

Ethnobotany of the Use of Nelambo Suon (*Bikkia* sp.) Plants Based on the Traditional Knowledge of the Yali Tribe, Papua Pegunungan Province

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Received: 13 May 2025 – Accepted: 1 September 2025
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ABSTRACT

The use of plants for human needs is very high, especially among communities in suburban and rural areas. Communities are highly dependent on forests as their main source of sustenance. The purpose of this study was to determine the use of Nelambo Suon (*Bikkia* sp.) plant stems among the Yali tribe in Yahukimo Regency, Papua. The method used was a survey, which was conducted through field observations and interviews using questionnaires. This study was conducted in four villages, namely Sabelebi, Muhumu, Kinkun, and Ohena, in the Heriapini District of Yahukimo Regency, Papua Mountains. This study involved 43 respondents consisting of primary informants, key informants, and supplementary informants. The results of the study show that the *Bikkia* plant is widely used by the Yali tribe in the Papua Mountains. The bark can be used as a remedy for malaria, while the trunk is used to make *sehen* arrows, *suap* arrows, and *wangkun* sticks (for harvesting crops). As many as 88.37% of the community acknowledged that the trunk of this tree is very strong and can be used for various purposes. However, conservation efforts for this plant have not yet been undertaken by the community. Considering that *Bikkia* sp., found in Yahukimo, is one of several species with limited distribution in the world, conservation efforts are needed.

Key words: Ethnobotany; *Bikkia*; Nelambo Suon; Papua; Rubiaceae.

INTRODUCTION

Natural resources are fundamental elements that play a crucial role in maintaining ecological balance and supporting diverse ecosystems. Plants contribute not only to the provision of oxygen and food, but also provide various ecosystem services that are beneficial to the environment and humans (Pachaya, 2024). Ecosystem services involve

provisioning services, regulating services, supporting services, and cultural services (Joseph, 2024; Pachaya, 2024). In Indonesia, most rural communities still depend on forests as a source of livelihood (Rakatama & Pandir, 2020; Pitaloka & Abdurrahim, 2023), including in Papua (Kadir *et al.*, 2025).

The Nelambo Suon plant (*Bikkia* sp.) is one of the plants found in Sabelebi Village, Heriapini District, Yahukimo Regency (Nelambo *et al.*, 2025). This tree-like plant grows on mountain slopes, hills, and low to high plains in the forests of the Papua Mountains. According to Aplin *et al.* (2015) and the Royal Botanic Gardens (RBG) Kew (2025), this plant has a limited distribution in the world,

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including in the New Guinea region (Papua and Papua New Guinea). There are at least 11 species of the genus *Bikkia* that are scientifically “accepted.” Of the 11 species in the world, 5 species have a limited distribution in New Guinea, namely: *Bikkia bridgeana*, *B. commerconiana*, *B. guilloviana*, *B. gaudichandiana*, and *B. tetandra*. Several other species are distributed in other regions, such as *B. longicarpa* (Mariana), *B. moluccana* (Maluccas), *B. montoyae* (Philippines), *B. palauensis* (Caroline Islands), *B. pancheri* (Bismarck Archipelago, New Caledonia, Solomon Islands, Vanuatu), and *B. philippinensis* (Philippines). However, Alejandro *et al.* (2015) revealed that a group of New Caledonian endemics was transferred to a genus of its own, *Thiollierea* Montrouz. (drooping flowers, inland habitats), leaving *Bikkia* (erect flowers, coastal habitats) with about 10 species worldwide.

However, information about the use of *Bikkia* plants is still limited. The limited distribution of these plants has resulted in limited knowledge and use of this plant group. In general, *Bikkia* plants are distributed from the Philippines and the Mariana Islands to Papua New Guinea and the Pacific. It grows in coastal habitats, in sandy or clayey soil on low-lying coral limestone (Utteridge & Jennings, 2022). Nelambo *et al.* (2024) revealed that *Bikkia* sp plants are used by the local community in Kampung Sabelebi as a traditional medicine for malaria.

