



Ethnoscience and Ethnobotanical: The Construction of Indigenous Knowledge on Parijoto (*Medinilla speciosa*) Plant

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ABSTRACT

Parijoto fruit (Medinilla speciosa), a characteristic plant from the slopes of Mount Muria, is traditionally believed to enhance fertility in pregnant women. This study aimed to examine the process of making parijoto syrup and relate it to scientific concepts. A qualitative case study approach was employed, involving semi-structured interviews, field observations of syrup production, and literature review to explore the fruit's composition and benefits. The research stages included preparation, primary data collection, and data analysis. Data were analyzed descriptively and comparatively, linking indigenous knowledge with principles of ethnoscience and ethnobotany. The investigation focused on community practices in syrup preparation, followed by verification, reconstruction, formulation, and conceptualization into scientific knowledge. From a scientific perspective, the syrup production process illustrates concepts such as classification of living organisms, elements and compounds, energy and work, simple machines, mixtures, temperature and heat, and energy transfer. Ethnobotanical findings show that the local community uses parijoto fruit and leaves for various medicinal purposes and fertility enhancement, with cultural beliefs attributing positive effects on offspring appearance. Integrating local knowledge with scientific learning provides opportunities to foster meaningful understanding and strengthen connections between education and regional natural potential.

Keywords: *parijoto plant, medinilla speciosa, ethnoscience, ethnobotanical, indigenous knowledge*

INTRODUCTION

Indonesia is a country endowed with rich biodiversity and cultural diversity. According to BPS data (2013), Indonesia is home to 633 major ethnic groups, each possessing unique and inherited local wisdom. Despite this, the learning process in schools has not fully utilized this potential as a source of contextual and meaningful learning. A gap exists when modern science education often overlooks indigenous knowledge, even though local wisdom, such as the traditions surrounding the parijoto plant in Kudus, encompasses ecological, spiritual, and scientific values that can enhance students' scientific literacy. The lack of a systematic ethnoscience approach in the curriculum results in students being less familiar with, less appreciative of, and less capable of inheriting local culture as part of their identity and as a solution for sustainable development. Consequently, a transformation in learning that integrates culture and science is necessary to ensure education not only preserves ancestral heritage but also cultivates a generation that is critical, possesses strong character, and cares for the environment.

The rapid advancement of science and technology necessitates the inclusion of local knowledge as a learning resource. Local wisdom represents knowledge tested and refined over generations, serving both as belief and tradition. It is essential for communities to transmit this wisdom to students so they can appreciate and inherit it. Education plays a dual role in preserving culture while fostering innovation. One approach to enhance learning in this context is ethnoscience. Ethnoscience is a pedagogical strategy that integrates culture into science education (Khoiri & Sunarno, 2018). Culture, as the product of human creativity, emotion, and intellect, evolves into indigenous knowledge (indigenous science), which can be transformed into scientific knowledge (Sudarmin et al., 2023). Through ethnoscience, students gain contextualized learning experiences that allow them to build foundational knowledge grounded in their local potential and cultural background. Introducing cultural heritage to future generations is therefore crucial for its preservation. Indonesia's rich cultural legacy, developed over a long historical process, provides indigenous knowledge that remains meaningful today. Many traditional cultural practices are closely connected to contemporary efforts in environmental conservation.

Local culture serves as a foundation for learning, supporting the development of students' critical thinking (Risdianto, Dinissjah, Nirwana, & Kristiawan, 2020), character (Juliani & Bastian, 2023), and environmental awareness (Laily & Fawaida, 2024). Ethnoscience has emerged as an approach to create diverse learning resources that adapt to local contexts and community knowledge (Indriyanti, Sumarni, & Rahayuningsi, 2025). Continuous collaboration between educators and local communities is essential to harness local potential and culture as an expression of national pride (Sudarmin, Mastur, & Parmin, 2017). Such synergy enhances the meaningfulness of the learning process. By engaging community experts as knowledge sources, students develop key competencies including collaboration, creativity, and conservation awareness (Ufie, Matitaputy, Kufla, & Info, 2020). Ethnoscience-based learning has been shown to increase students' interest in science (Nisa', Suprpto, Shofiyah, & Cheng, 2024), ecological knowledge, cognitive skills, attitudes, and behavior (Solheri, Azhar, & Yohandri, 2022). Integrating ethnoscience into science education also enhances scientific literacy in terms of conceptual understanding, processes, and attitudes (Dewi, 2021).

First introduced in the early 1960s, ethnoscience describes the conceptual frameworks employed by indigenous communities to understand their environment. The term originates from the Greek word *ethnos* (nation) and the Latin word *scientia* (knowledge), referring to the knowledge possessed by specific ethnic or social groups. According to Sturtevant (1964), ethnoscience represents the knowledge and cognitive systems unique to a particular culture, emphasizing the distinct knowledge within a community, also known as local wisdom. Its purpose is to recognize significant physical phenomena within a community or culture and organize them into structured understanding, commonly referred to as indigenous knowledge. Ethnoscience functions as an ecosystem of knowledge embedded in traditional or indigenous cultures, encompassing environmental factors and the interactions between humans and nature (Zidny & Sjöström, 2021). It is also identified as traditional ecological knowledge or pre-existing scientific knowledge (Zidny, Solfarina, Aisyah, & Eilks, 2021).

