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Original Research Paper

Ethnobotanical Diversity and Local Knowledge of Komak Plants (Fabaceae) in West Lombok Regency, Indonesia

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Abstract

Komak plants are local legume species (Fabaceae) widely distributed in West Lombok Regency and traditionally utilized by local communities. Ethnobotanical studies are important to document the relationship between communities, plant resources, and environmental knowledge that supports sustainable use of local biodiversity. This study aimed to analyze the morphological diversity, utilization patterns, and environmental wisdom associated with komak plants in West Lombok. Data were collected through field observations and semi-structured interviews using purposive and snowball sampling techniques across ten sub-districts. The results identified three main komak species utilized by the community, namely Lablab purpureus, Phaseolus lunatus L., and Canavalia ensiformis (L.) DC. Within the Lablab group, three variants were recorded: L. purpureus subsp. uncinatus Verdc., L. purpureus subsp. purpureus, and L. purpureus var. typicus. Community utilization of komak was classified into six categories: food, traditional medicine, traditional ceremonies, ecological functions, economic functions, and animal feed. The highest Index of Cultural Significance (ICS) was recorded for L. purpureus subsp. purpureus (59), while C. ensiformis showed the lowest value (4). In addition, komak management reflects local environmental wisdom, including mutual cooperation during harvest, traditional seed storage, and ecological adaptation practices that support the sustainability of local agroecosystems.

Keywords: Ethnobotany, Komak, Local wisdom.

INTRODUCTION

Komak (*Lablab purpureus L.)* is a tropical legume crop with significant potential as an alternative food source, livestock feed, and a supporting species for sustainable agriculture systems (Sukenti et al., 2022). This plant is widely distributed in tropical and subtropical regions due to its high adaptability to marginal lands, drought tolerance (Carvajal et al., 2025), and relatively high protein content, making it promising for local food security development (Amaro & Fatimah, 2025). In many developing countries, underutilized legumes such as komak are increasingly recognized as strategic resources for diversifying food sources and enhancing nutritional resilience (Verma et al., 2023). Recent studies have shown that minor legumes play an important role in supporting sustainable agricultural systems and climate adaptation in tropical regions (Melese et al., 2025).

Scientifically, komak belongs to the Fabaceae family and exhibits distinct morphological characteristics, including twining stems, flat to curved pods, and seeds with various colors and patterns (Vanlauwe et al., 2019). Besides being consumed as food, komak seeds and leaves are traditionally utilized as animal feed, green manure (Ahmad et al., 2025), and herbal medicine in several rural communities (Muliadi et al., 2026). The plant is also known for its ecological contribution through biological nitrogen fixation (Zhu et al., 2023), which improves soil fertility and supports low-input farming systems (Farooq et al., 2026). Despite these benefits, komak remains categorized as an underutilized crop, although it has substantial nutritional, economic, and ecological value.

In Indonesia, particularly on Lombok Island, komak is traditionally cultivated in home gardens, drylands, and field margins Sukenti et al., (2016), its utilization remains limited and has not been optimally developed as a local food commodity (Kinnunen et al., 2020). Communities generally consume komak only as supplementary vegetables, while knowledge regarding species diversity (Mishra et al., 2021), traditional utilization, and environmental wisdom related to its management is still poorly documented scientifically (Abas et al., 2022). This situation has led to the marginalization of komak compared with other more popular legumes, even though Lombok possesses diverse local varieties distinguished by seed color, morphology, and growth habit (Handayani et al., 2024). Previous studies have mainly focused on agronomic or nutritional aspects, whereas integrated studies combining botanical diversity, ethnobotanical utilization, and environmental wisdom are still scarce, creating an important research gap.

