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RESEARCH PAPER

Wild plants in traditional markets of the Jakarta Metropolitan Area and their use in Indonesian culture: an ethnobotanical survey

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Abstract

Java, a key region of Sundaland, is recognized as one of the world's biodiversity hotspots and the most populous island in Indonesia, with the Jakarta Metropolitan Area (JMA) serving as its primary urban center. The JMA is home to a diverse population encompassing multiple ethnic groups with distinct cultural traditions, many of which incorporate wild plants. This study aimed to document the diversity of wild plants sold in traditional markets within the JMA. Ten of the largest traditional markets were visited, and ethnobotanical data were collected through semi-structured interviews with sellers and buyers. Ethnobotanical indices, including Family Use Value, Use Value, and Plant Part Value, were used to assess the significance and usage of these plants. A total of 115 wild plant species, belonging to 56 families, were recorded during surveys conducted between 2023 and 2024. These species serve various purposes, including their use as vegetables, spices, fruits, and for medicinal, spiritual, and cultural applications. The most representative plant families were Zingiberaceae, Fabaceae, and Anacardiaceae. The most common plant life forms were trees (44 species), followed by herbs (42 species) and shrubs (13 species). Leaves were the most frequently sold plant parts, whereas *Musa acuminata* (Musaceae) exhibited the highest utility, as indicated by its high Use Value. UPGMA clustering based on Jaccard similarity grouped the markets mainly by geographic location, with Pasar Anyar Bogor exhibiting the highest diversity (77 species) and Pasar Rumpit the lowest diversity (51 species). Markets located farther from Jakarta showed greater species diversity and unique species, likely because of local ecosystems and harvesting practices. Our findings highlight the key role of traditional markets in ensuring food security, preserving cultural heritage, and promoting sustainable harvesting and trading practices.

Keywords

economic plants; Java; local knowledge; useful plants; use value

1. Introduction

Sundaland (Indonesia), with its enormous number of endemic plant species and unusually high biodiversity, is recognized as one of the world's 36 biodiversity hotspots (Butler, 2023; Noss, 2016). As the main part of the country, Java is also one of the most densely populated regions in the world, with almost half of the population of Indonesia living on this island, with the city of Jakarta serving as the central urban hub (Britannica, 2024). Owing to the growing population of Jakarta and its surroundings, the region was established and

commonly referred to as the Jakarta Metropolitan Area (JMA). This area is sometimes called Greater Jakarta or Jabodetabek (Jakarta, Bogor, Depok, Tangerang, and Bekasi). This serves as the focal point for the government, culture, education, and economy in Indonesia. The JMA is home to over 30.6 million residents (BPS, 2020). There are 31 major ethnic groups, including Sundanese, Javanese, Betawinese, Chinese, Bataknese, and Minangnese (BPS, 2010). Each has unique traditions, languages, and customs that make the region a melting pot of diverse cultures, as reflected in various cultural festivals, cuisines, and traditions.

Diversity and species richness in Indonesia are among the highest in the world. Plant species constitute 10% of the world's flora (CEPF, 2001), with 2,722 species of mosses, 512 species of lichens, 1,611 species of pteridophytes, and 24,632 species of spermatophytes (Retnowati et al., 2019). The diversity of plants used by the community is influenced by the diversity of plants around them, socioeconomic conditions, and cultural practices involving wild plants (Kang et al., 2014). According to Duriyaprapan et al. (2005), Sundaland has approximately 6200 plant species that are useful for various purposes. The use of wild plants within communities varies depending on the ethnic groups engaging in cultural practices and their specific uses, which may include purposes such as food, medicine, construction materials, fiber sources, dyes, ceremonies, and decorations (Rahmawati et al., 2023; Suharti, 2015). One piece of documentation that is representative of recording the use of plants in Indonesia is the relief of 63 plant species on the stone structure of the Borobudur Temple in Java, which was built in the eighth and ninth centuries (Kartawinata, 2010; Metusala et al., 2020).

Ethnobotany research, especially on plants traded in traditional markets, has become important globally because of the recognition of markets as a valuable repository of local knowledge. Traditional markets provide insight into the traditional uses of plants within communities. Examining the dynamics of plant trade in these markets enhances our understanding of cultural practices, indigenous knowledge, and complex relationships between communities and their plant resources (Cunningham, 2001).

Traditional marketplaces trade a variety of products, including industrial, dry, wet, agricultural, and wild plant products (Cruz-Garcia et al., 2015; Franco et al., 2020; Iskandar et al., 2020; Silalahi et al., 2015). Market surveys have been used for ethnobotanical research (Nguyen et al., 2008) as well as for studying wild plants around the world, such as in Croatia (Łuczaj et al., 2013), Greece (Hanlidou et al., 2004), Poland (Kasper-Pakosz et al., 2016), Cyprus (Karousou & Deirmentzoglou, 2011), Tanzania (Hilonga et al., 2018), and Mexico (Bye, 1986), etc. In Southeast Asia, some studies have been conducted to examine the wild plants sold in markets in Thailand, Malaysia, Laos, and Brunei Darussalam (Franco et al., 2020; Łuczaj et al., 2021; Shirai & Rambo, 2014; Sulaini & Sabran, 2018). Ethnobotanical studies in Indonesia have largely focused on medicinal plants (Iskandar et al., 2023; Khusna et al., 2022; Nahdi & Kurniawan, 2019), although several studies have explored wild edible plants in the market (Deanova et al., 2021; Iskandar et al., 2018, 2021; Pawera, 2021; Silalahi et al., 2021). However, despite the economic and cultural significance of wild plants in urban food markets, no study has specifically examined the diversity and trade of wild edible plants in JMA.

This study aimed to fill this gap by documenting wild plants sold in traditional markets in the JMA. Specifically, we investigated: I) which plants are most popular in the market, II) for what purposes people use particular species of wild plants, III) whether particular plants sold in

markets are associated with particular ethnic groups, and IV) what are the differences in plant composition between individual markets in the JMA region?

2. Materials and methods

2.1. Study area

Administratively, the JMA includes the capital city of Jakarta as the center and several districts or city areas. This region comes from three provinces, namely, the entire Jakarta Province, as well as parts of West Java Province and Banten Province. Our study focuses on the traditional markets in the JMA. Traditional markets are places where farmers, fishermen, and small traders can directly buy and sell agricultural products and other daily necessities. These markets reflect the local culture and natural resource diversity and promote economic and social interactions (BPS, 2018). A purposive sampling approach was used to select markets across ten districts within the JMA. The selection criteria included geographic distribution, market size, and accessibility, ensuring representation of diverse trade settings. Almost every market in our study has a building provided to sellers, but many sellers prefer to set up shops in open places, such as on the roadside around the market building and in the parking space. Thus, the market conditions in the JMA are a mixture of the indoor and outdoor markets (Figure 1).

2.2. Ethnobotanical data collection

We conducted a traditional market survey between June 2023 and April 2024. These markets usually operate from the early morning to late evening (4:00 AM to 10:00 PM). Our visits took place between 7:00 AM and 12:00 PM local time, which are the peak trading hours. Each market was visited on a one-day basis, with several visits (2–3) conducted across different markets. We purposefully approached the stalls based on the availability of wild plants, and then waited for the right moment to ask and explain our intentions to the seller and buyer.

The ethnobotanical information was collected through semi-structured interviews. This type of interview involves a set of pre-prepared questions that cover the name of the plant, part of the plant used, its origin, use, and preparation method. Based on the answers provided by the respondents, these questions may be modified, added, or removed as necessary (Adams, 2015). Semi-structured interviews mimic natural conversation, which is commonly used in ethnobotanical and market research. The open-ended questions in this format encourage respondents to share unexpected, additional information and offer detailed insights, whereas the basic framework questions ensure that important topics are covered (Abbate et al., 2022; Hilonga et al., 2018; Łuczaj et al., 2021; Nanagulyan et al., 2020).

