JPPIPA 11(12) (2025)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Characterization and Utilization of Woka (Saribus rotundifolius (Lam.) Blume.) Based on Local Wisdom of the People of Bolaang Mongondow Regency

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Received: October 16, 2025
Revised: November 06, 2025
Accepted: December 25, 2025
Published: December 31, 2025

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DOI: 10.29303/jppipa.v11i12.13159

Abstract: Woka (Saribus rotundifolius (Lam.) Blume.) is a palm tree that has significant ecological and socio-cultural value for the community of Bolaang Mongondow. However, local knowledge about its use and characteristics is threatened by extinction due to modernization. This study aims to: (1) identify the morphological characteristics of the woka plant, and (2) document the forms of utilization based on the local wisdom of the community of Bolaang Mongondow in managing woka. This study used qualitative methods with an ethnobotanical approach. Data were collected through field observations, in-depth interviews with key informants (traditional leaders and craftsmen), and documentation studies. The results show that woka has distinctive morphological characteristics, such as round fan-shaped leaves (rotundifolius) and strong stems. Woka has a wide range of uses, especially its leaves, which are used as roofing material for traditional houses (baloi), woven crafts for traditional ceremonies, and as food wrappers. Local wisdom is reflected in the knowledge system of sustainable harvesting techniques, traditional rules of harvesting, and beliefs that support the preservation of woka. It is concluded that woka is not just a plant but an integral part of the local cultural identity and ecosystem. This documentation is expected to serve as a database for the conservation and sustainable development of the economic value of woka.

Keywords: Local wisdom; Morphological characteristics; *Saribus rotundifolius*; Woka

Introduction

With more than 2550 species, palms (Arecaceae/Palmae) are an ecologically dominant and essential plant resource throughout the tropics, particularly in the highly diverse tropical rainforest ecosystems (Dransfield et al., 2008; Pintaud et al., 2008). However, palm communities face serious threats related to anthropogenic impacts (deforestation, overexploitation, and urban expansion) and climate change (Couvreur et al., 2024).

Palms are particularly affected by changes in land use by humans. In many cases, when forests are cleared for food crops or pasture, palm trees are left standing (Bernal et al., 2013; Montúfar et al., 2011). This leads to communities with standing dead palm syndrome, where mature trees continue to grow but the basic ecological process of population regeneration is halted (seeds are destroyed or do not survive), which is very common in widespread beneficial and endemic species. Thus, although these species appear abundant, their populations are actually threatened with extinction and will become locally extinct (Bernal et al., 2013). Although their global conservation status is not threatened, specific data on the population and habitat conditions of woka in various regions, including Bolaang Mongondow, are still relatively limited (Essien et al., 2017; Salsabila et al., 2023).

The existence of woka and the traditional knowledge associated with faces threats due to the pace

How to Cite:
Nurmawan, W., Walangitan, H. D., Sumakud, M. Y. M. A., & Pangemanan, E. F. S. (2025). Characterization and Utilization of Woka (Saribus rotundifolius (Lam.) Blume.) Based on Local Wisdom of the People of Bolaang Mongondow Regency. *Jurnal Penelitian Pendidikan IPA*, *11*(12). https://doi.org/10.29303/jppipa.v11i12.13159

of environmental and social change. Deforestation, land conversion, and development pressures often ignore the non-economic values of local plants such as woka (Forsyth et al., 2011). In fact, local wisdom related to the sustainable use of natural resources is an important asset in biodiversity conservation and cultural resilience (R. Ellen, 2007; Sada et al., 2018). The identification of medicinal plant diversity used by traditional healers (Battra) demonstrates a wealth of local knowledge that needs to be documented for preservation, similar to the potential of woka as a multifunctional resource in indigenous communities (Fanisah et al., 2023). Neglecting this traditional knowledge risks causing cultural erosion and the loss of time-tested sustainable use potential.