Based on these conditions, research on the diversity and ethnobotanical utilization of komak based on local community knowledge in West Lombok Regency is essential. This study offers novelty by integrating botanical identification, traditional utilization, and local environmental wisdom into a single ethnobotanical framework, which has rarely been reported for komak in Indonesia (NENENG et al., 2025). The study is expected to document the diversity of

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komak plants, reveal community-based utilization patterns, and identify local ecological knowledge in managing this species as part of cultural heritage and biodiversity conservation. Therefore, this research aims to examine the diversity of komak plants, their utilization, and the environmental wisdom of local communities in West Lombok Regency, Indonesia.

RESEARCH METHODS

Time and place

This research was conducted in Lombok Barat, Nusa Tenggara Barat, covering ten sub-districts that represent the distribution areas of komak plants and communities that traditionally utilize them. The study was carried out from March to August 2021 in two stages, including field exploration and laboratory identification. Field observations, interviews, and plant sample collection were conducted in the study sites, while specimen identification and data processing were performed at the Advanced Biology Laboratory, Faculty of Mathematics and Natural Sciences, University of Mataram.

Research design

This study employed a descriptive-exploratory design using an ethnobotanical approach (Yuliani et al., 2026). The descriptive method was used to document the diversity of komak plants (Mahanta et al., 2025), while the exploratory approach was applied to identify local community knowledge related to utilization patterns and environmental wisdom associated with komak cultivation. This design enables comprehensive documentation of biological variation and socio-cultural interactions between local communities and plant resources.

Population and research sample

The research population consisted of all komak plants cultivated or naturally occurring in the study area, as well as community members who possess knowledge regarding their use. Plant samples were selected purposively based on the occurrence of distinct morphological characters in each sub-district Mukkun et al., (2021), while respondents were determined using purposive and snowball sampling techniques (Jalca et al., 2020). Informants included farmers, traditional elders, and community members who actively cultivate, consume, or manage komak plants in daily life (Kropi et al., 2024). This approach was used to capture both plant diversity and traditional ecological knowledge comprehensively.

Research procedure

Data collection was conducted through field observation, plant exploration, specimen collection, and semi-structured interviews (Corroto & Macía, 2021). Observation included recording habitat characteristics, local distribution, and morphological variation of komak plants, including seed color, pod shape, and growth habit. Plant specimens were collected for herbarium preparation and taxonomic verification. Interviews were carried out to obtain information regarding local names, plant uses, processing methods, cultural practices, and environmental wisdom related to planting and maintaining komak in home gardens, plantations, and field margins. Supporting instruments included environmental measuring tools, documentation devices, interview sheets, and herbarium preparation equipment.

Research data analysis

The data obtained consisted of qualitative and quantitative data (Sari et al., 2026). Qualitative data included species diversity, local utilization, and forms of environmental wisdom, which were analyzed descriptively and presented in narrative and tabular form (Abubakari, 2025). Quantitative ethnobotanical importance was analyzed using the Index of Cultural Significance (ICS) developed by Turner to assess the cultural value of each komak type based on its use by local communities Turner (1988). The formula used was:

$$\mathrm{ICS} = \sum(q \times i \times i) \quad (1)$$

Description:
ICS = Index of Cultural Significance
q = quality value
i = intensity of use value
e = exclusivity value
n = number of species

Where q represents quality value, i indicates intensity of use, and e denotes exclusivity value. The ICS values were used to determine the relative importance of each komak type in local livelihoods, reflecting both practical utilization and cultural significance.

RESULTS AND DISCUSSION

Diversity and Botanical Characteristics of Komak Plants

The komak plant is characterized by its crescent-shaped pods and twining stems, making it easily recognizable. The research results in Table 1 identify three species of komak: Canavalia ensiformis (L.) DC, Phaseolus lunatus L., and Lablab purpureus, which are distributed throughout West Lombok Regency.