In total, 111 respondents were interviewed. The age of the participants ranged from 23 to 80 years. The sex composition of the respondents was 55% male and 45% female. We collected information, such as the name of the plants, purpose of use, plant parts used, methods of preparation, and



origin of these traded plants. Before the interviews, consent was obtained from all the participants, and their identities remained confidential.

2.3. Specimen collection and identification

During our visits, all the wild plants sold in the market were photographed. If possible, fresh or dry samples were collected as voucher specimens. Voucher specimens were deposited at the Herbarium of Jagiellonian University in Kraków, Poland (KRA). Plant identification followed Flora Malesiana (Holttum et al., 1959–1998; Van Steenis et al., 1948–2013), and the nomenclature of the species followed the Plant of the World databases (POWO, 2025).

Our study focuses on wild plants sold in traditional markets. Wild plants are defined as plants that are collected occasionally, self-seeded, and considered wild by locals (Łuczaj et al., 2021), occurring in natural or minimally disturbed habitats in the absence of management and cultivation (de Wet & Harlan, 1975).

In this study, wild plants are defined as species that market sellers report collecting from non-cultivated areas, such as forests, roadsides, near paddy fields, and abandoned lands. Although we acknowledge that some plants may originate in agricultural zones, our definition is limited to species that can establish and persist beyond managed cultivation. To validate this classification, we checked the species information against ethnobotanical literature and expert consultations.

2.4. Data analysis

To assess whether the selected 10 markets sufficiently represented plant diversity in the JMA area, a species-area curve analysis was conducted. This analysis estimated species richness as a function of the number of surveyed markets, helping to determine whether additional markets would significantly increase the number of recorded species. The analysis was performed using binary (presence–absence) data for the plant species recorded in each market. The

species accumulation curve was generated using the `specaccum` function of the `Vegan` package in R (Kindt, 2020) by applying a random permutation method to account for sampling variability.

Chord diagrams were created using the “circlize” tool (Gu et al., 2014) in R software (version 3.6.1; R Core Team, 2021) to show the contribution of various usages. The chord diagram enables us to study which plant parts are related to which use category, count the number of species in each use category, and determine which use group is more diversified, based on the thickness of each bar (Haq et al., 2022).

Data analysis was conducted descriptively regarding the use of wild plants in traditional markets in the Jakarta metropolitan area. The results of the survey were analyzed using Family Use Value (FUV), Use Value (UV), and Plant Part Value (PPV; Jadid et al., 2020). $UV = \Sigma U/n$, where UV = Use Value, ΣU = total use mentioned by informants per species, and n = total number of informants for a given species (Phillips & Gentry, 1993). $FUV = \Sigma UV/n$, where ΣUV is the total number of UVs of all species in one family, and n is the total number of species in one family (Phillips & Gentry, 1993). The plant part value (PPV) was calculated using the following formula: $PPV (\%) = RU \text{ plant part} / RU$, where RU plant part is the number of uses reported for all plant parts and RU is the sum of uses reported per part of the plant (Gomez-Beloz, 2002).

Cluster analysis of the markets studied was conducted using the Unweighted Pair Group Method with Arithmetic Mean (UPGMA), with the Jaccard Similarity Index. The analyses were performed in PAST 4.03 (Hammer-Muntz et al., 2001).

3. Results

3.1. Market inventory

The species accumulation curve (Figure 2) initially shows a rapid increase in species richness as markets are added, but this growth slows down after the eighth market, suggesting that most species have already been recorded (blue line). This implies that sampling beyond the eight markets is unlikely to reveal many additional species in the study area. The smoothed trend line (red line) continued to rise more gradually, levelling off at the 26th market, representing a broader prediction of species accumulation. While this red line provides a general trend, the observed data (blue line) indicate that the current sample of ten markets was sufficient to capture the market inventory.

A total of 115 wild plant species (Table 1) were recorded in 10 traditional markets of JMA. Following plant distribution data from Plants of the World (POWO, 2025), we analyzed the origin of the plants sold in the market and identified 55% as native to Indonesia and 45% as introduced.

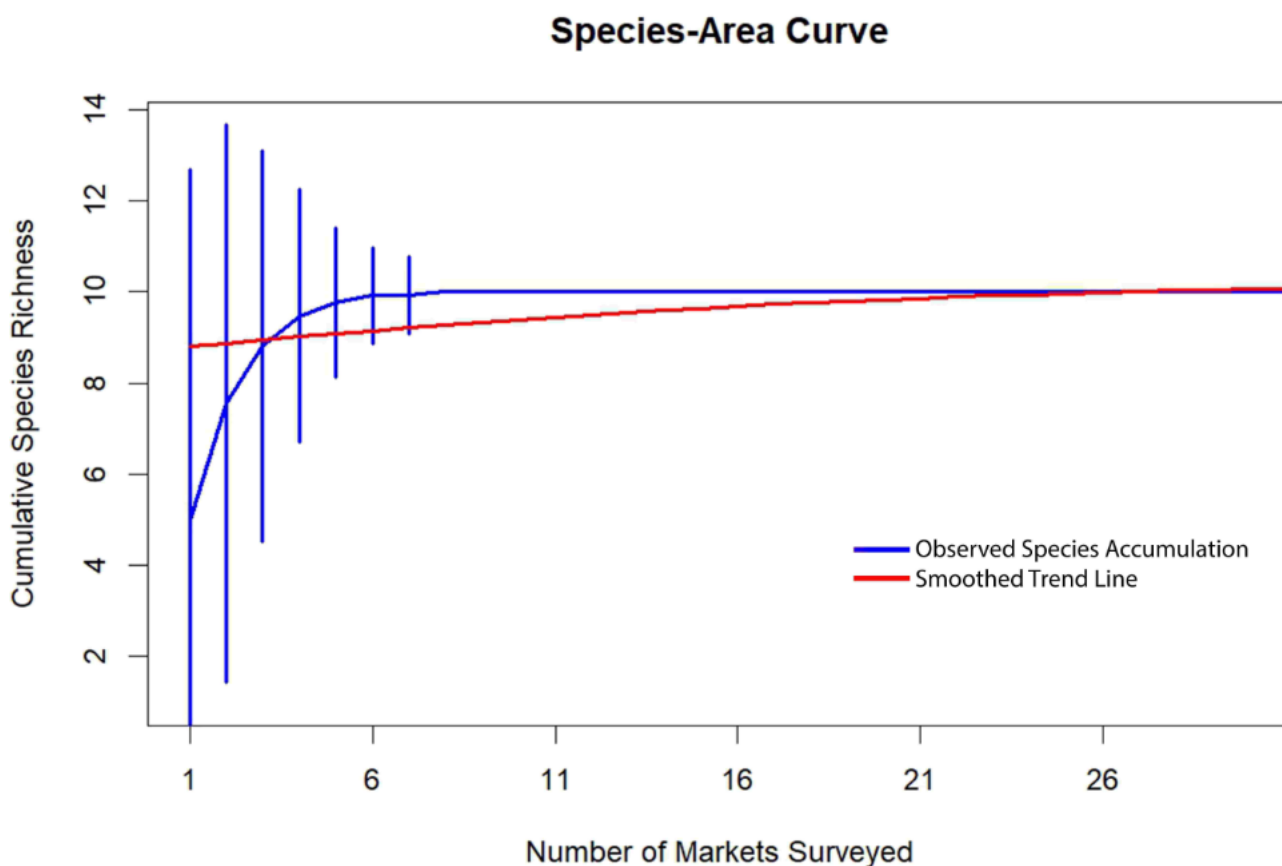


Figure 2 Species accumulation curves for market plant diversity based on the number of species as a sampling effort.

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area.

