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Wild Plants as Food for Communities Living Near The Arak-Arak Bondowoso Teak Forest

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Abstract:

Indonesia's biodiversity offers great potential for the utilization of wild plants as alternative food sources. This study aims to inventory the types of wild plants utilized as food by communities around the Jati Arak-Arak Forest area in Bondowoso. The approach used is qualitative ethnography with purposive and snowball sampling techniques, as well as triangulation methods through participatory observation, in-depth interviews, and field documentation. The results of the study indicate that there are 20 wild plant species from 18 different families that are actively consumed by the local community, particularly the leaves, fruits, and stems. Scientific classification and morphological analysis reveal that these plants contain bioactive compounds such as flavonoids, vitamins, and antioxidants, supporting their functional value as food. The calculation of use value (UV) indicates that *Diplazium esculentum* (fern) and *Colocasia esculenta* (taro) have the highest value (UV = 1.00), indicating a high level of utilization. The utilization of these wild plants as food to meet the nutritional needs of the communities around the Arak-arak Teak Forest necessitates the preservation of local wisdom to ensure the sustainability of natural resources and cultural heritage.

Keywords: Inventory, Wild Plants, Arak-Arak Teak Forest

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Introduction

Indonesia is one of the countries with the highest biodiversity in the world. Its strategic location in the tropics, with high rainfall and fertile soil, makes this country a habitat for various types of flora, ranging from lowland rainforests to high mountains. (Ministry of Environment and Forestry, 2020). It is estimated that Indonesia has around 30,000 to 40,000 species of flowering plants, representing approximately 15.5% of all flowering plant species in the world. Most of these plants grow naturally and are classified as wild plants.

Wild plants are plants that grow without human cultivation but have important benefits for ecosystems and human life, particularly as alternative food sources. Historically, traditional Indonesian communities have utilized various types of wild plants to meet their daily needs, whether as a source of food, medicine, building materials, or as part of cultural practices and rituals. Knowledge about the utilization of wild plants has been passed down from generation to generation and has become an important part of the local wisdom of the local community (Destryana & Ismawati, 2019).

With the tide of modernization, urbanization, and technological advances, this knowledge has begun to be marginalized. Commercial food products and modern cultivated crops now dominate people's diets. Additionally, the perception of wild plants as “weeds” or useless plants further widens the gap between modern society and the local biodiversity around them (Sholichah & Alfidhdhoh, 2020). However, the potential of wild plants is significant in contributing to food diversity and sustainable local food security, particularly in rural areas and near forest regions.

This gap highlights the disconnect between the theoretical foundation regarding the importance of biodiversity conservation and the utilization of local natural resources, and the empirical reality on the ground, where many communities are increasingly abandoning locally-based ecological practices. In addition, there have been few systematic efforts to document and educate communities, especially the younger generation, about the types of wild plants that can be consumed and how to utilize them. This has led to the gradual disappearance of ethnobotanical knowledge, which actually has high ecological, economic, and cultural value.

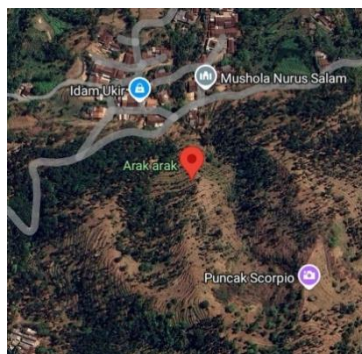
Previous studies have shown that the exploration of wild plants in rural communities makes an important contribution to the conservation of biological resources and local knowledge. Sholichah and Alfidhdhoh (2020), for example, identified 43 species of wild plants used as food in Mendi Village, Jombang. Another study by Panda Huki, Seran, and Sinaga (2024) in Kateri Wildlife Reserve revealed 15 types of wild plants used by the local community as their main food source, with the fruit and leaves being the most commonly used parts. In Kalimantan, Irawan, Oramahi, and Hardiansyah (2020) found 48 types of wild plants growing around forest areas that are utilized by the community of Sedahan Jaya Village to meet their daily consumption needs.

