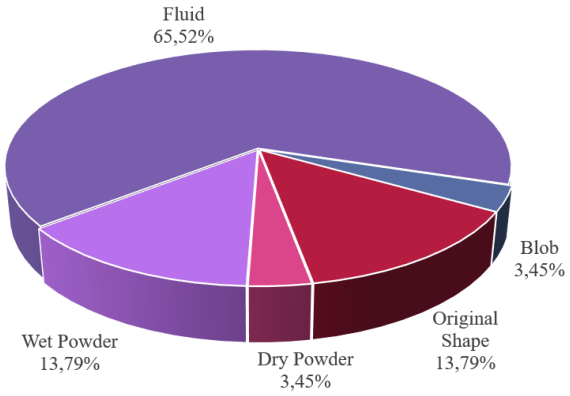


Fig. 5 Variations of processed medicinal plants of the SAD community

Variations in medicinal plant processing techniques produce several ready-to-use product forms, as shown in Figure 5.

In line with processing techniques that mostly use wet processing through boiling, the final product that is ready to be used is in liquid form. However, dry processing produces products in the form of wet powder, wet powder, and lumps. This means that there are other activities in the processing of medicinal plants, such as filtering, extorting and drying again. This medicinal plant processing technique is also related to the procedures for use and the group of medicinal plants themselves. Medicinal plants that are collected from long-lived plants (trees) in the form of fruit are generally only cleaned and the same is done for plants as external medicines in the form of leaves.

### 3.2. Sustainability Level of the SAD Community Medicinal Plant

The links between medicinal plants and biodiversity are exemplified by a long tradition of healing powers associated with the earth's natural systems, whether this entails traditional medicine, the ambient salubrious air, spring water, or the natural scenery [8]. Discussing the level of sustainability of the supply of medicinal plants to the SAD community in the BDNP area in the present conditions means that it is related to natural supply. The behavior of collecting medicinal plants from nature by the SAD community in general is presented in Table 2.

Table 2 The behavior of collecting medicinal plants by the SAD community in the BDNP area (Data processing, 2022)

| No. | Description | Proportions (%) |
|---|---|---|
| A | How to collect medicinal plants | |
| 1 | Unplug | 25.58 |
| 2 | Cut | 46.51 |
| 3 | Choose | 27.91 |
| B | Medicinal plant collection time | |
| 1 | Any time | 90.24 |
| 2 | Certain time | 9.76 |
| | a. Seasonal | 2.44 |
| | b. Specific month | 4.88 |
| | c. Annual incidental | 2.44 |
| C | Distribution of areas found in medicinal plants | |
| 1 | Spread evenly | 60.00 |
| 2 | Limited location | 35.00 |
| 3 | Special location | 5.00 |

Harvest behavior includes how, when, and where the location of these medicinal plants can be harvested by the SAD community in the BDNP area. Most medicinal plants are in the form of shrubs and food, so the collection process is also more dominant by pulling out, which means that the whole plant is harvested. However, groups of tree plants classified as long-lived plants are generally carried out by picking or cutting the parts needed. The consequence of this method of harvesting by retracting is that the supply naturally disappears immediately (one time), while those that are picked can be repeated until they are available again (renewable). Almost all types of medicinal plants can be collected from nature at any time except for certain plants, which are seasonal and annual. Types of medicinal plants that are harvested at a special time are generally a group of trees with the fruit harvested, such as the Jernang plant, which can only be harvested at a special time with a very short duration.

The use of medicinal plants which are used only for a limited time by the internal SAD community is thought to be a factor causing their sustainability to be maintained. This can be seen from the collection locations, most of which are still evenly distributed in the BDNP area. Generally, these medicinal plants are shrubs and food groups that can thrive in land ecosystem conditions (wet or dry), not too dependent on the microclimate (can grow on land with poor lighting under tree cover). Medicinal plants that can be found in certain locations are plants that grow and develop in ecosystems with certain microclimate conditions, while special locations are medicinal plants that are rare (endemic) and long-lived and require conservation or re-enrichment efforts.