Research on the use of woka by the Bolaang Mongondow community itself is still relatively limited, and the specific focus on the role of woka (Saribus rotundifolius (Lam.) Blume.) in the context of local wisdom has not been explored in depth. The potential of woka as a source of building materials, crafts, food, and traditional medicine, as well as its symbolic value in customs, is an integral part of the local community's culture (Mokolensang, 2016). Neglecting traditional knowledge risks accelerating cultural erosion and resulting in the loss of time-tested sustainable utilization potential (R. Ellen, 2007).

Research is needed to explore woka (Saribus rotundifolius (Lam.) Blume) and its utilization based on local wisdom among the Bolaang Mongondow community. The study includes the morphological characterization of woka found at the research site and its utilization based on local wisdom among the Bolaang Mongondow community, including its socio-cultural functions. This is very important so that the local community's knowledge about its role in the local wisdom of the Bolaang Mongondow community in North Sulawesi is well documented and the community can also know the scarcity status of the plants used.

Based on this background, this study aims to: identify the morphological characteristics of woka in Bolaang Mongondow, and document the utilization of woka based on the local wisdom of the Bolaang Mongondow community.

Method

The research was conducted in June-July 2025 in Bolaang Mongondow Regency, North Sulawesi Province, with location determination using purposive sampling based on the following criteria: areas with a significant population of woka trees and locations where the community still uses woka in their daily lives.

Data Type

The data used were primary data in the form of woka morphological characteristics. The population in this study included: indigenous communities that use woka, woka plant specimens in their natural habitat, and traditional craftsmen who utilize woka.

Data Collection Techniques

Data were collected through direct observation of woka harvesting, processing, and utilization techniques, visual documentation of the process of making crafts and traditional tools from woka, and observation of the morphology of woka plants during the research period. The morphological species concept by Stuessy (1990) and Kanis et al. (1999) was used in this treatment to define species limits.To complement the empirical data, interviews were conducted with indigenous communities who use woka and traditional craftsmen who utilize woka to gain insight into the use of woka and related local wisdom. Furthermore, a literature study was conducted to collect supporting data and theoretical context from relevant academic sources.

Data Analysis

The data were analyzed descriptively and presented in narrative and image form.

Results and Discussion

Woka Taxonomy

Woka (Saribus rotundifolius (Lam.) Blume.) is a species belonging to the large family Arecaceae (Essien et al., 2017; Viana et al., 2016). S. rotundifolius is a highly variable species and was originally a member of the genus Livistona under the name Livistona rotundifolia (Dowe, 2009; Viana et al., 2013). However, molecular data analysis has revealed the surprising fact that L. rotundifolia is a different genus, namely Saribus (Essien et al., 2017). Therefore, another scientific name used for this species in several publications is Saribus rotundifolius (Lam.) Blume (Essien et al., 2017). The genus Saribus was resurrected based on a study by Bacon et al. (2011).

Morphological Characteristics

Woka is a hermaphroditic palm with an upright, unbranched, solitary trunk (growing singly, exhibiting a distinctive shape and size). In general, the trunk can reach a height of 15-27 meters, and can even grow up to 45 meters, with a trunk circumference of 50-73 cm, forming a massive cylinder.

The surface of the trunk shows cracks with prominent leaf scars, ranging from faint to very visible, and is light green to brownish green in color. The stem segments are green to gray and have longitudinal

grooves. Another distinctive morphological feature is the dense network of grayish-brown to orange-brown fibers that cover the upper part of the stem below the crown. These fibers form a prominent crisscross pattern that persists throughout the life of the woka.

The root system of woka consists of fibrous roots that form an extensive network below the soil surface. This adventitious root system is characteristic of monocotyledonous plants and does not have a dominant taproot. Instead, the root system is numerous, relatively uniform, and spreads laterally from the base of the stem.

(a) (b) (c)

Figure 1. Woka stem (a) with leaf scars (b) cracks on the stem (c) fiber interlacing on the stem

The crown is round and contains 20–50 tightly arranged, rounded leaves. This crown shape maximizes light absorption while maintaining structural stability. The leaves are arranged spirally around the stem, creating an aesthetically pleasing and functionally efficient distribution pattern (Pitopang et al., 2011; Utteridge et al., 2004).