These studies generally focus only on the identification and inventory of species, with most research failing to cover areas that specifically have high flora potential but have been the subject of little academic study, such as the Arak-Arak Teak Forest in Bondowoso, East Java. The Arak-Arak Teak Forest is a forest area on the border of Bondowoso and Situbondo districts that harbors a diversity of wild plants and remains an alternative food source for the surrounding community. Villages such as Sumber Canting and Gunung Putri are areas where residents actively utilize wild plants for their daily food needs. The sustainability of this practice persists due to the strength of local customs and cultural values. Unfortunately, there is no systematic documentation that presents the local community's knowledge of wild plants in a scientific and engaging manner for both general readers and students.

The research area was chosen because the forest has an ecosystem rich in biodiversity, especially various types of wild plants. Research in this area provides opportunities for researchers to explore and document the variety of plant species that have the potential to be used as food sources. Through research in the area surrounding the forest, researchers can record local knowledge related to the use of wild plants. This effort not only supports the preservation of cultural values but also encourages the community to appreciate and protect the existence of wild plants that have important value (Kuswati, Widi Cahya Adi, 2021).

Method

This study uses a qualitative approach with ethnography to explore in depth the local wisdom of the communities around the Arak-Arak Teak Forest in utilizing wild plants as food. The research locations are in Sumber Canting Village (Bondowoso Regency) and Gunung Putri Village (Situbondo Regency), which are located on the southeast and north sides of the forest area. The research was conducted from the determination of the title in August 2024 to the final data collection in April 2025. The research subjects included local communities selected through purposive and snowball sampling techniques, with primary data sources consisting of observations, interviews, and active participation, as well as secondary data from supporting documentation and archives. Data collection techniques were carried out through source triangulation, namely participatory observation, in-depth interviews, and field documentation. The research stages included pre-research, field implementation, and compilation of results. Data analysis referred to the Miles and Huberman model, which included data reduction, data presentation, and conclusion drawing.



Gambar 1. Gambar Peta Lokasi Penelitian

Results and discussion

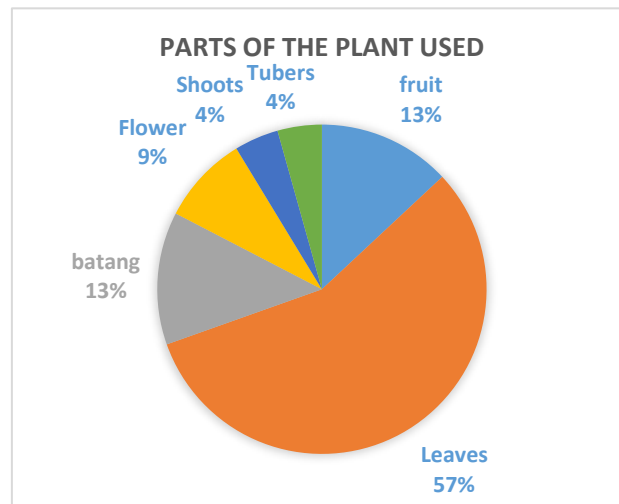
Based on the results of the inventory conducted on wild plants with potential as food sources in the area surrounding the Arak-arak teak forest, 20 species of wild plants from different families were found, as follows:

