Ethnobotanical Utilization and Phytochemical Investigation of the Pith of Patikan (*Caryota mitis*) Plant

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ABSTRACT

This study aimed to document the traditional uses of the Patikan (*Caryota mitis*) plant and to examine the phytochemical content of its pith, which is one of the least studied parts of the plant. The study focused on understanding how local communities use the plant for food, medicine, and other daily needs, the methods used in collecting and preparing the plant, and the basis used by community members to determine when the plant is ready to be used. The research was conducted in Tandawan, New Bataan, Davao de Oro and involved individuals who are knowledgeable about the Patikan plant. A mixed-method research design was used, combining qualitative interviews and quantitative phytochemical analysis. In-depth face-to-face interviews were conducted with selected participants, and the responses were analyzed using thematic analysis. The findings showed that the Patikan plant plays an important role in food security, traditional healing, and daily livelihood practices. Although some medicinal uses were not fully shared due to indigenous knowledge practices, the pith was consistently identified as an important edible part of the plant. The phytochemical analysis of the pith revealed the presence of five bioactive compounds, high concentration of tannins (12.4mg/g), phenols (10.2mg/g), and followed by flavonoids (8.4mg/g) which supports the traditional use of the plant and highlights its potential value for food and health-related applications. The combined results of the interviews and laboratory analysis show the importance of linking indigenous knowledge with scientific study. This research contributes to the preservation of traditional knowledge and provides useful information for future studies on the nutritional and medicinal potential of the Patikan plant.

Keywords: Plant Biology, Patikan (*Caryota mitis*) Plant, Utilization, Phytochemical Investigation, Bioactive Compound

INTRODUCTION

Traditional knowledge plays a vital role in many local communities, but much of it remains undocumented and unsupported by scientific evidence. Despite its importance to community health, this information is mostly passed down orally, making it vulnerable to permanent loss, especially as time passes and modernization advances. Relatedly, Luczaj (2023), an ethnobiologist, argues that the primary aim of ethnobiological research is to document traditional knowledge, including botanical knowledge, to ensure its preservation for future generations.

Caryota mitis Lour. (Arecaceae), commonly known as the fishtail palm, is a clustering tropical palm widely distributed across Southeast Asia, including the Philippines, Vietnam, Cambodia, and Andaman Islands. It typically grows in humid tropical forests and disturbed habitats within lowland to mid-elevation environments (Royal Botanic Gardens, Kew, 2025). In Singapore, this plant is cultivated and can be found in residential areas, disturbed areas, and along roadways (Admin,2015). The core of the growing tip of the plant can be cooked and eaten. *Caryota mitis* (Pugahan) was identified as one of the Wild Edible plants in Ormoc City, Philippines, the edible part was its "ubod" or heart of the palm, which tastes like carabao meat when cooked as a vegetable dish (Nazareno et al., 2025).

A review by Pattanaik et al. (2025a) recognized the importance of *Caryota mitis*. The different parts of this plant have been employed in traditional medicine to treat a wide array of ailments and highlight the cultural and medicinal significance of *C. mitis* across Asia and other tropical regions. The fruit peel of the plant is traditionally used to relieve joint and back pain, as well as inflammation, which shows that the plant has a wide therapeutic use (Trinh et al., 2025).

Locally, the Mansaka indigenous community and local residents in Tandawan, New Bataan, Davao de Oro, has long used the *Caryota mitis* plant commonly called Patikan for food and possibly for cultural and medicinal purposes. However, it remains undocumented and scientifically unexplored, particularly its pith. This study aims to address the gap by using a mixed-method approach to explore and document the utilization of Patikan plant within among the local community and to determine and quantify the bioactive compounds present in the pith of the plant.

METHODOLOGY

This is a mixed-methods study using a descriptive-exploratory research design. The study was conducted in Barangay Tandawan, one of the upland barangays of the municipality of New Bataan, characterized by rural, mountainous terrain and proximity to forests, and relies on agriculture and wild plant resources for income and food. The study explored two main phases: the ethnobotanical documentation and the phytochemical investigation of the Patikan pith.

Phase I – Botanical Documentation

Purposive sampling was applied to identify the selected individuals in the community. Five participants was selected recommended by the Barangay officials, who are knowledgeable and has been using the plant for a long time. Before interviewing the participant, informed consent was obtained to ensure their voluntary participation. The interview was conducted conversationally to allow the participants to share their own experiences and their practices. The participants' responses were transcribed, categorized, and analyzed to identify patterns, common uses, and themes.