Communities in suburban and rural areas usually utilize various daily necessities from their environment (Nelambo *et al.*, 2024). Papua Island

is one of the islands rich in local wisdom in utilizing plants. The diversity of endemic plants in Papua needs to be revealed through case studies and scientific research for the advancement of Indonesia as a country with abundant natural resources. The people of Papua have traditional knowledge for utilizing local wisdom based on the potential that has been passed down from generation to generation. The parts of plants that are utilized depend on the type and use (Ramdianti *et al.*, 2013; Nelambo *et al.*, 2024).

The availability of information related to the Nelambo Suon plant is interesting to explore. In addition to its bark being used as a traditional medicine for malaria (Nelambo *et al.*, 2024), this plant is also useful for other needs of the Yali tribe in Papua. Therefore, the purpose of this study was to determine the ethnobotany of Nelambo Suon (*Bikkia* sp.) wood among the Yali tribe in Papua. The results of this study provide an overview that the *Bikkia* sp. plant, which has a limited distribution in the world, can be utilized by the community and has the potential for development for other needs.

MATERIALS AND METHODS

Time and place of research

This research was conducted in the Heriapini District of Yahukimo Regency (Figure 1) from February to April 2024. Sampling was carried out among the Yali tribe in four villages, namely: Sabelebi, Muhumu, Kinkun, and Ohena villages,



Figure 1. Map of the research location in Yahukimo District, Papua Pegunungan.

Heriapingi District, Yahukimo Regency, Papua Pegunungan.

Data collection methods

The methods used in this study were surveys, field observations, and semi-structured interviews with the aid of questionnaires. Interviews were conducted to uncover data on the utilization of *Bikkia* sp. plants, involving 43 respondents. The respondents were spread across four villages, representing primary informants, key informants as makers of several tools that use *Bikkia* sp. plants as raw materials, and additional informants as product users. Respondents were asked questions about the utilization, manufacture, and strength of Nelambo suon plant stems. The focus of this study was the utilization of plant stems, in addition to the utilization of bark as a malaria remedy.

Data analysis

The observation data were analyzed descriptively and qualitatively based on field surveys, which were presented in tables and figures.

RESULTS AND DISCUSSION

The results of the study show that the Yali tribe in Heriapingi District uses the Nelambo Suon plant for various daily activities. Based on the results of interviews, it appears that the local community has known the *Bikkia* plant for a long time. This plant is known by the entire community (100%) and is used as a traditional medicinal plant (97.68%), as a complement to gardening tools (93.02%), and even for making hunting equipment

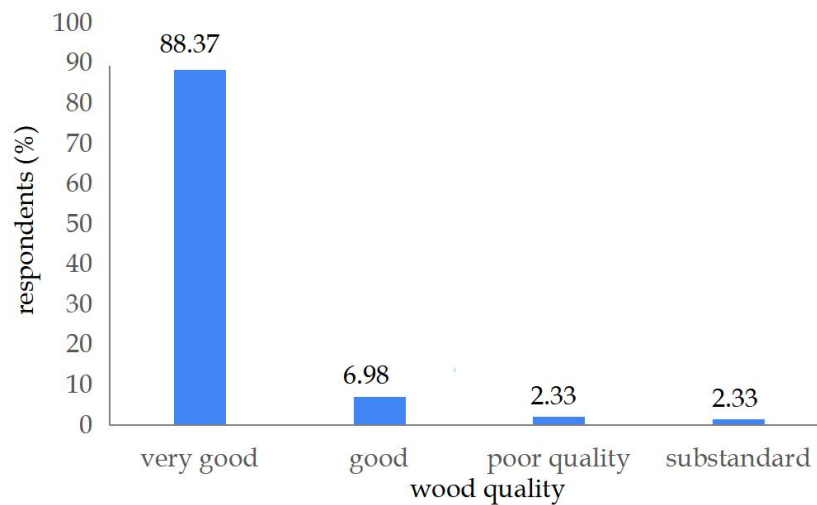


Figure 2. Level of public confidence in the quality of *Bikkia* sp. wood.

Table 1. The use of Nelambo Suon plants in the lives of the Yali tribe in Yahukimo, Papua.

