ASIAN JOURNAL OF ETHNOBIOLOGY
Volume 8, Number 2, November 2025
Pages: 312-323

E-ISSN: 2580-4510
DOI: 10.13057/asianjethnobiol/y080215

Ethnogastronomy of *bubur pedas* of the Malay community in North Sumatra, Indonesia and its contribution to local food security

JAMILAH NASUTION[1], NURSAHARA PASARIBU[1,♥], MARINA SILALAHI[2], R. HAMDANI HARAHAP[3]
[1]Doctoral Program in Biological Sciences, Faculty of Mathematics and Natural Sciences, Universitas Sumatera Utara. Jl. Bioteknologi No. 1, Padang Bulan, Medan Baru District, Medan 20155, North Sumatra, Indonesia. Tel./fax.: +62-61-8211050, ♥email: nursahara@usu.ac.id
[2]Department of Biology Education, Faculty of Teacher Training and Education, Universitas Kristen Indonesia. Jl. Mayjen Sutoyo No. 2, Cawang, East Jakarta 13630, Jakarta, Indonesia
[3]Department of Social Anthropology, Faculty of Social and Political Sciences, Universitas Sumatera Utara. Jl. Dr. A. Sofian No. 1A, Padang Bulan, Medan Baru District, Medan 20222, North Sumatra, Indonesia

Manuscript received: 17 September 2025. Revision accepted: 31 October 2025.

Abstract. *Nasution J, Pasaribu N, Silalahi M, Harahap RH. 2025. Ethnogastronomy of* bubur pedas *of the Malay community in North Sumatra, Indonesia and its contribution to local food security. Asian J Ethnobiol 8: 312-323.* The majority of Indonesian traditional foods are undocumented and endangered due to globalization and shifting diets. *Bubur pedas* ('spiced' or 'spicy porridge'), a Ramadan dish of the Malay community in North Sumatra, Indonesia, with over a century of history, is also at risk of of being forgotten or losing its prominence due to demographic change and cultural assimilation. Therefore, this study applied an ethnogastronomic method to determine key species' ingredients in *bubur pedas* and the contribution to local food security. Fieldwork was conducted from January to December 2023 in six historical Malay Sultanate areas, namely Medan, Langkat, Deli Serdang, Serdang Bedagai, Batubara, and Tanjungbalai. Data were collected through semi-structured interviews, participatory observations, and plant identification with 27 key informants. In total, 76 plant species from 33 families were documented, with leaves as the most common ingredient (45%). The results showed a strong correlation between Use Value (UV) and Relative Frequency of Citation (RFC), with 12 key species identified using the Relative Importance (RI) Index. The primary ingredients, determined based on high RI indices, were *Allium cepa, Arachis hypogaea, Coriandrum sativum, Cocos nucifera, Curcuma longa, Cuminum cyminum, Daucus carota, Etlingera elatior, Ipomoea batatas, Manihot esculenta, Oryza sativa,* and *Solanum tuberosum*. Mapping the results onto FAO's food security pillars showed that *bubur pedas* contributes to species availability, easy access through markets and household gardens, nutritional and medicinal value, as well as seasonal resilience. The study highlighted the role of Malay culinary heritage in sustaining culturally embedded, ecologically resilient food practices.

Keywords: *Bubur pedas*, ethnogastronomy, food security, local food, Malay

INTRODUCTION

Indonesia, the largest archipelagic country in Southeast Asia, harbors a rich bio- and cultural diversity shaped by over 1,300 ethnic groups and a wide range of ecological zones (Widyatmoko 2018; Utomo and McDonald 2020). Over 5,300 traditional foods have been documented in Indonesia throughout history, based on the convergence of natural resources, historical events, cultural values, and modes of preparation (Surya and Tedjakusuma 2022). In many local cultures, food serves a dual purpose as both nourishment and medicine, reflecting the food-medicine continuum where plants serve dual nutritional and healing functions (Adelman and Haushofer 2018). Traditional food systems, developed through generations of Traditional Ecological Knowledge (TEK), remain essential in linking biodiversity with cultural identity and food security (Rani et al. 2025). However, globalization and urbanization increasingly threaten this knowledge, leading to the gradual erosion of indigenous food practices among younger generations (Feldman and Wunderlich 2023; Yao et al. 2023). To address this, ethnobiology provides a framework to document and interpret community interactions with biodiversity through knowledge, practices, and beliefs (Ludwig and El-Hani 2020). Within this discipline, ethnogastronomy integrates ethnobotany, anthropology, and food studies to explore the cultural, ecological, and health dimensions of traditional food, aligning with Article 8(j) of the Convention on Biological Diversity (CBD) that emphasizes the preservation of TEK for sustainable development and local food security (CBD 2016; Stryamets et al. 2021).

Medan, the third-largest metropolitan city in Indonesia on the island of Sumatra, was historically part of the Deli Sultanate, a region once inhabited predominantly by the Malay ethnic group. Today, however, the Malay population in Medan is relatively small compared to other major ethnic communities such as the Batak, Javanese, Nias, Chinese, and Minangkabau (Ananta et al. 2015; Damanik 2020). The Malay population is largely concentrated along the east coast of North Sumatra, resulting in limited visibility and transmission of their cultural expressions, including traditional foods that remain localized within specific communities (Perry 2017). Unlike the Riau Malays, whose culinary heritage has been examined in terms of commodification, authenticity, and sustainability amid modernization pressures, the Malay food in Medan remains underrepresented despite its strong potential to preserve cultural identity and adapt to contemporary food systems without compromising authenticity (Mardatillah et al. 2019). Among the traditional dishes investigated in this study from an ethnogastronomic perspective is *bubur pedas* (literally, 'spiced' or 'spicy porridge'). Preparing and consuming *bubur pedas* has been a Ramadan tradition since at least 1909, intended to help maintain physical well-being during daily fasting periods of 13-14 hours. The inclusion of spices reflects the belief that 'spicy food' confers health benefits (Simbolon et al. 2025). Although *bubur pedas* has been studied among the Aceh Tamiang Malays, where 17 plant species were recorded (Navia et al. 2020), its preparation and plant composition among the Malays of Medan remain undocumented. Variations in ingredients and cooking methods likely reflect the distinct cultural identity of the Medan Malay community. Medan represents the main population center of Malays on the west coast of Sumatra, yet traditional knowledge of *bubur pedas* preparation techniques remains largely undocumented.

The preparation and transmission of traditional foods are increasingly recognized as part of biocultural diversity, the interconnectedness of biological, cultural, and linguistic diversity that sustains resilient socio-ecological systems (Swiderska et al. 2022). Within this framework, food practices embody not only ecological knowledge but also collective identity and cultural memory. Moreover, the continued use of local crops and culinary methods reflects food sovereignty, emphasizing the rights of communities to define their own food systems based on culturally appropriate practices and locally available biodiversity (FAO 2019; Blake 2022). Placing *bubur pedas* within these perspectives helps to explain how Malay food traditions support both cultural resilience and local food security. Yet, as urbanization, migration, and cultural assimilation continue, there is a growing risk that specific culinary knowledge, such as the choice of ingredients, balance of spices, and ceremonial uses, could gradually fade if not carefully documented through ethnogastronomic studies. Evidence for similar patterns was seen in the study on the vitality of the Malay language in North Sumatra, which reported declining transmission and shrinking daily use as younger generations shift toward majority or global languages (Pramuniati et al. 2024). This study therefore aimed to provide systematic documentation by (i) identifying the plant species used in preparing *bubur pedas*; (ii) applying the quantitative ethnobotanical indices such as Use Value (UV); Relative Frequency of Citation (RFC) as indicators of biological and cultural importance, as well as and (iii) examining the contributions of *bubur pedas* to the four pillars of local food security among the Malay community in North Sumatra, Indonesia.

MATERIALS AND METHODS

Study area

The study was conducted between January and December 2023 across six historical Malay Sultanate regions of North Sumatra Province, Indonesia. The regions include Medan City, Langkat District, Deli Serdang District, Serdang Bedagai District, Batubara District, and Tanjungbalai City, as shown in Figure 1.

The sites were selected because Malay communities in these areas continue to preserve the preparation of *bubur pedas* as part of their culinary heritage and ceremonial dish (Nasution et al. 2025). Geographically, the study sites represented a range of ecological and sociocultural contexts, extending from urban settlements (e.g., Maimun Village in Medan) to coastal zones (e.g., Tanjung Tiram and Kuala Kapias Districts) and peri-urban areas in between. These differences were not analyzed ecologically but are acknowledged as potential factors influencing the self-procurement of local plants from home gardens for the preparation of *bubur pedas*.