The integration of ethnoscience into science learning can enhance scientific literacy, 21st-century skills, and students' appreciation of local culture through approaches such as Ethno-STEM, RE-STEM, and E-PjBL, applied to contextual topics like traditional games, herbal medicine, and local technology (Indriyanti, Sumarni, & Rahayuningsi, 2025). Incorporating local wisdom, for example in traditional water resource management, with STEM concepts creates learning experiences that are both relevant and engaging (Alisah, Sajidan, & Muzzazinah, 2025). Integrating ethnoscience into modern science education requires a participatory approach to prevent the exploitation of traditional knowledge, ensuring that its use remains sustainable and ethical (Amiruddin et al., 2024).

Kudus, a city in Central Java, Indonesia, is rich in cultural heritage. One enduring cultural belief involves the Parijoto plant (*Medinilla speciosa*), traditionally thought to enhance the attractiveness of children born to mothers who consume it during pregnancy. Native to the slopes of the Muria Mountains, parijoto grows along the roads leading to the tomb of Sunan Muria. Historically, it is said that Sunan Muria's wife consumed the fruit during pregnancy, which contributed to the widespread belief in its benefits. This local myth and cultural practice provide a valuable resource for scientific learning, offering opportunities to study parijoto through the lenses of ethnoscience and ethnobotany, thereby connecting cultural heritage with scientific exploration.

METHODOLOGY

This study was conducted in Pendak Hamlet, Colo Village, Dawe Subdistrict, Kudus Regency, Central Java, Indonesia. The research involved three parijoto syrup producers (P1, P2, and P3) who have been engaged in this business for more than 12 years. Participants were selected based on their age and experience to capture indigenous knowledge that has been transmitted across generations, thereby preserving local wisdom. The processing of parijoto fruit into syrup aims to facilitate consumption and serves as a distinctive souvenir for pilgrims visiting the Sunan Muria site.

A qualitative approach was employed, drawing on ethnoscience and ethnobotany perspectives. The study focused on reconstructing indigenous knowledge into scientific knowledge by relating community practices to scientific concepts, principles, and laws, particularly in botanical studies. The reconstruction process highlighted the cultural practices of the Colo Village community, which have been historically preserved and are closely aligned with the region's geographical conditions. Throughout the study, the researcher maintained direct engagement with the parijoto syrup producers, ensuring that the data collection captured authentic practices and local insights. The research workflow is illustrated in Figure 1.

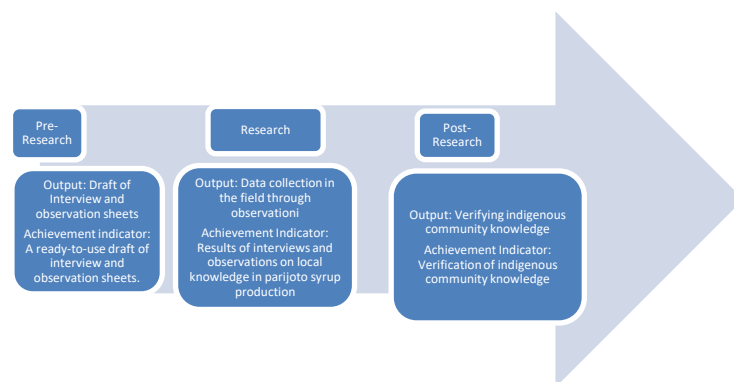


Figure 1. Research Flow Diagram

Primary data were collected through direct observation, in-depth interviews, and discussions with community members involved in parijoto syrup production. Secondary data were sourced from cultural studies related to parijoto syrup processing. In this study, the researcher served as the primary instrument, systematically gathering scientific data from the local community, followed by processes of verification, reconstruction, formulation, and conceptualization into relevant scientific knowledge. To ensure the reliability and credibility of the data, the researcher implemented rigorous steps such as Conducting field research through intensive observation, Triangulating data and methods, Providing adequate references, Conducting a negative case study

This study employed a qualitative approach to explore the traditional knowledge of the indigenous community in Kudus concerning the parijoto plant. Respondents were purposively selected from the Colo area, Kudus Regency, Central Java, Indonesia, to ensure participants had

relevant expertise and experience. The participants included ten individuals, comprising both parijoto fruit sellers and syrup producers. Data collection involved active participation, field observations, and documentation, complemented by in-depth interviews. These methods were used to examine the relationship between indigenous knowledge and scientific learning, providing insights into how local cultural practices can inform and enrich science education.

RESULT AND DISCUSSION

Ethnoscience Study of Parijoto

The study commenced with field observations involving parijoto farmers. Interviews revealed that parijoto is commonly consumed fresh, as rujak (a traditional fruit salad with sweet and spicy dressing), or processed into parijoto syrup. The fruit is recognized for its high antioxidant content, attributed to abundant phenolic and flavonoid compounds (Sighny, Azkia, & Kunarto, 2020). Moreover, parijoto exhibits antibacterial properties due to the presence of bioactive compounds such as alkaloids, polyphenols, tannins, flavonoids, quinones, and saponins in its extract (Milanda, Lestari, & Tarina, 2021).

The observation and interview process, illustrated in Figure 2, facilitated the systematic reconstruction of indigenous knowledge into scientific understanding. By documenting traditional practices and linking them to chemical and biological properties, the study highlights how local knowledge can serve as a valuable resource for contextualized science learning. This approach demonstrates the potential of ethnoscience to integrate cultural heritage with scientific concepts, enabling students to explore real-world applications of antioxidants, antibacterial activity, and natural product chemistry while fostering an appreciation for local biodiversity.