Phase II – Phytochemical Investigation

The pith of the Patikan plant was freshly gathered, washed, and cut into thin pieces. The samples that had been prepared were soaked in ethanol for 24 hours at a ratio of 1:5 (100 g pith:500 mL ethanol). The mixture was then filtered after the soaking period to separate the liquid extract and the solid residues. The filtrate was further treated to an oil bath method to get the crude extract. The resulting crude extract was stored in an amber bottle and then submitted to a research laboratory for phytochemical investigations.

Ethical Considerations

This study followed proper ethical guidelines. Ethical clearance was secured first before conducting the study and ensured that ethical standards are strictly observed by the researcher throughout the conduct of the study. The participants were properly informed about the objectives of the study, the methods, and the possible risks and benefits in a language they clearly understood.

RESULTS AND DISCUSSION

Qualitative Phase

Food Uses of the Patikan Plant. The findings indicated that the Patikan plant is a significant source of food for participants, especially when supplies are limited. The responses included a few food-related applications, such as extracting starch locally known as landang or natok, eating the pith (ubod) as a vegetable, and growing edible larvae (batod) inside the fallen trunk. These traditions highlight the importance of the plant as an alternative food source, deeply rooted in indigenous knowledge systems and the local community.

These findings are consistent with the literature on the food utilization of *Caryota mitis* and other palm species. The study conducted by Nazareno et al. (2025) revealed that *C. mitis* is a wild edible plant in the Philippines, with its ubod commonly prepared as a dish. On the same note, Admin (2015) noted that the trunk and the pith of Caryota species produced edible starch and palm heart that is consumed by the local communities. The nutritional value of palm-derived starches and pith as carbohydrate-containing foods was also confirmed in studies with related species such as *Caryota urens* (Grace & Henry, 2020).

Medicinal Uses of the Patikan Plant. The analysis showed that the participants are aware of several medicinal uses of the Patikan plant. Interestingly, the outer plant skin is applied topically to treat burns and blisters. It is made by peeling and applying fresh plant material, which is believed to enhance its healing potential. The practice reflects the local people's reliance on readily available plant materials for first aid and minor illnesses. Most participants stated they did not know any medicinal use, whilst some medicinal knowledge was not disclosed due to Indigenous Knowledge System Practices (IKSP).

These findings align with documented ethnobotanical and pharmacological studies of *Caryota mitis* and related species. Trinh et al. (2025) also confirm the therapeutic effectiveness of *C. mitis* by demonstrating that the peel of the fruit contains phenolics and flavonoids that have antioxidant and anti-inflammatory effects, and confirm its application in the treatment of joint pain and inflammation. However, the same study supported the antibacterial and antifungal effects of leaf extracts reported by Abdelhakim et al. (2017), thereby demonstrating the medicinal activity of various plant parts.

Other Uses of the Patikan Plant. The Patikan plant was also used extensively in the material and practical sense, in addition to food and medicine. The participants mentioned that it was used in tool handles, wooden houses, such as flooring, posts, and beams, because it was hard and durable once mature. The plant was also used in the making of traditional musical instruments, such as the Kimbal, a drum-like instrument, underscoring the plant's cultural and artistic importance.

The ethnobotanical literature supports these findings by stating that *Caryota mitis* was a multipurpose plant. Fibers and trunks of *C. mitis* were used as construction materials, household implements, and crafts by Admin (2015). The features of hardness and durability of mature trunks mentioned by the participants are analogous to botanical accounts on the characteristics of palm wood.

Quantitative Phase

Table 1. Bioactive Compound Screening

Bioactive Compounds	Result	Description
Alkaloids	+	Weakly Positive
Flavanoids	+++	Strongly Positive
Tannins	+++	Strongly Positive
Saponins	-	Negative
Glycosides	+	Weakly Positive
Phenols	++	Moderate Positive
Terpenoids	-	Negative

Data show that flavonoids and tannins were strongly positive (+++), indicating that these compounds are abundantly present in the pith extract of the patikan. At the same time, phenols show moderate positive (++), followed by the alkaloids and glycosides, which show weakly positive intensity, suggesting that these compounds are present in the pith extract but at lower concentrations only. On the other hand, the saponins and terpenoids show negative (-) values, indicating their absence at detectable levels in the pith extract. Abdelhakim et al. (2017) conducted a botanical and biological study on the leaves of *Caryota mitis* cultivated in Egypt, providing important insights into its pharmacological potential. The investigation reported the presence of key phytochemical groups, including flavonoids, phenolics, and saponins, which are often associated with therapeutic effects.