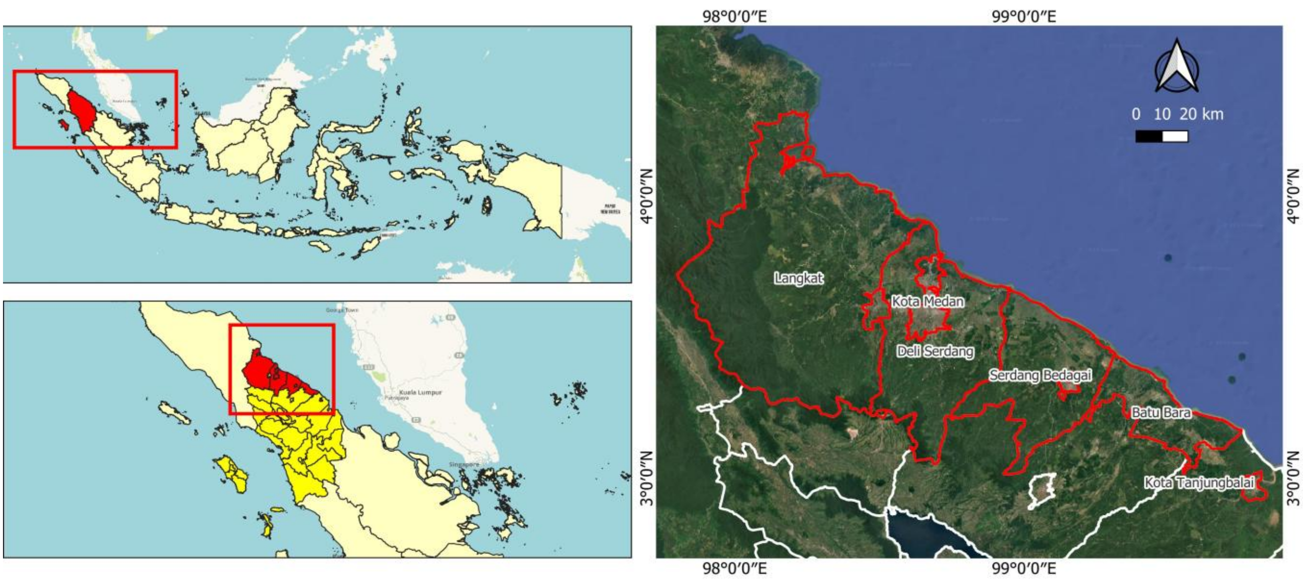

Figure 1. Location of study sites covering six historical areas inhabited by the Malay community in North Sumatra, Indonesia

Data collection

This study was designed using a qualitative or descriptive method within the framework of ethnogastronomy to examine the plant diversity and cultural significance of *bubur pedas* among Malay communities in North Sumatra. Data collection focused on documenting plant species used in the dish, including botanical and vernacular names, parts used, perceived functions (food, medicine, or both), availability status (abundant, scarce, or difficult to obtain), and sources of procurement (household gardens or markets). Ethnobotanical indices were applied to identify species of dominant cultural and biological importance. A total of 27 informants were recruited using purposive and snowball sampling, both of which were non-probability methods commonly applied in ethnogastronomic studies (Martin 2004; Motti et al. 2024).

The methods were deemed appropriate as they provided rapid access to the study population and TEK was unevenly distributed within the community, with detailed expertise concentrated among specific individuals. Eligibility criteria required informants to be at least 35 years old, have direct experience in preparing *bubur pedas*, possess detailed knowledge of the plants, including the parts and preparation methods, as well recognized within the community as custodians of culinary knowledge. Informants were selected from the five historical Malay sultanates of North Sumatra, comprising seven from Deli and five each from Langkat, Asahan, Batubara, and Serdang, to ensure balanced geographical representation. Recruitment continued until thematic saturation was achieved (Etikan 2016). Informants represented variation in gender, age, education, and occupation, as detailed in Table 1. Data were collected through semi-structured interviews, participatory observation, and plant identification. Semi-structured interviews were used to document plant species, the parts used, sources of procurement, availability, and associated cultural meanings. Participatory observation during the preparation of *bubur pedas,* combined with photographic and written documentation, captured tacit knowledge and preparation processes. Plant identification was conducted using standard taxonomic references, with nomenclature validated through Plants of the World Online (POWO). Voucher specimens were not collected due to logistical limitations arising from the study's wide geographic scope and time constraints during the fasting month.

Ethical considerations

In this study, permit was obtained from official authorities at all sites. Participation was voluntary, with oral informed consent secured before interviews and observations, while the identities of informants were anonymized. This study adhered to the International Society of Ethnobiology Code of Ethics (2006) and the Nagoya Protocol (2010) on Access and Benefit Sharing.

Data analysis

All interview and observation data were tabulated and organized in digital formats. Descriptive summaries were first generated to provide an overview of species diversity, plant parts used, availability, sources of procurement, type of utilization, and cultural functions. Quantitative ethnobotanical analysis was conducted using two standard indices, such as UV. This was aimed to measure the frequency and intensity of use of a plant based on the number mentioned by the informant (Phillips and Gentry 1993) through the formula:

$$UV = \frac{\Sigma Ui}{N}$$

Where Ui is the number of uses cited by each informant for a given species, and N is the total number of informants.

RFC is the proportion of informants who mentioned the use of a plant, signifying the level of popularity or general nature of the species (Tardío and Pardo-de-Santayana 2008), and it is calculated using the following formula:

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

Where FC is the number of informants mentioning a species at least once, and N is the total number of informants. A set of key species that serve as indicators or distinguishing elements of the traditional dish was identified using the relative importance (RI) index (Tardio and Pardo-de-Santayana 2008), calculated according to the following formula:

$$RI = [RFC_{max} - RNU_{max}] \div 2$$

Where RFC_{max} = FC/FC_{max} denotes the RFC of a species. It is obtained by dividing the frequency of citation of a given species (FC) by the frequency of citation of the most mentioned species (FC_{max}). Similarly, RNU_{max} = NU/NU_{max} denotes the relative number of use categories. This parameter is calculated by dividing the number of use or disease categories reported for a particular species (NU) by the number of categories recorded for the species with the highest number of categories (NU_{max}).

Table 1. Sociodemographic profile of informants recruited through snowball sampling for the extraction of information regarding *bubur pedas* (N = 27)

Parameter	Category	N	%
Gender	Male	6	22.22
	Female	21	77.78
Age	35–49 years	11	40.74
	50–64 years	7	25.92
	65–79 years	9	33.34
Education	Primary school	3	11.11
	Junior high school	2	7.42
	Senior high school	16	59.25
	University graduates	6	22.22
Occupation	Housewife	14	51.85
	Teacher	4	14.81
	Office staff	2	7.42
	Private employee	4	14.81
	Artist	1	3.69
	Fisherman	2	7.42

To assess contributions of *bubur pedas* to food security, qualitative data were translated qualitatively with the four Food and Agriculture Organization (FAO) pillars, such as availability, accessibility, utilization, and stability (FAO 2019). Field data on species diversity, procurement pathways, and availability were mapped to these dimensions and interpreted through ethnogastronomic lenses. The relationship between UV and RFC was visualized using linear regression and Spearman's rank correlation (ρ). Associations between categorical variables (e.g., availability and accessibility) were analyzed using Pearson's chi-square and Fisher's exact tests. Effect size was calculated using the phi (φ) coefficient based on the number of species (N = 76), providing a standardized measure of association strength. All analyses were performed using Minitab® version 19.0.

RESULTS AND DISCUSSION

A total of 76 plant species belonging to 33 families were documented and used in the preparation of *bubur pedas* among Malay communities in North Sumatra, as detailed in Table 2 and Figure 2. Among the species' ingredients, the highest UV was documented for shallot (*Allium cepa*, UV = 4.07), coconut (*Cocos nucifera*, UV = 4.00), sweet potato (*Ipomoea batatas*) and potato (*Solanum tuberosum*) (both UV = 3.85), cassava (*Manihot esculenta*, UV =3.56), as well as torch ginger (*Etlingera elatior*, UV = 3.25). Some species achieved the maximum citation (RFC = 1.00), including coriander (*Coriandrum sativum*), coconut (*C. nucifera*), peanut (*Arachis hypogaea*), lemongrass (*Cymbopogon citratus*), turmeric (*Curcuma longa*), and torch ginger (*E. elatior*). Other frequently cited species with high RFC values (0.89-0.96) were carrot (*Daucus carota*), sweet potato (*I. batatas*), lime (*Citrus hystrix*), potato (*S. tuberosum*), ginger (*Zingiber officinale*), cumin (*Cuminum cyminum*), cassava (*M. esculenta*), mung bean (*Vigna radiata*), banana (*Musa acuminata*), and rice (*Oryza sativa*). *Bubur pedas* was prepared using a wide range of plant species and parts that Malay communities harvested. Leaves were the most frequently used part (45%), followed by seeds (17%), fruits (14%), tubers (9%), and rhizomes (8%), while flowers, stems, endosperm, sprouts, and bark appeared in smaller proportions, as detailed in Figure 3. Procurement patterns revealed that more than half of the ingredients were sourced from local markets (55%). Nearly half were obtained directly from home gardens or yards (45%), as presented in Figure 3. In the markets, most of the ingredients were readily available in abundance (81%), and only a small fraction, approximately 19% were difficult to find. Statistical analysis confirmed a strong association between species availability and accessibility (χ^2 = 14.23, df = 1, p<0.001; Fisher's exact test, p<0.001). The corresponding phi coefficient (φ = 0.43, N = 76) indicates a moderate-to-large effect size, suggesting that species abundance strongly influences their accessibility in markets and household yards.