Figure 2. Interview with Parijoto Farmers

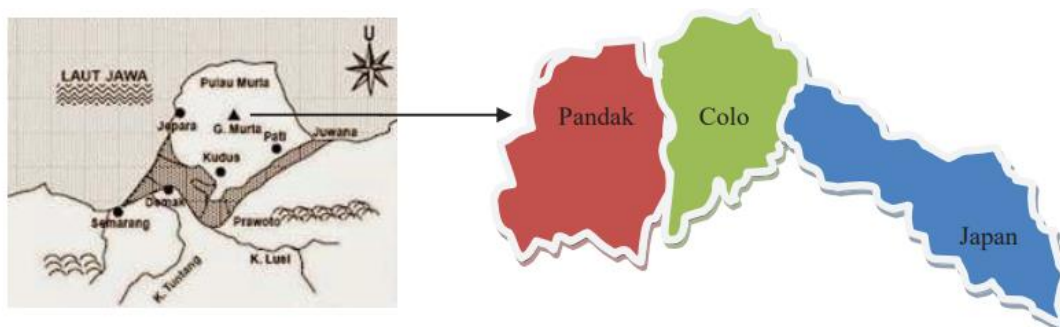


Figure 3. The location of Pandak Hamlet Colo Village Kudus Regency.
(Source: doc. Alima Saida Hanum, Erma Prihastanti and Jumari)

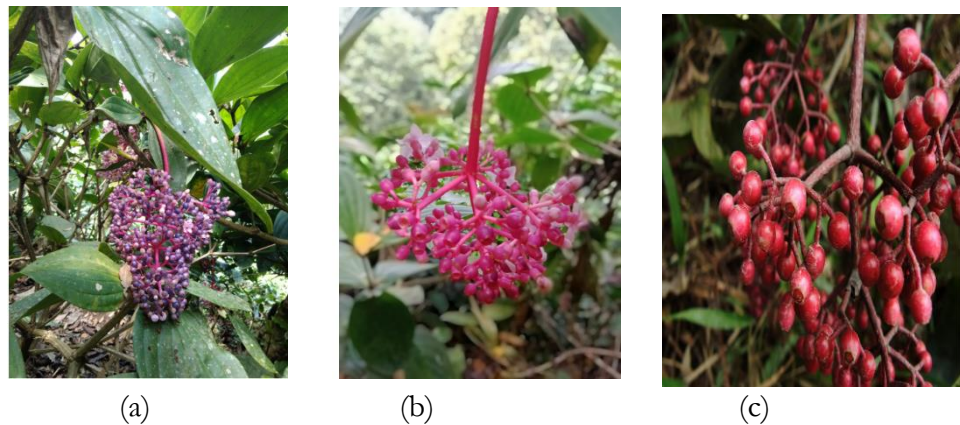


Figure 4. (a) *Medinilla speciosa*, (b) *Medinilla javanensis*, (c) *Medinilla verrucosa*
(Source : doc. Ulya dan bioliz)

Figure 4 illustrates the type of parijoto found in the Muria Mountains. Local communities sell freshly harvested parijoto along the roads leading to the Sunan Muria pilgrimage site, making it a distinctive regional souvenir. To extend its shelf life and facilitate transport for visitors, the fruit is processed into syrup, allowing it to be preserved while remaining convenient for consumption and as a take-home product. This practice exemplifies how traditional knowledge of food processing can be linked to scientific concepts such as preservation, chemical stability, and food storage, providing a practical context for integrating ethnoscience into learning.

Table 1. Reconstruction of Indigenous Knowledge into Scientific Knowledge in the Parijoto Syrup Production Process.

No	Topik	Indigenous Knowledge	Scientific Knowledge
1	Washing 	The washing process is carried out on freshly harvested Parijoto fruits using flowing water	Washing fruits with flowing water helps reduce the transmission of foodborne pathogens, efficiently removes dust, soil, and pesticide residues, and ensures the freshness and quality of the fruit (Dallner, Harlow, & Nasheri, 2022). Washing Parijoto under running water for 15 seconds has been shown to significantly reduce pesticide residues (Brar, BCIT School of Health Sciences, Environmental Health, & Sidhu, 2015).
2	Grinding 	The grinding process has been modernized by using a blender, enabling the production of larger quantities of Parijoto extract.	Blending Parijoto fruit is the process of breaking down larger particles into finer ones. During this process, electrical energy is converted into kinetic energy.
3	Filtering	To achieve a smooth texture, the filtration process is carried out twice to effectively separate the Parijoto juice from its pulp.	The filtration process is carried out using a sterile white cloth to separate large particles (pulp) from

		small particles (juice) of parijoto fruit.
4	Cooking 	The cooking process is carried out for four hours to produce high-quality syrup. The cooking process involves mixing sugar to achieve a sweet taste. The cooking duration is four hours to obtain a good texture for parijoto syrup. Besides serving as a sweetener, sugar also acts as a natural preservative. This process follows the principle of chemical energy, transforming raw ingredients into cooked products using the concepts of temperature and heat, homogeneous solutions, and crystallization.
5	Cooling 	The cooling process is carried out by airing the parijoto syrup at room temperature. The cooling process is carried out at room temperature in a sterile space to prevent contamination by bacteria in the environment. This process follows the principles of heat and temperature.
6	Packaging 	Packaging is done once the syrup has cooled, and the bottles and caps have been washed with warm water. The caps are sealed to prevent air from entering. The packaging process includes sterilizing the containers with hot water to eliminate bacteria, ensuring that the syrup remains uncontaminated during packaging.