(a) (b) (c)

Figure 2. Woka leaves (a) thorns on leaf sheaths (b) young leave (c) mature leaves

The leaf sheath is 92–210 cm long and shows complex morphological adaptation, with a width of 13–17.5 cm at the base and tapering to about 2 cm at the tip near the leaf blade. The leaf sheath is slightly curved, with a flat or slightly grooved surface at the top. There are blackish-green spines along the edge of the black leaf blade, reaching 2 cm in length. The arrangement of these spines shows ontogenetic change: younger plants show a more pronounced armature that decreases with age (Utteridge et al., 2004). The leaf blade is semicircular in shape, 115-164 cm wide and 95-123 cm high. Each section has a clearly visible gap. The leaf venation system is clearly parallel. The leaf blade is shiny green when young and turns yellow with age.

At the time of observation, no flowering or fruiting plants were found, so observation of the morphology of the reproductive structure was not carried out. The first leaf produced by the germinated seed is known as the eophyll and has five veins. The first leaf of S. rotundifolius is lanceolate, with parallel veins. The morphology of the eophyll is diagnostic for species identification in the early stages of development and is covered by two leaf sheaths (Viana et al., 2013).

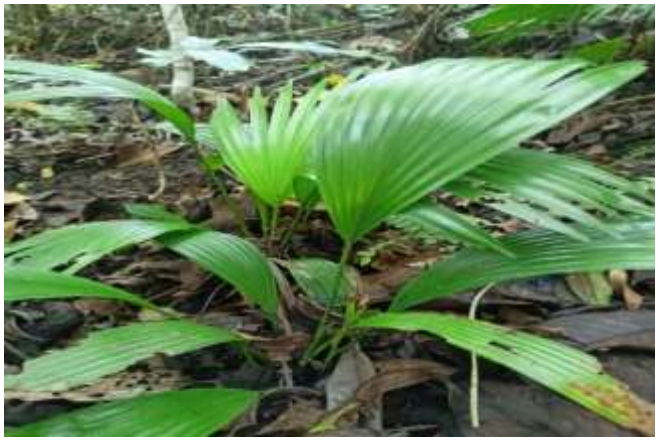


Figure 3. First leaf (eophyll)

Utilization of Woka Based on Local Wisdom

The existence of woka in the Bolaang Mongondow region is not only a component of forest biodiversity, but has long been integrated into the socio-cultural life of the community, forming a unique system of local wisdom. Knowledge about the use of woka leaves and other local plants has been passed down from generation to generation, highlighting the community's deep-rooted relationship with its natural environment (Mamahani et al., 2016). The use of natural materials emphasizes the importance of ecological sustainability, as these materials are often biodegradable and contribute to the local ecosystem (Wiratama et al., 2023). Ethnobotanical practices in indigenous traditions, such as the use of plants in rituals or daily life, reflect the harmony between humans and nature that supports sustainable development goals (SDGs), as seen in the Bebubus tradition of the Sasak tribe in Lombok, which can be a model for the sustainable use of woka (Putri et al., 2024). Beyond its unique botanical characteristics, woka has long played an important role in the lives of local communities. Its broad, strong leaves are traditionally used for various purposes, ranging from roofing, weaving, wrapping traditional foods such as yellow rice and dodol, handicrafts, to fans.

