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Ethnobotany of *lalaban* as a food source in the peri-urban Sundanese community of Cireundeu Hamlet, West Java, Indonesia

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Abstract. *Irawan B, Siagian DSP, Annisa, Rohmatullayaly EN, Ihsan M, Suryana, Iskandar BS, Iskandar J. 2026. Ethnobotany of* lalaban *as a food source in the peri-urban Sundanese community of Cireundeu Hamlet, West Java, Indonesia. Biodiversitas 27 (3): d270328. https://doi.org/10.13057/biodiv/d270328*. Local communities understand how to utilize the plants around them, passing down this traditional ecological knowledge (TEK) from their ancestors in utilizing surrounding plant resources, including fresh vegetables known as *lalaban* in Sundanese cuisine. This study documents and analyzes the diversity, utilization patterns, and cultural importance of *lalaban* among the peri-urban community of Cireundeu, Cimahi City, West Java, Indonesia. An ethnobotanical mixed-methods approach was employed through semi-structured interviews with 13 key informants, structured questionnaires with 56 respondents, participatory observation, and species identification using Plants of the World Online (POWO). One method they use these plants is in a vegetable salad called *lalaban*. *Lalaban* is common among the Sundanese people and is part of their daily diet. The community of Cireundeu Hamlet, Cimahi City, West Java, knows how to process and use *lalaban*. Currently, knowledge about *lalaban* is being lost due to globalization and large-scale deforestation. This study highlights the Cireundeu community's extensive knowledge of *lalaban* as a food ingredient. A total of 38 *lalaban* species belonging to 24 families were recorded, with Asteraceae as the most represented family. Leaves were the most utilized plant organ (51%), followed by fruits (16%), stems (14%), flowers (11%), and seeds (8%). *Lalaban* sources were primarily gardens (62%), forests (24%), home gardens (13%), and rice fields (1%). Relative Frequency of Citation (RFC) analysis indicated four culturally important species: *Manihot esculenta* and *Carica papaya* (RFC = 1), *Pilea melastomoides* (0.64), and *Crassocephalum crepidioides* (0.38). *Lalaban* consumption ranges from one to six days per week and reflects both nutritional and cultural significance, particularly cassava as a cultural keystone species. Documentation of this knowledge is essential to support conservation strategies, local food security, and intergenerational transmission of TEK amid peri-urban environmental change.

Keywords: Cireundeu, ethnobotany, *lalaban*, local knowledge, Sundanese cuisine

INTRODUCTION

Local knowledge is understanding gained from experience and interaction with nature, applied within a specific community (Sotero et al. 2020). Since ancient times, humans have conducted various experiments and developed knowledge about nature and local wisdom in their surroundings. Over time, local wisdom has evolved into customs and culture, including among the Sundanese people. The Sundanese not only know the names or terms for various elements of nature but also appreciate the character of each as a lesson (Nasir et al. 2023). One natural resource that has been widely used and managed for generations is plants. Plants are often used for clothing, food, shelter, medicine, crafts, and other purposes. One category of plants used as food is vegetables. The Sundanese call fresh vegetables *lalaban* (Cahyanto et al. 2018).

Lalaban is typically served with rice and chili sauce for added richness. West Java's mountainous geography results in fertile soil, making it easy for Sundanese people to access fresh vegetables (Endo 2020). Food reflects traditional ethnic knowledge, known as Traditional ethnic food (TEF), with vegetables being key. In Sundanese tradition, vegetables are eaten as *lalab* or *lalaban*, some cultivated, others wild (Kodir and Moektiwardoyo 2022). Communities like Banceuy and Cijambu have unique culinary practices, such as *sambal papagan* and exten*siv*e knowledge of wild plants (Alfinandah et al. 2025; Raihandhany and Purnomo 2025). The use of *lalaban* is closely tied to indigenous communities, like Cireundeu in Cimahi, which, despite embracing technology, preserves customs rooted in nature and uses cassava as a staple (Adiputra et al. 2021; Irawan et al. 2024). For Cireundeu, *lalaban* is more than food; it's part of their cultural identity, philosophy, and food security. Sundanese people equate *lalaban* with "herbophilia" a love of wild greens (Alifa et al. 2024; Aulia et al. 2025). Over time, knowledge of *lalaban* as a food source and the toponymy of Cireundeu community have eroded, threatening food security. Rapid modernization endangers ancestral values and traditional practices, making traditional knowledge irrelevant to newer generations. Cireundeu, surrounded by hills and forests, faces environmental pressure from infrastructure and residential development

around Cimahi City, which harms the growth of wild *lalaban*. Deforestation and land conversion for plantations threaten native flora used as food (Permana et al. 2025). The shift from monoculture to diversified crops has wiped out many wild plants among cultivated crops, risking the loss of low value *lalaban* species (Nelly et al. 2024; Aulia et al. 2025).

The Cireundeu community exemplifies a peri-urban group that successfully preserves local wisdom despite urbanization pressures in Cimahi City. Since 1918, they have transitioned from rice to cassava (*rasi/beras singkong*) as their main staple. This practice provides a valuable model for how local values can blend with modern sustainable practices (Irawan et al. 2024; Permana et al. 2025). While previous research has documented the diversity of *lalaban* in other Sundanese communities, there is no in-depth study on Cireundeu's unique mix of cassava-based staples, land-use types, *lalaban* diversity, and the significance of RFC. Therefore, this knowledge should be documented to prevent its loss, using an ethnobotanical approach. This research aims to document and analyze the diversity, usage patterns, and community perceptions of *lalaban* plants, and to evaluate their cultural importance within the Cireundeu community. Additionally, documenting these findings is vital for future conservation efforts. The results are expected to expand ethnobotanical knowledge of *lalaban* (traditional vegetables) in Cireundeu and aid conservation initiatives.

Therefore, to address the identified knowledge gap, the following research questions guided this study: (i) What is the species diversity and taxonomic composition of lalaban used by the Cireundeu community? (ii) Which species have the highest cultural importance based on the Relative Frequency of Citation (RFC) values? (iii) How are *lalaban* species distributed across different land-use categories (garden, forest, home garden, and rice field)? We hypothesize that, despite peri-urban pressures, Cireundeu maintains high ethnobotanical diversity of *lalaban*, with cassava (*Manihot esculenta*) serving as a cultural keystone species reflected by the highest RFC values and strong integration within local food systems.

MATERIALS AND METHODS

Study area

This study was conducted in Cireundeu Hamlet, Cimahi, West Java, Indonesia. Geographically, it is located at 6°54'51.7"S, 107°31'22.2"E (Figure 1). The Cireundeu Hamlet area is part of RW 10 in Leuwigajah Urban Village, South Cimahi Sub-district, Cimahi City. The name of Cireundeu Traditional Village comes from the *reundeu* plant, a local variety cultivated in Cimahi City. This plant is about 15 cm tall, with a weak stalk, long leaves, large and facing each other, and purple flowers (Irawan et al. 2024). The place name (toponymy) reflects the natural environment surrounding the area.

Based on interviews with informants, land use in Cireundeu Hamlet is divided into three categories: *leuweung larangan*, *leuweung tutupan*, and *leuweung baladahan*. *Leuweung larangan,* or forbidden forest, is an area where human intervention is not allowed; the trees cannot be cut down for water storage, ensuring that during the rainy season, there is no excess water, and during the dry season, there is no shortage of water. *Leuweung tutupan,* or reforestation forest, is an area designated for reforestation; the community can use the trees, but they must be replanted afterward. *Leuweung baladahan,* or agricultural forest, is an area managed by the Cireundeu community for gardening to meet their needs (Irawan et al. 2024).