No.	Family	Species	Vernacular name/ Indonesian name	Life Form	Way of Use	Use Value	Family Use Value
1	2	3	4	5	6	7	8
1	Auriculariaceae	<i>Auricularia auricula-judae</i> (Bull.) Wettst.	Jamur kuping	Fungi	Sh: Vegetable	1	1.0
2	Pluteaceae	<i>Volvariella volvacea</i>	Jamur merang	Fungi	Sh: Vegetable	1	1.0
3	Solieriaceae	<i>Eucheuma cottonii</i> [3]	Rumput laut jelly	Seaweed	Sh: Snack (put into Cendol and Es Campur)	0,1	0.1
4	Aspleniaceae	<i>Diplazium esculentum</i> (Retz.) Sw.	Pakis sayur	Herb	L: Vegetable (Stir-Fry or Gulai)	0,8	0.8
5	Cyatheaceae	<i>Alsophila spinulosa</i> (Wall. ex Hook.) R.M.Tryon [3]	Paku Pohon	Tree Fern	L: Vegetable (Stir-Fry or Gulai)	0,1	0.1
6	Marattiaceae	<i>Angiopteris evecta</i> (G.Forst.) Hoffm. [6]	Pakis Gajah	Herb	L: Vegetable (Stir-Fry or Gulai)	0,1	0.1
7	Polypodiaceae	<i>Pleocnemia irregularis</i> (C.Presl) Holttum	Paku	Herb	L: Vegetable (Stir-Fry or Gulai)	0,2	0.2
8	Gnetaceae	<i>Gnetum gnemon</i> L.	Melinjo	Tree	L, Fr: Vegetable (Sayur Asem) S: Snack (Chips)	2	2.0
9	Acanthaceae	<i>Andrographis paniculata</i> (Burm.f.) Wall. ex Nees	Sambiloto	Herb	Sh: Medicine (Fever, Diabetes, Rheumatic)	0,3	0.2
10	Acanthaceae	<i>Staurogyne elongata</i> (Nees) Kuntze [10]	Reundeu	Herb	L: Lalapan (Eaten Freshly)	0,1	0.2
11	Acanthaceae	<i>Strobilanthes crispa</i> (L.) Blume	Pecah beling	Herb	L: Medicine (kidney stones)	0,2	0.2
12	Achariaceae	<i>Pangium edule</i> Reinw.	Kluwak	Herb	L: Vegetable (Sliced into thin layers then cooked as sayur Pangi), S: Spice (Rawon)	1,1	1.1
13	Alismataceae	<i>Limnocharis flava</i> (L.) Buchenau	Genjer	Herb	Sh: Vegetable (Stir-Fry)	1	1.0
14	Amaranthaceae	<i>Amaranthus hybridus</i> L.	Bayam Gajah	Herb	L: Vegetable (Soup)	1	1.0
15	Anacardiaceae	<i>Anacardium occidentale</i> L.	Jambu mede, jambu monyet	Tree	L: Lalapan (Eaten Freshly)	0,4	0.6
16	Anacardiaceae	<i>Bouea macrophylla</i> Griff.	Gandaria	Tree	Fr: Spice (Stir-fry vegetable); Snack (Rujak)	0,6	0.6
17	Anacardiaceae	<i>Mangifera caesia</i> Jack	Kemang	Tree	Fr: Snack (Rujak); Fruit (Eaten freshly)	0,4	0.6
18	Anacardiaceae	<i>Mangifera foetida</i> Lour.	Bacang	Tree	Fr: Ripe Fruit is eaten freshly	0,3	0.6
19	Anacardiaceae	<i>Mangifera odorata</i> Griff.	Kuini	Tree	Fr: Ripe Fruit is eaten freshly	0,6	0.6
20	Anacardiaceae	<i>Spondias dulcis</i> Parkinson	Kedondong	Tree	Fr: Snack (Rujak, Pickled and Candied Fruit), Fruit (Eaten freshly)	1,2	0.6
21	Annonaceae	<i>Cananga odorata</i> (Lam.) Hook.f. & Thomson	Kenanga	Tree	Fl: Spiritual Purpose (Flower petal for grave)	0,7	0.7

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area (cont.).

1	2	3	4	5	6	7	8
22	Apiaceae	<i>Centella asiatica</i> (L.) Urb. [10]	Pegagan	Herb	L: Lalapan (Eaten freshly)	0,1	0.1
23	Apiaceae	<i>Oenanthe javanica</i> (Blume) DC. [10]	Tespong	Herb	L: Lalapan (Eaten freshly)	0,1	0.1
24	Apocynaceae	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult. [7]	Mondokaki, Bunga Wari	Shrub	Fl: Spiritual Purpose (Flower petal for grave)	0,1	0.1
25	Araceae	<i>Colocasia esculenta</i> (L.) Schott	Keladi	Herb	Pt: Vegetable (Gulai) T: Snack (chips, boiled)	2	1.1
26	Araceae	<i>Typhonium flagelliforme</i> (G.Lodd.) Blume [1]	Keladi Slemnat/Tikus	Herb	Pt: Vegetable (Gulai), Medicine (Ulcer, increased appetite, clean digestion)	0,2	1.1
27	Araliaceae	<i>Polyscias fruticosa</i> (L.) Harms [10]	Berlangkas	Shrub	L: Lalapan (Eaten freshly)	0,1	0.1
28	Arecaceae	<i>Areca catechu</i> L.	Pinang	Tree	Fr: Betel Chewing	1	0.7
29	Arecaceae	<i>Arenga pinnata</i> (Wurmb) Merr.	Aren	Tree	S: Snack (Put into es campur, kolak), Lm: Tools (Woven plate)	1	0.7
30	Arecaceae	<i>Borassus flabellifer</i> L.	Lontar	Tree	S: Snack (Put into es campur, Eaten freshly)	0,2	0.7
31	Arecaceae	<i>Calamus</i> spp.	Rotan	Rattan	St: Tools (Woven basket)	0,7	0.7
32	Asparagaceae	<i>Dracaena angustifolia</i> (Medik.) Roxb.	Suji	Shrub	L: Food Coloring (Blended leaf used for coloring)	0,4	0.4
33	Asteraceae	<i>Cosmos caudatus</i> Kunth	Kenikir	Herb	L: Vegetable (Stir-Fry, Gulai, Pecal)	1	1.0
34	Balsaminaceae	<i>Impatiens balsamina</i> L.	Bunga pacar air	Herb	Fl: Spiritual Purpose (Flower Petal for Grave)	1	1.0
35	Brassicaceae	<i>Nasturtium microphyllum</i> (Boenn.) Rchb. [3]	Selada air	Herb	L: Vegetable (Stir-Fry, Gulai, Soup)	0,1	0.6
36	Brassicaceae	<i>Nasturtium officinale</i> W.T.Aiton	Selada air	Herb	L: Vegetable (Stir-Fry, Gulai, Soup)	1	0.6
37	Caricaceae	<i>Carica papaya</i> L.	Pepaya kampung	Tree	L, Male Fl, Fr: Vegetable (Stir-Fry, Gulai)	1	1.0
38	Clusiaceae	<i>Garcinia atroviridis</i> Griff. ex T.Anderson	Asam potong	Tree	Fr: Spice (Put into Soup, Gulai)	0,3	0.2
39	Clusiaceae	<i>Garcinia xanthochymus</i> Hook.f. ex T.Anderson [3]	Asam kandis	Tree	Fr: Spice (Put into Soup, Gulai)	0,1	0.2
40	Convolvulaceae	<i>Ipomoea aquatica</i> Forssk.	Kangkung air	Herb	L: Vegetable (Stir-Fry, Soup)	1	1.0
41	Cucurbitaceae	<i>Benincasa hispida</i> (Thunb.) Cogn.	Kundur	Climbing plant	Fr: Vegetable (Soup, Gulai); Snack (Es Campur); Medicine (Cough)	0,3	0.7
42	Cucurbitaceae	<i>Lagenaria siceraria</i> (Molina) Standl.	Labu air	Climbing plant	Fr: Vegetable (Soup, Gulai)	1,1	0.7

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area (cont.).