Based on Table 1, numerous indigenous knowledge practices have been reconstructed into scientific concepts and subsequently analyzed as learning resources for students. The preparation of parijoto syrup involves five key stages: washing, grinding, filtering, cooking, and packaging. The initial stage, washing, removes dirt, debris, and potential pesticide residues from the harvested fruit. Running water is used to ensure that soluble impurities are immediately carried away, preventing reattachment to the fruit. Studies show that washing with running water can reduce pesticide residues by up to 80% and minimizes contamination from physical substances, such as glass, stones, plastics, and tape, as well as chemical contaminants including weeds, fungal toxins, and persistent organic pollutants (Widianarko, Soedarini, & Hartoro, 2017).

The subsequent stage involves grinding the parijoto fruit using a blender, which streamlines the process and reduces processing time. The blender operates on principles of physics and chemistry, with its main components consisting of an electric motor as the primary driver, a shaft coupling (bushing) to transfer power, and a blade mixer for grinding and mixing. The electric motor

converts electrical energy into kinetic energy, enabling the blending process (Hayati, 2019). Typically, an asynchronous motor is used, compliant with IEC and NEMA standards, with power measured in kilowatts (kW). The ratio of parijoto fruit to water during blending is 1:1, a critical factor influencing viscosity, color, and texture. Variations in fruit mass and water content directly affect sensory attributes such as viscosity, total dissolved solids, and color, which are key parameters in assessing product acceptability (Aprilyan, Lutfi, & Yulianingsih, 2015).

The next stage in parijoto syrup production is filtration, performed using cloth to extract the fruit juice. Filtration separates a heterogeneous mixture of fluid and solid particles by allowing the liquid to pass through a porous medium while retaining solids. The method employed is the Plate and Frame Filter Press, where filter cloth is attached to the plates. This technique, widely used in the food industry, effectively separates suspended solids, producing clear fruit juice suitable for syrup production.

Following filtration, the syrup is cooked by heating the extracted juice with sugar in a 1:1 ratio. During a typical production batch, 10 liters of raw ingredients are reduced to 7–8 liters due to water evaporation. This step decreases water content, preserves the syrup, and prevents spoilage. The sugar concentration is critical: sucrose content should not exceed 65% to avoid crystallization, nor fall below 60% to prevent microbial growth (Fickri, 2019). Physical and chemical properties such as viscosity, pourability, and color intensity are monitored, with temperature strictly controlled to within 0.1°C to ensure consistency, particularly for applications related to food and pharmaceutical formulations. Cooking takes approximately three hours, with continuous stirring to maintain texture and prevent excessive thickening.

After cooking, the syrup undergoes cooling, which removes heat from the system, lowering temperature and potentially inducing phase changes. Convective cooling is applied, whereby hot syrup exposed to open air transfers heat to surrounding air particles. According to Newton's Law of Cooling, the rate of temperature reduction is proportional to the difference between the syrup's temperature and the ambient environment (Guswantoro, Sianturi, Prapitasari, & Elona, 2017).

The final stage is packaging, which involves sterilization of containers to prevent contamination. Wet sterilization at high temperatures eliminates potential microbial contaminants such as bacteria and fungal spores, ensuring product safety and extended shelf life (Wulandari, Nisa, Taryono, Indarti, & Sayekti, 2022). Packaging occurs in a controlled environment, with workers wearing protective clothing. Syrup is filled into bottles of varying sizes (100 ml, 150 ml, and 250 ml), sealed with plastic caps, and labeled to provide information and enhance appearance. Properly packaged syrup can remain safe for up to two years at room temperature, provided containers are intact. The reconstruction of indigenous knowledge from these production processes offers valuable learning resources for students. The stages of parijoto syrup production can be directly linked to scientific concepts, including mixtures, heat and energy transfer, physical and chemical properties, and food preservation, as summarized in Table 2.

Table 2. Material Content in The Production of Parijoto Syrup.

Parijoto Syrup Production Process	Grade (Junior High)	Science Material Content
Selection of Parijoto Varieties	VII BAB 5 "Classification of Living Organism"	Classification
Washing	VIII BAB 5 "Elements, Compounds, and Mixtures"	Physical Properties of Water (Solubility and Purity), Simple Mixture Separation Methods
Grinding	VIII BAB 3 "Work, Energy, and Simple Machines"	Energy Transformation (Mechanical Energy), Physical Properties of Materials
Filtering	VIII BAB 5 "Elements, Compounds, and Mixtures"	Filtration

Parijoto Syrup Production Process	Grade (Junior High)			Science Material Content		
Cooking	VII	BAB	3	“Temperature, Heat, and Expansion”	Physical and Chemical Changes, Heat Transfer, Temperature, and Heat	Energy
Cooling	VII	BAB	3	“Temperature, Heat, and Expansion”	Heat and Temperature	
Packaging	VII	BAB	3	“Temperature, Heat, and Expansion”	Heat and Temperature	

Ethnobotanical Study of Parijoto

The local community recognizes parijoto as a distinctive plant found on the slopes of Mount Muria, believed to enhance fertility. This plant is considered a heritage of Sunan Muria. The local people believe parijoto to be a remedy for various diseases (Nafi’ah, 2022).