No	Questions	Respondents' responses		
		Yes	No	Hesitant
1.	Getting to know the Nelambo Suon plant (<i>Bikkia</i> sp.)	100	0	0
2.	Utilizing <i>Bikkia</i> sp. plants for firewood	0	58.14	41.86
3.	Used for traditional medicine	97.68	0	2.32
4.	Used for daily needs (gardening)	93.02	0	6.98
5.	Have you ever used products made from this plant?	93.02	0	6.98
6.	Knowing the growing location (habitat) of plants	100	0	0
7.	Have you ever grown or cared for this plant?	6.98	79.07	13.95

(arrows). However, the community has never used this plant as fuel wood (Table 1).

For the Yali tribe, knowledge of the *Bikkia* plant has been passed down from generation to generation. The community uses the trunk, bark, and flowers for various purposes. The Nelambo Suon plant has high local wisdom value for the Yali tribe. Based on the local language, the name Nelambo Suon comes from two words, namely: *honai nelamboma*, which means the inhabitants of the Yali tribe in the village of Sabelebi, and *suon*,



Figure 3. Morphology of the Nelambo Suon plant (*Bikkia* sp.). A. roots, B. stem, and C. flowers (Source: Personal document, 2024).



Figure 4. Bark of the *Bikkia* sp plant used as a traditional medicine for malaria. A. Wet bark, B. Dried bark. (Source: Personal document, 2024).

which means large, meaning that it has many uses. This plant grows in plains, cliffs, steep slopes, riverbanks, and hills in the Heriapini district, Yahukimo Regency. According to Nelambo *et al.* (2024), this plant is commonly found in the Heriapini District, which has a hilly topography, slopes, and other districts in the surrounding area. This plant belongs to the Rubiaceae family, which is widely used for various purposes by the community. Its limited distribution means that this plant is not widely known by the general public, especially in the lowlands of Papua.

Based on the interview results, it is known that the local community believes that this plant is widely used and has fairly good quality (Figure 2). Most respondents (88.37%) know that Nelambo Suon wood has excellent quality, 6.97% rate it as good, 2.33% rate it as poor, and 2.33% rate it as unfit for use. This shows that the wood is of fairly good quality and is widely used for various daily purposes. According to RBG Kew (2025), the distribution of this plant is quite limited to certain areas, including New Guinea, so its wood quality is not yet scientifically known (Figure 3).

According to Siregar & Rahmadina (2024), plants of the Rubiaceae family are commonly used as ingredients in traditional medicine. Some examples include *Morinda citrifolia* L., *Ixora Coccinea*, *Uncaria acida*, *U. tomentosa*, and *Cinchona pubeschens*, which are used by the community of Tanjung Gusta Village, Sunggal District, Deli Serdang Regency. Furthermore, González-Castelazo *et al.* (2023) show that Rubiaceae can be considered a major component of traditional medicine in Sub-Saharan Africa. Many plants from the Rubiaceae family are used in the treatment of malaria and as a source of antibiotics for various diseases.

Use as a malaria remedy

Research shows that the bark of *Bikkia* sp. is used as a traditional remedy for malaria (Figure 4). According to Nelambo *et al.* (2024), the bark of *Bikkia* sp. is often used as a traditional remedy in Sabelebi Village, Heriapini District, Yahukimo Regency. The community uses it by boiling the bark and consuming it to reduce and cure the

symptoms of malaria. This is considered very effective considering its ease of use, low cost, and ability to save time and energy.

Furthermore, Nelambo *et al.* (2022) revealed that *Bikkia* sp. bark extract is capable of inhibiting the development of malaria. Phytochemical

screening results show that Suon bark extract contains a group of secondary metabolite compounds, such as alkaloids, flavonoids, steroids, triterpenoids, saponins, tannins, and quinones. Amin *et al.* (2025) emphasized that more effective approaches to molecular modification, such as derivatization, isosteric, and hybridization, have been applied to bioactive compounds such as quinones, alkaloids, and terpenoids for malaria. The modification results showed an increase in antimalarial effectiveness and expanded the spectrum of activity against various *Plasmodium* strains.