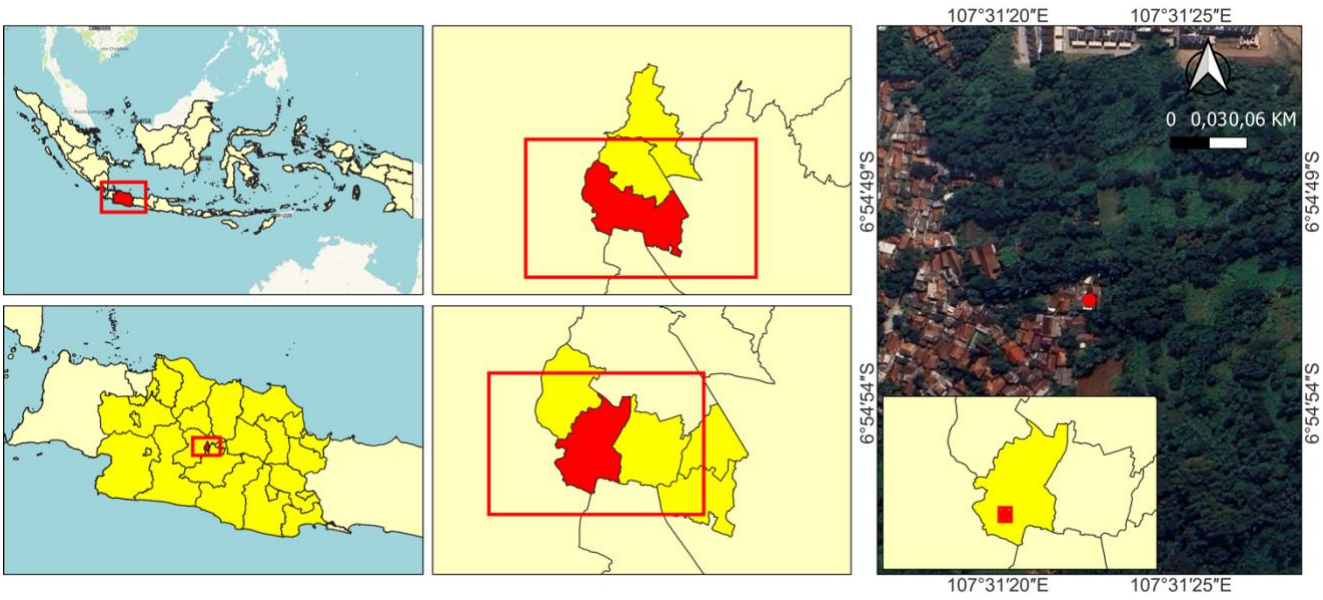

Figure 1. Location of study site (6°54'51.7"S, 107°31'22.2"E) in Cireundeu Hamlet, Cimahi City, West Java, Indonesia

The community of Cireundeu Hamlet consists of 114 people from 56 families, including 54 men and 60 women. The age distribution varies, with more adults than young children. There are 9 children aged 1-10 years, 9 teenagers aged 11-20 years, 43 adults aged 21-50 years, and 53 elderly adults aged 51-80 years. Regarding education, the community ranges from those not yet in school to university graduates, with elementary school graduates being the most common. The occupations of the community of Cireundeu Hamlet fall into 10 categories: casual daily laborers, private employees, housewives, individuals not working, farmers, teachers, students, retirees, and civil servants. The most common occupation is housewife, while retirees and civil servants are the least frequent.

Lalaban consumption serves as an internalized symbol of ethnic identity, embodying values of simplicity and ecological harmony. It originates from a fertile mountain ecosystem that regularly sustains the tradition of eating raw plant foods high in micronutrients. Preserving these foods is crucial for ensuring food security and the well-being of local communities amid global modernization.

Procedures

The tools used in this research are stationery, notebooks, cellphone cameras, questionnaire sheets, interview guides, and voice recorders. The method used a mixed-methods approach (Leavy 2022). The data collection techniques were semi-structured interviews with interview guides, structured interviews with questionnaire sheets, participant observation, exploration, and documentation. This semi-structured interview method was conducted using a questionnaire as a guide, yet still allowed researchers to obtain unique and interesting responses from informants (Fitriah and Mulyanto 2025; Nursamsu et al. 2025). The aim was to document traditional knowledge about plant types, local names, plant origins, prices, and the parts of plants that are sold or utilized. The aspects explored include plant identification by the community, anatomical uses, processing and management methods, and social and cultural benefits. The questions asked in the questionnaire generally refer specifically to the aspects explored. For example, in terms of anatomical utilization, the answers sought are which parts of the plant are used, such as leaves, fruit, roots, rhizomes, tubers, or seeds. In addition, to understand the uniqueness of Sundanese gastronomy, information was gathered on the culture of consuming fresh vegetables, known as *lalab*, which is related to culinary traditions that are rich in philosophical values and the natural wealth of the surrounding area (Alifa et al. 2024). The data analysis used was descriptive, simple statistical analysis (percentage), and the Relative Frequency of Citation (RFC) analysis. The data analysis and processing were conducted using Microsoft Office Excel 2024 statistical software.

The research stages were preliminary surveys, semi-structured interviews, structured interviews, participant observation, exploration, identification, and documentation. Species identifications were carried out using references on the POWO (Plants of the World Online) website (https://powo.science.kew.org/). A preliminary survey was conducted to identify a traditional village for use as the research location and to obtain permission from the relevant parties to use it. Furthermore, semi-structured interviews were conducted using purposive and snowball sampling. Purposive and snowball sampling are based on specific considerations: people who still apply local knowledge and interact with *lalaban*, and traditional elders who know the origin of Cireundeu. This technique can be used in interviews to select informants (Leavy 2022). Consequently, a total of 69 individuals contributed information to this study, comprising 13 key informants (qualitative) and 56 respondents (quantitative). This interview was conducted in a semi-structured manner with questions that referred to a series of open questions to allow new questions to emerge from the informants' answers to dig deeper into information, with a total number of 13 key informants consisting of nine men and four women, with an age range of 38 to 66 years.

Informants were frequently selected through purposive and snowball sampling techniques, focusing on traditional leaders, farmers, or housewives who were deemed to possess extensive knowledge regarding *Lalaban* and the food crops utilized by the community (Fitriah and Mulyanto 2025; Nursamsu et al. 2025). In this context, the selection of thirteen informants was based on their familiarity with *lalaban*, starting with village elders, village officials, and the Family Welfare and Empowerment Organization. 56 respondents were chosen based on their willingness and capability to answer questions about traditional knowledge of *lalaban* utilization, employing a snowball sampling approach to reach a number sufficiently representative of the Cireundeu community.

Furthermore, structured interviews are a data collection method using written questions. This interview used a questionnaire to 56 family heads, with 56 respondents consisting of 31 men and 25 women aged 20 to 80. Participatory observation is a method that involves the researcher in the life of the community being studied. This is done to learn about the community's daily life and ensure the research results can be trusted (Malik 2020). Furthermore, exploration is carried out to re-examine the species *lalaban* in the Cireundeu Hamlet. Exploration also aims to obtain information about various *lalaban* plants in Cireundeu Hamlet. Identification is carried out to confirm the scientific names of various species of *lalaban* plants found during exploration. Identification is carried out using various literature sources and identification books on vegetables. The last thing done is documentation of *lalaban*, which is done as a researcher's archive and can be used for identification purposes. Documentation can be done during exploration. There are several limitations in conducting identification: species were identified on-site rather than collected. Identification was verified by cross-referencing local names in taxonomic literature and POWO's website. Species verification and matching will be periodically performed on the website from 2024 to 2025.

Prior to data collection, researchers wrote to the local government and obtained permission from the Cireundeu customary authorities with an official research letter from Universitas Padjadjaran, following institutional ethical

guidelines, explaining the research procedures, and obtaining written consent before each interview and census.

Data analysis

Data analysis was conducted both qualitatively and quantitatively. Qualitative analysis involved cross-checking research results in the field with informants' opinions. Additionally, the data were summarized, synthesized, and described in a narrative form (Newing 2010). The reliability validation process uses snowball sampling, where information from one informant is confirmed with the next to strengthen the context and discussion points, ensuring strong information validity. Plants were organized into a table based on local names, scientific names, families, sources, parts used, and processing methods. Quantitative analysis was performed using basic statistical methods, specifically calculating the percentage of respondents' answers with the percentage formula and the Relative Frequency of Citation (RFC) analysis. This simple percentage was utilized to analyze the quantitative data collected through structured interviews. The percentage formula used is as follows (Iskandar 2018):

$$P = \frac{f}{N} x\ 100\%$$

Where, P: percentage of total respondents, f: frequency of respondent's answer, N : total respondents (56).

Relative Frequency of Citation (RFC) is a value that describes the local knowledge of the community in identifying the types of variation of *lalaban* used by the Cireundeu community. The RFC index value ranges from 0 to 1. A value of 0 is taken if none of the respondents mention cassava landraces that are considered useful, and a value of 1 is taken if all respondents agree to mention cassava landraces that are considered useful (El Mekkaoui et al. 2024). The formula used is as follows (Arunachalam et al. 2023):

$$RFC = \frac{FC}{N}$$

Where, FC : the number of respondents who mentioned useful *lalaban* landrace, N : number of respondents (with total respondents 56).