Table 3. Ethnobotanical Study of Parijoto Plant

Parijoto Plant Classification	Ethnobotanical Study of Parijoto Plant
Kingdom: Plantae Division: Magnoliophyta Class: Magnoliopsida Order: Myrtales Family: Melastomataceae Genus: <i>Medinilla</i> Species: <i>Medinilla javanensis</i>	This plant grows on the slopes of Mount Muria or in cultivated forests, either as a fruit-bearing plant or an ornamental plant. It thrives at an altitude of 1,602 meters above sea level. <i>Medinilla speciosa</i> is a shrub-like plant with older stems and branches having pseudo-nodes, grayish-white in color. The bark is cracked length-wise, following the growth direction of the stem. Young branches have a four-sided shape and light green. Branch growth is relatively slow, and the plant can reach a height of 4.4 to 7.5 meters. The leaves are simple, arranged alternately opposite, and occasionally rosetted with 3 to 4 leaves. The leaf shape is oblong/elongated, with a pointed tip and blunt base, smooth edges, leaf length ranging from 14.5 to 32.5 cm, width from 6.5 to 14.5 cm, and a short stalk of 0.5 to 1 cm. Mature leaves are glossy dark green, while young leaves are light green with a brownish tint, and unopened leaves are dark brown. Leaf veins curve following the leaf shape and are reddish from half the base. The lower surface of the leaf is light greenish-white, with seven prominent veins. Veins near the base are smaller compared to those above and are reddish halfway up.. The compound flower cluster grows terminally at the branch tips and axillarily at the leaf and stem nodes. The unopened flowers are pinkish-white. The ovary of blooming flowers is pink, and the number of petals are 4 to 5. There are eight stamens, with the lower half pink and the upper half blue, curving inward. In the middle of each stamen, there are bifurcated yellow anthers. The pistil is reddish-orange with a curved tip. Young fruits are pink, mature fruits are red, and fully ripe fruits turn black. The seeds are small and black (Umiyati, Pramesti, & Pujiastutik, 2021)

The Parijoto plant brings many benefits for the residents around the slopes of Mount Muria. The community utilizes it in daily life as a medicinal remedy. Various plant parts, including the fruit and leaves, are used, often mixed with rhizomes, as shown in Table 4.

Table 4. Benefits of Parijoto Plant

No	Benefit	Ingredients	Part(s)	Serving Method
1	Mouth ulcers/wounds in the mouth	Parijoto	Fruit	Take 5 mg of parijoto fruit, wash it thoroughly, and crush it until smooth. Dissolve it in water, use it as a mouthwash, and the remainder can be consumed.
2	Diarrhea	Parijoto and water	Leaf	sh ± 20 grams of Parijoto leaf, then boil them in 400 ml of water for 15 minutes, filter, drink twice a day, in the morning and evening.

No	Benefit	Ingredients	Part(s)	Serving Method
3	Anti-inflammatory	Parijoto Lempuyang Brown sugar Water	Fruit Root	Prepare $\pm$ 20 grams of Parijoto fruit, crush together with lempuyang, then boil. Add brown sugar to reduce the bitterness of lempuyang. Drink twice a day, in the morning and evening.
4	Antibacterial	Parijoto Ginger Water	Fruit Root	Prepare $\pm$ 20 gram of Parijoto fruit, crush together with ginger, then boil. Strain and drink the water.
5	Anticancer (Winanta, Hanik, & Febriansah, 2021)	Parijoto Turmeric Lempuyang	Fruit Leaf Root	Prepare $\pm$ 20 grams of Parijoto fruit, $\pm$ 10 grams of Parijoto leaf, turmeric and lempuyang, Coarsely grind, then boil. Strain and drink twice a day, in the morning and evening.
6	Fertility for pregnant women	Parijoto	Fruit	Consume the Parijoto fruit directly without any additives.
7	For a beautiful/handsome appearance	Parijoto Pamelo Orange Pomegranate	Fruit	Consume the parijoto fruit, pomegranate, and pamelo orange with ground brown sugar.
8	Antioxidant (Sa'adah, Indiani, Nurhayati, & Ashuri, 2020)	Parijoto Turmeric Ginger	Fruit Root	Prepare $\pm$ 20 grams of Parijoto fruit, turmeric, and ginger. Coarsely grind then boil. Strain and drink twice a day, in the morning and evening.

(Hanum, Prihastanti, & Jumari, 2017)

Parijoto is recognized for its numerous benefits, and local communities surrounding Mount Muria in Kudus Regency consider it a medicinal plant capable of addressing a variety of health conditions. Beyond its medicinal applications, parijoto is also cultivated as an ornamental plant and utilized as a symbolic element in cultural rituals. One prominent traditional practice involves the consumption of parijoto by pregnant women who are three months or more into their pregnancy. This tradition is rooted in the historical narrative of Sunan Muria's wife, who reportedly consumed parijoto during her pregnancy and gave birth to a healthy and attractive child.

In addition, parijoto is integrated into the Mitoni ritual—a traditional seven-month pregnancy ceremony—often prepared in rujak, a type of fruit salad, symbolizing the hope that the unborn child will be born handsome or beautiful. Within the Mount Muria community, parijoto is not only reserved for pregnant women but is also believed to serve as a remedy for various ailments. Longstanding cultural beliefs attribute to parijoto the ability to assist childless couples in conceiving and to support recovery in patients recovering from stroke, establishing the plant as a highly valued medicinal resource.