In addition, Pattanaik et al. (2025b) compiled research on the pharmacology and Phytochemistry of *Caryota mitis.* The study found a wide diversity of secondary metabolites, including alkaloids, flavonoids, terpenoids, phenolics, and fatty acids. These compounds have been linked to various pharmacological actions, including anti-inflammatory, antibacterial, antifungal, antioxidant, antitumor, anti-platelet, and anti-asthmatic. In general, *C. mitis* can be considered a medicinally useful species with a versatile phytochemical profile. However, additional pharmacological and toxicological research is needed to confirm its safety, efficacy, and therapeutic value.

Meanwhile, recent studies indicate that the absence of certain phytochemicals may be influenced by extraction conditions. According to Azwanida (2015) terpenoids are better extracted using non-polar solvents such as hexane, making the use of ethanol as a solvent may result in low or undetectable levels of certain terpenoids. On the other hand, saponins are known to be heat-sensitive and water-soluble glycosides. Improper extraction conditions, such as prolonged heating or inappropriate solvent choice, can lead to degradation or poor extraction of saponins (Sofowora, 2008).

Table 2. Bioactive Compounds Concentration

Bioactive Compound	Result (mg/g)
Alkaloids (as atropine)	1.1
Flavanoids (as quercetin)	8.4
Tannins (as Gallic acid)	12.4
Phenols (as tannic acid)	10.2
Glycosides	2.6

Data shows that the Patikan (*Caryota mitis*) pith extract contains several bioactive compounds, with tannins (12.4 mg/g) and phenols (10.2 mg/g) having the highest concentrations. These compounds are widely associated with antioxidant and protective activities in plants. Plant extracts with tannin and phenolic contents above 5 mg/g are generally considered biologically active and useful. Similar findings were reported in palm species, including C. mitis, where high phenolic and tannin contents were linked to strong antioxidant and chemopreventive potential (Ma et al., 2019; El-Akad et al., 2021). The similar pattern observed in the current study may be explained by the use of ethanol to extract the compounds, which is able to extract polar compounds like phenols and tannins. However, the slight difference in concentration in comparison to previous studies may be due to the part of the plant that was used in this study, as we have only considered the pith, while other studies may use leaves or fruits in which phenolic content varies.

Flavonoid (8.4 mg/g) and glycoside (2.6 mg/g) were the next-highest compounds. Flavonoid concentrations of 1–10 mg/g in plant extracts are considered effective and biologically relevant (Panche et al., 2016). The study by El-Akad et al. (2021) revealed that *C. mitis* contains several compounds, including quercetin and kaempferol derivatives, that exhibit chemopreventive activity. The functional levels of glycosides are still found at lower levels, but are functional in crude extracts of 15 mg/g to 5 mg/g. But the slightly lower glycoside content in this study compared to some reports may be explained by the extraction method, especially the polarity of the solvent and the heating time using oil bath, which might affect the stability and solubility of the glycoside.

Meanwhile, the lowest concentration was observed in alkaloids (1.1 mg/g). Nevertheless, alkaloids are reported to be quite potent and can still play a role in biological systems even at low concentrations. Medicinal plant alkaloids have been shown to contain pharmacologically relevant levels, with substantial pharmacological effects in many therapeutic situations, including pain management, suggesting their relevance even at relatively low concentrations in plant extracts (Shoaib et al., 2016). The reduced alkaloid yield in this study could be due to the plant part chosen, with alkaloids typically being more abundant in roots, bark or seeds than in pith tissues. Other variables that could have impacted the yield include environmental conditions, such as climatic conditions, plant maturity and soil quality, as well as extraction conditions such as method and temperature.

CONCLUSION

This study recorded and documented the rich ethnobotanical knowledge on Patikan (*Caryota mitis*) plant by outlining the food, medicinal and other practical uses. Qualitative interviews showed that the participants had an in-depth knowledge about the plant based on the long held cultural activities, especially in using the pith as food, outer parts as traditional medicine and the trunk as a construction and livelihood related activity. These findings highlight the significance of indigenous knowledge systems in informing sustainable plant use and indicates the way the traditions are informed by the close observation of plant growth, maturity and functionality. Moreover, the study provided a gap between the traditional and the scientific inquiry by looking at the pith of Patikan in the context of a phytochemical analysis. Combination of qualitative data and quantitative results is important to reinforce the relevance of the plant besides a cultural practice and support its scientific prospect of nutritional and bioactive value.

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