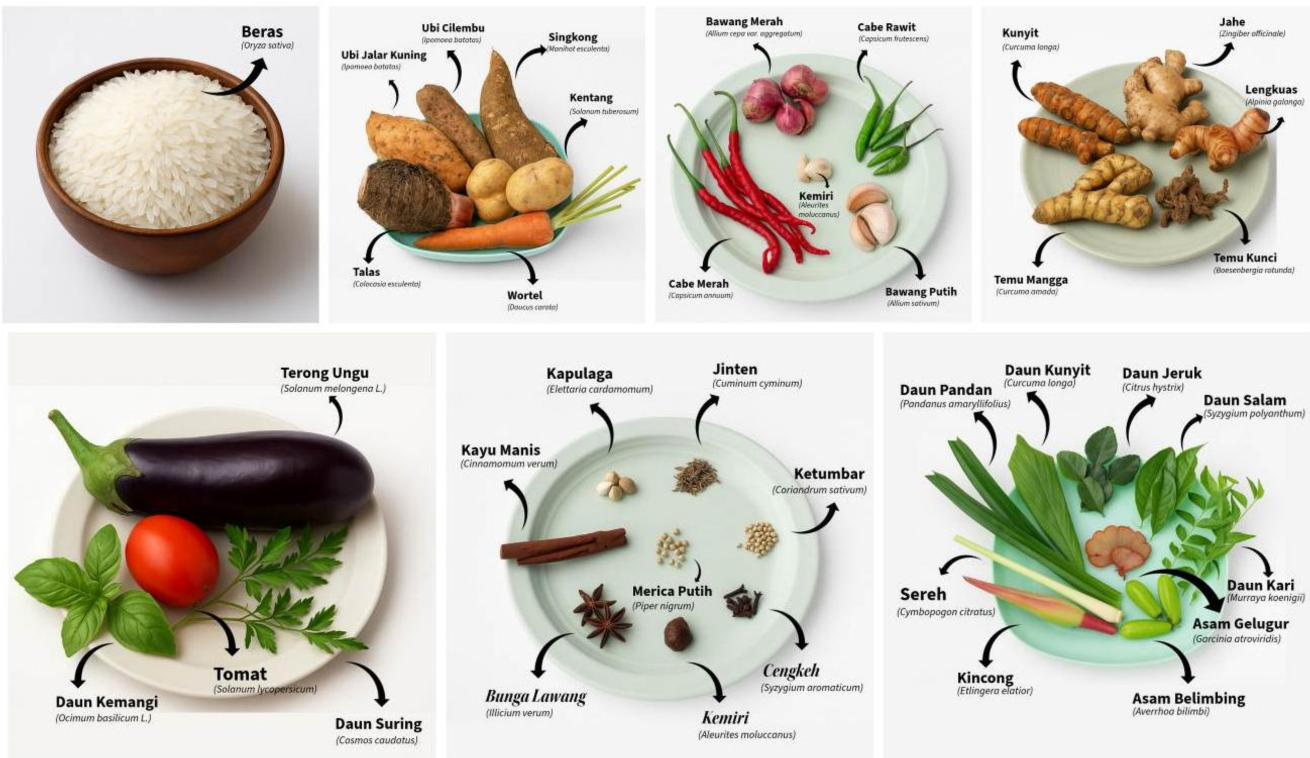

Figure 2. Some food ingredients in Malay *bubur pedas* are from different plant species and parts used

Table 2. List of plant species (N = 76) used in the preparation of *bubur pedas* by Malay communities in North Sumatra, Indonesia

Family	Scientific name	Local name	PPU	Availability	Accessibility	Use(s)	UV	RFC
Acanthaceae	*Ruellia tuberosa* L.	*Kencana ungu*	Leaf	Scarce	Yard	F, M	0.04	0.04
Amaranthaceae	*Amaranthus tricolor* L.	*Bayam*	Leaf	Abundant	Market, Yard	F	0.15	0.07
Amaryllidaceae	*Allium cepa* L.	*Bawang merah*	Tuber	Abundant	Market	F	4.07	0.81
Amaryllidaceae	*Allium fistulosum* L.	*Bawang Prei*	Leaf	Abundant	Market	F	0.22	0.07
Amaryllidaceae	*Allium sativum* L.	*Bawang putih*	Tuber	Abundant	Market	F, M	1.89	0.63
Anacardiaceae	*Mangifera indica* L.	*Mangga*	Leaf	Abundant	Yard	F	0.22	0.11
Apiaceae	*Cuminum cyminum* L.	*Jintan putih*	Seed	Abundant	Market	F	2.67	0.89
Apiaceae	*Pimpinella anisum* L.	*Jintan manis*	Seed	Abundant	Market	F	2.00	0.67
Apiaceae	*Coriandrum sativum* L.	*Ketumbar*	Seed	Abundant	Market	F, M	2.00	1.00
Apiaceae	*Centella asiatica* (L.) Urb.	*Pegagan*	Leaf	Abundant	Yard	F	0.52	0.26
Apiaceae	*Apium graveolens* L.	*Seledri*	Leaf	Abundant	Market	F, M	1.22	0.41
Apiaceae	*Daucus carota* L.	*Wortel*	Tuber	Abundant	Market	F	2.89	0.96
Arecaceae	*Cocos nucifera* L.	*Kelapa*	Endosperm	Abundant	Market	F	4.00	1.00
Araceae	*Colocasia esculenta* (L.) Schott	*Keladi, Talas*	Tuber	Abundant	Market	F	2.11	0.70
Araliaceae	*Polyscias scutellaria* (Burm.f.) Fosberg	*Mangkokan*	Leaf	Abundant	Yard	F, M	1.41	0.70
Araliaceae	*Polyscias fruticosa* (L.) Harms	*Berlangkas, Paku geroda*	Leaf	Scarce	Yard	F	0.30	0.15
Asteraceae	*Acmella repens* (Walter) Rich.	*Kancing baju*	Leaf	Scarce	Yard	F, M	0.11	0.04
Asteraceae	*Pluchea indica* (L.) Less.	*Beluntas*	Leaf	Abundant	Yard	F, M	0.67	0.22
Asteraceae	*Cosmos caudatus* Kunth	*Daun suring, Ulam raja*	Leaf	Rare	Yard	F	0.15	0.07
Asteraceae	*Elephantopus scaber* L.	*Tapak liman*	Leaf	Abundant	Yard	F, M	0.44	0.22
Brassicaceae	*Brassica oleracea* L.	*Kol*	Leaf	Abundant	Market	F	0.07	0.04
Caricaceae	*Carica papaya* L.	*Pepaya*	Leaf	Abundant	Market, Yard	F	0.22	0.07
Clusiaceae	*Garcinia atroviridis* Griff. ex T. Anderson	*Asam gelugur*	Leaf	Rare	Yard	F	0.44	0.15
Convolvulaceae	*Ipomoea batatas* (L.) Poir.	*Ubi jalar*	Tuber	Abundant	Market	F	3.85	0.96
Cucurbitaceae	*Cucurbita moschata* Duchesne	*Labu*	Fruit	Abundant	Market	F	2.37	0.59
Cucurbitaceae	*Sechium edule* (Jacq.) Sw.	*Labu jipang*	Fruit	Abundant	Market	F	0.89	0.22
Euphorbiaceae	*Aleurites moluccanus* (L.) Willd.	*Kemiri*	Seed	Abundant	Market	F	0.56	0.19
Euphorbiaceae	*Manihot esculenta* Crantz	*Ubi kayu*	Leaf, Tuber	Abundant	Market, Yard	F	3.56	0.89
Fabaceae	*Phaseolus vulgaris* L.	*Buncis*	Fruit	Abundant	Market	F	0.15	0.04
Fabaceae	*Glycine max* (L.) Merr.	*Kacang kedelai*	Seed	Abundant	Market	F	0.96	0.48
Fabaceae	*Canavalia ensiformis* (L.) DC.	*Kacang koro*	Seed	Abundant	Market	F	0.07	0.04
Fabaceae	*Vigna unguiculata ssp. sesquipedalis* (L.) Verdc.	*Kacang panjang*	Fruit	Abundant	Market	F	0.22	0.07
Fabaceae	*Arachis hypogaea* L.	*Kacang tanah*	Seed	Abundant	Market	F	2.00	1.00
Fabaceae	*Vigna angularis* (Willd.) Ohwi & H. Ohashi	*Kacang merah*	Seed	Abundant	Market	F	0.89	0.30
Fabaceae	*Parkia speciosa* Hassk.	*Petai*	Fruit	Abundant	Market	F	0.07	0.04
Fabaceae	*Leucaena leucocephala* (Lam.) de Wit	*Petai cina*	Seed	Abundant	Market	F	0.07	0.04
Fabaceae	*Vigna radiata* (L.) R. Wilczek	*Kacang hijau*	Seed, Sprouts	Abundant	Market	F	1.78	0.89
Gnetaceae	*Gnetum gnemon* L.	*Melinjo*	Leaf	Abundant	Yard	F	0.37	0.19
Lamiaceae	*Premna serratifolia* L.	*Babuas, Buas-buas*	Leaf	Scarce	Yard	F, M	1.67	0.56
Lamiaceae	*Coleus amboinicus* Lour.	*Bangun-bangun*	Leaf	Scarce	Yard	F, M	0.44	0.15
Lamiaceae	*Ocimum basilicum* L.	*Kemangi*	Leaf	Abundant	Market, Yard	F	0.89	0.30
Lamiaceae	*Vitex trifolia* L.	*Lagundi*	Leaf	Scarce	Yard	F	0.30	0.15
Lamiaceae	*Ocimum tenuiflorum* L.	*Ruku-ruku*	Leaf	Scarce	Yard	F	0.33	0.11
Lauraceae	*Cinnamomum verum* J.Presl	*Kayu Manis*	Bark	Abundant	Market	F, M	0.74	0.37
Moringaceae	*Moringa oleifera* Lam.	*Kelor*	Leaf	Abundant	Yard	F, M	0.15	0.07
Musaceae	*Musa acuminata* Colla	*Pisang kepok*	Fruit	Abundant	Market	F	1.78	0.89
Myrtaceae	*Syzygium aromaticum* (L.) Merr. & L.M. Perry	*Cengkeh*	Flower	Abundant	Market	F, M	1.48	0.74
Myrtaceae	*Psidium guajava* L.	*Jambu biji*	Leaf	Abundant	Yard	F, M	0.30	0.15
Myrtaceae	*Syzygium malaccense* (L.) Merr. & L. M. Perry	*Jambu bol*	Leaf	Abundant	Yard	F	0.15	0.07
Myrtaceae	*Syzygium polyanthum* Miq.	*Salam*	Leaf	Abundant	Yard	F, M	1.04	0.52
Myristicaceae	*Myristica fragrans* Houtt.	*Pala*	Seed	Abundant	Market	F, M	0.56	0.56
Pandanaceae	*Pandanus amaryllifolius* Roxb.	*Pandan*	Leaf	Abundant	Yard	F	0.37	0.19
Piperaceae	*Piper nigrum* L.	*Merica, Lada*	Seed	Abundant	Market	F	1.85	0.93
Poaceae	*Zea mays* L.	*Jagung*	Fruit	Abundant	Market	F	2.22	0.74
Poaceae	*Oryza sativa* L.	*Padi, Beras*	Fruit	Abundant	Market	F	2.67	0.89
Poaceae	*Cymbopogon citratus* (DC.) Stapf	*Serai*	Leaf	Abundant	Market, Yard	F, M	1.00	1.00
Polygonaceae	*Persicaria odorata* (Lour.) Sojak*	*Cendohom, Kesum*	Leaf	Rare	Yard	F	0.07	0.04
Rhamnaceae	*Ziziphus jujuba* L. (Lam).	*Pule*	Leaf	Scarce	Yard	F, M	0.07	0.04
Rubiaceae	*Morinda citrifolia* L.	*Mengkudu*	Leaf	Abundant	Yard	F, M	0.37	0.19
Rubiaceae	*Paederia foetida* L.	*Sikentut*	Leaf	Scarce	Yard	F, M	1.78	0.59
Rutaceae	*Citrus hystrix* H. Perrier	*Jeruk purut*	Leaf	Abundant	Yard	F	1.93	0.96
Rutaceae	*Murraya koenigii* (L.) Spreng.	*Kari*	Leaf	Abundant	Yard	F	0.52	0.26
Schisandaceae	*Illicium verum* Hook. F.	*Bunga lawang*	Flower	Abundant	Market	F	0.96	0.48
Solanaceae	*Capsicum annuum* L.	*Cabe merah/ hijau*	Fruit	Abundant	Market	F	0.59	0.30
Solanaceae	*Solanum tuberosum* L.	*Kentang*	Tuber	Abundant	Market	F	3.85	0.96
Solanaceae	*Solanum americanum* Mill.	*Leunca, Meranti*	Leaf	Scarce	Yard	F	0.11	0.04
Solanaceae	*Solanum torvum* Sw.	*Rimbang*	Fruit	Abundant	Yard	F	0.11	0.04