1	2	3	4	5	6	7	8
43	Dioscoreaceae	<i>Dioscorea alata</i> L.	Uwi	Climbing plant	T: Snack (Boiled)	0,3	0.3
44	Dioscoreaceae	<i>Dioscorea esculenta</i> (Lour.) Burkill	Gembili	Climbing plant	T: Snack (Boiled)	0,3	0.3
45	Euphorbiaceae	<i>Cnidoscolus aconitifolius</i> (Mill.) I.M.Johnst.	Singkong arab	Shrub	L: Medicine (Diabetes, Decreasing Cholesterol); Vegetable (Gulai)	0,9	1.0
46	Euphorbiaceae	<i>Manihot carthagenensis</i> subsp. <i>glaziovii</i> (Müll. Arg.) Allem	Singkong Karet	Shrub	L: Vegetable (Gulai)	0,2	1.0
47	Euphorbiaceae	<i>Manihot esculenta</i> Crantz	Singkong	Shrub	L: Vegetable (Gulai), T: Snack (Chips, Tapai)	2	1.0
48	Fabaceae	<i>Archidendron jiringa</i> (Jack) I.C.Nielsen	Jengkol	Tree	S: Vegetable (Gulai); Lalapan (Eaten Freshly)	2	0.9
49	Fabaceae	<i>Biancaea sappan</i> (L.) Tod.	Kayu secang	Tree	St: Medicine (Infection, Diabetes)	1	0.9
50	Fabaceae	<i>Cajanus cajan</i> (L.) Huth [10]	Kacang Gude	Shrub	Fr: Vegetable (Stir Fry with other vegetables)	0,2	0.9
51	Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	Petai cina	Tree	Fr: Vegetable (Stir Fry with other vegetables)	0,6	0.9
52	Fabaceae	<i>Parkia speciosa</i> Hassk.	Pete	Tree	Fr: Vegetable (Stir Fry with other vegetables); Lalapan (Eaten Freshly)	2	0.9
53	Fabaceae	<i>Psophocarpus tetragonolobus</i> (L.) DC.	Kecipir	Climbing plant	Fr: Vegetable (Stir-Fry)	1	0.9
54	Fabaceae	<i>Senna alexandrina</i> Mill.	Jati cina	Tree	L: Medicine (Hemorrhoids, Diabetes, Rheumatic)	0,5	0.9
55	Fabaceae	<i>Sesbania grandiflora</i> (L.) Poir. [1]	Turi	Tree	Fl: Vegetable (Stir-Fry, Pecel)	0,1	0.9
56	Fabaceae	<i>Tamarindus indica</i> L.	Asam jawa	Tree	Fr: Spice (Put into Soup, Pecel)	1	0.9
57	Lamiaceae	<i>Coleus amboinicus</i> Lour. [9]	Bangun-bangun	Herb	L: Vegetable (Gulai), Medicine (Increase Breast milk)	0,1	0.7
58	Lamiaceae	<i>Ocimum tenuiflorum</i> L.	Kemangi	Herb	L: Lalapan (Eaten freshly)	2	0.7
59	Lamiaceae	<i>Orthosiphon aristatus</i> (Blume) Miq.	Kumis kucing	Herb	Sh: Medicine (Hypertension, Diabetes, Kidney stone)	0,5	0.7
60	Lamiaceae	<i>Platostoma palustre</i> (Blume) A.J.Paton	Cincau hitam	Herb	Sh: Snack (The extract is put into Cendol and Es Campur)	0,3	0.7

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area (cont.).

1	2	3	4	5	6	7	8
61	Lauraceae	<i>Cinnamomum verum</i> J.Presl	Kayu manis	Tree	B: Spice (Put into a cake)	1	1.0
62	Lecythidaceae	<i>Planchonia valida</i> (Blume) Blume	Songgom, putat	Tree	L: Lalapan (Eaten Freshly)	0,1	0.1
63	Magnoliaceae	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Cempaka	Tree	Fl: Spiritual Purpose (Used for wedding accessory)	0,2	0.2
64	Marantaceae	<i>Phrynium pubinerve</i> Blume	Daun nasi	Herb	L: Food Packaging (Used for wrapping snacks and rice cakes)	0,2	0.2
65	Meliaceae	<i>Lansium domesticum</i> Corrêa [6]	Duku	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.1
66	Meliaceae	<i>Sandoricum koetjape</i> (Burm.f.) Merr.	Kecapi	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,2	0.1
67	Meliaceae	<i>Swietenia mahagoni</i> (L.) Jacq. [6]	Mahoni	Tree	S: Medicine (Infection, Diabetes, Malaria)	0,1	0.1
68	Menispermaceae	<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thomson	Brotowali	Climbing plant	St: Medicine (Infection, Diabetes, Immunity)	0,7	0.7
69	Moraceae	<i>Artocarpus altilis</i> (Parkinson) Fosberg	Sukun	Tree	Fr: Snack (Unripe fruit is deep fried)	1	0.9
70	Moraceae	<i>Artocarpus camansi</i> Blanco	Kluhih	Tree	Fr: Vegetable (Unripe fruit for Gulai), S: Snack (boiled)	0,4	0.9
71	Moraceae	<i>Artocarpus heterophyllus</i> Lam.	Nangka	Tree	Fr: Vegetable (Unripe fruit is cooked for Gulai); Fruit (Ripe Fruit is eaten freshly)	3	0.9
72	Moraceae	<i>Artocarpus integer</i> (Thunb.) Merr. [1]	Cempedak	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.9
73	Moraceae	<i>Ficus virens</i> Aiton [10]	Bunut	Tree	L: Lalapan (Eaten Freshly)	0,1	0.9
74	Moringaceae	<i>Moringa oleifera</i> Lam. [1]	Kelor	Tree	L: Vegetable (Soup); Medicine (diabetes); Spiritual Purpose (used for Exorcism)	0,3	0.3
75	Musaceae	<i>Musa acuminata</i> Colla	Pisang kepok	Tree-Like Herb	Fl: Culinary Vegetable, Fr: Culinary Snack, Fruit, L, St: Food Packaging	4	4.0
76	Myristicaceae	<i>Myristica fragrans</i> Houtt.	Pala	Tree	Fr: Spice (put into soup)	1	1.0
77	Myrtaceae	<i>Syzygium aqueum</i> (Burm.f.) Alston	Jambu air	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,8	0.5
78	Myrtaceae	<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry [6]	Jambu bol	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.5
79	Myrtaceae	<i>Syzygium polyanthum</i> (Wight) Walp.	Salam	Herb	L: Spice (put into soup, gulai)	1	0.5
80	Myrtaceae	<i>Syzygium polycephalum</i> (Miq.) Merr. & L.M.Perry [6]	Kupa	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,2	0.5

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area (cont.).