Estimating the level of supply sustainability of the medicinal plants naturally uses several variables, including volume, experience, and location distribution as well as the frequency of obtaining them. Based on these variables, the level of sustainability of the supply of medicinal plants is obtained, as presented in Figure 6.

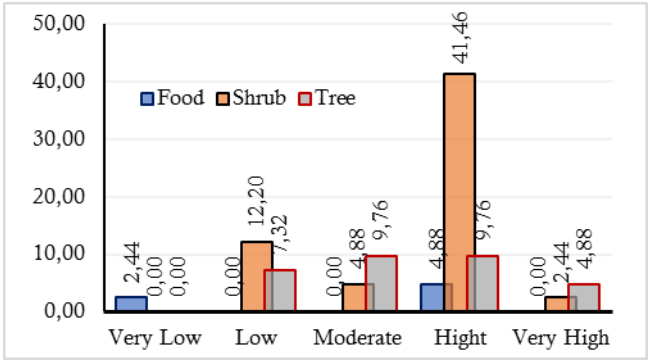


Fig. 6 Sustainability level of natural supply of medicinal plants in each group of plant species

The average level of sustainable supply of medicinal plants belonging to the shrub group (77.14%) was higher than that of the tree group (76.92%) and food (69.05%). Considering the proportion of the number of medicinal plants that are also classified as shrubs, it can be stated that this group of plants has the most potential to become a priority in usage as raw materials for medicines and herbs. However, because the collection is done by pulling (one time) than in the development of medicines and herbs based on medicinal plants, the SAD community needs a strategy to maintain a sustainable supply. This is because when commercialization is carried out, the need will increase so it will threaten its natural availability.A suitable strategy is to increase the planted area through the development of cultivation in SAD communities both within the BDNP area and around existing SAD community settlements. This is based on the fact that there is a close relationship between the level of sustainable supply and the potential for cultivating medicinal plants from this shrub group (Figure 7).

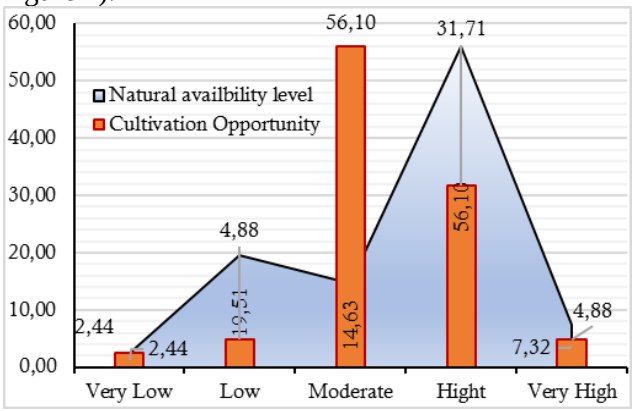


Fig. 7 The relationship between the medicinal plant sustainability supply level, and the potential for cultivation

This phenomenon is quite unique when observing the relationship between medicinal plants that have moderate and high availability in nature and are more potential to be cultivated than plants with low and very low availability. This indicates that the SAD community thinks that this group of medicinal plants should be developed because they are quite easy to collect and develop. This group of potential medicinal plant species belongs to the shrub group, as shown in Figure 8.

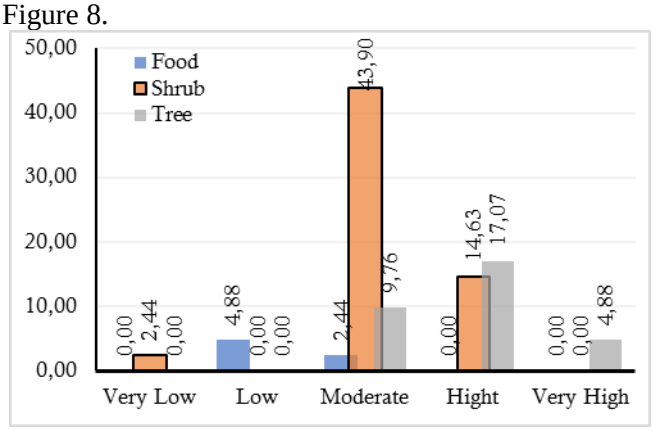


Fig. 8 Potential development of cultivation based on medicinal plant group

The above discussion regarding the relationship between the level of supply sustainability and the potential for medicinal plant cultivation indicates that the types of plants that are classified as shrubs (non-food) have the most potential for cultivation. A description of the relationship between the level of sustainability supply and the fulfillment of the supply of plant raw materials through cultivation.