The ethnobotanical uses of parijoto, as detailed in Table 4, reflect a sophisticated form of local ecological knowledge rather than a collection of arbitrary practices. This indigenous knowledge aligns closely with contemporary pharmacological findings. Central to its cultural significance is the belief that parijoto enhances fertility. Scientific investigation provides a plausible rationale for this practice, as the fruit contains high concentrations of bioactive compounds, including flavonoids, tannins, and phenolic compounds, which are known for their potent antioxidant properties (Lelono, Tachibana, & Itoh, 2019).

Oxidative stress is a recognized factor that can adversely affect reproductive health, including gamete quality and embryo development. The antioxidant-rich profile of parijoto may mitigate oxidative stress, thereby potentially creating a more favorable physiological environment for conception and maintaining a healthy pregnancy (Afsar et al., 2018). These findings offer a biochemical foundation for the traditional beliefs surrounding parijoto, positioning its use as an empirical form of nutraceutical therapy that has been transmitted across generations. By documenting and analyzing these practices, this study demonstrates how indigenous knowledge

can be reconstructed and utilized as a meaningful learning resource, linking cultural heritage with scientific understanding in the context of integrated science education.

The use of parijoto (*Medinilla speciosa*) for treating ailments such as diarrhea, inflammation, and bacterial infections (Table 4) is supported by its documented bioactive properties. Studies have confirmed the antibacterial activity of parijoto fruit extracts against pathogens, including *Staphylococcus aureus*, validating its traditional use in managing infections. Its anti-inflammatory potential, primarily attributed to flavonoid and tannin content, provides a scientific rationale for its application in addressing inflammatory conditions. This convergence of indigenous knowledge and scientific validation underscores the value of ethnobotany as a framework for bioprospecting, illustrating how local communities have effectively identified and utilized a natural resource with diverse therapeutic properties through long-term observation and experience.

Beyond its medicinal applications, parijoto is deeply embedded in the socio-cultural and spiritual practices of the Muria community. Its role in the Mitoni (seven-month pregnancy) ritual and its association with the legacy of Sunan Muria elevate the plant from a functional medicinal resource to a cultural symbol, embodying hopes for beauty, health, and spiritual blessing. This cultural embeddedness is critical for the plant's conservation. However, as parijoto is often harvested from the wild, its existence is threatened by overexploitation and habitat loss. An ethnobotanical perspective emphasizes the urgent need for sustainable management. Practices such as integrating parijoto into agroforestry systems or cultivating it as an ornamental plant, already adopted by some local communities, can ensure its availability while preserving the associated indigenous knowledge (Silalahi & Nisyawati, 2018). Consequently, conserving parijoto encompasses both biodiversity protection and the safeguarding of living cultural heritage. Future research should prioritize clinical trials to validate its medicinal efficacy and the development of sustainable cultivation protocols to secure this invaluable ethnobotanical resource for future generations.

The study, entitled *Ethnoscience and Ethnobotany Study: The Construction of Indigenous Knowledge on the Parijoto Plant*, demonstrates significant novelty by transforming a local myth—specifically, the Kudus community's belief in the benefits of parijoto for pregnant women—into science literacy rooted in cultural, spiritual, and ecological contexts. Its originality lies in framing indigenous knowledge as a legitimate local epistemology, wherein oral traditions and hereditary practices are systematically examined using ethnobotanical and ethnoscientific approaches. This methodology generates contextualized and meaningful science learning resources. Beyond cultural validation, the research contributes to the conservation of the endemic plant *Medinilla speciosa*, preserving the biological and spiritual heritage of the Muria community, while supporting Sustainable Development Goal 15 (Life on Land) through ecosystem preservation guided by community participation and transformative education. In this way, the study bridges science and culture, strengthens local identity, and provides a foundation for educational innovation and environmental sustainability.

Despite its contributions, the study has limitations. Its qualitative and descriptive design, although rich in contextual detail, is based on a relatively small number of informants—three syrup entrepreneurs and ten additional participants—from a specific geographic area. As a result, the findings are highly contextual and may not be fully generalizable to other communities using parijoto. Furthermore, while the research successfully documents traditional practices and links them to scientific concepts, it does not empirically test the plant's claimed health benefits, such as fertility enhancement or antibacterial activity. The scientific validations cited rely on existing phytochemical literature, indicating a need for direct pharmacological and clinical studies to substantiate these ethnobotanical claims.

Nonetheless, the findings of this study carry significant implications across multiple domains, including science education, cultural preservation, and sustainable resource management. By integrating indigenous knowledge with scientific understanding, the study offers a model for contextualized learning that fosters scientific literacy, environmental awareness, and appreciation for local heritage, providing valuable insights for both educators and policymakers. Implications for Science Education, this study provides a concrete model for integrating ethnoscience and ethnobotany into the science curriculum. The detailed reconstruction of the parijoto syrup production process, linked to junior high school science topics (as presented in Table 2), offers educators a ready-to-use, contextualized learning resource. It illustrates how abstract scientific concepts—such as energy transformation, filtration, and heat transfer—can be taught through culturally relevant local practices. Such integration has the potential to enhance student engagement, improve scientific literacy, and foster appreciation for indigenous knowledge, demonstrating the value of local cultural resources as effective tools for meaningful science learning. Implications for Conservation and Policy, the study identifies parijoto (*Medinilla speciosa*) as a significant biological and cultural asset within the Mount Muria ecosystem. The reliance on wild harvesting, combined with its cultural and medicinal importance, emphasizes the urgent need for sustainable management strategies. Findings from this research can guide local governments and environmental agencies in developing programs to promote the cultivation of parijoto, thereby preventing overexploitation and ensuring its availability for future generations. This approach aligns with broader sustainable development objectives, particularly SDG 15 (Life on Land), by supporting the conservation of endemic species through community-based awareness, participatory management, and environmentally responsible practices.