RESULTS AND DISCUSSION

Species diversity of *lalaban*

In general, Sundanese culture is known for fresh vegetables, such as *lalaban*, because Sundanese people like to grow crops. One of the secrets to Sundanese people's health is consuming fresh vegetables (*lalaban*), which contain many vitamins (Nugraha et al. 2019). *Lalaban* is a side dish for rice, usually served with *sambal*. *Lalaban* is the most favorite food of the Sundanese people. Consuming *lalaban* is a community's tradition, culture, and character. *Lalaban* is a vegetable that is washed and cut, without cooking or half-cooking. The Sundanese community's consumption of *lalaban* is a culture, tradition, and character. According to Maryanti et al. (2024), *lalaban* has high ethnoscience value within Sundanese culture. Studying fresh vegetables from an ethnoscience perspective can help us understand the Sundanese people's knowledge, beliefs, and cultural values. It is important to preserve Sundanese culture and increase public awareness of Indonesia's rich culture, which should also be integrated into education.

In Indonesia, the Sundanese land in West Java is geographically mountainous, making the soil more fertile for agriculture. The condition makes the Sundanese consume a lot of *lalaban* daily. As one of the world's biodiversity hotspots, Indonesia has more than 25,000 plant species. These plants are an integral part of the dietary practices of rural communities, providing essential nutrients (Rahayu et al. 2024). Besides being known as traditional ethnic foods (TEF), *lalaban* generally includes vegetables. The search for unconventional food sources derived from these plants has high potential to expand food utilization while causing less environmental impact. TEF provides interesting nutritional components such as fiber, protein, phenolic compounds, and carotenoids, which are several bioactive compounds that promote health benefits (Milião et al. 2022). *Lalaban* is the same as the modern food today, namely salad. Salad is also a raw vegetable usually served with complementary seasonings, while *lalaban* can be served with chili sauce (*sambal*). This culture of eating *lalaban* is an activity that aims to associate oneself with nature (Endo 2020).

On average, the current global intake of fruits and vegetables is about 57% of the recommended amount and ranges from about 25% in some South Asian and Sub-Saharan African countries to about 95% in some Mediterranean, Middle Eastern, and North African countries such as Armenia, Turkey, Tunisia, Romania, Egypt, and Iran. *Lalaban* tends to be more recognized by women with an average age of over 50 years. Certain fresh vegetables are recognized by local communities as traditional medicines with potential to treat multiple ailments (Hernawati et al. 2022).

The study's results revealed 38 species of *lalaban* plants used by the community of Cireundeu as food sources, divided into 24 families. Table 1 shows the species of *lalaban* plants used and the RFC value contained in each type.

Table 1 showed that *lalaban* was consumed from almost all plant organs, including leaves, stems, flowers, fruits, and seeds, with leaves as the most frequently utilized organ due to their relatively soft texture and suitability for processing into various food preparations. Besides that, leaf organs can be consumed directly, raw, or processed. The process of *lalaban* generally involves cooking it and mixing it with other ingredients, such as chili sauce or fish. This habit has been practiced for generations and is a part of everyday life. The chili sauce (*sambal*) is generally made from a mixture of chili peppers, tomatoes, galangal, garlic, shallots, sugar, salt, and shrimp paste (Handayani and Hidayati 2021; Hernawati et al. 2022; Rachmawati et al. 2023).

Table 1. Species of vegetables found and utilized by the community, along with RFC values

Local name	Scientific name	Family	Organ part	Processing method*	Source location**	RFC
Avocado	*Persea americana* Mill.	Lauraceae	Leaves	R	G	0.02
Antanan (horse foot leaf)	*Centella asiatica* (L.) Urb	Apiaceae	Leaves	R/B	G/F	0.21
Babalimbingan	*Oxalis barrelieri* L.	Oxalidaceae	Leaves, fruit, stem	R/B	G/F	0.02
Cangkudu (noni)	*Morinda citrifolia* L.	Rubiaceae	Leaves	R/B	G/H	0.09
Daun dewa	*Gynura procumbens* (Lour.) Merr.	Asteraceae	Leaves	R	H	0.02
Eceng	*Pontederia vaginalis* Burm.f.	Pontederiaceae	Leaves	B	G	0.09
Gedang (papaya)	*Carica papaya* L.	Caricaceae	Leaves, flower, young stem	R/B	G/H	1.00
Genjer	*Limnocharis flava* (L.) Buchenau	Alismataceae	Leaves	B/S	G	0.07
Hiris (mung bean)	*Cajanus cajan* (L.) Huth	Fabaceae	Seeds	R	G	0.02
Hui boled (sweet potato)	*Ipomoea batatas* (L.) Lam.	Convolvulaceae	Leaves	B	G	0.07
Jaat (winged bean)	*Psophocarpus tetragonolobus* (L.) DC.	Fabaceae	Fruit	R/B	G	0.02
Jengkol	*Archidendron jiringa* (Jack) I.C.Nielsen	Fabaceae	Seeds	R/B	G	0.14
Jonghe	*Emilia sonchifolia* (L.) DC. ex Wight	Asteraceae	Leaves	R	G/Rf	0.07
Jotang	*Acmella paniculata* (Wall. Ex DC.) R.K.Jansen	Asteraceae	Leaves	R/B	G	0.21
Kadondong Cina (yellow mombin)	*Spondias mombin* Jacq.	Anacardiaceae	Leaves	B	G/H	0.09
Kanikir (cosmos)	*Cosmos caudatus* Kunth.	Asteraceae	Leaves	R/B	G/H	0.16
Ketapang	*Terminalia catappa* L.	Combretaceae	Leaves	B	G	0.04
Waluh (chayote)	*Sicyos edulis* Jacq.	Cucurbitaceae	Leaves, fruit	B	H	0.09
Leunca	*Solanum nigrum* L.	Solanaceae	Fruit	R	G/H/F	0.27
Loseh	*Galinsoga parviflora* Cav.	Asteraceae	Leaves	R/B	G	0.02
Papakisan	*Pityrogramma calomelanos* (L.) Link	Pteridaceae	Leaves	B	G/F	0.04
Paria (bitter melon)	*Momordica charantia* L.	Cucurbitaceae	Fruit	S	G	0.05
Japanese papaya	*Cnidoscolus aconitifolius* (Mill.) I.M.Johnst.	Euphorbiaceae	Leaves	B	H	0.04
Peuteuy selong	*Leucaena leucocephala* (Lam.) de Wit	Fabaceae	Seeds	R	G	0.14
Banana	*Musa x paradisiaca* L.	Musaceae	Flower	B/S	G/F	0.02
Pohpohan	*Pilea melastomoides* (Poir.) Wedd.	Urticaceae	Leaves	R	G/H/F	0.64
Putat	*Planchonia valida* (Blume) Blume	Lecythidaceae	Leaves	R	G	0.09
Reundeu	*Staurogyne elongata* (Blume) Kuntze	Acanthaceae	Leaves	R	H	0.20
Sampeu (cassava)	*Manihot esculenta* Crantz.	Euphorbiaceae	Leaves	B/S	G	1.00
Senggang (spiny spinach)	*Amaranthus spinosus* L.	Amaranthaceae	Leaves	B	G/H	0.11
Sintrong	*Crassocephalum crepidioides* (Benth.) S.Moore	Asteraceae	Leaves	R/B	G/F	0.38
Surawung (basil)	*Ocimum basilicum* L.	Lamiaceae	Leaves	R	G/H	0.11
Takokak	*Solanum torvum* Sw.	Solanaceae	Fruit	R/B	G/F	0.14
Tangkil (*melinjo*)	*Gnetum gnemon* L.	Gnetaceae	Leaves	B	G	0.05
Tespong	*Oenanthe javanica* (Blume) DC.	Apiaceae	Leaves	R	G	0.02
Tomato	*Solanum lycopersicum* L.	Solanaceae	Fruit	R	H	0.13
Tongtolang (jackfruit)	*Artocarpus heterophyllus* Lam.	Moraceae	Fruit	B/S	G/F	0.04
Walang	*Eryngium foetidum* L.	Apiaceae	Leaves	B	G	0.14

Note: *Processing method: R: Raw, B: Boil, S: Steam. **Location source: F: Forest, G: Garden, H: Home garden, Rf: Rice field

Several studies have been conducted on *lalaban* in West Java, especially in traditional Sundanese villages. Based on research by Septiani et al. (2020), 46 plant species have the potential to be *lalaban* in Kampung Naga. Another study conducted by Cahyanto et al. (2018) found 50 types of vegetables commonly used by the Subang community. Septiani et al. (2020) stated that the species *lalaban* plants could generally be found in forests, home gardens, gardens, and rice fields. The study found that most sources were in gardens. This is because various types of plants in gardens are often utilized and have economic value for the community. Rahayu et al. (2024) found 52 unconventional food plants commonly consumed in the diet of rural communities in the Rancakalong Sub-district, Sumedang District, West Java. The most diverse family is Asteraceae (8 species), followed by Phyllanthaceae (5 species). The families of Apiaceae, Anacardiaceae, Cucurbitaceae, Fabaceae, and Solanaceae have 3 species. Almost everyone in Cireundeu Hamlet has abandoned rice as their main food and switched to cassava rice, commonly called *rasi.* Usually, *rasi* is eaten using *lalaban* and chili sauce.