Solanaceae	*Solanum melongena* L.	*Terong ungu*	Fruit	Abundant	Market	F	0.15	0.07
Zingiberaceae	*Amomum compactum* Sol. Ex Maton	*Kapulaga*	Seed	Abundant	Market	F, M	0.67	0.33
Zingiberaceae	*Alpinia galanga* (L.) Willd.	*Lengkuas*	Rhizome	Abundant	Market, Yard	F, M	2.22	0.74
Zingiberaceae	*Boesenbergia rotunda* (L.) Mansf.	*Temu kunci*	Rhizome	Scarce	Market, Yard	F, M	0.78	0.26
Zingiberaceae	*Curcuma longa* L.	*Kunyit*	Leaf, Rhizome	Abundant	Market, Yard	F, M	2.00	1.00
Zingiberaceae	*Curcuma amada* Roxb*	*Temu mangga*	Rhizome	Rare	Market, Yard	F, M	1.00	0.33
Zingiberaceae	*Etlingera elatior* (Jack) R.M.Sm.	*Kecombrang*	Flower	Abundant	Yard	F, M	3.25	1.00
Zingiberaceae	*Zingiber officinale* Roscoe	*Jahe*	Rhizome	Abundant	Market, Yard	F, M	1.93	0.96
Zingiberaceae	*Zingiber zerumbet* (L.) Roscoe ex Sm.	*Lempuyang*	Rhizome	Abundant	Market	F, M	0.44	0.22

Note: PPU: Plant part used. F: Food. M: Medicine. UV: Use value. RFC: Relative frequency of citation. Species with an asterisk (*) are prioritized for conservation

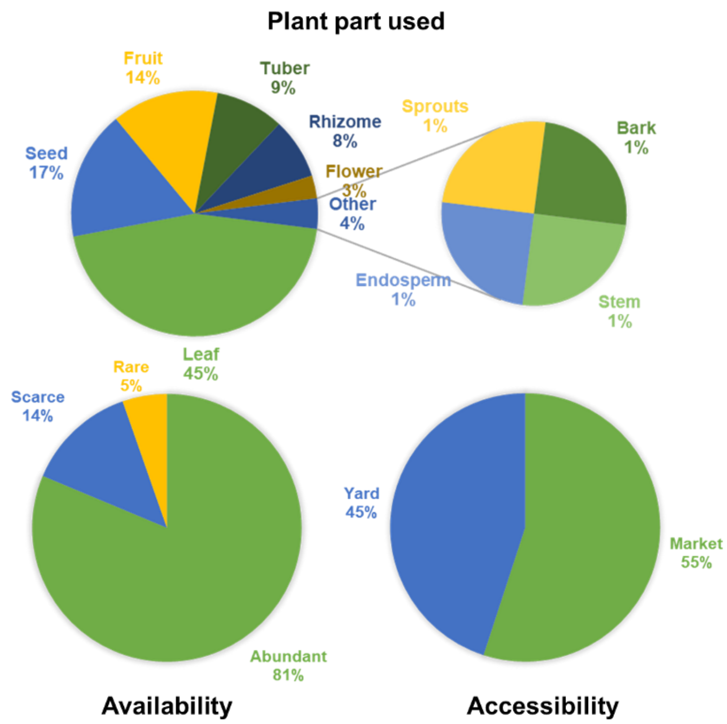

Figure 3. Percentage of accessibility, availability, and plant parts used in the preparation of *bubur pedas* by Malay communities in North Sumatra, Indonesia

The categorization of plant species based on UV and RFC values revealed that the majority were classified as low categories, as presented in Figure 4.A. Out of 76 species, 48 (63.2%), 23 (30.3%), and 5 (6.6%) fell into the low, medium, and high UV categories, respectively. A similar pattern was observed for RFC, with 43 (56.6%), 16 (21.1%), and 17 (22.4%) classified as low, medium, and high. However, a strong, positive, and significant relationship ($p<0.001$) was observed between UV and RFC, as signified from a high coefficient of determination (R^2 = 0.78) and Spearman's correlation coefficient (ρ = 0.95). The relationship showed that species with higher UV also tended to have greater RFC. As a result, the plants most frequently cited by informants had the greatest diversity and intensity of uses. The most important species that characterize the identity of *bubur pedas* ingredients were determined based on the RI index, using the 75th percentile as the threshold. A total of twelve species were identified as the key or signature ingredients of the dish, representing those with RI values above the 75th percentile threshold (RI>0.75), as shown in Figure 5. These species represent the plants most important to, most frequently cited by, and most commonly used among informants in the preparation of *bubur pedas*. Coconut (*C. nucifera*), tuber crops such as *I. batatas* and *S. tuberosum*, together with staple rice (*O. sativa*), showed high RIs (≥0.90). Spices and aromatic plants, including *C. longa*, *E. elatior*, *C. cyminum*, and *C. sativum*, confirmed the strong role of Zingiberaceae and Apiaceae in shaping the characteristic flavor of the dish. Legumes (*A. hypogaea*) and widely consumed vegetables, namely *D. carota*, *A. cepa*, and *M. esculenta,* also ranked within the top group. These plant species represent the most versatile and frequently cited ingredients with their functional importance in the preparation of *bubur pedas*. Food security was approached through four interconnected dimensions, including availability, accessibility, utilization, and stability, following the framework provided by the FAO. The ethnogastronomic information and field observations were translated into these four pillars to capture the role of *bubur pedas* in supporting local food systems. Among the pillars, availability was the most accomplished task, with many plant species being either abundant in markets or readily cultivated in household gardens. Detailed indicators and results are summarized in Table 3.