Table 1. Community Knowledge of Wild Plants as Food

Common/local name	Part used	Uses
Takokak/ <i>Pokak</i>	Fruit	Lalapan, Stir-fry
Katuk/ <i>Gerager</i>	Leaves	Clear vegetable soup
Bayam merah/ <i>Tarnyak</i>	Leaves	Clear vegetable soup, lalapan
Kangkung / <i>Kangkong</i>	Batang, Leaves	Stir fry
Semanggi/ <i>Semanggi</i>	Leaves	Clear vegetable soup
Genjer/ Tong- <i>centhongan</i>	Batang, Leaves, Flower	Lalapan, Stir fry
Simbukan/ <i>Kasembukhan</i>	Leaves, Flower	Pothok
Murbai/ <i>Arwe</i>	Fruit	Consumption fruit
Ciplukan / Or - <i>nyioran</i>	Fruit	Consumption fruit
Rukam/ <i>rukam</i>	Fruit	Consumption fruit
Tunas bambu/ <i>rebbung</i>	The top part of a bamboo shoot	Vegetable soup
Pakis/ <i>Pakes</i>	stem, Leaves	Stir fry, Vegetable soup
Kenikir/ <i>keniker</i>	Leaves	Urap-urap, Lalapan, Vegetable soup
Krokot/ <i>krokot</i>	Leaves	Stirfry, urap, Vegetable soup
Meniran/ <i>meniran</i>	Leaves	Blend with water, strain, and drink.
Talas/ <i>tales</i>	Tuber, Leaves, and stem	Taro and vegetable patties
Beluntas/ <i>beluntas</i>	Leaves	salads, urap, and additional ingredients in dishes such as botok and vegetables
Pegagan/ <i>pegagan</i>	Leaves	As a vegetable
Kelor/ <i>kelor</i>	Leaves	Vegetable soup

Common/local name	Part used	Uses
Daun sendok/ <i>Sendokan</i>	Leaves	Lalapan, Stir fry

Source: Interview Results and Field Observations



Gambar 2.

Referring to Table 1, there are 20 edible plant species found in the area around the Arak-arak teak forest. These species come from various different families. The results of the inventory in this area show that most of the wild plant species found have the potential to be a source of food that is suitable for consumption. The most commonly used plant parts for food are the leaves. This aligns with research indicating that moringa leaves are widely utilized as direct food ingredients or as processed food products (Silalahi: 2020; Wadu, et al: 2021). Additionally, the leaves of *Coleus amboinicus* L are widely used as functional food supplements for breastfeeding mothers (Syarief, et al: 2014). Leaves are often utilized because they are easily accessible, abundantly available in nature, and their collection and processing are relatively simple. Furthermore, leaves are known to have various beneficial properties (Pelokang et al., 2018).

The results of the study revealed that the parts of the plant most commonly used by the community are the leaves, followed by the fruit, stem, flowers, and tubers. This reflects the community's preference for parts that are easy to process and commonly consumed in their daily diet. This study found that the community around the Arak-Arak Teak Forest still maintains the practice of utilizing wild plants as a food source. These plants are utilized based on local knowledge that has been passed down from generation to generation, without them knowing the scientific side of it. The community recognizes and processes various types of wild plants through empirical experience based on taste, shape, and the effects of consumption on the body. However, in addition to the community's knowledge of wild plants as food, they can also be viewed from a scientific perspective, such as scientific classification, Latin names, families, and their morphology, as well as specific nutritional information, including nutrient content and functional benefits, as shown in the table below:

Table 2. Classification of Wild Plants as Food

No	Latin Name	Scientific Name	Family	Main Morphological Characteristics	Compound/Bioactive Content
1	Takokak	<i>Solanum torvum</i>	Solanaceae	Thorny shrub, wavy oval leaves, small round fruit	Flavonoids, saponins, steroids, vitamins A, E, B complex
2	Katuk	<i>Sauropus androgynus</i>	Phyllanthaceae	A bushy shrub with many branches and small pinnate leaves.	Vitamins A, C, E, K, iron, calcium
3	Bayam merah	<i>Alternanthera amoena</i>	Amaranthaceae	Herbaceous plant, reddish-purple leaves	Fiber, vitamin C, minerals
4	Kangkung	<i>Ipomoea aquatica</i>	Convolvulaceae	Creeping herb, succulent stem, arrow-shaped leaves	Protein, carotene, vitamin C
5	Semanggi	<i>Oxalis corniculata</i>	Oxalidaceae	Small creeping herb, trifoliate heart-shaped leaves	Oxalic acid, vitamin C, antioxidants
6	Genjer	<i>Limnocharis flava</i>	Limnocharitaceae	Swamp plant, broad leaves, yellow flowers	Protein, fiber, vitamin A
7	Simbukan	<i>Paederia foetida</i>	Rubiaceae	Creeping, oval leaves, distinctive odor	Antioxidants, antimicrobials
8	Murbai		Moraceae	Small tree, broad serrated leaves, compound fruit	Flavonoids, vitamin C, anthocyanins
9	Ciplukan	<i>Physalis angulata</i>	Solanaceae	Branching herb, fruit enclosed in calyx	Alkaloids, vitamins A and C
10	Rukam	<i>Flacourtia rukam</i>	Flacourtiaceae	Small thorny tree, dark green leaves, round fruit	Polyphenols, flavonoids, vitamin C
11	Tunas bambu	<i>Dendrocalamus asper</i>	Poaceae	Large bamboo, jointed stems, shoots growing from the ground	Coarse fiber, carbohydrates