Various kinds of *lalaban* can grow well in Cireundeu because of the fertile soil. *Lalaban* can be obtained from gardens, home gardens, and forests (Jabbaril 2018). One of the famous species of *lalab* in Sundanese society is *reundeu* (*Staurogyne elongata*), whose leaves are used as one of the traditional dishes of Sundanese society. Sundanese people around the West Java Mount Simpang Nature Reserve area consume *S. elongata* leaves as *lalab* (raw salad) or by steaming (Handayani and Hidayati 2021). Regarding plant diversity, the Cireundeu community uses 38 plant species; this is fewer than the 48 species recorded for the Cijambu Village community and the 160 plant species documented for the Banceuy indigenous community, yet it still reflects deep local knowledge of taxonomy. The Cireundeu community is notably distinctive among other Sundanese communities in its staple-food practices. While most Sundanese people consider rice their primary food, the Cireundeu community has consumed *rasi* (cassava rice) as their main staple since 1924. This variation arises from historical and ecological factors. In 1918, a severe drought affected rice fields, and during the Dutch colonial era, a rice shortage occurred. The community adapted to the challenging highland conditions for rice farming by switching to cassava, a crop more tolerant of marginal land. Despite these differences in staple foods, they maintain strong Sundanese cultural ties, such as speaking Sundanese as their mother tongue and practicing the tradition of eating *lalaban* (raw or boiled vegetables) (Irawan et al. 2024; Alfinandah et al. 2025; Raihandhany and Purnomo 2025).

Figure 2 shows the four dominant families used by the Cireundeu community. When viewed as a percentage of use, the Asteraceae family has 6 species with a total percentage of 15.79%, namely *sintrong* (*Crassocephalum crepidioides*), *kanikir* (*Cosmos caudatus*), *jotang* (*Acmella paniculata*), *jonghe* (*Emilia sonchifolia*), *loseh* (*Galinsoga parviflora*), and *daun dewa* (*Gynura procumbens*). Asteraceae have high economic value and are used for various purposes, including food (*lalaban*), medicine, and ornamental plants (Irsyam and Hariri 2016). To clarify this comparison, please refer to the summary of family richness percentages in Table 2. Based on research, plants or vegetables used in Sundanese cuisine are alternative medicinal plants for various diseases, such as high blood pressure, coronary heart disease, diabetes mellitus, liver disease, asthma, and rheumatism (Nugraha et al. 2019). In the Tabanan community of Bali, several plants, including *Plumeria rubra* and *Musa x paradisiaca*. *Piper betle*, and *Centella asiatica*, are used in traditional medicine (Andila et al. 2022). The Asteraceae family dominates the wild food plant category (Figure 2) owing to its high adaptability and functional benefits. Plants within this family, such as *sintrong* and *kenikir*, are abundant in secondary metabolites, including antioxidants, flavonoids, polyphenols, and tannins. Locally, these plants are utilized as anti-inflammatory, diuretic, and hepatoprotective agents. These species frequently grow spontaneously in open fields and along roadsides, thus ensuring their easy accessibility to the community. Furthermore, the primary utilization of garden land (dry fields or gardens) is as the main food source, as observed in Cireundeu (Irawan et al. 2024; Alfinandah et al. 2025).

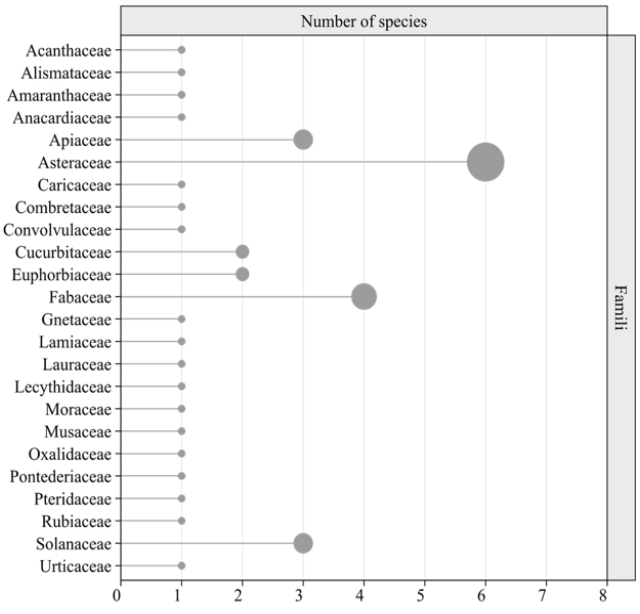

Figure 2. Comparison of the number of species of each family of *lalaban* found

Table 2. Summary of the percentage of each identified family

Family	Percentage
Acanthaceae	2.63%
Alismataceae	2.63%
Amaranthaceae	2.63%
Anacardiaceae	2.63%
Apiaceae	7.89%
Asteraceae	15.79%
Caricaceae	2.63%
Combretaceae	2.63%
Convolvulaceae	2.63%
Cucurbitaceae	5.26%
Euphorbiaceae	5.26%
Fabaceae	10.53%
Gnetaceae	2.63%
Lamiaceae	2.63%
Lauraceae	2.63%
Lecythidaceae	2.63%
Moraceae	2.63%
Musaceae	2.63%
Oxalidaceae	2.63%
Pontederiaceae	2.63%
Pteridaceae	2.63%
Rubiaceae	2.63%
Solanaceae	7.89%
Urticaceae	2.63%

As shown in Table 2, a large percentage of types are outside the Asteraceae family. Several other plant families have notable species representation, including Fabaceae (4 species), which includes legumes that are a key source of vegetable protein in the Sundanese diet. Solanaceae (3 species), typically comprising plants like eggplant or *rimbang*, which are commonly found in gardens. Apiaceae (3 species), including plants such as celery or *antanan*, are used both as food and in traditional medicine. Figure 2 also shows a diverse range of families, each with fewer species, such as Euphorbiaceae (2 species), to which cassava (*M. esculenta*) belongs. Despite having only two species in this graph, this family holds great cultural significance in Cireundeu as a staple food substitute for rice. Cucurbitaceae (2 species), a group of gourds often used as boiled vegetables. Additionally, there are families with only one species, totaling 18 others (such as Caricaceae for papaya, Musaceae for banana, and Lamiaceae), each represented by a single species. This highlights that, despite the dominance of certain groups, the biodiversity of local food crops remains well preserved and spans a broad taxonomic spectrum.

The second-highest utilization is the Fabaceae family, with a 10.26% share. The Fabaceae family includes 4 species: *jengkol* (*Archidendron jiringa*, *peuteuy selong* (*Leucaena leucocephala*), *hiris* (*Cajanus cajan*), and *jaat* (*Psophocarpus tetragonolobus*). Generally, plants from the Fabaceae family have high economic value. They are used for various purposes, such as food (*lalaban*), medicine, natural dyes, ornamental plants, and wood producers (Hariri et al. 2021). The families with the third-highest utilization are Apiaceae and Solanaceae, with a combined percentage of 7.69%. The Apiaceae family has 3 species, namely *walang* (*Eryngium foetidum*), *antanan* (*C. asiatica*), and *tespong* (*Oenanthe javanica*). The Solanaceae family includes 3 species: tomato (*Solanum lycopersicum*), *takokak* (*Solanum torvum*), and *leunca* (*Solanum nigrum*). *Lalaban* plants obtained from the garden in Cireundeu Hamlet include *jonghe* (*E. sonchifolia*), *jotang* (*A. paniculata*), *walang* (*E. foetidum*), *leunca* (*S. nigrum*), and others. *Lalaban* plants can be found widely in the garden area, so people can easily gather and use them as traditional medicine. Rahayu et al. (2024) in Rancakalong, Sumedang, West Java, found that the community often consumes *Solanum americanum*, *C. crepidioides, S. torvum, E. foetidum*, *Moringa oleifera*, and *Breynia androgyna.* In the Sindangsari area of West Java, 181 plant species were found to be utilized by the community, some of which were used as *lalaban*, including *pohpohan, petai,* spinach, cabbage, beans, papaya, *hiris, jengkol, leunca,* cassava, and *takokak,* like those found in the Cireundeu community (Soemarwoto and Iskandar 2021).