In addition, some parts of the *Bikkia* plant, such as the leaves and flowers, are also used in traditional medicine, although this information is limited to certain people. They use the leaves and flowers in the same way as leaf tea, which can help calm the mind and reduce stress.

Utilization of *Bikkia* sp.

1. *Bikkia* stems for arrowheads

The research shows that nelambo suon stems are used by the Yali tribe to make hunting tools, namely arrows (*Suap olongkon*). Arrows are made based on the target animal. The selected Nelambo Suon stems are split into 4-5 pieces (according to size). To make arrows for small birds, the wood is sharpened to a standard shape (without carvings) (*Suap kuhulig*), while arrows for larger animals are carved with variations (*Suap ayegtek*) (Figure 5). *Suap ayegtek* is usually used for hunting large birds, such as maleo (*Macrocephalon maleo*), jungle fowl (*Gallus* spp.), cassowary (*Casuarius* sp.), and others. Meanwhile, *suap kuhulig* is used for shooting smaller birds.

Special arrows for tree cuscus

Lun (local name) are patterned arrowheads made from nelambo suon plant stems, which are specially prepared for hunting large birds and tree cuscus (*Spilocuscus* spp.). Many communities still hunt tree cuscus, including in Yahukimo. According to Kadir *et al.* (2025), tree kuskus are one of the unique animals found in the Maluku-Papua region, which are often hunted by communities for consumption as a source of



Figure 5. *Bikkia* plant stems for making arrows. A. Process of making arrowheads, B. Various types of arrows for bird hunting, C. Types of arrowheads (lun) for hunting tree cuscus (*Spilocuscus* spp.).



Figure 6. Arrowheads (lun) made for hunting tree kangaroos.

animal protein. That is why, even though the hunting location is quite far from residential areas, hunting is still carried out.

Lun has a special feature that is variedly patterned by Yali men to distinguish *lun* and *suap* made from Nelambo Suon plants. Yali men prepare a large amount of *lun* when they want to hunt tree kuskus in forests far from residential areas. Hunting takes a long time, so the community often goes to the forest with huts, traditional fires (*sehene*), firewood, and food supplies. Tree kuskus hunting can take up to one or two weeks in the forest. During the day, they observe the hunting location, and only hunt at night.

Arrow shafts, binding cords, and adhesive glue

Arrow shafts (*suap ayo*), binding cords (*helisi*), and adhesive glue (*somug*) are the materials needed to make arrows. *Suap ayo* means arrow shaft, while *helisi* is a rattan cord. In the process of making arrows, the rattan string, shaft, and traditional glue must be prepared in advance. To make an arrow, the *suap ayo* will be used for the shaft, and the outer part of the rattan string will be used, while the inner part will be discarded. Traditional glue is used to stick the handle to the arrow. If the wooden handle is not straight, it can be straightened by heating it over hot coals. *Somug* is a traditional glue used in the manufacture of *suap* and *lun*. This traditional glue is made from a

combination of *honey*, *suon sap*, and *wan angken*.

Nelambo Suon arrow shaft

Sehen is the main shaft (body) of the arrow, made from Nelambo Suon wood. The selection of nelambo suon wood for the arrow shaft is very important for the Yali tribe (Figure 8). This is because the wood used must meet specific requirements, such as not being too young or too old. The flexibility of the wood is also very important. Based on experience, they have specific local knowledge because it determines the durability of the arrow so that it can withstand long-term use.

2. Stems for sweet potato digging sticks and dancing

In addition to making traditional arrows, Nelambo Suon stems are also used as agricultural tools. These tools are used to dig up sweet potato crops (*Ipomoea batatas*), often referred to as *wangkun* (sticks made from plants) (Figure 9). *Wangkun* Nelambo Suon is one of the parts of the Nelambo Suon plant stem that is utilized. There are several types of *wangkun* known to the community, including *wangkun suburu*, *yahaltukon*, *losike*, *tomuk*, and *kaem*. *Wangkun suburu* is usually used to dig sweet potatoes, *wangkun tomuk* is a stick used by the elderly, and *wangkun losike* is used by women when dancing.