The results and discussion should be presented in the same part, clearly and briefly. The discussion part should contain the benefit of the research result, not the repeat result part. The results and discussion part can be written in the same part to avoid the extensive quotation. Tables or graphs must present different results. The results of data analysis must be reliable in answering research problems. References to the discussion should not repeat the references in the introduction. Comparisons with the findings of previous studies must be included.

## 4. Conclussion and Implication

### 4.1. Conclusion

Based on the results of the study, it can be concluded that most drugs in the SAD community are still processed singly (not ingredients from various types of plants), the final form of the product before using a liquid, and plants in the group of shrubs. The types of medicinal plants that were classified as shrubs had a higher level of sustainable supply from nature. This group of medicinal plant species also has the opportunity to be cultivated so that it can be integrated with efforts to empower the SAD community both in the area (in-sites) and around the BDNP (ex-sites). The preservation of medicinal plants of the SAD community in the BDNP area is still maintained, except for several types of medicinal plants belonging to certain trees that require conservation efforts through

protection and ecosystem enrichment.

### 4.2. Implication

Based on the level of supply of medicinal plants, it can be stated that a special strategy is needed for each medicinal plant in developing its economic value, which is grouped into conservation and cultivation efforts, both in situ and ex situ. The preservation of medicinal plants in the BDNP area is still maintained even though the quality comes from various commercialization.

### 4.3. Novelty and Limitations

The availability of medicinal plants in conservation areas is a determining factor in the sustainability of the supply of raw materials (inputs) in the development of the economic value of traditional medicinal plants, including those used by the SAD community. Information about this availability will be the main consideration in making decisions, whether to be left naturally available, preservation, enrichment, or cultivation development so that supply continuity can be maintained. Nevertheless, further research is needed to directly conduct an inventory and mapping of the presence of medicinal plants directly because this research is still limited to data and information from interviews with traditional leaders "tumenggung" who are assumed to be collectors and key actors in the use of medicinal plants in the SAD community.

## Acknowledgments

The authors are thankful to the head of the Center of Excellence (CoE) for Ethnomedicine and Nutraceuticals, University of Jambi, who has entrusted the Research Team to conduct this research activity. Furthermore, thanks are conveyed to the Chancellor and Chair of the Jambi University Research and Community Service Institute for facilitating and funding this research activity. To the source of information from traditional leaders of the SAD community "Tumenggung" for their willingness to take the time to conduct in-depth interviews during field data collection, thank you for your participation.

## Fund Project

Innovation Research Scheme, Non-Tax Revenue Jambi University, Indonesia.

## References

[1] SILALAHI M, SUPRIATNA J, WALUJO E B, and NISYAWATI. Local knowledge of medicinal plants in sub-ethnic Batak Simalungun of North Sumatra, Indonesia. *Biodiversitas*, 2015, 16(1): 44-54. https://doi.org/ 10.13057/biodiv/d160106

[2] WHO (World Health Organization). 2020. Traditional medicine strategy 2002–2005. http://whqlibdoc.who.int/hq/2002/WHO_EDM_TRM_2002.1.pdf

[3] CHATTERJEE N. Global Medical Geography: Book reviews. *International Journal of Environmental Studies*, 2011, 68(5): 752-756. https://doi.org/10.1080/ 00207233.2011.614382

[4] GESLER W M. Therapeutic landscapes: medical Issues in Light of the new cultural geography. *Social Science & Medicine*, 1992, 34(7): 735-746. https://doi.org/10.1016/0277-9536(92)90360-3

[5] RANI D, and AFDAL. Identification of water pollution in the Batanghari River in Sitiung District, Dharmasraya Regency. Based on a physical and chemical review. *Andalas University Physics Journal*, 2020, 9(4): 510-516. https://doi.org/ 10.25077/jfu.9.4.510-516.2020