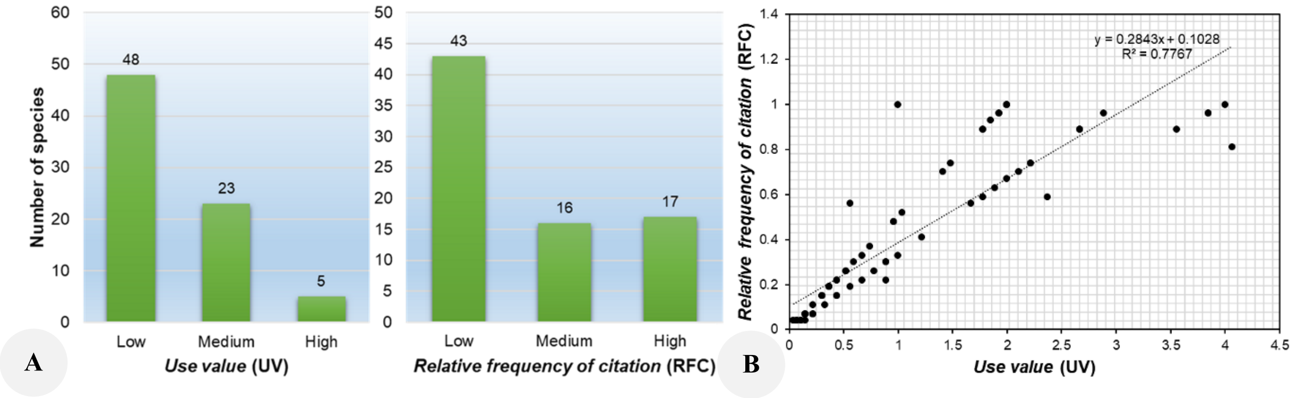

Figure 4. Ethnobotanical indices (UV, RFC) were used for the ethnogastronomic context. A. Categorization of UV and RFC for several plant species used in the preparation of *bubur pedas*. Low: 1<UV, 0.4<RFC; Medium: 1≤UV≤3, 0.4≤RFC≤0.8; High: UV>3, RFC>0.8. B. Relationship between UV and RFC using a linear regression curve showing a moderate-to-high value of the coefficient of determination (R^2)

Table 3. Food security indicators based on FAO's four pillars, with its connection to *bubur pedas* in the Malay communities in North Sumatra, Indonesia

FAO pillars	Field indicators	Results
Availability	Species richness; Multiple sources (market and home garden)	76 species from 32 families; 52% obtained from markets, 48% from home gardens
Accessibility	Distance and cost of access	Markets are located nearby; home gardens provide free and direct access (specifically for leaves)
Utilization	Plant parts and nutritional value	Leaves (>45%) are the main parts used; Members of *Zingiberaceae* provide health benefits; Tubers and vegetables serve as sources of carbohydrates and bioactive compounds.
Stability	Seasonality and scarcity	Leaves are abundant during the rainy season, while tubers are more widely used in the dry season. Three species are becoming scarcely available: *Cosmos caudatus* (still can be found in some home gardens but is limited), *Curcuma amada* (only available through flower bouquet vendors), and *Persicaria odorata* (reported in coastal areas but not found during field surveys).

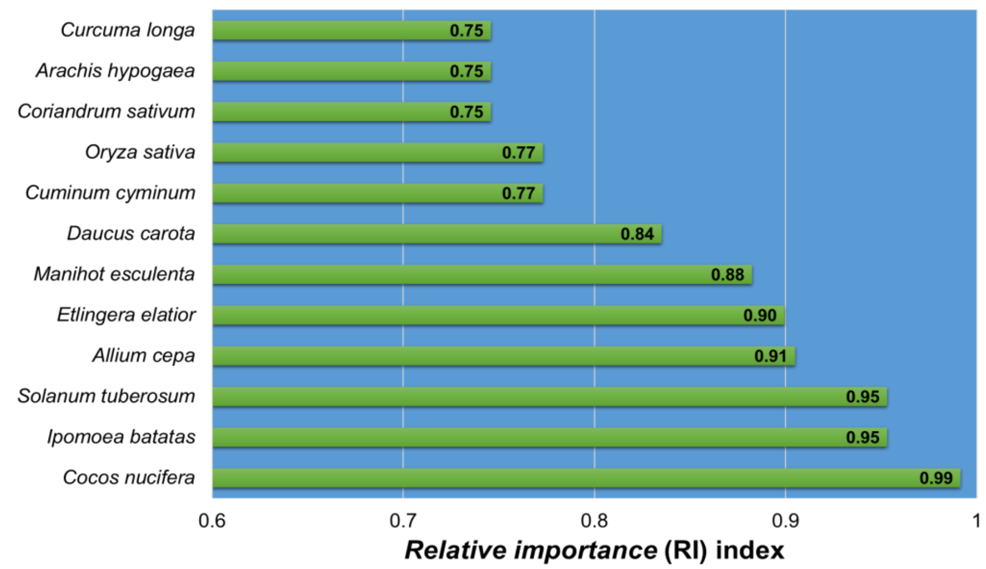

Figure 5. Twelve key ingredients of plant species in Malay *bubur pedas* based on the highest (75% percentile) of the RI Index in the Malay communities in North Sumatra, Indonesia

Discussion

The richness of traditional food reflects the abundance of native natural resources and the traditional knowledge shared across ethnic and cultural boundaries (Turner et al. 2011). The idea of porridge, cooked grains served as a soft dish, has ancient roots and appears in many cultures around the world. Historical records show that communities have prepared porridge for thousands of years. Despite regional variations, this food shares common traits, including being simple to prepare, versatile, and nutritious. Most are prepared from locally grown grains, enriched with ingredients available in the surrounding environment. The popularity of porridge lies in the ease of preparation and adaptability. The choice of grain varies by region, producing flavors that range from savory to spicy (Wijesekara 2025). In an effort to enrich the documentation of Indonesia's cultural heritage, particularly traditional food that remains underexplored and vulnerable to obscurity or loss, an ethnogastronomic method was applied to study *bubur pedas*. In this study, women, particularly housewives, were the majority of informants for *bubur pedas* preparation, emphasizing the crucial role in preserving gastronomic heritage. Similar results have been documented globally, for example, in the Coastal Cilento region, Italy, where women comprised 63% of informants having knowledge of traditional dishes (Motti et al. 2024). In Castilla-La Mancha, Spain, women also preserved gastronomic traditions while contributing to agri-food sectors and hospitality (García-Henche et al. 2024). Among the Huni Kuĩ indigenous community in the Amazon, Brazil, the culinary activities were strictly female domains, acting as primary transmitters of biodiversity knowledge and maintainers of food systems (Pilnik et al. 2021). In Mollo District, East Nusa Tenggara, Indonesia, the expertise in traditional cuisine was in line with ecofeminist perspectives, promoting women as key agents for sustainable gastronomic tourism through domestic skills and local food promotion (Mandaru et al. 2025).

The preparation of *bubur pedas* comprised 76 plant species across 33 families, an exceptionally high diversity for a single porridge-based dish. Among the species, seven were assigned as key ingredients with high UV and RFC values. Fabaceae and Apiaceae were the most represented families, contributing legumes, beans, and aromatic spices that are essential for both nutrition and flavor. Legumes such as *A. hypogaea*, *V. radiata*, and *Glycine max* provide plant-based proteins, energy, and texture to the dish while *C. cyminum*, *C. sativum*, and *Apium graveolens* supply distinctive aromas and digestive benefits (Ropashree et al. 2025; Safitri et al. 2025). Members of Zingiberaceae played a central role in shaping the sensory identity of the dish through color, aroma, and pungency, and also exemplify the food-medicine continuum with anti-inflammatory, carminative, and immune-enhancing properties (Deng et al. 2022; Inta et al. 2023). Poaceae anchored the dish through its staple cereals (*O. sativa, Zea mays*), showing cultural and nutritional values within Malay and broader Asian food signatures (Mohapatra et al. 2025). Arecaceae, represented by *C. nucifera* (coconut milk), imparted a milky texture and savory taste to *bubur pedas*. At the species level, several plants were identified as signature ingredients, each contributing distinct culinary and medicinal values. *Curcuma longa* provided the characteristic yellow hue and was also revered for its therapeutic attributes (Jikah and Edo 2025). *Etlingera elatior* and *Z. officinale* added fragrance, supportive digestion, and warmth sensation (John et al. 2025). *Allium cepa* and *Piper betle* enhanced aroma and flavor integration within the dish (Li et al. 2022; Patra et al. 2022). In this study, *bubur pedas* relied heavily on leaves (45%), especially from Fabaceae, Lamiaceae, and Asteraceae, which provided the leafy greens and herbs. The use of green leaves in porridge is not unique to the Malay community, as similar practices have been documented elsewhere. Leafy ingredients were shown to lower glycaemic response in Sri Lankan porridges (Senadheera and Ekanayake 2013) and to improve micronutrient intake, particularly iron and zinc, in South African porridges (Kruger et al. 2015).

From a broader perspective, the high-RI ingredients identified in *bubur pedas* possess well-documented nutritional and phytochemical properties that can support physiological resilience during prolonged fasting. Some examples included *C. longa* (turmeric) which contains curcumin and associated polyphenols with strong anti-inflammatory and antioxidant activities. Recent reviews and meta-analyses have demonstrated that curcumin supplementation can reduce inflammatory markers and oxidative-stress biomarkers in humans (Peng et al. 2021; Kaur et al. 2024). *Etlingera elatior* (torch ginger) is particularly rich in phenolic and flavonoid compounds, exhibiting significant antioxidant capacity in vitro, which may help mitigate oxidative stress during fasting (Mutmainah et al. 2024). *Cocos nucifera* (coconut) provides medium-chain fatty acids, such as lauric acid, that act as readily available energy sources, while its water is rich in electrolytes (potassium, sodium, and magnesium) that promote rehydration and energy balance, factors essential for recovery at *iftar* and maintaining metabolic stability during fasting (Patil and Benjakul 2018; Mat et al. 2022). Finally, *O. sativa* (rice) offers rapidly digestible carbohydrates and, depending on its variety and processing, contains resistant starch fractions that modulate glycemic response and support steady postprandial energy release, key aspects for sustaining energy following fasting periods (Takahashi et al. 2022).