The Nelambo Suon plant also has cultural

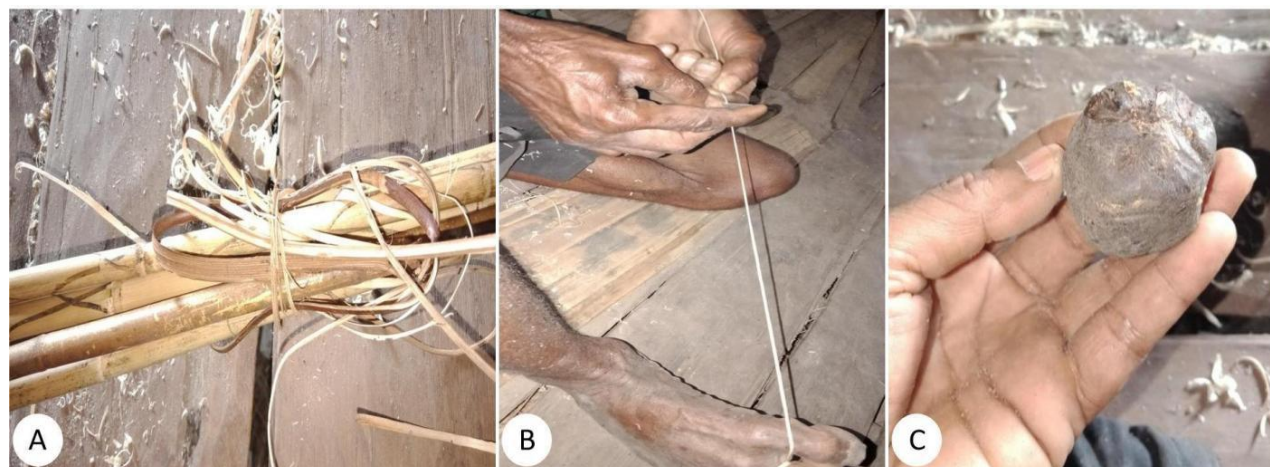


Figure 7. Materials used to make arrows. A. Arrow shaft (*suap ayo*), B. Rattan string (*helisi*), and C. Traditional glue (*somug*).



Figure 8. Nelambo Suon's arrow shaft (Source: Personal document, 2024).



Figure 9. Sweet potato digging stick and Nelambo Suon dance stick.

significance, including its trunk, which is used as a weapon to earn a living and provide for the Yali tribe. In addition, the bark is used to prevent malaria and to treat old and new wounds. The bark powder is used to carry fire from one place to another. The extensive use of the Nelambo Suon

plant has an impact on the community's belief that it is a magical plant for the Yali tribe in Heriapini District, Yahukimo Regency, Papua Pegunungan Province.

However, based on the interview results, only 6.98% (79.07% never) are involved in the maintenance of this plant. This condition shows that the community makes extensive use of the *Bikkia* plant but does not yet have a sense of concern for its conservation. Regarding cases such as this, Fišer *et al.* (2021) and Lopez (2023) reveal that conservation efforts are needed for plants that are frequently used by communities around the world. This is especially true if the plant has significant value, is threatened with extinction, and has limited distribution in the world.

In general, biodiversity encompasses species diversity, genetic variation, and ecosystems that interact to sustain life. As the foundation of our planet's resilience, biodiversity plays a crucial role in maintaining ecosystem services that are essential for human survival, such as clean air, water, food, and climate regulation. Given the current rate of biodiversity loss, conservation efforts are more important than ever (Lopez, 2023; Hamilton, 2024; Kaya, 2024).

CONCLUSION

The results of this study indicate that the Nelambo Suon plant (*Bikkia* sp.) is one of several plant species with limited distribution in the world. In Yahukimo, this plant is widely used by the community for several purposes, including its bark as a remedy for malaria, as a raw material for making arrows and arrowheads, and for making tools for harvesting crops, especially sweet potatoes (*Ipomoea batatas*). Most of the community (88.37%) acknowledged that they use the wood because of its good quality (strength).

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