Table 1. Types of komak plants spread across the West Lombok Regency area

No	Species/Subspecies/Varieties	Local Name
1	*Lablab purpureus* subsp. *purpureus*	Komak beaq; Komak jamaq (1); Komak ungu; Komak IR
	Lablab purpureus var. *typicus*	Komak nyengik; Komak ijo (1); Komak are (1); Komak lemes; Komak senggeh
	Lablab purpureus subsp. *uncinatus* Verdc.	Komak puteq; Komak merah
2	*Canavalia ensiformis* (L.) DC	Komak bateq
3	*Phaseolus lunatus* L.	Komak kedit; Komak are (2); Komak pertanian; Komak jamaq (2); Komak pace; Komak ijo (2); Komak gaet; Komak lendang; Komak kekare

The differences in the characteristics of the komak plant are evident in its stems, leaves, flowers, pods, and seeds, as identified from herbarium specimens and field observations.

The komak plant is most commonly found in the Lembar and Gunung Sari Districts, with four variants, as shown in Figures 1, 2, and 3. The dominant species in each area are L. purpureus subsp. purpureus and P.lunatus. In this study, 3 variants of komak beans from the Lablab genus were found. The identified variants are 2 subspecies, namely L. purpureus subs. purpureus and L. purpureus sub. uncinatus. Meanwhile, there are 3 subspecies recognized by Verdcourt (1970), namely unicinatus, purpureus and bengalensis. The main characteristics of the first variant, namely L. purpureus subs. purpureus, have dark purple flowers with a little white, with dark purple stems, white pods with purple edges, black and brown dry seeds.

Meanwhile, L. purpureus subs. uncinatus has light purple flowers, green pods that are slightly wider at the end, light brown to cream dry seeds. The Lablab genus has 2 cultivated varieties, namely, L. purpureus var. typicus and L. purpureus var. lignosus, this was reported by Shivashankar et al., (1971) in Deshmukh et al., (2012). One of these varieties, L. purpureus var. typicus, is characterized by white flowers, patterned brown dry seeds, and light green pods. This is consistent with research by Bharathi et al. (2020), which reports that this variant has white flowers across all varieties and that pod color ranges from light to dark green.

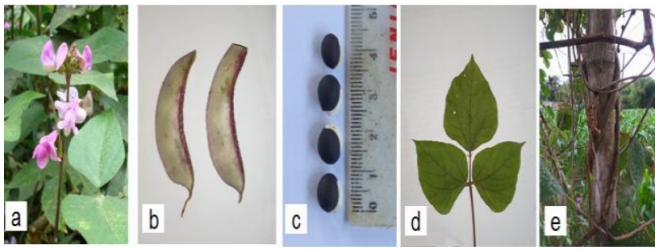

Figure 1. *L. purpureus sub. purpureus* (a. flowers; b. pods; c. seeds; d. leaves; e. stems)

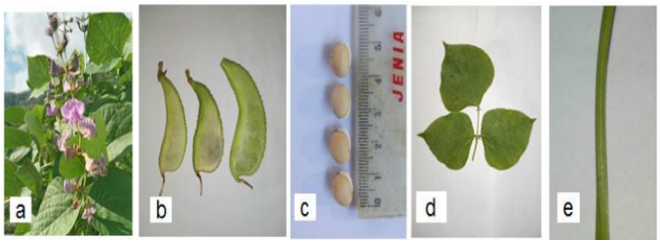

Figure 2. *L. purpureus* subs *uncinatus*. (a. flowers; b. pods; c. seeds; d. leaves; e. stems)

Figure 3. *L. purpureus* var. *typicus*. (a. flowers; b. pods; c. seeds; d. leaves; e. stems)

The komak bean has two distinct plant variants characterized by broad and pointed leaves, white and purple flowers, and flat seeds with no pattern and round seeds with patterns. During the research, no known variations of this species were found, so these differences were classified as the same species. The seed color and color patterns of komak bean seeds exhibit high variation. In the study, the dominant color was brownish black and the second color was light brown. This type of komak has various variations as shown in Figures 4 and 5. According to Gepts (2014), the color differences produced on the surface of the seed coat are a biochemical pigmentation process that is a flavonoid compound and included in the anthocyanin, resulting in a variety of varied color patterns.