Although the dish is called *bubur pedas*, analysis showed that chili peppers (*Capsicum annuum*) did not rank among the most important ingredients, with relatively low values for both UV (0.59) and RFC (0.30). While chilli was recognized for adding heat, it was not consistently regarded as a defining or indispensable component of the recipe. The usage was mostly limited to flavoring, in contrast to species such as *C. nucifera*, *C. longa*, or *E. elatior*, which combined culinary, medicinal, and cultural roles as evidenced from their high RI values. Informants also noted that spiciness (chili) can be adjusted to personal preference or even omitted entirely, whereas ingredients such as coconut milk and turmeric are regarded as indispensable for maintaining the authentic character of *bubur pedas*.

This observation reflects what can be described as a "spicy paradox", a misconception in which the term *pedas* (spicy) actually refers to the complex, aromatic warmth produced by ginger, turmeric, and pepper, rather than the capsaicin-derived heat of chili.

The strong and significant association between availability and accessibility indicates two complementary procurement pathways. Markets provide year-round access and diversity of ingredients, yet dependence on them can expose households, especially low-income ones, to price and supply fluctuations. In contrast, home gardens offer a subsistence buffer, ensuring stable access to essential plants and reducing reliance on external sources. This combination reflects a dual food strategy in which Malay households balance market convenience with self-provisioning to maintain culinary traditions amid shifting socio-economic conditions. This pattern was consistent with broader ethnobotanical results, where plants of lower economic value or strong cultural significance were more often cultivated in small home plots for family use rather than for trade (Appamaraka et al. 2023; Phatlamphu et al. 2023). Although the species contribute little to market economies, owing to seasonal nature and limited circulation, household food security was sustained and dietary diversity was enriched. These practices show a self-sufficient food system, where plants are grown mainly to support needs and preserve cultural traditions, rather than to earn money from selling (Taniushkina et al. 2024). Within this framework, the persistence of growing scarce species in home gardens shows how Malay communities not only preserve the culinary authenticity of *bubur pedas* but also strengthen resilience against market fluctuations. One of the informants also confirmed that by stating, *"If all the leaves are available at home, we don't need to go to the market; we just pick them"*. Although most recorded species are readily available through cultivation or local markets, *Curcuma amada* and *Persicaria odorata* were relatively scarce and maintained mainly in household gardens. Their low citation values suggest limited cultivation and a gradual decline in local knowledge of their culinary use. This trend may result from low market demand and replacement by more accessible substitutes. Promoting small-scale cultivation, homegarden propagation, and community seed exchange could help sustain these species while preserving the traditional food practices associated with *bubur pedas* (Pushpakumara et al. 2020; Shao et al. 2021).

A strong and significant positive correlation was shown between UV and RFC (R^2 = 0.78; ρ = 0.95) even though most species showed relatively low values for both indices. This indicates that widely used species are more frequently cited, reflecting a consensus on their importance within the community. In simple terms, species with broader versatility tend to be cited more frequently by a greater number of informants (Tardío and Pardo-de-Santayana 2008). This interpretation was consistent with previous studies. For example, Qaseem et al. (2018) reported a positive UV-RFC correlation (R^2 = 0.60) in studies of indigenous medicinal flora in Pakistan, while Ahmed et al. (2018) found a similar pattern (Spearman's ρ = 0.60) when assessing the local importance of tree species in the North Western Himalayas. Conversely, Afrianto (2025) documented a weak or non-significant relationship between the Number of Uses (NU) and RFC in the ethnobotany of Javanese home gardens, suggesting that plant importance in some contexts may be more influenced by cultural or symbolic functions than by frequency of mention. These reports reinforced that the interpretation of ethnobotanical indices must remain context-specific. Documenting traditional knowledge, therefore, serves as an essential foundation for further investigations. Future studies may explore the bioactive compounds of the most frequently used species (Reyes-García 2010) and assess their nutritional and functional properties (Zebua et al. 2025), given that many plants in *bubur pedas* are traditionally perceived as both food and medicine.

Briefly, the preparation of *bubur pedas* began with the selection of spices, which were dry-roasted to intensify aroma and flavor. The roasted mixture was then ground and sieved into a fine powder. Grains of rice were combined with diced tubers, leafy vegetables, and aromatics such as lemongrass. This mixture was sautéed together with the ground spices and fresh herbs, followed by pounding or grinding to achieve a uniform consistency. The fine spice-rice mixture was sieved once more before being simmered with coconut milk and vegetables. The final dish was a thick, aromatic porridge, distinguished by a yellowish color, rich in spices, and spicy. During Ramadan, it is prepared either for family consumption or shared with the wider community, as detailed in Figure 6. Other similar dish, such as *bubor paddas* from Kalimantan, was promoted as emergency food and long-term food supplies (Rusiardy et al. 2014). A single serving delivered substantial energy (618.11 kcal) and protein (7.13 g) while maintaining a low glycemic index (Lestari and Purwayantie 2018). Besides nutrition, anthropological studies also reported a rich vocabulary (lexicon) in the *bubur pedas*' recipe, ingredients, preparation methods, and tools (Maharani et al. 2023). These suggest a great chance of *bubur pedas* becoming a popular traditional dish that is both nutritious and culturally distinct.

In conclusion, this study reported a comprehensive botanical documentation of *bubur pedas*, a traditional dish by the Malay communities in North Sumatra. In a time of declining biodiversity and rapid dietary modernization, traditional cuisines remain vital in maintaining both ecological balance and cultural identity. The case of *bubur pedas* shows that Indonesia's culinary heritage supports sustainable food practices consistent with global goals, including the United Nations Sustainable Development Goals, SDG 2 (Zero Hunger), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land), and the FAO's four pillars of food security. Malay food traditions illustrate that biodiversity, nutrition, and cultural values can coexist within everyday cooking, where conservation is embedded naturally in community life rather than imposed by policy.

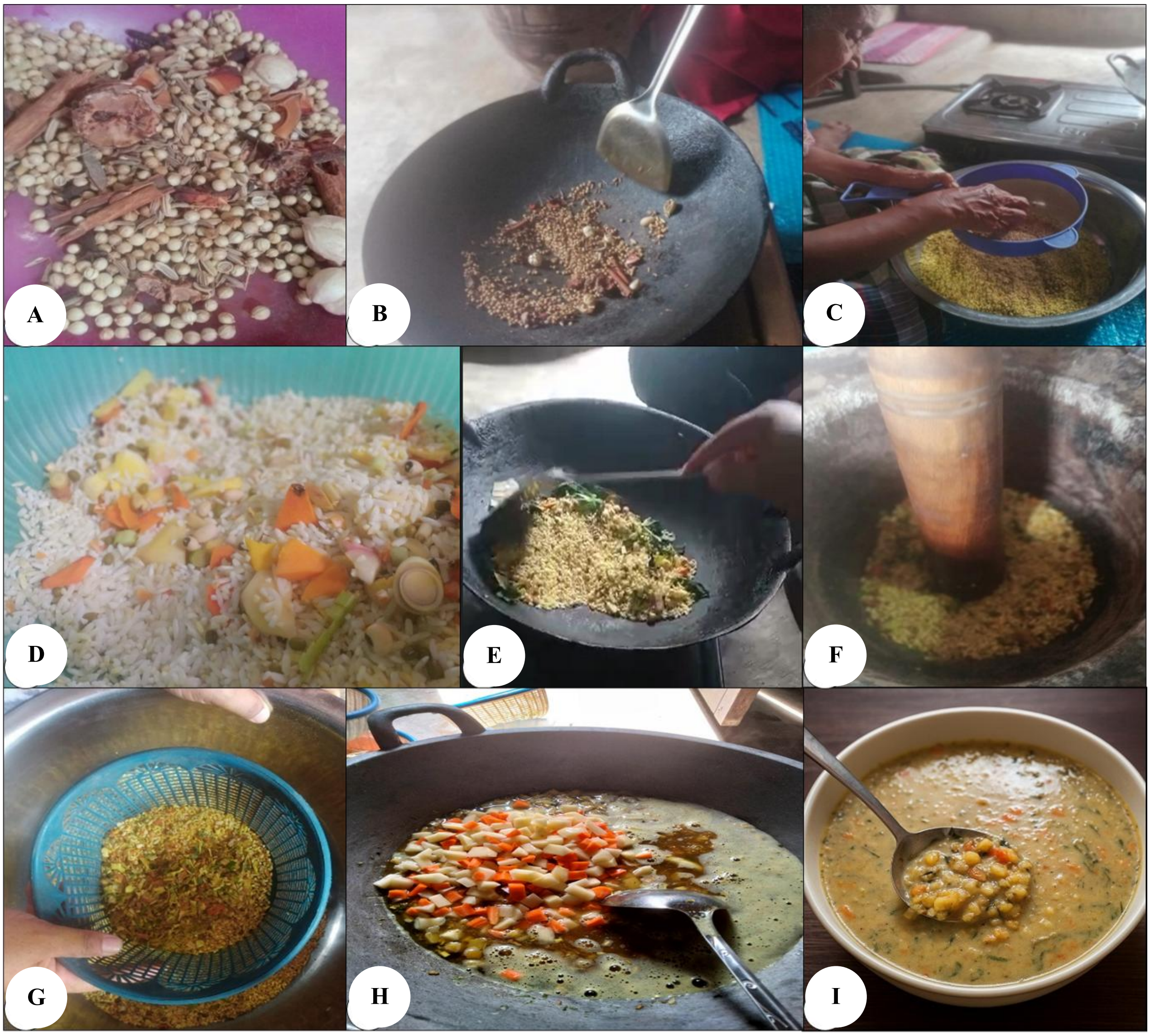

Figure 6. Preparation process of Malay *bubur pedas* in North Sumatra, Indonesia. A. Raw spices before processing, B. Roasting of spices, C. Grinding and sieving of roasted spices, D. Mixing rice with tubers, vegetables, and aromatics, E. Frying spice-rice mixture with herbs, F. Pounding for finer consistency, G. Sieving to refine texture, H. Simmering mixture with coconut milk and vegetables, I. Final appearance of *bubur pedas*, a traditional Malay dish of 'spiced' or 'spicy porridge'