Plant organs used

Based on the Relative Frequency of Citation (RFC) analysis, which is a value that describes the local knowledge of the community in revealing the species *lalaban* that are beneficial to the community. Table 1 shows that papaya and cassava exhibited the highest RFC (1.00), followed by *pohpohan* (0.64), and *sintrong* (0.38) (Figure 3). This result shows that these four plants are important and often consumed by the community of Cireundeu Hamlet. The four plants have good taste and aroma and are easy to find in Cireundeu, so the community uses them widely. A high RFC value (such as 1 for cassava and papaya) signifies more than just being a common plant. It can indicate that the plant is a cultural keystone species: an RFC value of 1 indicates that it is a cultural symbol (Raihandhany and Purnomo 2025). For example, cassava is a symbol of food sovereignty and identity for the Cireundeu community, which does not eat rice. This value demonstrates that knowledge about the plant's use is evenly shared across the community, from older to younger members, and it is considered essential in daily life.

Other types of *lalaban* with lower RFC values, such as *tespong*, *pohpohan,* and *sintrong*, contain antioxidants and have good potential to combat non-communicable and chronic diseases, including cardiovascular disease and cancer. The phytochemicals of the three *lalaban* also have good potential for cytotoxic effects, anti-microbial effects, anti-parasitic effects, etc. Daily consumption of *lalaban* can improve health conditions and prevent disease (Kodir and Moektiwardoyo 2022). *Sintrong*, or *C. crepidioides*, is traditionally used to treat indigestion, digestive diseases, and wounds. It has been proven that *C. crepidioides* leaves have wound-healing activity. Experimental data provide evidence of the wound-healing activity of *C. crepidioides* leaves, due to their antioxidant, anti-inflammatory, fibroblast-proliferation, wound-contractile activity, and angiogenic effects. In addition, consuming *C. crepidioides* leaves in cooked form has greater medicinal value, including treatment

of indigestion, headache, swollen lips, sleeping sickness, and epilepsy (Akinpelu et al. 2019; Can and Thao 2020).

In research on cassava in the Cireundeu community, it has become a key cultural species in Cireundeu. Cassava demonstrates that it functions as a key cultural species and holds high cultural value for the community (Irawan et al. 2024). Papaya and cassava are very easy to find in the garden, especially since the Cireundeu community still maintain their habit of consuming *rasi* (cassava rice) as their main food; this is what makes cassava gardens in Cireundeu Hamlet very abundant (Graha et al. 2022). Cassava leaves are also often used as a *lalaban*; besides its delicious taste, cassava is also very easy to find in Cireundeu Hamlet, both planted and growing wild. Cassava in the garden should not be taken for shoots to be used as *lalaban*, as this will affect tuber yield. Community members typically collect only 2-3 shoots per stem to avoid reducing tuber productivity. Alternatively, shoots are taken from wild-growing cassava or plants used as garden boundary fences to minimize yield loss. Papaya is similarly abundant and widely utilized. It is easily found both cultivated in gardens and growing wild along field margins. Its favorable taste and accessibility contribute to its frequent use by the community. Papaya plants can be easily found in the garden and grow wild along the edge. Conversely, Table 1 indicates that eight *lalaban* species exhibit the lowest Relative Frequency of Citation (RFC = 0.02): *babalimbingan* (*Oxalis barrelieri*), *daun dewa* (*G. procumbens*), *hiris* (*C. cajan*), *jaat* (*P. tetragonolobus*), *loseh* (*G. parviflora*), *banana* (*M. paradisiaca*), avocado (*Persea americana* Mill.), and *tespong* (*O. javanica*) with the same value of 0.02. Their low RFC values reflect their limited availability in gardens and nearby forest areas, despite some occurring as wild plants. This scarcity likely reduces their cultural prominence and frequency of consumption within the community.

Figure 4 shows the various parts of the vegetables used by the Cireundeu community. Leaves represent the most frequently consumed organ (51%), followed by fruits (16%), stems (14%), flowers (11%), and seeds (8%). These percentages were calculated from the total 38 recorded species, based on the frequency of organ use across all species. The predominance of leaves indicates their central role in local dietary practices, while other organs are comparatively less utilized as vegetables. The dominance of leaf use reflects biological, practical, and cultural factors. Leaves are generally soft-textured, widely available, and easy to prepare—either consumed raw, briefly boiled (*dikulub*), or steamed (*diseupan*). Many *lalaban* species are fast-growing herbs that thrive in gardens, home gardens, and semi-wild habitats, supported by the fertile volcanic soils and mountainous climate of West Java. In addition, leaves are recognized locally for their nutritional value and bioactive compounds. Beyond their dietary function, the consumption of fresh green leaves embodies a Sundanese philosophy of simplicity and harmony with nature, reinforcing the cultural identity associated with *lalaban* practices (Alifa et al. 2024; Nelly et al. 2024; Aulia et al. 2025; Nursamsu et al. 2025).

Figure 3. The four most consumed *lalaban* plants by the Cireundeu community. A. Cassava leaves, B. Papaya leaves, C. *Pohpohan* leaves, and D. *Sintrong* leaves

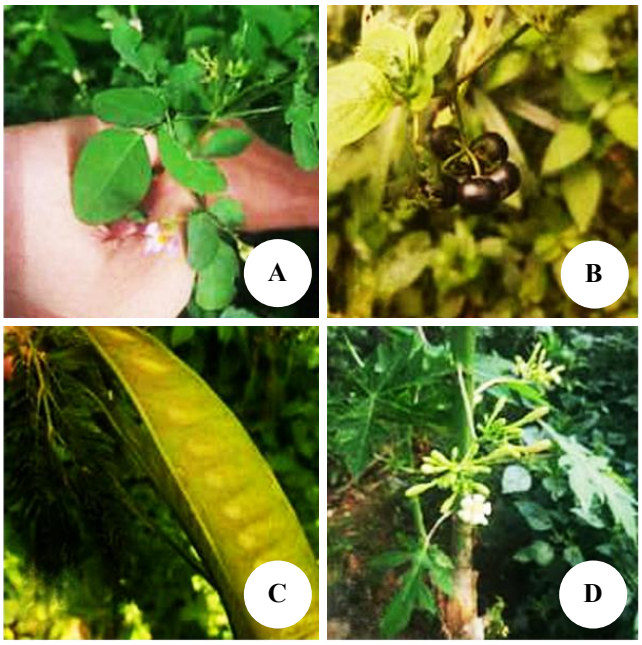

Figure 4. A. Leaf and stem organs (*Babalimbingan*), B. Fruit organs (*Leunca*), C. Seed organs (*Petai selong*), D. Flower organs (papaya)

The stereotypical characteristics of Sundanese cuisine associated with "vegetables" and "healthy food" stem from the frequent consumption of raw vegetable dishes, such as *lalab* and *rujak* (Sundanese salad), which are not widely consumed by other ethnic groups (Endo 2020). In addition to the Sundanese community, the tradition of consuming fresh vegetables has been passed down from generation to generation in indigenous villages in East Priangan. Research by Hernawati et al. (2022) showed that the East Priangan community routinely consumes five vegetables with RFC values from highest to lowest in cucumber, cassava, papaya, *genjer,* and basil. Indigenous villagers recognize *lalaban* in the form of fresh vegetables eaten raw or cooked first to complement rice, side dishes, and *sambal* in their daily meals. *Lalaban*, or traditional ethnic foods (TEF), are commonly eaten by Sundanese communities, including in Cireundeu, Banceuy, and Cijambu, offering health benefits beyond just vitamins. These plants, which aren't heavily cultivated, supply vital micronutrients such as protein, fiber, and minerals like calcium, phosphorus, and iron—often at levels higher than those of commercial vegetables. *Lalaban* contains phytochemicals like antioxidants, flavonoids, and polyphenols, which help combat free radicals, reduce inflammation, and regulate blood sugar and blood pressure. Eating *lalaban* regularly diversifies diets, prevents malnutrition, and serves as daily "functional medicine" to support physical health without the adverse effects commonly associated with modern medicines. (Irawan et al. 2024; Alfinandah et al. 2025; Raihandhany and Purnomo 2025).