Figure 4. *P.lunatus* purple flowers. (a. bunga; b. daun; c. Biji)

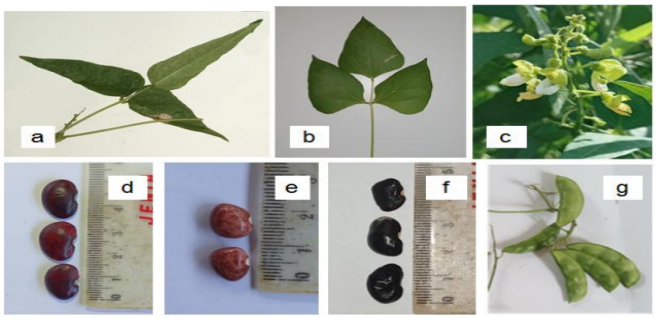

Figure 5. *P. lunatus* white flowers, (a. pointed leaves; b. oval leaves; c. flowers; d. large patterned seeds; e. small patterned seeds; f. plain seeds; g. pods)

Another difference is found in the flower color, where two distinct variations were found. In relation to environmental adaptation, Martinez-Castillo et al., (2003) in their study revealed that the purple flower variant is a cultivated type similar to the wild type, while the white flower variant is a cultivated type. C. ensiformis, or komak plant, has a very different appearance from other species, with large, long, sword-shaped pods and upright growth, rather than twining or climbing. Despite its differences, this species, locally known as komak bateq, is one of three groups classified within the komak bean family. The komak plant, locally known as komak bateq, has distinct characteristics, as seen in Figure 6.

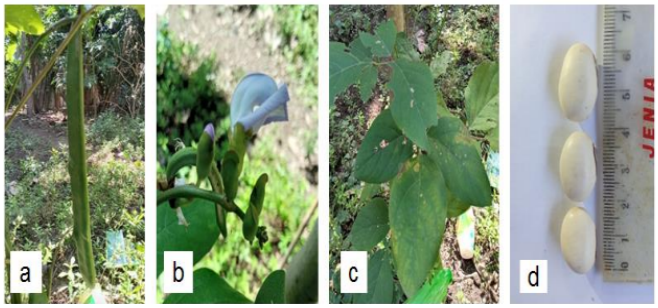

Figure 6. C. ensiformis. (a. pods; b. flowers; c leaves; d. pods)

Ethnobotanical Utilization of Komak Plants

The ethnobotanical study showed that local communities in Lombok Barat utilize komak plants in six main categories, namely as food, traditional medicine, traditional ceremonial materials, animal feed, ecological functions, and economic resources. Based on interviews conducted with communities

in ten sub-districts, Lablab purpureus subsp. purpureus (locally known as komak beaq) had the highest Index of Cultural Significance (ICS) value, reaching 93, whereas Canavalia ensiformis (komak bateq) had the lowest value, only 4. These values indicate that komak beaq is the most culturally important and widely utilized species in the daily life of local communities. A summary of komak utilization categories based on interview results is presented in Table 2.

Table 2. Categories of komak plant utilization based on community interviews.

Utilization category	Plant part used	Form of utilization
Food	Pods, seeds	Vegetables, sambal, snacks
Traditional medicine	Leaves, seeds	Herbal remedies
Traditional ceremonies	Seeds	Offerings and ritual foods
Animal feed	Leaves	Supplementary fodder
Ecological functions	Whole plant	Shade, fences
Economic functions	Pods, seeds	Sold in local markets

Based on the data in Table 2, the use of komak as a food source was the most dominant category. Interview results revealed that local communities commonly utilize both young pods and mature seeds as ingredients in various traditional dishes, such as clear vegetable soup, stir-fried vegetables, sambal, and boiled snacks. One of the most frequently encountered dishes was komak clear soup mixed with corn (Zea mays) and winged bean (Psophocarpus tetragonolobus). This dish is a common household food consumed daily and is considered an important local nutritional source. Field documentation of this traditional preparation is shown in Figure 7.