1	2	3	4	5	6	7	8
81	Oleaceae	<i>Jasminum sambac</i> (L.) Aiton	Melati	Shrub	Fl: Spiritual Purpose (Flower Petal for Grave)	0,4	0.4
82	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	Belimbing wuluh	Tree	Fr: Spice (Put into soup, gulai)	0,6	0.4
83	Oxalidaceae	<i>Averrhoa carambola</i> L. [5]	Belimbing	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.4
84	Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb. ex Lindl.	Pandan wangi	Herb	L: Spice (Put into Kolak); Food Coloring (Cendol); Spiritual Purpose (Leaf is cut into small pieces for grave)	3	3.0
85	Phyllanthaceae	<i>Antidesma bunius</i> (L.) Spreng.	Huni, buni	Tree	Fr: Snack (Rujak)	0,4	0.5
86	Phyllanthaceae	<i>Baccaurea racemosa</i> (Reinw.) Müll.Arg.	Kepundung	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,2	0.5
87	Phyllanthaceae	<i>Breynia androgyna</i> (L.) Chakrab. & N.P.Balacr.	Katu	Shrub	L: Vegetable (Soup, Gulai)	1	0.5
88	Piperaceae	<i>Piper betle</i> L.	Sirih	Climbing plant	L: Betel Chewing; Medicine (Antibiotic, Antioxidant)	3	3.0
89	Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	Sereh	Herb	St: Spice (Put into Soup, Gulai)	1	0.5
90	Poaceae	<i>Dendrocalamus asper</i> (Schult. & Schult.f.) Backer	Bambu	Bamboo	Ys: Vegetable (Stir-fry, gulai), L: Food Packaging (bacang)	1,1	0.5
91	Poaceae	<i>Imperata cylindrica</i> (L.) Raeusch.	Akar alang-alang	Herb	R: Medicine (Fever)	0,2	0.5
92	Poaceae	<i>Saccharum edule</i> Hassk.	Terubuk	Herb	Fl: Vegetable (Stir-Fry, Soup, Gulai)	0,2	0.5
93	Poaceae	<i>Schizostachyum brachycladum</i> (Kurz ex Munro) Kurz [3]	Bambu leman	Bamboo	St: Food Packaging (Lemang)	0,1	0.5
94	Rubiaceae	<i>Mussaenda frondosa</i> L. [7]	Nusa Indah	Shrub	Fl: Spiritual Purpose (Flower Petal for Grave)	0,1	0.3
95	Rubiaceae	<i>Uncaria gambir</i> (W.Hunter) Roxb.	Gambir	Climbing plant	Sh: Betel Chewing	0,4	0.3
96	Rutaceae	<i>Bergera koenigii</i> L.	Daun Kari	Tree	L: Spice (Put into gulai)	0,2	0.3
97	Rutaceae	<i>Zanthoxylum acanthopodium</i> DC.	Andaliman	Shrub	Fr: Spice (Put into Arsik, and Sambal)	0,3	0.3
98	Sapindaceae	<i>Pometia pinnata</i> J.R.Forst. & G.Forst. [6]	Matoa	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.1
99	Sapotaceae	<i>Lucuma campechiana</i> Kunth [6]	Campolay	Tree	Fr: Fruit (Ripe Fruit is eaten freshly)	0,1	0.1
100	Solanaceae	<i>Physalis angulata</i> L.	Ciplukan	Herb	Sh: Medicine (Fever, Hypertension)	0,2	1.0

Table 1 Wild plants sold in traditional markets in the Jakarta Metropolitan Area (cont.).

1	2	3	4	5	6	7	8
101	Solanaceae	<i>Solanum nigrum</i> L.	Leunca	Shrub	Fr: Vegetable (Gulai, Stir-Fry); Lalapan (Eaten freshly)	1,6	1.0
102	Solanaceae	<i>Solanum torvum</i> Swartz	Rimbang	Shrub	Fr: Vegetable (Gulai, Stir-Fry, Sambal); Lalapan (Eaten freshly)	1,2	1.0
103	Urticaceae	<i>Pilea melastomoides</i> (Poir.) Wedd.	Pohpohan	Herb	L: Lalapan (Eaten freshly)	0,8	0.8
104	Talinaceae	<i>Talinum fruticosum</i> (L.) Juss. [3]	Gingseng jawa	Herb	L: Vegetable (Stir-Fry)	0,1	0.1
105	Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd.	Lengkuas	Herb	R: Spice (Put into Gulai, Soup)	1	1.1
106	Zingiberaceae	<i>Boesenbergia rotunda</i> (L.) Mansf.	Temu kunci	Herb	R: Spice (Put into Soup)	0,9	1.1
107	Zingiberaceae	<i>Curcuma aeruginosa</i> Roxb. [9]	Temu Hitam	Herb	R: Medicine (Antioxidant)	0,1	1.1
108	Zingiberaceae	<i>Curcuma longa</i> L.	Kunyit	Herb	R: Food Coloring (Blended and put into Rice or Sticky Rice), R, L: Spice (Put into Gulai)	2	1.1
109	Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb.	Temulawak	Herb	R: Medicine (Increase appetite, Anti-inflammatory)	1	1.1
110	Zingiberaceae	<i>Curcuma zedoaria</i> (Christm.) Roscoe [9]	Kunyit putih	Herb	R: Medicine (Help digestion, Relieving menstrual pain)	0,1	1.1
111	Zingiberaceae	<i>Etlingera elatior</i> (Jack) R.M.Sm.	Kecombrang	Herb	St, Fl, Fr: Spice (Put into Sambal, Soup, Gulai)	1	1.1
112	Zingiberaceae	<i>Kaempferia galanga</i> L.	Kencur	Herb	R: Spice (Put into Seblak, Pecel)	2	1.1
113	Zingiberaceae	<i>Kaempferia rotunda</i> L.	Temu rapet	Herb	R: Medicine (Stomached)	0,8	1.1
114	Zingiberaceae	<i>Wurfbainia compacta</i> (Sol. ex Maton) Škornick. & A.D.Poulsen	Kapulaga	Herb	Fr: Spice (Put into Soup, Gulai)	1	1.1
115	Zingiberaceae	<i>Zingiber officinale</i> Roscoe	Jahe	Herb	R: Spice (Put into Soup, Gulai); Medicine (Headache, Relieving menstrual pain, and Sore Throat)	2	1.1

Unique species only found in the market: **1** = Pasar Grogol West Jakarta; **3** = Pasar Senen Central Jakarta; **5** = Pasar Rumpit South Jakarta; **6** = Pasar Anyar Bogor; **7** = Pasar Kemiri Depok; **9** = Pasar Baru Bekasi; **10** = Pasar Pelita Sukabumi. Part Plants: R = Rhizome; Sh = Shoot; Ys = Young Shoot; St = Stem; B = Bark; L = Leaf; Pt = Petiole; LM = Leaf Midrib; Fl = Flower; Fr = Fruit; S = Seed.

The plants belong to 56 families and 97 genera. The most common plant families are (Figure 3A): Zingiberaceae (11 species), Fabaceae (9 species), and Anacardiaceae (6 species), while the most common plant life forms were trees (44 species), followed by herbs (42 species) and shrubs (13 species) (Figure 3B). A variety of plants are traded on the market for different uses. Vegetables (36 species) had the highest number of species (Figure 3C), followed by spices (20 species) and medicine (20 species).

3.2. Plant Use

The plants in the market are mostly used as vegetables. There are many variations in dishes prepared from wild vegetable plants sold in the markets, one of which is *gulai*. This dish is in the form of soup with various spices, coconut milk, and vegetables as ingredients. The most common vegetables used for *gulai* were *Manihot esculenta* leaves, *Musa acuminata* flowers, and *Colocasia esculenta* stipules (Figure 4).

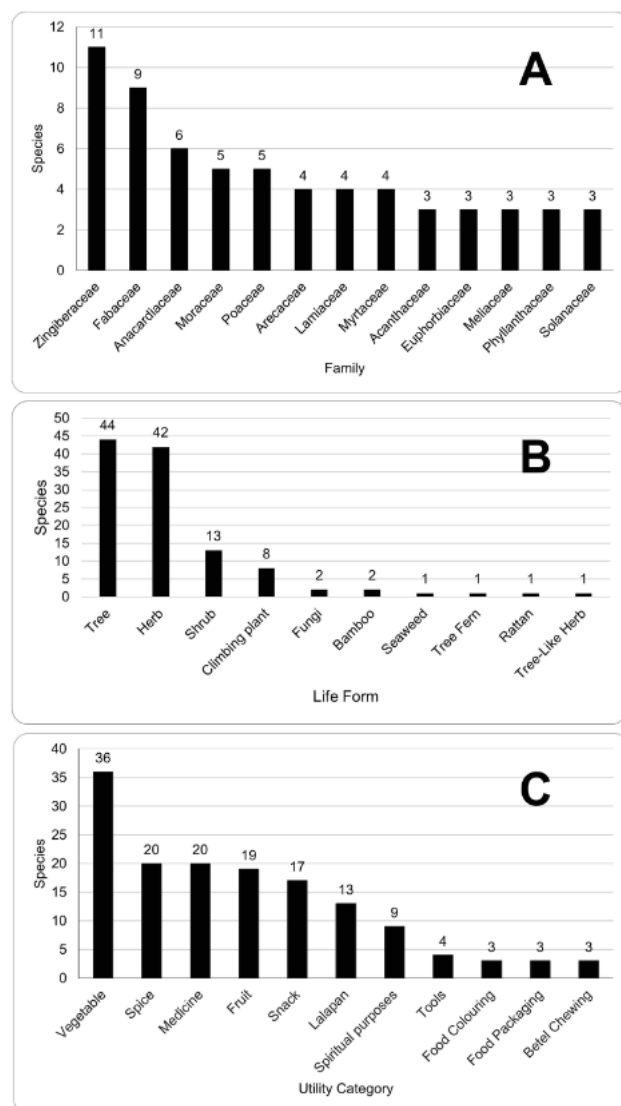


Figure 3 Share of families (A); their life forms (B); and category of utility (C) of wild plants sold in traditional markets of the JMA.