This study added the important role of ethnogastronomy within ethnobiology as a lens for understanding food as both a biological resource and a cultural expression. The preparation of *bubur pedas*, combining ingredients from home gardens and local markets, reflects a flexible, reciprocal relationship between people and plants, a living form of biocultural conservation. Such practices sustain food sovereignty, enabling Malay communities in North Sumatra to preserve their food choices and identity amid the growing uniformity of global diets. Importantly, *bubur pedas* also incorporated from the region's core local food plants, i.e. cassava, maize, mung bean, peanut, soybean, and sweet potato, which are central to North Sumatran agrodiversity and align with Indonesia's *Pangan Lokal Berkelanjutan* (Sustainable Local Food Program). These crops provide accessible sources of carbohydrates and plant-based protein while reinforcing food diversification and local self-sufficiency. At the community level, the wide range of plant species used in *bubur pedas* reflects household adaptability to seasonal and market fluctuations. The dish's distinct identity lies not in the heat of chili but in the layered texture of tubers and leafy greens, and in the gentle warmth of local spices, a culinary expression of ecological adaptability. The communal preparation of *bubur pedas* during Ramadan and other gatherings further strengthens cultural continuity and intergenerational knowledge transfer. Theoretically, this work positions ethnogastronomy as a bridge connecting biodiversity conservation, cultural resilience, and food security. Practically, it highlights the value of supporting home-garden cultivation, protecting local crop varieties, and integrating traditional food knowledge into regional food policy and education. Nonetheless, this study faced limitations: voucher specimens were not collected due to logistical constraints, and food security analysis relied on qualitative mapping rather than nutritional testing. Future research should address these gaps by exploring local perceptions, nutrient composition, and the ecological benefits of these traditional food plants. Despite these limitations, *bubur pedas* stands as more than a meal, it is a viable symbol of Malay identity and a reminder that sustainable food futures can emerge from the biodiversity and wisdom preserved in local kitchens.

REFERENCES

Adelman J, Haushofer L. 2018. Introduction: Food as medicine, medicine as food. J Hist Med Allied Sci 73 (2): 127-134. DOI: 10.1093/jhmas/jry010.

Afrianto WF. 2025. Ethnobotanical documentation of home gardens in relation to Javanese basic life needs in Kediri District, East Java, Indonesia. Asian J Ethnobiol 8 (1): 79-91. DOI: 10.13057/asianjethnobiol/y080107.

Ahmed J, Sharma S, Kumar D. 2018. Quantitative ethnobotanical approach to analyze local importance of tree species in North Western Himalaya: A case study of Ponda Watershed, J&K. Proc Natl Acad Sci India Sect B Biol Sci 88 (3): 897-903. DOI: 10.1007/s40011-016-0828-6.

Ananta A, Arifin EN, Hasbullah MS, Handayani NB, Pramono A. 2015. Demography of Indonesia's Ethnicity. ISEAS Publishing, Singapore. DOI: 10.1355/9789814519885.

Appamaraka S, Saensouk S, Saensouk P, Junsongduang A, Setyawan AD. 2023. Ethnobotanical knowledge of medicinal plants in the Don Pu Ta Forest by the Kaloeng Ethnic Group, Sakon Nakhon Province, Northeastern Thailand. Biodiversitas 24 (8): 4617-4635. DOI: 10.13057/biodiv/d240844.

Blake J. 2022. The need for a cultural rights-based approach to ensure the right to food sovereignty of indigenous and local communities. J Hum Right 17 (2): 45-64. DOI: 10.22096/hr.2024.2011706.1617.

Convention on Biological Diversity (CBD). 2016. Report of the conference of the parties to the convention on biological diversity on its thirteenth meeting. CBD/COP/13/25. In: Proceedings of the thirteenth meeting of the conference of the parties to the convention on biological diversity. Cancun, Mexico.

Damanik EL. 2020. Ethnicity situation and intolerant attitudes in multicultural societies in the Medan City. Humaniora 32 (1): 39-50. DOI: 10.22146/jh.v32i1.43918.

Deng M, Yun X, Ren S, Qing Z, Luo F. 2022. Plants of the genus *Zingiber*: A review of their ethnomedicine, phytochemistry and pharmacology. Molecules 27 (9): 2826. DOI: 10.3390/molecules27092826.

Etikan I. 2016. Comparision of snowball sampling and sequential sampling technique. Biom Biostat Intl J 3: 55. DOI: 10.15406/bbij.2016.03.00055.

Feldman CH, Wunderlich S. 2023. Cultural food distancing: A conceptual discourse on the evolution of seminal to present and future models of traditional food practices. Brit Food J 125 (5): 1936-1952. DOI: 10.1108/BFJ-12-2021-1337.

Food and Agriculture Organization (FAO). 2019. The State of the World's Biodiversity for Food and Agriculture. In: Bélanger J, Pilling D (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. FAO, Rome. DOI: 10.4060/CA3129EN.

García-Henche B, Cuesta-Valino P, Duran-Alamo P, Penelas-Leguía A. 2024. The role of women in maintaining the heritage value of gastronomy in Castilla-La Mancha. Intl J Gastron Food Sci 37: 100987. DOI: 10.1016/j.ijgfs.2024.100987.

Inta A, Trisonthi C, Pongamornkul W, Panyadee P. 2023. Ethnobotany of Zingiberaceae in Mae Hong Son, Northern Thailand. Biodiversitas 24 (4): 2114-2124. DOI: 10.13057/biodiv/d240422.

International Society of Ethnobiology Code of Ethics. 2006. International Society of Ethnobiology Code of Ethics. https://www.ethnobiology.net

Jikah AN, Edo GI. 2025. Turmeric (*Curcuma longa*): An insight into its food applications, phytochemistry and pharmacological properties. Vegetos 38: 845-866. DOI: 10.1007/s42535-024-01038-4.

John OD, Surugau N, Kansedo J, Panchal SK, Brown L. 2025. Plant-based functional foods from Borneo. Nutrients 17 (2): 200. DOI: 10.3390/nu17020200.

Kaur K, Al-Khazaleh AK, Bhuyan DJ, Li F, Li CG. 2024. A review of recent curcumin analogues and their antioxidant, anti-inflammatory, and anticancer activities. Antioxidants 13 (9): 1092. DOI: 10.3390/antiox13091092.

Kruger J, Mongwaketse T, Faber M, van der Hoeven M, Smuts CM. 2015. Potential contribution of African green leafy vegetables and maize porridge composite meals to iron and zinc nutrition. Nutrition 31 (9): 1117-1123. DOI: 10.1016/j.nut.2015.04.010.

Lestari OA, Purwayantie S. 2018. The calories and glycaemic index of bubur pedas, traditional food of West Kalimantan, Indonesia. Intl Conf Food Trop Agrifood Feed and Fuel (ICTAFF): Sustain Food, Feed Fuel Trop Resour Qual Future 2018: 9-13.

Li J, Dadmohammadi Y, Abbaspourrad A. 2022. Flavor components, precursors, formation mechanisms, production and characterization methods: garlic, onion, and chili pepper flavors. Crit Rev Food Sci Nutr 62 (30): 8265-8287. DOI: 10.1080/10408398.2021.1926906.

Ludwig D, El-Hani CN. 2020. Philosophy of ethnobiology: Understanding knowledge integration and its limitations. J Ethnobiol 40 (1): 3-20. DOI: 10.2993/0278-0771-40.1.3.

Maharani MH, Putri MM, Lubis T. 2023. The lexicon of *bubur pedas* as a culinary at Stabat: An anthropolinguistic study. J Anthropolinguistics 4 (1): 8-13.

Mandaru SS, Leuape ES, Meilawati FT. 2025. Gastronomic tourism: A case study of ecofeminism in local food promotion. Briocolage: Jurnal Magister Ilmu Komunikasi 11 (1): 47-58. DOI: 10.30813/bricolage.v11i1.6670.

Mardatillah A, Raharja SJ, Hermanto B, Herawaty T. 2019. Riau Malay food culture in Pekanbaru, Riau Indonesia: Commodification, authenticity, and sustainability in a global business era. J Ethn Food 6: 3. DOI: 10.1186/s42779-019-0005-7.

Martin JG. 2004. Ethnobotany: A Methods Manual. Routledge, London.

Mat K, Kari ZA, Rusli ND, Harun HC, Wei LS, Rahman MM, Khalid HNM, Hanafiah MHMA, Anis S, Sukri M, Khalif RIAR, Zin ZM, Zainol MKM, Panadi M, Nor MFM, Goh KW. 2022. Coconut palm: Food, feed, and nutraceutical properties. Animals 12 (16): 2107. DOI: 10.3390/ani12162107.

Mohapatra PK, Sarkar RK, Panda D, Kariali E. 2025. Origin and evolution of rice as domesticated staple food crop. In: Mohapatra PK, Sarkar RK, Panda D, Kariali E (eds.). Tillering Behavior of Rice Plant. Springer, Singapore. DOI: 10.1007/978-981-97-5235-5_1.