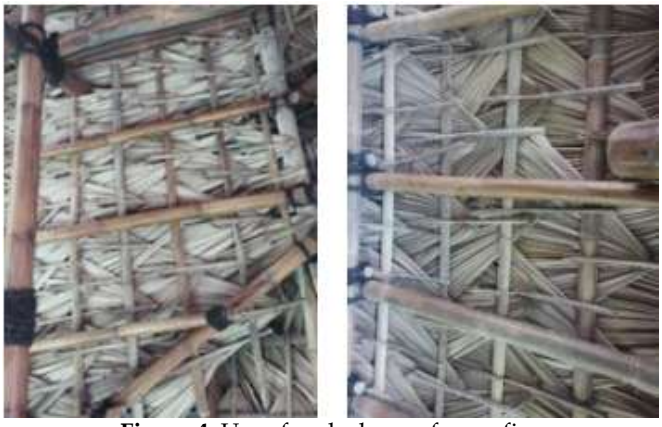


Figure 4. Use of woka leaves for roofing

The process of transforming woka leaves into roofing begins with selecting leaves that have reached optimal maturity and have a strong texture. Traditional craftsmen have intuitive knowledge to distinguish leaves that are suitable for roofing based on their position on the tree, thickness, and level of flexibility. Leaves that are too young will rot quickly, while those that are too old may break easily. The harvesting process is also carried out with careful consideration for the environment. Instead of cutting down the trees, a certain number of leaves are picked, allowing the trees to continue to grow and produce new leaves.

The technique of arranging woka leaves on the roof frame is an art in itself that has been passed down from generation to generation. The leaves are arranged tightly on top of each other, starting from the bottom of the roof towards the ridge. Each leaf is arranged tightly on the wooden frame to ensure that rainwater flows down smoothly without seeping in.

The functional advantage of woka roofing lies in its ability to create an ideal atmosphere indoors. The natural porous structure of the leaves allows for optimal air circulation, keeping the room underneath cool during the hot daytime, yet warm enough at night. The natural wax coating on woka leaves makes them resistant to rain, while their thickness provides effective protection from solar radiation. Even more amazingly, this roof has a long service life, lasting up to 3-5 years before partial or complete replacement is necessary.

More than just fulfilling material needs, woka also plays a role in the spiritual and socio-cultural dimensions of the Bolaang Mongondow community. In various traditional ceremonies, these palm leaves are often used as decorations or ritual equipment, symbolizing purity, sustainability, and protection.

In the Hindu community in Eastern Indonesia, woka leaves are used as a basic component of various types of offerings. For canang sari, woka serves as the base that supports all the components of the offering. According to research by Ristanto et al. (2020), the wide and strong characteristics of woka leaves allow for the stable arrangement of flowers, boreh, and raka-raka. Each component of canang sari, including palm materials, reflects a deeper spiritual meaning, such as balance and perfection in life (Rismawati & Cahyuni, 2023). Unlike Balinese canang, which uses palm fronds as the main container, the woka-based canang used by the people of Bolaang Mongondow has a fairly complex weave but still retains its philosophical meaning as a daily offering. This offering is an integral part of the ritual, reflecting cultural values and honoring the gods through intricate decorations (Miyaura et al., 2015).

The use of parts of plants from the Arecaceae family, especially leaves, is also recorded in the Mappacci traditional ritual of the Bugis tribe in South Sulawesi, where the leaves are used together with other plants to symbolize goodness and purity, reflecting philosophical values similar to the role of woka in the making of canang sari, tamiang, and other offerings in the Bolaang Mongondow community (Patiola et al., 2024). In the making of tamiang, woka leaves are used in a form that is adapted to the availability of materials. While in Bali tamiang is made from intricate woven palm leaves in the shape of a protective circle, in Bolaang Mongondow tamiang is made from woven woka leaves forming a circle as a symbol of protection from negative influences.

Porosan is a central part of Balinese Hindu offerings made from betel leaves, lime, and areca nuts. Porosan is placed in the center of offerings, such as canang sari, as a central symbol of the offering itself. The people of Bolaang Mongondow use porosan made from woka leaves. Porosan is shaped in such a way, then joined to form a series that symbolizes devotion and love. The weaving and connections use woka sticks to unite one part with another.