City residents also eat fresh plants in a salad called *lalapan*, which is commonly served with chili sauce (*sambal*). Many parts of plant can be consumed as *lalapan*, but most are the leaf of plant such as *Ocimum tenuiflorum*, *Pilea melastomoides*, *Anacardium occidentale*, *Staurogyne elongata*, *Centella asiatica*, *Polyscias fruticosa*, *Planchonia valida*, and *Ficus virens* (Figure 4).

Several fruits are available for direct consumption, including *Andorricum koetjape*, *Syzygium polycephalum*, *Baccaurea racemosa*, and *Artocarpus integer* (Figure 5). Additionally, fruits are prepared as a snack called *rujak*, a fruit salad with sweet and spicy sauce. *Rujak* includes fruits from *Spondias dulcis*, *Bouea macrophylla*, *Mangifera caesia*, *Antidesma bunius*, and *Mangifera foetida*. Moreover, the seeds of *Borrassia flabellifer* are also eaten as snacks and consumed with sweet syrup, whereas *Artocarpus altilis* fruits are processed into chips or a simple deep-fried snack.

Based on informant citations, the importance of the studied wild plant species was assessed using the Use Value (UV) and Family Use Value (FUV) calculation, with values ranging from 0.10 to 4.00 (Table 1). *Musa acuminata* (Musaaceae) had the highest UV (4.00) and FUV (4.00). This was followed by *Artocarpus heterophyllus*, *Pandanus amaryllifolius*, and *Piper betle*, each with a UV of 3.00. In contrast, 26 species had the lowest UV (0.10), suggesting their limited cultural or economic importance.

Musa acuminata is a starchy banana, locally known as *Pisang Kepok*, which serves multiple purposes and is utilized in four distinct categories: vegetable, snack, fruit, and food packaging. Flowers are widely available in all markets and are sold as vegetables. The ripe fruits are consumed fresh as table fruit or prepared as a sweet dessert known as *kolak*, whereas unripe fruits are processed into banana chips. Leaves are highly valued for food packaging and are commonly used to wrap rice, snacks, and various other food items. Additionally, the dried stem was used as a wrapping material for the palm sugar. The versatility of this species makes it an important and widely traded commodity in the local markets.

Artocarpus heterophyllus, commonly known locally as jackfruit or *nangka*, is utilized in different ways depending on its ripeness. Unripe fruit is consumed as a vegetable, while ripe fruit is eaten fresh as a table fruit. *Pandanus amaryllifolius*, locally referred to as *pandan wangi*, is valued primarily for its fragrant leaves. These leaves are widely used as spices, for natural food coloring, and for spiritual purposes. *Piper betle* is well known for its medicinal properties, particularly its leaves, which are commonly used as traditional remedies. Additionally, the leaves are chewed fresh along with other spices as part of the betel-chewing tradition.

3.3. Plants and community

Various plants are used as species in different cuisines (Figure 6). These spices have significant cultural value, with specific ethnic groups incorporating them into traditional dishes. For instance, the Minangnese use the leaves of *Curcuma longa*



Figure 4 Selected edible plants sold in JMA markets. Vegetable: (A) *Diplazium esculentum*; (B) *Alsophila spinulosa*; (C) *Angiopteris evecta*; (D) *Pleocnemia irregularis*; (E) *Pangium edule*; (F) *Limncharis flava*; (G) *Colocasia esculenta*; (H) *Typhonium flagelliforme*; (I) *Nasturtium microphyllum*; (J) *Carica papaya*; (K) *Manihot carthagenensis*; (L) *Manihot esculenta*; (M) *Coleus amboinicus*; (N) *Artocarpus camansi*; (O) *Musa acuminata*; (P) *Dendrocalamus asper*; (Q) *Saccharum edule*; Lalapan: (R) *Staurogyne elongata*; (S) *Anacardium occidentale*; (T) *Centella asiatica*; (U) *Oenanthe javanica*; (V) *Polyscias fruticosa*; (W) *Planchonia valida*; (X) *Ficus virens*; (Y) *Pilea melastomoides*.

in rendang traditional dishes, while Batakese use the fruit of *Zanthoxylum acanthopodium* and the stem of *Etligeria elatior* for seasoning. Additionally, the Javanese used the rhizome of *Boesenbergia rotunda* in their culinary practices. Wild plants are also used by people as medicinal remedies. *Piper betle*, *Biancaea sappan*, *Curcuma zanthorrhiza*, *Kaempferia rotunda*, *Tinospora cordifolia*, *Senna alexandrina*, and *Orthosiphon aristatus* are among the most frequently traded species used for medicinal purposes.

In addition to consumption, some plants are used for spiritual purposes in religious and cultural activities. For example, the flower petals of *Mussaenda frondosa*, *Jasminum sambac*, *Magnolia champaca*, *Impatiens balsamina*, *Tabernaemontana divaricata*, and *Cananga odorata*, along with thin slices of *Pandanus amaryllifolius* leaves, are sold as mixed flowers for graves because of their bright color and fragrant aroma. These flowers are also used in *sesajen* and spiritual offerings for supernatural powers.