Interviews with informants also indicated that community preferences differed among komak species depending on taste and texture characteristics. Komak beaq (L. purpureus subsp. purpureus) was the most frequently utilized because it has softer pods and more palatable seeds. In contrast, komak bateq (C. ensiformis) was rarely consumed because of its relatively bitter taste and harder pod texture. Details of komak species and their intensity of utilization as food are presented in Table 3.

Figure 7. Komak bean clear soup and komak peanut sauce

The data in Table 3 indicate that komak beaq was the most dominant species utilized by the community because of its preferred taste and ease of processing into various food products. This finding is consistent with previous studies stating that komak is a local legume with high potential as an alternative plant-based protein source in tropical regions. In addition, (Naeem et al., 2023)reported that Lablab purpureus contains substantial nutritional value, particularly protein, dietary fiber, and carbohydrates, making it a promising crop for sustainable local food development.

Table 3. Interview results on the use of komak as food

Species	Local name	Processed products	Utilization intensity
L. purpureus subsp. *purpureus*	Komak beaq	Clear soup, sambal, boiled seeds	High
L. purpureus var. *typicus*	Komak lemes	Stir-fried vegetables	Moderate
Phaseolus lunatus	Komak kedit	Soup, boiled beans	Moderate
C. ensiformis	Komak bateq	Stir-fried pods	Low

Overall, the results presented in Table 2, Table 3, and Figure 7 indicate that komak is not merely a supplementary food crop, but occupies a strategic position within the traditional food system of communities in Lombok Barat. The high utilization intensity of komak beaq (*Lablab purpureus* subsp. *purpureus*) suggests that local communities have selectively maintained this type due to its high productivity, preferred taste, and adaptability to dryland agroecosystems. This condition demonstrates that the utilization of komak is not solely based on resource availability, but rather reflects a long-term cultural selection process integrating ecological adaptation, food preferences, and local farming experience. These findings are consistent with studies on tropical local legumes showing that plant species maintained by rural communities generally possess both strong adaptive capacity to environmental stress and high consumption value (Chitete et al., 2026).

From a food security perspective, the utilization of komak reflects a household food diversification strategy based on local biological resources. The processing of komak into clear soup, sambal, and boiled dishes indicates that local communities continue to preserve traditional food practices as part of their adaptation to seasonal food availability. This is particularly important because komak is a drought-tolerant legume capable of producing under marginal land conditions and during dry seasons when other food crops often decline. Therefore, the presence of komak contributes significantly to local-scale food security, especially in dryland areas such as West Lombok. Recent studies have emphasized that underutilized local legumes play a significant role in supporting sustainable food systems and nutritional security in tropical dry regions (Barrett, 2024). Furthermore, the relationship between komak utilization and traditional

community knowledge indicates that this plant forms part of a living ethnobotanical system. Knowledge regarding edible komak varieties, processing methods, harvesting periods, and seed storage practices is transmitted across generations through daily practices rather than formal institutions. This pattern suggests that komak conservation is not only related to the preservation of local germplasm, but also to the safeguarding of the traditional knowledge associated with it. If komak utilization continues to decline due to shifts toward modern dietary patterns, the disappearance of this plant may also lead to the loss of long-established cultural knowledge. Therefore, the ethnobotanical documentation of komak provides an important scientific basis for the development of local alternative food resources while simultaneously supporting biodiversity conservation and the preservation of cultural heritage (Hassan et al., 2024).

Environmental Wisdom in Komak Plant Management

The results of this study indicate that local communities in West Lombok Regency not only utilize komak plants as a food resource but also apply various forms of environmental wisdom in their management and conservation. This knowledge was documented through interviews with informants across ten sub-districts and supported by direct field observations. The management practices include the use of komak as an ecological component in home gardens, traditional seed storage systems, and cultivation strategies adapted to dryland conditions.