CONCLUSION

This study aimed to identify and describe indigenous knowledge associated with the production of parijoto syrup and to link this traditional practice with relevant scientific concepts. The reconstruction of the syrup-making process was analyzed to generate scientific understanding. Ethnoscience analysis revealed multiple scientific concepts embedded in parijoto syrup production, including the classification of living organisms, elements and compounds, work, energy, simple machines, mixtures, temperature and heat, and heat and energy transfer. From an ethnobotanical perspective, the local community around the slopes of Mount Muria utilizes both the leaves and fruits of the parijoto plant for various purposes. These include treating mouth ulcers, diarrhea, inflammation, bacterial infections, and cancer, enhancing fertility in pregnant women, serving as a supplement to support the birth of healthy and attractive children, and providing antioxidants. Beyond medicinal applications, parijoto is also valued as an ornamental plant, a general health tonic, and a fertility enhancer during pregnancy. The study demonstrates how indigenous knowledge can be reconstructed into scientific knowledge, providing contextualized learning resources that integrate cultural heritage, scientific principles, and practical applications.

REFERENCES

- Aprilyan, D. B., Lutfi, M., & Yulianingsih, R. (2015). Analisa Pengaruh Massa dan Air Terhadap Proses Pemplenderan Pada Uji Kelayakan Pembuatan Saus Buah Paprika (*Capsium Annuum*). *Jurnal Keteknik Pertanian Tropis Dan Biosistem*, 3(2), 172–178.
- Brar, A., BCIT School of Health Sciences, Environmental Health, & Sidhu, B. (2015). Consumers knowledge regarding pesticides on apples and effective washing to remove the pesticides. *BCIT Environmental Public Health Journal*. <https://doi.org/10.47339/ephj.2015.114>
- Dallner, M., Harlow, J., & Nasheri, N. (2022). Efficacy of washing produce in removing human coronavirus OC43 and murine norovirus. *Journal of Applied Microbiology*, 133(3), 1800–1807.

<https://doi.org/10.1111/jam.15667>

- Dewi, C. C. A., Erna, M., Haris, I., & Kundera, I. N. (2021). The effect of contextual collaborative learning based ethnoscience to increase student's scientific literacy ability. *Journal of Turkish Science Education*, 18(3), 525-541.
- Fickri, D. Z. (2019). Formulasi Dan Uji Stabilitas Sediaan Sirup Anti Alergi Dengan Bahan Aktif Chlorpheniramin Maleat (Ctm). *Journal of Pharmaceutical Care Anwar Medika*, 1(1), 16–24. <https://doi.org/10.36932/j-pham.v1i1.4>
- Guswanto, T., Sianturi, M., Prapitasari, N., & Elona, A. (2017). Hubungan Kecepatan Pendinginan Air dengan Kecepatan Tiupan Udara. *Prosiding SNFA (Seminar Nasional Fisika Dan Aplikasinya)*, 2(2), 241. <https://doi.org/10.20961/prosidingsnfa.v2i0.16404>
- Hanum, A. S., Prihastanti, E., & Jumari. (2017). Ethnobotany of utilization, role, and philosophical meaning of parijoto (*Medinilla*, spp) on Mount Muria in Kudus Regency, Central Java. *AIP Conference Proceedings*, 1868(June). <https://doi.org/10.1063/1.4995210>
- Hayati, N. (2019). Mesin Blender Buah. *Jurnal Science Tech*, 11(1), 1–14. Retrieved from <http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484>
- Indriyanti, D. R., Sumarni, W., & Rahayuningsi, M. (2025). Integration of Ethnoscience in Natural Science learning : Literacy Study, 11(6), 68–77. <https://doi.org/10.29303/jppipa.v11i6.9980>
- Juliani, A. ., & Bastian, A. (2023). Pendidikan Karakter Sebagai Upaya Mewujudkan Profil Pelajar Pancasila. *Prosiding Seminar Nasional Pendidikan PPs Universitas PGRI Palembang*, 3(1), 1–9. <https://doi.org/10.51878/cendekia.v3i1.1950>
- Khoiri, A., & Sunarno, W. (2018). Pendekatan Etnosains Dalam Tinjauan Fisafat. *SPEKTRA: Jurnal Kajian Pendidikan Sains*, 4(2), 145. <https://doi.org/10.32699/spektra.v4i2.55>
- Laily, N. N., & Fawaida, U. (2024). Implementation of the Ethno-STEM Approach (Science, Teknologi, Engineering, And Mathematics) in Science Learning to Improve Critical Thinking Skill and Interest of Students. *Jurnal Tarbiyatuna*, 5(1), 70–85. Retrieved from <https://ejournal.iaida.ac.id/index.php/Tarbiyatuna/article/view/3353/1775>
- Lelono, R. A. A., Tachibana, S., & Itoh, K. (2019). In vitro antioxidative activities and polyphenol content of *Medinilla speciosa* Blume. *Pakistan Journal of Biological Sciences*, 22(2), 91–98.
- Milanda, T., Lestari, K., & Tarina, N. T. I. (2021). Antibacterial Activity of Parijoto (*Medinilla speciosa* Blume) Fruit Against *Serratia marcescens* and *Staphylococcus aureus*. *Indonesian Journal of Pharmaceutical Science and Technology*, 8(2), 76. <https://doi.org/10.24198/ijpst.v8i2.32166>
- Nafi'ah, L. (2022). Review Article: Aktivitas Farmakologi Tanaman Parijoto (*Medinilla speciosa*). *Jurnal Riset Rumpun Ilmu Kesehatan*, 1(1), 09–18. <https://doi.org/10.55606/jurrikes.v1i1.172>
- Nisa', K., Suprpto, N., Shofiyah, N., & Cheng, T. H. (2024). How does ethnoscience-students' worksheet (ESW) influence in science learning? *Journal of Education and Learning*, 18(2), 403–412. <https://doi.org/10.11591/edulearn.v18i2.21178>
- Risdianto, E., Dinissjah, M. J., Nirwana, & Kristiawan, M. (2020). The effect of Ethno science-based direct instruction learning model in physics learning on students' critical thinking skill. *Universal Journal of Educational Research*, 8(2), 611–615. <https://doi.org/10.13189/ujer.2020.080233>
- Sa'adah, N. N., Indiani, A. M., Nurhayati, A. P. D., & Ashuri, N. M. (2020). Bioprospecting of parijoto fruit extract (, (June 2017).