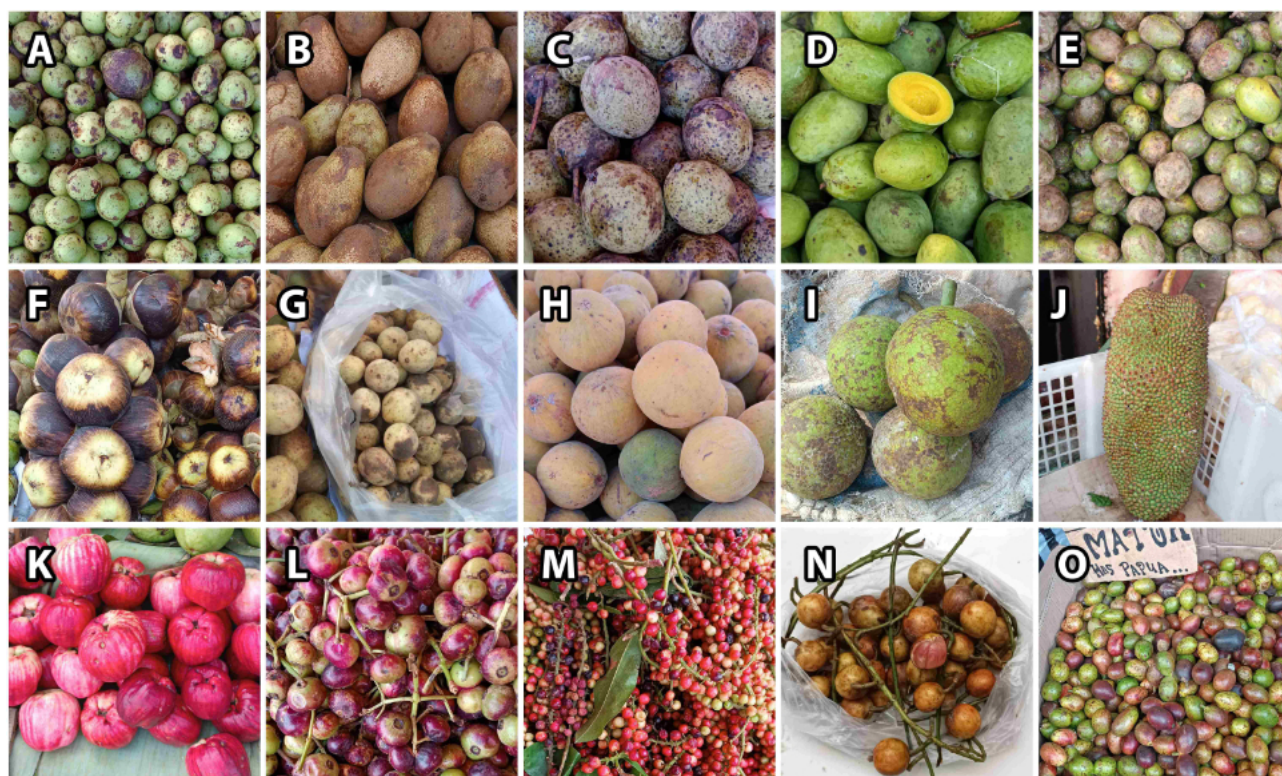


Figure 5 Selected fruit sold in markets of the JMA: (A) *Bouea macrophylla*; (B) *Mangifera caesia*; (C) *Mangifera foetida*; (D) *Mangifera odorata*; (E) *Spondias dulcis*; (F) *Borassus flabellifer*; (G) *Lansium domesticum*; (H) *Sandoricum koetjape*; (I) *Artocarpus altilis*; (J) *Artocarpus integer*; (K) *Syzygium malaccense*; (L) *Syzygium polyccephalum*; (M) *Antidesma bunius*; (N) *Baccaurea racemosa*; (O) *Pometia pinnata*.



Figure 6 Selected plant for spices sold in markets of the JMA: (A) *Pangium edule*; (B) *Garcinia atroviridis*; (C) *Garcinia xanthochymus*; (D) *Tamarindus indica*; (E) *Myristica fragrans*; (F) *Averrhoa bilimbi*; (G) *Bergera koenigii*; (H) *Zanthoxylum acanthopodium*; (I) *Alpinia galanga*; (J) *Boesenbergia rotunda*; (K) *Curcuma longa*; (L) *Etlingera elatior* (1 = stem, 2 = flower, 3 = fruit); (M) *Kaempferia galanga*.

Some plants are used for packaging food. For example, the stems of *Schizostachyum brachycladum* are used to cook rice or sticky rice, called *lemang*, by placing the grain inside and roasting it. In addition to stems, leaves are used to wrap a variety of dishes and pastries. The leaves of *Phrynium pubinerve* are used to wrap rice cakes called *lontong*. Various tools and utensils are also derived from the stems and leaves of wild plants. For instance, the leaf midribs of *Arenga pinnata* are used for woven plates, stems of *Tamarindus indica* for cutting boards, stems of *Calamus* spp. for a traditional chicken basket, and stems of *Dendrocalamus asper* for woven trays and skewer sticks.

Fourteen plant parts were available in the market. The most popular trade object was fruits (40 species; Figure 7A); however, the most commonly used plant parts were leaves (28.75% of PPV; Figure 7B). Notably, the Chord diagram (Figure 7C) reveals that leaves have a diverse range of usage, primarily for vegetables, *lalapan*, medicinal purposes, and spices, with a strong connection to the vegetable category. The second most popular fruits are table fruits, vegetables, snacks, spices, medicines, and *lalapan*. The food category (vegetable, table fruit, and *lalapan*) dominates, with a significant proportion of connections flowing from various plant parts. This suggests that plant-based food

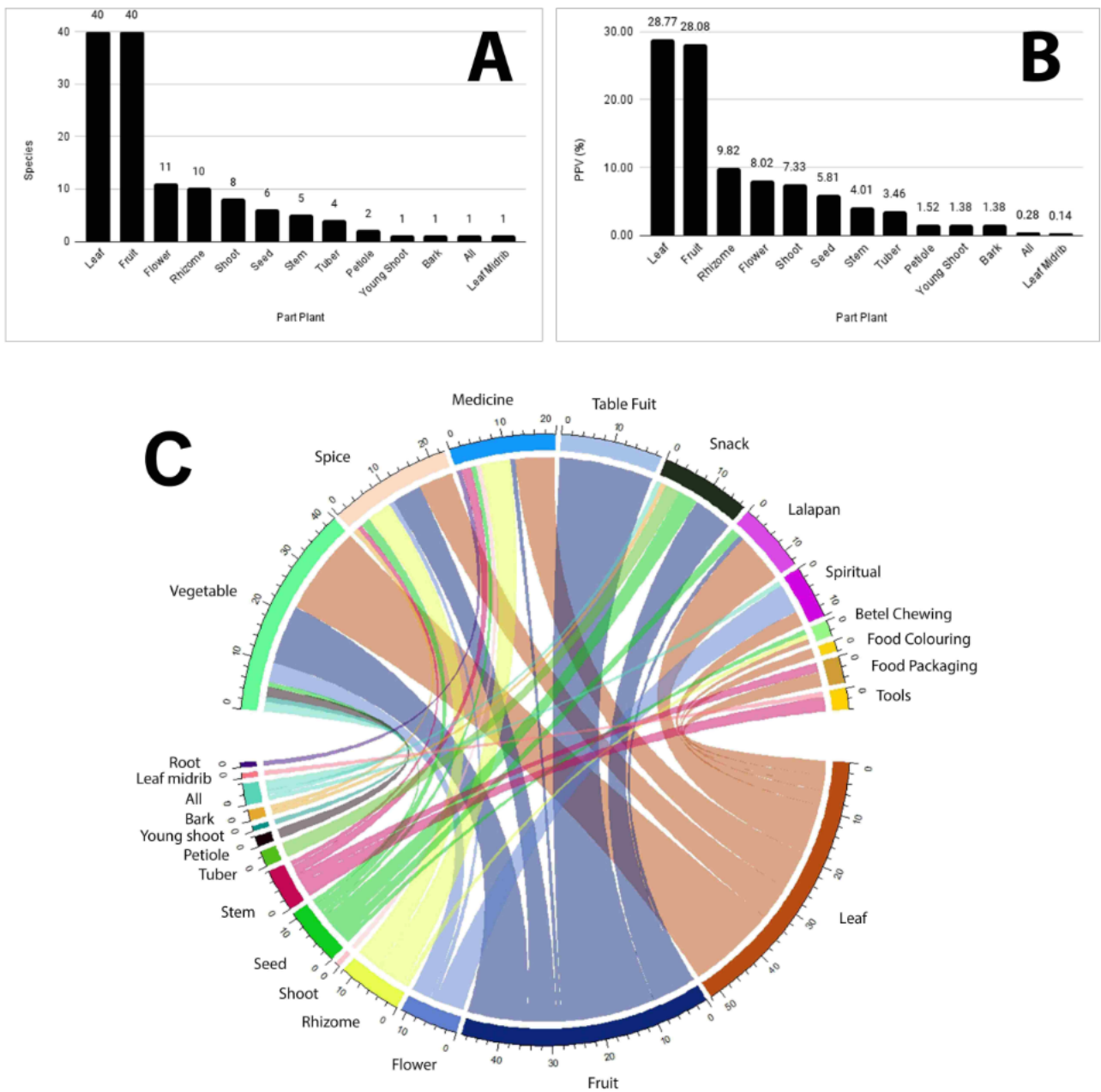


Figure 7 Some wild plants sold in markets (A) and their values (B). Chord diagram showing the distribution of plant parts used for different purposes (C).

sources were particularly prevalent in the surveyed markets.

3.4. Analysis of species composition

The highest diversity of wild plant species available for sale was observed in Pasar Anyar Bogor (77 species), whereas the lowest was recorded in Pasar Rumput (51 species). UPGMA clustering based on Jaccard similarity (Figure 8) grouped the surveyed markets according to their geographic locations. Markets within Jakarta city, including Pasar Rumput, Anyar Tangerang, Teluk Gong, Kemiri Depok, Kramat Jati, Baru Bekasi, and Grogol, exhibited similar species compositions, likely due to shared supply chains, centralized distribution networks, and common consumer preferences. The markets located farther from Jakarta – Pasar Anyar Bogor and Pelita Sukabumi – demonstrated a higher number of species, as well as a higher number of unique plants. Pasar Anyar Bogor contained eight unique species, whereas Pasar Pelita Sukabumi contained six species.