12	Pakis	<i>Diplazium esculentum</i>	Polypodiaceae	Ferns with creeping rhizomes, pinnate leaves	Vitamin A, iron, antioxidants
13	Kenikir	<i>Cosmos caudatus</i>	Asteraceae	Erect herb, pinnate leaves, light purple flowers	Flavonoids, vitamins A and E, calcium
14	Krokot	<i>Portulaca oleracea</i>	Portulacaceae	Erect creeping herb, succulent stem, oval leaves	Omega-3, vitamins A and C
15	Meniran	<i>Phyllanthus niruri</i>	Euphorbiaceae	Small herb, erect stem, small pinnate leaves	Lignans, alkaloids, flavonoids
16	Talas	<i>Colocasia esculenta</i>	Araceae	Starchy tubers, large shield-shaped leaves	Carbohydrates, fiber, vitamin B6
17	Beluntas		Asteraceae	Erect shrub, serrated leaves, small pink flowers	Antioxidants, tannins, flavonoids
18	Pegagan	<i>Centella asiatica</i>	Apiaceae	Flat round leaves, creeping stems, small flowers	Asiaticoside, flavonoids, vitamins B1, B2, C
19	Kelor	<i>Moringa oleifera</i>	Moringaceae	Small tree, compound pinnate leaves, long fruit	Calcium, phosphorus, vitamins A, B, C
20	Daun sendok	<i>Plantago major</i>	Plantaginaceae	Basal rosette, long stems, elliptical leaves	Flavonoids, polyphenols, tannins, vitamin C

Based on the classification results, it is known that the types of wild plants used as food come from 18 families, including: Solanaceae, Asteraceae, Amaranthaceae, Convolvulaceae, Oxalidaceae, Rubiaceae, Moraceae, Flacourtiaceae, Poaceae, Polypodiaceae, Portulacaceae, Euphorbiaceae, Araceae, Apiaceae, Moringaceae, Plantaginaceae, Phyllanthaceae, and Limnocharitaceae. The most dominant families in utilization are Asteraceae, Solanaceae, and Portulacaceae. This diversity indicates the potential of local biodiversity to support food security based on natural resources. These plants not only have variations in taxonomic classification but also exhibit morphological differences that reflect ecological adaptations to their respective habitats.

The results of the classification table show the scientific name, family, morphological characteristics, and even the chemical compounds present in the wild plants used as food, such as taro, which contains carbohydrates, fiber, and vitamin B6. This aligns with the research by Nur Habibah and I Wayan Astika, who stated that taro is one of the food sources rich in essential nutrients, including protein, fat, carbohydrates, vitamins, and

minerals. However, some taro varieties contain calcium oxalate crystals, which can cause an itchy sensation when consumed. These calcium oxalate compounds form through the binding of oxalate ions and calcium ions, resulting in salts that are irritating to mucous membranes (Habibah and Astika, 2020). Additionally, there is the fern plant (*Diplazium esculentum*), which contains Vitamin A, iron, and antioxidants. This aligns with research by Indrayeni et al., who stated that fern plants are highly nutritious, rich in vitamin C, phenolic compounds, and antioxidants. Furthermore, they contain fiber, folic acid, minerals (Ca and Fe), vitamin B complex, vitamin A, phosphorus, and omega fatty acids, which are beneficial for heart health (Indrayeni et al., 2020).