[6] WITRIANTO. Historical and Archaeological Potential of the Batanghari Watershed. Historical Analysis: Finding the Path of History, 2020. 9(1): 32-43. http://dx.doi.org/10.25077/ asah.9.1.%25p.2020

[7] BROWN T M, CUEUTO M, and FEE E. The World Health Organization and the Transition From "International" to "Global" Public Health. *America Journal Public Health*, 2005, 96(1): 62-72. https://doi.org/10.2105%2FAJPH.2004.050831

[8] BANSARD J, and SCHRÖDER M. The Sustainable Use of Natural Resources: The Governance Challenge. International Institute for Sustainable Development (IISD) Article. 2021. https://www.iisd.org/system/files/2021-04/still-one-earth-natural-resources.pdf

[9] MUCHLIS F, LUBIS D P, INSENGK R A, and TASMAN A. Sejarah marginalisasi Orang Rimba Bukit Duabelas di era orde baru. *Paramitha Historical Studies Journal*, 2016. 26(2): 217-229. https://doi.org/10.15294/paramita.v26i2.4972

[10] WEINTRE J. *Organisasi dan Kebudayaan Kelompok Minoritas Indonesia*. Yogyakarta: Universitas Gajah Mada. 2003.

[11] ALBUQUERQUE U P AND A G ALVES. "Ethno what?" Terminological problems in ethnoscience with a special emphasis on the Brazilian context. In Recent Developments and Case Studies in Ethnobotany, 2010. https://doi.org/10.13140/RG.2.1.1312.8408

[12] HEDDY S, and KURNIATI M. *Prinsip- prinsip Dasar Ekologi*. PT. Raja Grafindo Persada. Jakarta. 1994: 55-57.

[13] AHIMSA P H S. *Etnosains dan etnoteknologi: Wawasan budaya untuk pengembangan teknologi*. Conference Paper "Pembangunan Berwawasan Budaya". 2002.

[14] PUTRA H S A. Ethnoscience A bridge to back to nature. E3S Web of Conferences 2020: 249.01002. https://doi.org/10.1051/e3sconf/202124901002

[15] NURHAYANI. *Jenis Tumbuhan Obat yang Digunakan Masyarakat Desa Pelayang Raya. Kecamatan Sungai Penuh Kerinci.* Thesis. STKIP PGRI Sumbar, Padang. 2003.

[16] INDRIATI G. Etnobotani tumbuhan obat yang digunakan suku anak dalam di desa tabun kecamatan VII Koto Kabupaten Tebo, Jambi. *Jurnal Sainstek*, 2014, 6 (1): 52-56.

[17] BDNP (BUKIT DUABELAS NATIONAL PARK) AGENCY. *Keanekaragaman Hayati: Profil Taman Nasional Bukit Duabelas.* 2022. http://www.tnbukitduabelas.id/profile/keanekaragaman-hayati

[18] NAMDEO A G. Cultivation of Medicinal and Aromatic Plants (Chapter 20). *Natural Products and Drug Discovery: An Integrated Approach*, 2018: 525-553. https://doi.org/10.1016/B978-0-08-102081-4.00020-4

[19] WANGKHEIRAKPAM S. Traditional and Folk Medicine as a Target for Drug Discovery (Chapter 2). *Natural Products and Drug Discovery: An Integrated Approach*, 2018: 29-56. https://doi.org/10.1016/B978-0-08-102081-4.00002-2
[20] SRIVASTAVA A K. Significance of medicinal plants in human life (Chapter 1). *Synthesis of Medicinal Agents from Plants*. 2018: 1-24. https://doi.org/10.1016/B978-0-08-102071-5.00001-5
[21] MAULIDIAH M, WINANDARI O P, and SAPUTRI D A. Utilization of Plant Organs as Traditionally Processed Medicines in the Sugar Cane Garden District, West Lampung Regency. *Journal of Medicine and Health Sciences*, 2020, 7(2): 443-447. https://doi.org/10.33024/jikk.v7i2.2720
[22] ADIYASA M R, and MEIYANTI M. Use of traditional medicine in Indonesia: distribution and influential demographic factors. *Biomedicine and Health Journal*, 2021, 4(3): 130-138. https://doi.org/10.18051/JBiomedKes.2021.v4.130-138
[23] MAJA P K. Profile of the Use of Traditional Medicines in the Community of Wae Ia Village, Golewa District, Ngada Regency, East Nusa Tenggara Province. Thesis 2021. Faculty of Pharmacy Sanata Dharma University, Yogyakarta, Indonesia.