Source location and management of *lalaban*

The community of Cireundeu actively manage local natural resources, particularly those derived from nearby forests and gardens, to support community livelihoods. Traditional ceremonies are performed as expressions of communal resilience and collective responsibility, accompanied by the consumption of herbal preparations and *rasi* (cassava rice) to maintain physical endurance and food self-sufficiency. Like other Sundanese communities, the people of Cireundeu regularly consume fresh raw leaves known as *lalaban*, which are culturally embedded in daily meals and associated with health benefits (Sofiana et al. 2022). The vegetables consumed as *lalaban* originate from four primary land-use types: gardens (62%), forests (24%), home gardens (13%), and rice fields (1%). Several species occur across multiple habitats. These proportions were derived from structured interviews with 56 respondents, who identified the primary sources of the vegetables they utilize, indicating consistency in reported habitat origins across households.

The number of *lalaban* plants in the forest is abundant, but people rarely use them because the forest is quite far from the settlement, closer to the garden. *Lalaban* plants obtained from the forest in Cireundeu Hamlet include *babalimbingan* (*O. barrelieri*), *leunca* (*S. nigrum*), *papakisan* (*Pityrogramma calomelanos*), *sintrong* (*C. crepidioides*), *pohpohan* (*Pilea melastomoides*), and so on (can be seen in Table 1). The source location of *lalaban* plants in Cireundeu can be divided into 4 locations: gardens (*leuweung baladahan*), forests (*leuweung tutupan*), home gardens, and rice fields (Figure 5). The location of the most extensive *lalaban* collection was in the garden (62%). The primary use of garden land (dry fields/gardens) (Figure 5.B) as the main food source (as seen in Cireundeu) is driven by ecological constraints: the Cireundeu area is located in a dry highland, limiting land available for rice irrigation. Latosol and red-yellow podzolic soil conditions better support resilient plants on marginal land, such as cassava. Additionally, the community employs a crop rotation system in their gardens, ensuring cassava is available year-round and meeting basic needs without depending on rice fields. This was further reinforced by major changes in 1918 caused by a drought in the rice fields, which compelled people to shift to cultivating cassava in their gardens as a survival strategy.

The community utilizes gardens as a source of *lalaban* because many *lalaban* plants grow wild in the garden, so it is very easy to get and free. Some species of *lalaban* are rarely found and no longer sold in the market, so they must be preserved. The second source location is in the forest area at 24%. Generally, *lalaban* plants in this forest grow wild and naturally, not intensively cultivated. Wild plants from this forest can be useful for the community in providing nutrients for the body (Susandarini et al. 2021). There are many *lalaban* plants in the forest, but people rarely use them because the forest is quite far from settlements, closer to the garden. The other location for taking *lalaban* is in the home garden area at 13%. People who grow vegetables in their home gardens often do so to avoid taking vegetables from the garden when they are not available. The home garden system (Figure 5.C) provides a variety of foods, including vegetables, herbs, and fruits, because the plants can be harvested daily. The owner can easily pick or harvest various crops for family consumption or sale because the home garden is integrated with the house. Planting in the home garden with various species of perennials and annuals will meet its quality and nutritional needs (Suwartapradja et al. 2023). *Lalaban* is rarely found in the rice field area, accounting for only 1%. The plant that comes from rice fields is *jonghe* (*E. sonchifolia*). None of the community of Cireundeu owns or cultivates rice fields, but most manage cassava gardens. People who plant herbs in their home gardens often take them to the garden when they are unavailable. *Lalaban* plants obtained from the home garden in Cireundeu Hamlet include Japanese papaya (*Cnidoscolus aconitifolius*), tomato (*S. lycopersicum*), *daun dewa* (*G. procumbens*) and others. According to the community, the Homegarden area in front of the house can be planted with a variety of plants, including ornamentals, vegetables, and others. Plants that come from rice fields are *jonghe* (*E. sonchifolia*). This can be interpreted as the community still utilizing the *lalaban* from rice fields, but not much. *Joghe* can also be grown in the garden; therefore, the use of this rice field is very limited. The community of Cireundeu do not own or cultivate rice fields; instead, they mostly manage cassava gardens.

Sundanese people in West Java have a rich cultural heritage and knowledge of medicinal plant use. They consume fresh edible plants in their dishes. Sundanese

local eating habits are characterized by high fiber intake, less fried foods, and lower saturated fat intake, which have been associated with positive effects on human health (Milanda et al. 2022). According to the community, our natural resources are abundant, so utilizing what is available in the garden or forest is easy. The community already has traditional ecological knowledge about the local landscape through cultural heritage and personal experience interacting with the environment. People living near this garden/forest will utilize natural resources to fulfill their needs. This is in line with the concept of cultural landscape, namely the relationship between various aspects of people, places, and identity in communities that utilize natural resources sustainably, such as in the Cintaratu Pangandaran Village area, Cijambu Sumedang Village, and Kanekes Village in Baduy (Partasasmita et al. 2020; Iskandar and Iskandar 2021; Ihsan et al. 2024). These Cireundeu community are generally still relatives. Some people also do not have gardens, so they are accustomed to asking their relatives who has gardens. One type of plant is cultivated in large quantities: cassava. This happens because the community of Cireundeu Hamlet consume cassava rice (*rasi*) as the main food (Irawan et al. 2024).

Cultural significance and ceremonies

The community also has a habit of conducting traditional ceremonies after the harvest by displaying various crops, including several species of *lalaban* that are commonly consumed. Since ancient times, humans have utilized natural resources to fulfill their needs. One of the natural resources that has been widely utilized and managed for a long time is plants. Plants are often used as materials for clothing, food, shelter, medicine, crafts, and other purposes. One of the primary needs that must be met every day is food. Plants also have religious significance as offerings to the gods and entrances to the other world. Indigenous people consider the plants sacred and related to sustainable conservation efforts (Balick and Cox 2020). The Cireundeu community conducts agricultural practices and soil conservation efforts to maintain a spiritual connection with nature and God. Every year, they hold a ceremony called the traditional ceremony *ngemban taun* as a form of gratitude to God for the gift of an abundant harvest that meets their needs (Primasongko and Raihandhany 2022).

The source of the *lalaban* is generally from farming fields; this is part of the hereditary folklore, passed down from generation to generation in Sundanese culture, about the legend of *Sangkuriang*, who wanted to marry his young mother, *Dayang Sumbi*. The key to keeping *Dayang Sumbi* young was her regular diet of young leaves from plants around her home. From this story, people began to grow vegetables for *lalaban* in their fields and around their homes or home gardens. Later generations of Sundanese also widely accepted that Sundanese people consumed various plants in their daily menu as salads. From this perspective, the relationship between Sundanese people and plants is traditionally bound (Kodir and Moektiwardoyo 2022). Based on gastronomic ethnobiology, the diversity of traditional foods, including *lalab* in rural West Java, is strongly influenced by the local biophysical environment and culture. Various plant parts such as leaves, fruits, tubers, stumps, and rhizomes are widely used as vegetable *lalab* by rural communities in West Java and then consumed as fresh vegetables (*lalab*) (Iskandar et al. 2023). For the people of Cireundeu, cassava is more than just an alternative food; it is a cultural identity and a symbol of food sovereignty. Cassava has become a cultural keystone species, shaping the community's biocultural system. Their food sovereignty is holistic. In addition to the roots (tubers) processed into rice, tapioca flour, and snacks, the cassava leaves are used as the main ingredient in a vegetable salad (*lalaban*). This showcases the plant's maximum utilization to meet carbohydrate and vegetable nutrient needs from a single source, strengthening food independence without relying on external rice supplies. *Lalaban* holds deep cultural significance for the Sundanese people, not just as a raw vegetable dish, but as a symbol of ethnic identity, harmony with nature, and a reflection of life values. *Lalaban* also symbolizes simplicity for the Sundanese people. According to traditional values, a simple life directly sourced from nature is believed to be key to physical and mental health (Alifa et al. 2024; Irawan et al. 2024).