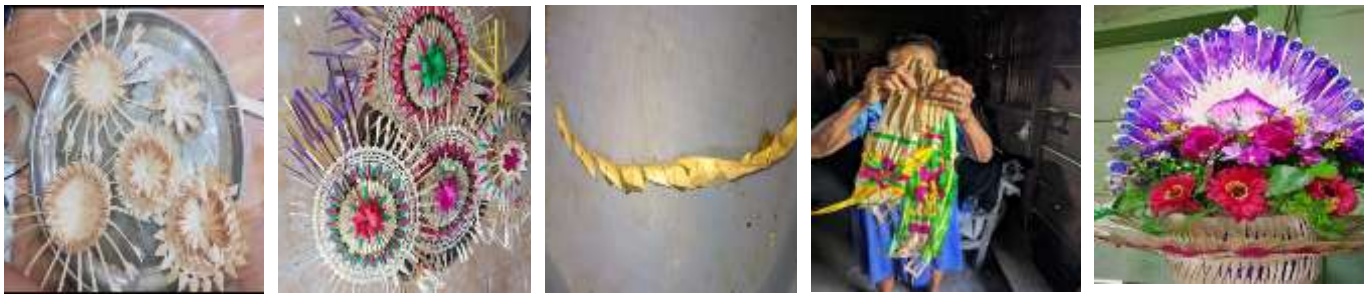
In segehan, woka leaves serve as a substitute for takir from janur. Woka leaves are shaped into containers to hold jaja, tetabuhan, and flowers for offerings to Bhuta Kala. The thick and sturdy nature of the leaves makes them ideal for holding various offerings.

For pajegan or ceremonial tools that symbolize a medium for worship, woka is used as a base on which to place ceremonial tools. Narayanan's (2002) research notes that in large ceremonies such as piodalan, woka leaves are arranged in layers to create a large offering area.

In addition, woka leaves are often used as wrappers for traditional foods such as yellow rice and dodol, which are believed to give a distinctive aroma and flavor to the food they wrap. Furthermore, the use of woka leaves as food wrappers is considered safer for consumption.

Old, dry leaf stalks (fronds), known for their strength and durability, are also used as firewood for

daily cooking, especially in rural areas. Thus, almost all vegetative parts of this tree have a use, demonstrating the efficiency with which local communities utilize natural resources.



(a) (b) (c) (d) (e)

Figure 5. (a) Canangsari, (b) Tamiang, (c) Porosan (d) Segehan (e) Pajegan

The traditional ecological knowledge of the Bolaang Mongondow community regarding woka also deserves attention. Local community knowledge of plant use, including in traditional rituals, is a heritage passed down from generation to generation and supports the sustainability of natural resources, with a spiritual approach that can support the restoration of traditional practices and biodiversity conservation (Nasution et al., 2023). The community has unwritten rules governing leaf harvesting to prevent overexploitation. For example, they usually only take leaves from the lower part of the tree and leave the shoots or young leaves that are vital for the tree's growth. There is also an understanding to avoid cutting down trees that are still productive, especially those that are flowering or fruiting, to ensure that natural regeneration runs smoothly. This wisdom has indirectly led to the implementation of a sustainable harvesting system and helped maintain the age structure of the tree population in nature.

Conclusion

Woka is not just a plant but an integral part of the local cultural identity and ecosystem. This documentation is expected to serve as a database for the conservation and sustainable development of the economic value of woka. The exploration of woka (Saribus rotundifolius (Lam.) Blume.) in Bolaang Mongondow is an important step that not only reveals the richness of local biodiversity but also provides a solid data foundation for future conservation planning and responsible utilization. This research bridges the knowledge of taxonomy, ecology, and ethnobotanical potential of one of the iconic palm species. The data generated is expected to contribute to more effective management of Indonesia's biodiversity, as well as support education and empowerment efforts for local communities in preserving their valuable natural heritage.

Acknowledgments
We would like to thank to UNSRAT for funding this research through the UNSRAT DIPA Fiscal Year 2025.

Author Contributions
All authors contributed to writing this article.

Funding
This research was funded by UNSRAT DIPA for Fiscal Year 2025.

Conflicts of Interest
No conflict interest.

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