**参考文:**

[1] SILALAHI M、SUPRIATNA J、WALUJO E B 和 NISYAWATI。印度尼西亚北苏门答腊巴塔克西马伦贡亚民族药用植物的当地知识。生物多样性, 2015, 16(1): 44-54. https://doi.org/10.13057/biodiv/d160106
[2] WHO（世界卫生组织）。2020. 2002-2005 年传统医学战略。http://whqlibdoc.who.int/hq/2002/WHO_EDM_TRM_2002.1.pdf
[3] CHATTERJEE N. 全球医学地理：书评。国际环境研究杂志，2011, 68(5): 752-756. https://doi.org/10.1080/00207233.2011.614382
[4] GESLER W M. 治疗景观：新文化地理学中的医学问题。社会科学与医学，1992, 34(7): 735-746. https://doi.org/10.1016/0277-9536(92)90360-3
[5] RANI D 和 AFDAL。法会摄政区八当哈里河的水污染鉴定。基于物理和化学审查。 安达拉斯大学物理杂志，2020，9(4)：510-516。https://doi.org/10.25077/jfu.9.4.510-516.2020
[6] WITRIANTO。八当哈里流域的历史和考古潜力。历史分析：寻找历史的路径，2020. 9(1): 32-43. http://dx.doi.org/10.25077/asah.9.1.%25p.2020
[7] BROWN T M、CUEUTO M 和 FEE E。世界卫生组织和从“国际”到“全球”公共卫生的转变。美国公共卫生杂志，2005，96(1)：62-72。https://doi.org/10.2105%2FAJPH.2004.050831
[8] BANSARD J 和 SCHRÖDER M. 自然资源的可持续利用：治理挑战。国际可持续发展研究所(国际可持续发展研究所)文章。2021. https://www.iisd.org/system/files/2021-04/still-one-earth-natural-resources.pdf
[9] MUCHLIS F、LUBIS D P、INSENGK R A 和 TASMAN A. 十二山丛林人在新秩序时代边缘化的历史。波罗蜜历史研究杂志，2016。26（2）：217-229。https://doi.org/10.15294/paramita.v26i2.4972
[10] WEINTRE J. 印度尼西亚少数民族的组织和文化。日惹：加札马达大学。2003.
[11] ALBUQUERQUE U P 和 A GALVES。“民族什么？”民族科学中的术语问题，特别强调巴西语境。在民族植物学的最新发展和案例研究中，2010 年。https://doi.org/10.13140/RG.2.1.1312.8408
[12] HEDDY S 和 KURNIATI M. 生态学基本原理。PT。格拉芬多佩萨达国王。雅加达。1994：55-57。
[13] AHIMSA P H S. 民族科学与民族技术：技术发展的文化洞察力。会议论文“具有文化洞察力的发展”. 2002.
[14] PUTRA H S A. 民族科学回归自然的桥梁。2020, 乙 3 小号会议网络：249.01002。https://doi.org/10.1051/e3sconf/202124901002
[15] NURHAYANI. 西兰岗拉雅村民使用的药用植物类型。满河克林奇区。论文。STKIP 植物遗传资源研究所西苏门答腊，巴东。2003.
[16] INDRIATI G. 占碑特博摄政 VII Koto 区塔汶村阿纳达拉姆部落使用的药用植物民族植物学。塞恩斯特克杂志，2014，6 (1)：52-56。
[17] 发展局（武吉杜亚伯拉斯国家公园）机构。生物多样性：武吉杜贝拉斯国家公园概况。2022. http://www.tnbukitduabelas.id/profile/keanekaragaman-hayati
[18] NAMDO A G. 药用和芳香植物的栽培（第 20 章）。天然产物和药物发现：综合方法，2018：525-553。https://doi.org/10.1016/B978-0-08-102081-4.00020-4
[19] WANGKHEIRAKPAM S. 作为药物发现目标的传统和民间医学（第 2 章）。天然产物和药物发现：综合方法，2018：29-56。https://doi.org/10.1016/B978-0-08-102081-4.00002-2
[20] SRIVASTAVA A K. 药用植物在人类生活中的意义（第 1 章）。从植物中合成药物。2018：1-24。https://doi.org/10.1016/B978-0-08-102071-5.00001-5
[21] MAULIDIAH M、WINANDARI O P 和 SAPUTRI D A. 西楠榜摄政区甘蔗园区植物器官作为传统加工药物的利用。医学与健康科学杂志，2020, 7(2): 443-447. https://doi.org/10.33024/jikk.v7i2.2720
[22] ADIYASA M R 和 MEIYANTI M. 印度尼西亚传统医学的使用：分布和有影响的人口因素。生物医学与健康杂志，2021, 4(3): 130-138. https://doi.org/10.18051/JBiomedKes.2021.v4.130-138
[23] MAJA P K. 东努沙登加拉省纳达县戈莱瓦区威拉村社区传统药物使用概况。2021 年论文。印度尼西亚日惹佛法大学药学院。