Motti R, Ercolini D, Ricciardi M, Gherardelli M, Iacomino G, Magistris AD. 2024. Persistence of folk dishes in the Coastal Cilento's Culinary Culture: An ethnogastronomic approach. Discov Food 4: 15. DOI: 10.1007/s44187-024-00083-x.

Mutmainah M, Mayangsari Y, Santoso U, Chansuwan W, Sirinupong N. 2024. Phytochemical profile and antioxidant activity of torch ginger (*Etlingera elatior*) inflorescence extract after in vitro simulated digestion. Func Food Health Dis 14 (7): 528-545. DOI: 10.31989/ffhd.v14i7.1382.

Nagoya Protocol. 2010. Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity. https://www.cbd.int/abs/doc/protocol/nagoyaprotocol-en.pdf

Nasution J, Pasaribu N, Silalahi M, Harahap RH. 2025. Corrigendum to: Ethnogastronomic study of Malay *gulai masam* in North Sumatra: Preserving traditional culinary heritage to support food security. Biol Web Conf 186: 04016. DOI: 10.1051/bioconf/202518604016.

Navia ZI, Audira D, Afifah N, Turnip K, Nuraini, Suwardi AB. 2020. Ethnobotanical investigationof spice and condiment plants usedby the Taming tribe in Aceh, Indonesia. Biodiversitas 21 (10): 4467-4473. DOI: 10.13057/biodiv/d211001.

Patil U, Benjakul S. 2018. Coconut milk and coconut oil: Their manufacture associated with protein functionality. J Food Sci 83 (8): 2019-2027. DOI: 10.1111/1750-3841.14223.

Patra B, Deep SK, Rosalin R, Pradhan SN. 2022. Flavored food additives on the leaves of *Piper betle* L.: A human health perspective. Appl Biochem Biotechnol 194 (10): 4439-4461. DOI: 10.1007/s12010-022-03912-w.

Peng Y, Ao M, Dong B, Jiang Y, Yu L, Chen Z, Hu C, Xu R. 2021. Anti-inflammatory effects of curcumin in the inflammatory diseases: Status, limitations and countermeasures. Drug Des Devel Ther 15: 4503-4525. DOI: 10.2147/DDDT.S327378.

Perry MS. 2017. Feasting on culture and identity: food functions in a multicultural and transcultural Malaysia. 3L Southeast Asian J Engl Lang Stud 23 (4): 184-199. DOI: 10.17576/3L-2017-2304-14.

Phatlamphu N, Saensouk S, Saensouk P, Junsongduang A, Setyawan AD. 2023. Economic value assessment of edible plants in Muang District, Kalasin Province, Thailand. Biodiversitas 24 (7): 3960-3967. DOI: 10.13057/biodiv/d240734.

Phillips O, Gentry AH. 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Econ Bot 47: 15-32. DOI: 10.1007/BF02862203.

Pilnik MS, Argentim T, Kinupp VF, Haverroth M, Machado CC, Escobar NA. 2021. "I cook for him, he gives me the roçado": The role of Huni Kui women in indigenous food practices in the Lower Jordão River, Acre, Brazil. Ethnoscientia 6 (2): 249-283. DOI: 10.18542/ethnoscientia.v6i2.10395.

Pramuniati I, Mahriyuni M, Syarfina T. 2024. The vitality of Malay language in North Sumatera, Indonesia. Res J Adv Hum 5 (1): 223-245. DOI: 10.58256/h2vqkg98.

Pushpakumara G, Sokolow J, Sthapit B, Sujarwo W, Hunter D. 2020. Keeping it close to me: Home gardens and biodiversity conservation. In: Dissanayake DHG, Maredia KM (eds). Home Gardens for Improved Food Security and Livelihoods. Routledge, London. DOI: 10.4324/9781315471778.

Qaseem MF, Qureshi R, Amjad MS, Ahmed W, Masood A, Shaheen H. 2018. Ethno-botanical evaluation of indigenous flora from the communities of Rajh Mehal and Goi Union Councils of District Kotli, Azad Jammu Kashmir Pakistan. Appl Ecol Environ Res 17 (2): 2799-2829.

Rani J, Gulia V, Sangwan A, Dhull SS, Mandzhieva S. 2025. Synergies of traditional ecological knowledge in biodiversity conservation: A paradigm for sustainable food security. In: Jatav HS, Raiput HD, Minkina T (eds). Ecologically Mediated Development. Springer, Singapore. DOI: 10.1007/978-981-96-2413-3_2.

Reyes-García V. 2010. The relevance of traditional knowledge systems for ethnopharmacological research: theoretical and methodological contributions. J Ethnobiol Ethnomed 6 (1): 32. DOI: 10.1186/1746-4269-6-32.

Ropashree R, Jayasankar R, Mirle P, Aranganathan V, Giresha AS. 2025. Nutritional composition of leguminous microgreens. In: Mathur P, Gupta A (eds). Recent Trends and Applications of Leguminous Microgreens as Functional Foods. Springer, Cham. DOI: 10.1007/978-3-031-75678-8_4.

Rusiardy I, Yasni S, Syamsir E. 2014. The characteristics of spicy porridges in the can packaging. Jurnal Teknologi dan Industri Pangan 25 (2): 185-192. DOI: 10.6066/jtip.2014.25.2.185. [Indonesian]

Safitri RN, Hanum U, Pratiwi MR, Hermawan WG, Nurcahyati M, Budiharta S, Setyawan AD. 2025. Ethnobotanical knowledge of edible plants in a karst landscape of Gawang Hamlet, Ketro Village, Pacitan District, Indonesia. Intl J Trop Drylands 9 (1): 85-97. DOI: 10.13057/tropdrylands/t090108.

Senadheera SPAS, Ekanayake S. 2013. Green leafy porridges: How good are they in controlling glycaemic response? Intl J Food Sci Nutr 64 (2): 169-174. DOI: 10.3109/09637486.2012.710895.

Shao H, Hill R, Xue D, Yang J. 2021. In situ conservation of traditional vegetable diversity in Wa homegardens in southwestern Yunnan, China. J Ethnobiol Ethnomed 17: 54. DOI: 10.1186/s13002-021-00479-4.

Simbolon IY, Achriah, Faishal M. 2025. The tradition of eating bubur pedas among the Malay community at Al Osmani Grand Mosque, Medan Labuhan, Medan City. Innovative: J Soc Sci Res 5 (1): 4282-4300. [Indonesian]

Stryamets N, Mattalia G, Pieroni A, Khomyn I, Sõukand R. 2021. Dining tables divided by a border: The effect of socio-political scenarios on local ecological knowledge of Romanians living in Ukrainian and Romanian Bukovina. Foods 10: 126. DOI: 10.3390/foods10010126.

Surya R, Tedjakusuma F. 2022. Diversity of sambals, traditional Indonesian chili paste. J Ethn Foods 9: 25. DOI: 10.1186/s42779-022-00142-7.

Swiderska K, Argumedo A, Wekesa C, Ndalilo L, Song Y, Rastogi A, Ryan P. 2022. Indigenous peoples' food systems and biocultural heritage: Addressing indigenous priorities using decolonial and interdisciplinary research approaches. Sustainability 14 (18): 11311. DOI: 10.3390/su141811311.

Takahashi K, Fujita H, Fujita N, Takahashi Y, Kato S, Shimizu T, Suganuma Y, Sato T, Waki H, Yamada Y. 2022. A pilot study to assess glucose, insulin, and incretin responses following novel high resistant starch rice ingestion in healthy men. Diabetes Ther 13: 1383-1393. DOI: 10.1007/s13300-022-01283-3.

Taniushkina D, Lukashevich A, Shevchenko V, Belalov IS, Sotiriadi N, Narozhnaia V, Koralev K, Krenke A, Lazarichev N, Bulkin A, Maximov Y. 2024. Case study on climate change effects and food security in Southeast Asia. Sci Rep 14 (1): 16150. DOI: 10.1038/s41598-024-65140-y.

Tardío J, Pardo-de-Santayana M. 2008. Cultural importance indices: A comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Econ Bot 62: 24-39. DOI: 10.1007/s12231-007-9004-5.

Turner NJ, Łuczaj LJ, Migliorini P, Pieroni A, Dreon AL, Sacchetti LE, Paoletti MG. 2011. Edible and tended wild plants, traditional ecological knowledge and agroecology. Crit Rev Plant Sci 30 (1-2): 198-225. DOI: 10.1080/07352689.2011.554492.

Utomo AJ, McDonald PF. 2020. Internal migration, group size, and ethnic endogamy in Indonesia. Geogr Res 59 (1): 56-77. DOI: 10.1111/1745-5871.12433.

Widyatmoko D. 2018. Biodiversity in Indonesia. In: Pullaiah T (eds). Global Biodiversity. Apple Academic Press, Florida. DOI: 10.1201/9780429487743.

Wijesekara PD. 2025. An exploration of the porridge tradition in Southern Sri Lankan culture. J Ethn Foods 12: 27. DOI: 10.1186/s42779-025-00288-0.

Yao R, He C, Xiao P. 2023. 'Food and medicine continuum' in the East and West: Old tradition and current regulation. Chin Herb Med 15 (1): 6-14. DOI: 10.1016/j.chmed.2022.12.002.

Zebua LI, Purnamasari V, Suharno. 2025. Ethnobotany of local banana (*Musa* spp.) in Sentani community and its proximate analysis in Jayapura District, Papua, Indonesia. Asian J Ethnobiol 8 (2): 149-157. DOI: 10.13057/asianjethnobiol/y080202.