Based on the research results, the Use Value (UVi) was calculated as an indicator to assess the extent to which a wild plant species is utilized by the community around the Arak-Arak Teak Forest, in the context of local wisdom and its potential use as a food source. The calculation of Use Value (UVi) was performed for each plant family using the following formula (Winda et al., 2014):

$$UVis = \sum U_{is} / Nis$$

Explanation:

- **UVis:** use value of a particular species (i) based on information from respondents (s).
- **$\sum U_{is}$:** total of all types of use of species (i) reported during the interview process.
- **Nis:** number of interview opportunities in which respondents provided information related to that species.

Table 3. Use Value of Wild Plants
Wild plants most widely used by communities living near teak forests

Family Name	$\sum U_{is}$	Nis	Uvis
<i>Solanaceae</i>	10	20	0,5
<i>Phyllanthaceae</i>	17	20	0,85
<i>Amaranthaceae</i>	13	20	0,65
<i>Convolvulaceae</i>	18	20	0,9
<i>Oxalidaceae</i>	9	20	0,45
<i>Limnocharitaceae</i>	18	20	0,9
<i>Rubiaceae</i>	5	20	0,25
<i>Moraceae</i>	17	20	0,85
<i>Flacourtiaceae</i>	9	20	0,45
<i>Poaceae</i>	13	20	0,65
<i>Polypodiceae</i>	20	20	1

<i>Asteraceae</i>	5	20	0,25
<i>Portulacaceae</i>	5	20	0,25
<i>Euphorbiaceae</i>	6	20	0,3
<i>Araceae</i>	20	20	1
<i>Apiaceae</i>	7	20	0,35
<i>Moringaceae</i>	18	20	0,9
<i>Plantaginaceae</i>	3	20	0,15

Source: Field Data Processing Results

The highest UV values were found in the Polypodiaceae family (UV = 1.00) and the Araceae family (UV = 1.00), indicating that almost all informants actively mentioned and utilized these plants as food in their daily lives. This is because ferns and taro are easily found on the edges of forests, and taro plants also grow abundantly around people's yards. These UV values indicate a high level of cultural attachment and functionality in the utilization of these species.

The most widely utilized families are Asteraceae and Polypodiaceae, which are globally recognized as groups of plants with medicinal properties and are easily accessible. The growth locations of these species are generally in environments close to human activities, such as residential yards, fields, forest edges, and gardens, making it easier for communities to access and utilize them sustainably. This aligns with statements from communities around the jati arak-arak forest, who noted that the Araceae family, which includes taro, is easily found in residential areas, while the Polypodiaceae family, such as ferns, is commonly found along forest edges.

These findings support the results of research by Lailatus Sholichah and Dinar Alfidhdhoh (2020), which identified 43 species of wild plants as food sources in Mendi Village, Jombang, with a predominance of the Asteraceae family. A similar study by Christine Naomi Panda Huki et al. (2024) in Kateri Wildlife Reserve also showed the dominance of fruit and leaf utilization from 15 wild plant species. This study is also in line with the findings of Ria Irawan et al. (2020) in West Kalimantan, which emphasize the importance of conserving wild plants that grow naturally and are utilized wisely. Additionally, ethnoscience studies in science education support the preservation of local culture while enriching contextual learning resources, as mandated by the Merdeka Curriculum.

Conclusion

Based on the inventory results, it was found that the communities around the Arak-Arak Teak Forest still practice the use of wild plants as food sources using local knowledge that has been passed down from generation to generation. A total of 20 wild plant species from 18 families are actively consumed in daily life, with a dominant focus on the use of leaves and fruits. These plants not only have economic and cultural value but also contain bioactive compounds with high nutritional value.

The results of the use value analysis indicate that species such as ferns (*Diplazium esculentum*) and taro (*Colocasia esculenta*) have a strong connection to local consumption practices. This suggests that local wisdom is still preserved in the practice of consuming healthy and sustainable alternative foods.

The diversity of wild plants found in this study reinforces the importance of preserving local natural resources, while also emphasizing that local community wisdom plays a significant role in supporting food security and biodiversity conservation. Therefore, documentation and strengthening of traditional knowledge related to wild plants must continue as part of strategies for environmental conservation and the development of sustainable local food systems.

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