Appendix 1. Guide of interviews

**List of Information needed in the SAD Community Medicinal Plant Survey**
**Name of the Medicinal Plant: .....**

a. Sources
b. Removing unpleasant odors or tastes

Simplify the Introduction

1. What is its use?
a. Is it for treatment? (yes or no)
b. What disease is it mainly used for?
c. Is it also used for other types of disease?
d. Is there any other applications besides medicine? (specify)
2. What part of the medicinal plant is used?
3. Are there any special requirements for the parts used?
4. If YES, explain how the section was selected
…… ……
……
5. Is the medicinal plant part used alone or mixed with other ingredients?
6. If mixed with other ingredients, please specify
……..
7. What is the function of the additive?
c. Other medicinal production process
d. Easy to use
e. Diluent
f. Others. ……..
8. Parts of medicinal plants that are not used as medicinal raw materials
a. Is there anything that can be used?
b. If so, what part?
c. What is it used for?
d. Is it collected together with the part for the manufacture of drugs?

Drug Production Process and Its Use

1. Production Process
a. Composition of use
b. Treatment of raw materials before the preparation process (fresh, dried, boiled, etc.)
c. Stages of concocting medicine
d. Work duration
e. Special conditions of workmanship
f. Craftsmanship special spell
g. Post-cooking treatment (can be used immediately or need other treatment)
h. The final product form of the drug (powder, liquid or other)

2. How to use
a. The main user patient and is there a special spell for medicinal use
b. How is the process of use (consumption or external drugs)
c. If CONSUMPTION DRUGS (drink directly or mixed with other such as food)
d. Medicinal flavors (sweet, bland, bitter)
e. If EXTERNAL DRUGS (smeared, sprinkled, rubbed, bathed or other)
f. Who can use (healer, gatherer, patient or others)
g. Usage time and frequency
h. Time to heal

3. Reactions that will be felt by patients using drugs
a. Can be felt or not
b. If it can be felt ……
c. Symptoms and signs of recovery

Natural availability

1. Are medicinal plants taken by themselves?
2. If you take it yourself, is it related to certain conditions?
3. Or can only be done by people who have been trained or have special requirements?
4. Before being taken is there a certain spell?
5. If so, what is the sound and meaning?
6. At this time, is it still easy to find these types of medicinal plants in the area?
7. Where can usually be found this medicinal plant?
8. Is it found in open space (sunlight enters the area or under tree plants (low light), or around water (river) or other (specify) ……
9. Was this type of medicinal plant when found growing in groups or separately?
10. Are there certain conditions for the type of medicinal plant to be taken, for example, age, color, etc.?
11. If harvesting is done, is the whole plant part taken or only the part that is needed?
12. Can the location be found in the forest area or in the surrounding area?
13. If we go into the forest to look for the medicinal plant, how long and how far will it take to get it.
14. Do these medicinal plants grow themselves or do they grow:
15. Have you ever tried growing it by your own?