In social interaction, the people of the Cireundeu Hamlet maintain and preserve their tolerance by working together in various activities, including involvement in the *ngemban taun* ceremony (Figure 6). The *ngemban taun* ceremony is held for one day from morning to evening, so it involves many parties; both indigenous and non-indigenous people will work together to aid in enlivening the *ngemban taun* ceremony, which is held for several days (Fauziyyah et al. 2022). During the *ngemban taun* ceremony, prayers or worship to *Sang Hyang* are conducted privately and do not involve the general public, as it is part of the *Sunda wiwitan* religious ritual. After the traditional ritual is performed, there is a procession that may involve the community in bringing the harvest from the local area. In the hamlet of Cireundeu, the *ngemban taun* ceremony is performed by the Cireundeu community to show gratitude and harmony with nature. This ritual is closely connected to how TEK helps preserve the existence of important species, especially for indigenous cultures.

Figure 5. Locations of *lalaban* plants. A. Forest area, B. Garden area, C. Homegarden area, D. Rice field area

Figure 6. The procession of the *ngemban taun* traditional ceremony, which displays various crops of the Cireundeu community

Lalaban has been known to have taboos that people believe to be myths. However, there is a scientific explanation from an ethnoscience point of view: vegetables are important and consumed not only as a cultural heritage, but there are benefits that can be obtained, such as types of fruits, vegetables, or plants that are used as potential vegetables that can be consumed, nutritional studies of vegetables, characteristics or inventory of plants used as vegetables, have symbolic meanings as balance, simplicity, and closeness to nature (Maryanti et al. 2024). The community uses *lalaban* as its main food source. They consume *lalaban* accompanied by *sambal* or chili sauce. It can be *sambal terasi, sambal oncom,* or others. The *sambal* is usually made from galangal flowers, mango seeds, and lime. Apart from the Cireundeu community, the same habit also exists in the Cijambu Village community in Sumedang, West Java. The parts of vegetable plants commonly consumed by the people of Cijambu Village can be divided into eight parts: tubers, flowers, fruits, leaves, rhizomes, roots/tubers, seeds, and shoots. Vegetable plants are traditionally consumed as fresh raw vegetables and cooked vegetables, kitchen spices, and several types of staple or main Sundanese foods, such as *karedok, rujak,* and *urab* (Iskandar et al. 2023).

Potential health implications

Many countries, including Indonesia, have traditional dishes that feature a mix of vegetables, spices, and herbs combined with *lalaban* sauce, which contains cucumber, white cabbage, tomatoes, basil leaves, shallots, garlic, and chilies (Rachmawati et al. 2023). According to Rahmah and Ansori (2023), the diversity of Indonesian cuisine is influenced by factors such as resources, history, and culture. Furthermore, due to the archipelago's vast geographical resources, history, and cultural diversity, there are many variations in form, texture, and flavor, adapted to local ingredients and preferences. Based on interviews, *lalaban* consumption in the Cireundeu community ranges from once a week to six times a week. Figure 7 shows the percentage of days on which *lalaban* is consumed each week, based on interviews with 56 respondents. The highest percentage occurs at a consumption frequency of once a week, followed by twice and three times a week. These consumption patterns do not follow a consistent order from day 1 to day 6. On the fifth day, people generally do not consume *lalaban* because they substitute it with other side dishes. Respondents explained that eating *lalaban* every day can lead to boredom, so they add other vegetables, fish, and side dishes to keep it interesting. Adults are not the only ones who eat *lalaban*—some children do too. About 64% of respondents said they enjoy eating raw vegetables, while the rest prefer not to.

Lalaban is typically eaten with *sambal* (chili sauce). Sambal is a common side dish that goes alongside staple foods. According to questionnaire results, all participants confirmed they eat *lalaban* with chili sauce. In Sundanese culture, chili sauce is seen as a symbol that boosts appetite and relieves fatigue, especially for those working in agriculture. Children's enjoyment of chili sauce is viewed as an early sign of developing resilience and toughness needed in adulthood. Philosophically, maturity in Sundanese culture involves embracing the "colors" of life. Just as the flavor of chili sauce comes from its blend of spiciness, saltiness, and savoriness, children's acceptance of spiciness symbolizes their readiness to face the diverse emotions and challenges in life (Alifa et al. 2024; Aulia et al. 2025).

The most common method of processing vegetables is boiling (54%), followed by eating raw (41%), with steaming at 5%. According to the public, boiling and steaming can make *lalaban* healthier and remove harmful substances compared to eating them raw. Heating or processing vegetables can reduce their nutrient content, with the extent

depending on the duration of heating. The optimal cooking time is about 7.5 minutes to preserve nutritional quality. Steamed vegetables often have better flavor than boiled ones. A study comparing boiling, steaming, and heating vegetables such as cauliflower, carrots, and sweet potatoes found that boiling was most effective at reducing potential cancer risk. Extended cooking can diminish antioxidant activity and total phenolic content (Fabbri and Crosby 2016; Coe and Spiro 2022). Raw consumption retains more nutrients, and according to Maryanti et al. (2024), preference for fresh vegetables is influenced by taste, texture, and nutritional value, as well as cultural factors.

Similar *lalaban* varieties are also found in the communities of Sukapura and Tarumajaya Villages in Bandung Regency, West Java, but they have a unique type called *leunca manuk* (*S. americanum*), characterized by very small, round leaves that grow in clusters. This *lalaban* type is typically prepared from boiled leaves or leaves cooked with fish (Mulyanto et al. 2018). Milanda et al. (2022) reported that nine raw vegetables commonly eaten in West Java—such as *Ocimum tenuiflorum*, *Etlingera elatior*, *Vigna unguiculata*, and *C. asiatica*—show antibacterial and cytotoxic effects. These findings support further research into each species and the search for new bioactive compounds with antibacterial and anticancer potential. The community believes that cooking or steaming *lalaban* makes it healthier and safer, removing harmful substances compared to eating it raw. Examples of processed products, including raw, cooked, and steamed forms, are shown in Figure 8. Heating or processing vegetables can lead to nutrient loss, especially when food is cooked or steamed. Consuming fresh vegetables remains a traditional cultural practice in Indonesian society, particularly in Sundanese cuisine, which encourages vegetable intake (Amrinanto et al. 2019; Coe and Spiro 2022).

Figure 8 presents four examples of processed vegetables that contain bioactive compounds, such as antibacterial agents. The bioactive analysis of Sundanese *lalaban* components shows that *pohpohan* leaves (*P. melastomoides*) host an endophytic microbiome, including members of the Firmicutes and Proteobacteria phyla. These microbes may affect the diversity of the human gut microbiota and strengthen the immune system against pathogenic bacteria (Yonantiko et al. 2024). In cassava (*M. esculenta*), boiling plays a crucial role in reducing potential toxins and improving hygiene by killing microbes associated with the food, making it essential for functional food security (Permana et al. 2025; Raihandhany and Purnomo 2025). Steamed banana flowers (*M. paradisiaca*) exemplify Traditional ecological knowledge (TEK), hold high cultural value, and serve as a natural antioxidant source (Alifa et al. 2024; Raihandhany and Purnomo 2025; Sujarwo et al. 2025). Lastly, steamed bitter melon (*Momordica charantia*), a staple in Sundanese cuisine, is valued for its bitter compounds. These compounds could potentially be used to boost immune health (Adriani and Fahrudin 2025; Aulia et al. 2025). Research conducted by Afrianto et al. (2024) shows that most edible plants in the community are generally cooked before consumption (40%), as are vegetables (68 species). The Sundanese people typically eat vegetables such as *lalaban*, a typical Sundanese vegetable. According to Septiani et al. (2020), Sundanese people consume 86 types of vegetables, including *lalaban*, which can be eaten fresh, such as cabbage, lettuce, eggplant, cucumber, and basil. People who eat raw *lalaban* often do so because they see their parents doing it and follow the same pattern. Raw vegetables are rich in fiber, can cleanse the intestines, provide nutrients to support health, are low in calories, and are easy to digest. Consuming vegetables raw without processing helps preserve their nutrients. The culture of eating *lalaban* provides nutrients such as β-carotene, which has beneficial effects on heart and skin health (Rachmawati et al. 2023; Rahayu et al. 2024). Several studies on *lalaban*'s potential content suggest that it has promise for further research in the future; however, in this study, no direct measurements of health outcomes related to its consumption were conducted.