- Silalahi, M., & Nisyawati. (2018). The ethnobotanical study of edible and medicinal plants in the home garden of Batak Karo sub-ethnic in north Sumatra, Indonesia. *Biodiversitas*, 19(1), 229–238. <https://doi.org/10.13057/biodiv/d190131>
- Siqhny, Z. D., Azkia, M. N., & Kunarto, B. (2020). Karakteristik Nanoemulsi Ekstrak Buah Parijoto (*Medinilla speciosa* Blume). *Jurnal Teknologi Pangan Dan Hasil Pertanian*, 15(1), 1. <https://doi.org/10.26623/jtphp.v15i1.1888>
- Solheri, S., Azhar, M., & Yohandri, Y. (2022). JPBI (Jurnal Pendidikan Biologi Indonesia) Analysis of ethnoscience integrated environmental literacy for junior high school, 8(2), 178–188.
- Sudarmin, Pujiastuti, S. R., Asyhar, R., Prasetya, A. T., Diliarosta, S., & Ariyatun. (2023). Chemistry Project-Based Learning For Secondary Metabolite Course With Ethno-STEM Approach To Improve Students' Conservation and Entrepreneurial Character in the 21ST Century. *Journal of Technology and Science Education*, 13(1), 393–409.
- Sudarmin, S., Mastur, Z., & Parmin, P. (2017). Pengetahuan Ilmiah Berbasis Budaya Dan Kearifan Lokal Di Karimunjawa Untuk Menumbuhkan Soft Skills Konservasi. *JPPS (Jurnal Penelitian Pendidikan Sains)*, 6(2), 1363. <https://doi.org/10.26740/jpps.v6n2.p1363-1369>
- Ufie, A., Matitaputy, J. K., Kufla, J., & Info, A. (2020). Vean tradition as a local wisdom of customary people and its relevance to maritime history learning, 14(4), 590–598. <https://doi.org/10.11591/edulearn.v14i4.16401>
- Umiyati, W., Pramesti, M. A., & Pujiastutik, E. (2021). Pest and Disease Identification in Parijoto Plant (*Medinilla speciosa* blume) at Nglurah Tawangmangu. *Jurnal Biologi Tropis*, 21(3), 1073–1080. <https://doi.org/10.29303/jbt.v21i3.2970>
- Widianarko, B., Soedarini, B., & Hartoro, I. (2017). *Sanitasi Buah dan Sayur Segar*. Semarang.
- Winanta, A., Hanik, L. S., & Febriansah, R. (2021). Antioxidant Activity and Cytotoxic Potential of Parijoto (*Medinilla speciosa* (Reinw ex BL)) Fruit Fractions on HeLa Cell Line. *Indonesian Journal of Cancer Chemoprevention*, 12(2), 74. <https://doi.org/10.14499/indonesianjcanchemoprev12iss2pp74-82>
- Wulandari, S., Nisa, Y. S., Taryono, T., Indarti, S., & Sayekti, R. S. (2022). Sterilisasi Peralatan dan Media Kultur Jaringan. *Agrotechnology Innovation (Agrinova)*, 4(2), 16. <https://doi.org/10.22146/a.77010>
- Zidny, R., & Sjöström, J. (2021). A Multi-Perspective Reflection on How Indigenous Knowledge and Related Ideas Can Improve Science Education for Sustainability. *Science & Education*, (2020), 145–185.
- Zidny, R., Solfarina, S., Aisyah, R. S. S., & Eilks, I. (2021). Exploring indigenous science to identify contents and contexts for science learning in order to promote education for sustainable development. *Education Sciences*, 11(3). <https://doi.org/10.3390/educsci11030114>