Figure 8. Komak plants seeds on the market

One important form of local environmental wisdom is the multifunctional use of komak within household landscapes. Communities cultivate komak around home yards not only for harvesting pods and seeds but also as shade plants, living fences, and land boundary markers. Due to its climbing growth habit, komak is commonly supported by simple wooden trellises, allowing the vines to spread and create shaded areas around houses. This practice is documented in Figure 9, which shows the use of komak as a shading plant in residential yards. Meanwhile, Figure 10 illustrates the use of komak as a living fence and boundary between agricultural plots. These practices demonstrate how local people adaptively utilize the morphological characteristics of komak to support ecological and aesthetic functions in their environment (Saensouk et al., 2025).

In addition to its ecological role, local communities possess traditional knowledge regarding the preservation of komak seeds for future planting. Based on interviews, farmers store harvested komak seeds using natural drying methods. Mature pods are collected, sun-dried, and the seeds are separated before being stored in cloth bags or sealed containers and hung in dry places, often above the kitchen area, to avoid moisture exposure. This practice allows the seeds to remain viable for up to one year. The marketing of dried komak seeds in traditional markets is shown in Figure 8, indicating that besides household consumption, komak seeds also hold economic value as a local commodity. Traditional seed preservation has been recognized as an effective strategy for maintaining seed viability and protecting against fungal damage and pest attacks (Waongo et al., 2019).

Figure 9. Komak plants as shade

Interview results further revealed local ecological knowledge related to seasonal adaptation of komak species. Informants reported that komak beaq (Lablab purpureus subsp. purpureus) is more tolerant to dry conditions than other species and is therefore more widely cultivated. In contrast, *Phaseolus lunatus* tends to grow vigorously during the rainy season but produces fewer pods under excessive moisture conditions. This knowledge serves as a practical basis for farmers in determining planting seasons, selecting preferred varieties, and managing agricultural land. Such practices indicate that local communities have developed adaptive conservation strategies based on long-term ecological experience and empirical observation (Suharjanto, 2010).

Figure 10. Komak plants as a land boundary fence

The socio-cultural dimension also forms an integral part of environmental wisdom in komak management. During the harvest season, communities still practice mutual cooperation (*gotong royong*), where family members and neighbors work together to collect komak pods. This tradition not only reduces labor burdens but also strengthens social relationships among community members. Knowledge regarding seed selection, cultivation techniques, and post-harvest handling is transmitted informally through these daily collective activities. Thus, komak management in West Lombok reflects not only ecological adaptation to dryland environments but also a close integration between traditional knowledge, social

practices, and biodiversity conservation (Budiman & Oue, 2025).

Overall, the findings confirm that komak is an integral component of the traditional agroecological system in West Lombok. Its use as food, living fences, shading vegetation, and seed reserves demonstrates that komak has broader ecological functions beyond being merely a supplementary crop. The preservation of this local knowledge is essential because it provides a scientific basis for developing sustainable agriculture rooted in local wisdom (Lwoga et al., 2010), while simultaneously supporting the conservation of indigenous plant genetic resources in tropical dryland ecosystems (Salgotra & Chauhan, 2023) .

CONCLUSION

Three species of komak plants have been found in West Lombok Regency: Phaseolus lunatus L., Canavalia ensiformis (L.) DC., and Lablab purpureus. The Lablab genus has three varieties: L. purpureus subs. purpureus, L. purpureus subs. uncinatus, and one cultivated variety, L. purpureus var. typikus. Community utilization of komak plants is categorized into six categories: food, ecological function, economic function, traditional ceremonies, animal feed, and medicine. Based on the Index of Cultural Significance (ICS), komak beaq (L. purpureus subs. purpureus) has the highest score of 59, while komak bateq (C. ensiformis) has the lowest score of 4. Various environmental wisdoms regarding komak plants include the best time to plant and harvest, good soil conditions, where to store komak seeds, and how to store them. In conservation efforts, communities store dried komak beans for use in the next planting season. This socio-cultural value involves farmers practicing mutual cooperation during each komak bean harvest.

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