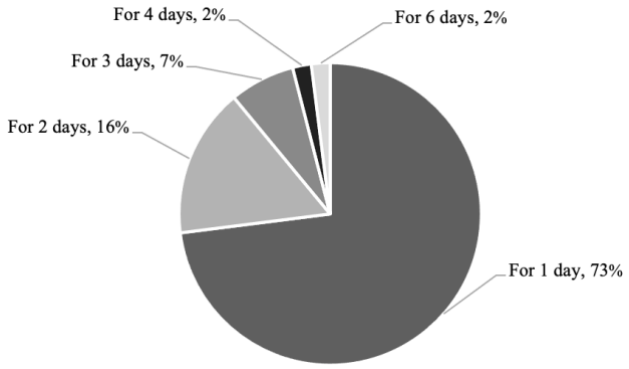

Figure 7. The percentage of people who have weekly *lalaban* consumption frequency

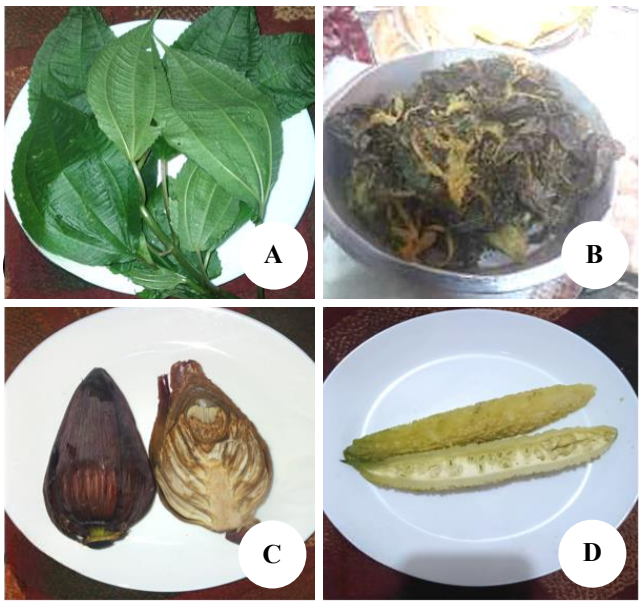

Figure 8. A. Raw *pohpohan* leaves, B. Boiled cassava, C. Steamed banana flowers, and D. Steamed bitter melon

Conservation implications

The Cireundeu community traditionally practices crop rotation and seasonal harvesting in their dry-field gardens. After harvest, seeds are stored as stem cuttings in shady, moist conditions for replanting the next year, helping preserve landraces in their natural environment. For instance, harvesting cassava leaf tips for *lalaban* is viewed as a conservation method—by taking only enough leaves, they ensure the long-term survival of cassava in their dry fields (*kebon*), keeping them productive (Irawan et al. 2024). Furthermore, planting beneficial species in home gardens is a practical way to conserve wild food plants, which are increasingly threatened by nearby deforestation. The shift from dependence on forests to reliance on home gardens signals ecological and cultural changes. As natural habitats decline and forest land is converted for tourism or commercial use, dependence on home gardens increases, leading wild plants to move closer to homes to maintain access. Culturally, the community actively conserves by planting valuable species in gardens, supporting food and medicinal resources amid modernization. Home gardens also serve as spaces for women (housewives) to manage family kitchen and health needs, reinforcing traditional domestic roles. Knowledge about *lalaban* is traditionally passed down orally by parents and elders in Sundanese. However, there is a noticeable decline in this knowledge transfer. The RFC shows the community's familiarity with different species. Species such as *O. barrelieri*, *C. cajan*, and *G. procumbens*, with very low RFC scores (0.02), are rarely used and are hardly recognized today. This deep understanding is mostly held by the older generation, who follow *Sunda wiwitan* teachings. Meanwhile, the younger generation's involvement in industrial and urban jobs, along with their rice consumption, reduces the transmission of traditional knowledge.

The Sundanese *lalaban* culture faces significant threats from modernization, land use change, and the erosion of traditional knowledge. Nevertheless, efforts to conserve it through agroecology, historical research, and education rooted in local wisdom persist. According to Aulia et al. (2025), there has been a notable decline in the introduction of wild plant species; historical records from the early 20th century identify 232 wild lalab species, whereas recent studies indicate only about 50-100 species. The younger generation increasingly favors fast food, which is perceived as more prestigious, leading to a decline in knowledge about processing and consumption of *lalaban* (Nelly et al. 2024). Another challenge is the transformation of forests and traditional farmland into large-scale plantations, monocultures, or settlements, which destroys the natural habitats of many wild lalab species. Since the 1990s, roughly 40% of mountain forests in West Java's Mountain forests have been lost, directly reducing the plants traditionally gathered for foraging. Additionally, globalization threatens local culinary traditions, replacing native, nutritionally and culturally valuable vegetables with those that begin to dominate markets and tables among the Sundanese (Aulia et al. 2025).

Ethnobotanical studies are vital for systematizing recipes, processing techniques, and folklore associated with each variety of *lalab*, thereby helping safeguard indigenous knowledge (Adriani and Fahrudin 2025; Raihandhany and Purnomo 2025). Conservation measures are essential for protecting diverse local wisdoms, including those held by the Cireundeu community. Practical approaches for conserving lalab plants encompass integrating them into traditional yard designs and employing intercropping methods. These strategies are anticipated to support the preservation of genetic diversity and naturally enhance soil fertility through the cultivation of nitrogen-fixing crops such as long beans. Moreover, for sustainable conservation, incorporating locally grounded character education in Cireundeu—combining formal and traditional pedagogical approaches—can promote Sundanese cultural values and environmental consciousness, including the philosophy of *manusa nu ngasuh* (people who care for nature). By maximizing these initiatives, the aim is to preserve the significance of local wisdom, particularly in the utilization and management of *lalaban*, for future generations. In relation to food security, efforts should emphasize soil solarization, appropriate irrigation practices, and hygienic post-harvest handling to minimize pathogen contamination in *lalaban*. These measures not only biologically conserve the plants but also safeguard the cultural identity of the Sundanese people, who cherish harmony with nature (Yonantiko et al. 2024; Permana et al. 2025). On a broader scale, the development of culinary tourism could position *lalaban* as a prominent gastronomic attraction in Bandung and the surrounding areas, thereby enhancing the region's reputation and supporting local farmers engaged in traditional vegetable cultivation. Collaboration among entrepreneurs, government authorities, and academia is crucial for devising promotional strategies that harmonize conservation objectives with economic development.

In conclusion, there are 38 species of *lalaban* belonging to 24 families that are utilized by the Cireundeu community. The family Asteraceae was the most represented. Leaves were the dominant plant organ used (51%), followed by fruits (16%), stems (14%), flowers (11%), and seeds (8%). *Lalaban* was primarily sourced from gardens (62%), followed by forests (24%), home gardens (13%), and rice fields (1%). Relative Frequency of Citation (RFC) analysis identified four culturally important species: *M. esculenta* and *C. papaya* (RFC = 1), *P. melastomoides* (0.64), and *C. crepidioides* (0.38), indicating strong shared knowledge and frequent use. People typically obtain *lalaban* from gardens and home gardens because they are easier to grow and harvest. *Lalaban* can be consumed in three ways: raw, cooked, and steamed. Parts used include leaves, fruit, stems, flowers, and seeds, with leaves being the most used. Sources of *lalaban* plants are forests, gardens, home gardens, and rice fields. The habit of consuming *lalaban* has health benefits and could become a medicinal ingredient in the future because it contains various bioactive compounds. *Lalaban* consumption ranges from 1-6 days per week, reflecting both nutritional practice and cultural identity. Cassava functions as a cultural keystone species, supporting food sovereignty through the integrated use of tubers and leaves. There is a ritual called *ngemban taun*, performed as an expression of gratitude and to demonstrate

how TEK helps maintain the diversity of *lalaban* species. The use of locally based character education in Cireundeu combines formal and traditional teaching to promote Sundanese values and environmental awareness. These steps not only help preserve the plants' biological diversity but also protect the cultural identity of the Sundanese people, who value harmony with nature. However, this study was limited to a single peri-urban hamlet and relied on on-site species identification without herbarium voucher collection. Future research should incorporate multi-village comparative studies, voucher-based taxonomic validation, phytochemical and nutritional analyses, and quantitative assessment of intergenerational knowledge transmission to strengthen conservation and food security frameworks.

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