Pasar Senen, despite being located within Jakarta, stands apart as a group. This may be because of their unique characteristics as one of the cities' oldest markets. This historical significance may have contributed to its unique species composition, as established trade networks and long-standing consumer demand for specific plant species distinguish it from other markets in the city.

These findings suggest that geographic distance to supply areas, along with market history connected to community

preferences, play key roles in shaping species composition in markets. The unique species composition in markets located far from Jakarta is likely due to stronger connections with local ecosystems and regional harvesting practices, where sellers source plants directly from nearby forests, home gardens, or small-scale farms instead of large urban suppliers.

4. Discussion

The high diversity of wild plants documented in this study highlights the continued importance of wild plant use even in densely populated urban areas. We recorded 115 wild plant species, which is a relatively high number compared to similar studies in other regions. For instance, Łuczaj et al. (2021) reported 110 edible wild plant species in Laos, Kang et al. (2014) identified 81 species in Gansu, China, Shirai & Rambo (2014) recorded 54 species in Thailand, and Kar & Borthakur (2007) documented 29 species in Assam, India.

In Indonesia, research on traditional markets has largely focused on both cultivated and wild edible and medicinal plants. Silalahi et al. (2015) identified 257 wild and 87 cultivated medicinal species in North Sumatra, whereas Sujarwo et al. (2018) recorded 30 wild and 20 cultivated species in three markets in Tabanan, Bali. The relatively high number of wild plants in our study suggests that urban markets continue to serve as important hubs for the trade of wild plant resources, reflecting both cultural and urban demands.

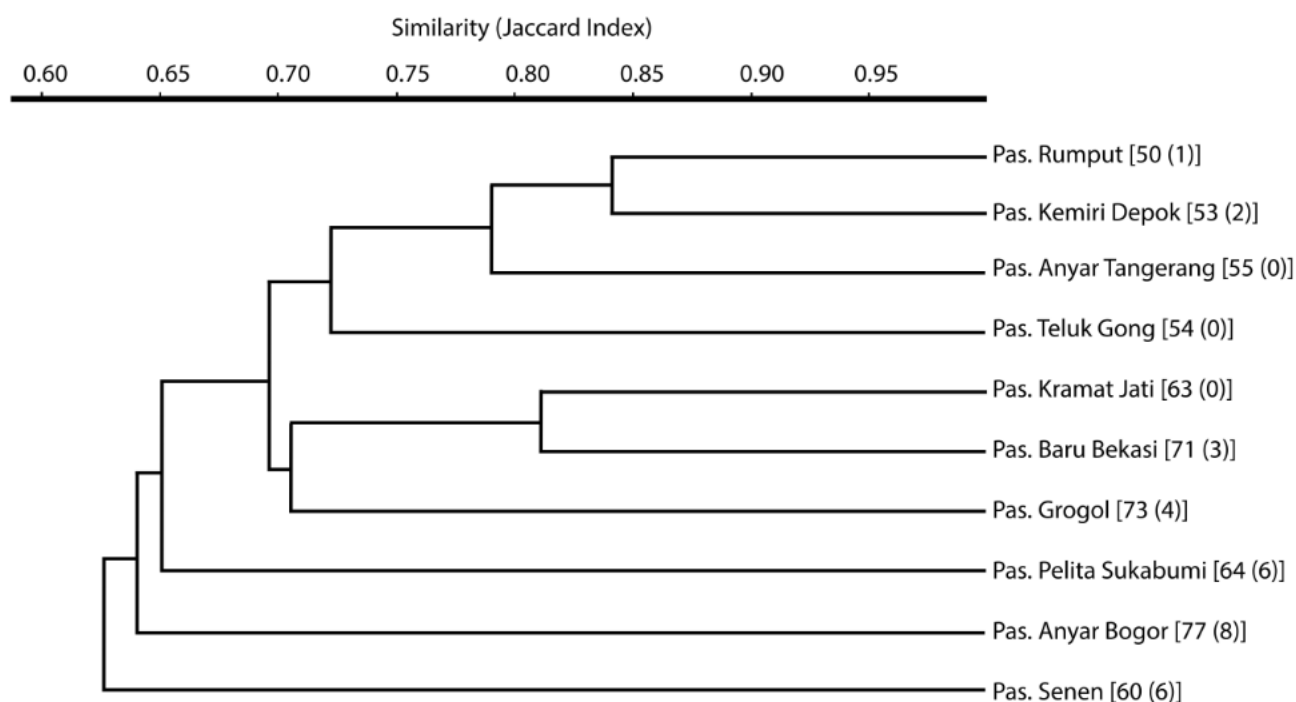


Figure 8 UPGMA dendrogram of ten traditional markets in the JMA. Numbers in square brackets indicate the number of species available in each market (including the number of unique species).

4.1. Ethnic and cultural factors influencing wild plant use

The presence of diverse ethnic groups in the JMA influences the diversity of the wild plants sold in the market. Although the JMA has historically been dominated by Betawinese and Sundanese ethnic groups (Melalatoa, 1995), rapid population growth has resulted in other ethnic groups moving across Indonesia. Notably, Jakarta itself is currently home to 3.4 million Javanese, 2.7 million Betawinese, 1.3 million Sundanese, 600 thousand Chinese, 300 thousand Batakese, 200 thousand Minangnese, and other ethnic groups (BPS, 2010). These ethnic groups have preserved their cultural and traditional practices. Even after relocating far from their homeland, they continued to uphold these traditions.

Knowledge of useful wild plants, including the methods, purposes, and parts of plants used by Indonesian communities, is unique to each group. A single plant species can be used by one or more ethnic groups for the same or different purposes, with the same or different plant parts, and using similar or different processing methods. With so many different ethnic groups currently inhabiting the JMA area, it is not surprising that a wide variety of wild plants can also be found in marketplaces.

4.2. Sources and distribution of wild plants

A market analysis within the JMA revealed variations in the availability of wild plants, largely influenced by the different ethnic communities and the distance to the supply area. A key question is how traditional markets in densely populated urban regions such as the JMA manage to source a wide variety of wild plants to meet the needs of different ethnic groups. Notably, Jakarta itself has almost no agroforestry activities and lacks natural forests (BPS, 2023). Therefore, most wild plants sold in JMA markets originate from neighboring regions, including West Java (Bogor, Bandung, Sukabumi) and Banten (Rangkasbitung). Interviews with traders also confirmed that most of the wild plants available in JMA markets come from outside the area, with some even being imported from other islands such as Sumatra. Specific wild plants, such as *Saccharum edule*, are transported directly from Bogor, whereas others, such as *Baccaurea racemosa*, are imported by traders from Rangkasbitung. This targeted sourcing strategy reflects a highly specialized supply chain, ensuring that consumer demand for traditional plant resources is met despite the absence of local agroforestry or natural forest resources.

4.3. Wild plant's role

Most wild plants sold on the market are primarily used for consumption. This highlights the critical role that wild plants play in ensuring food security in the region. According to the Food and Agriculture Organization (FAO), food security is defined as a situation where all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life (FAO,

2002). The consumption of wild plants in local diets emphasizes their importance in supporting food availability and local economies (FAO & WHO, 2022; McClafferty & DeWaal, 2021).

In addition to their culinary uses, wild plants have significant medicinal value. For thousands of years, plants have been used in traditional medicine across different cultures (IARC, 2002), and Indonesia is no exception. More than 13,000 plant species are used for medicinal purposes in the country (BPPKRI, 2012). *Piper betle*, *Curcuma longa*, and *Zingiber officinale* are commonly used for medicinal purposes in Indonesia. These plants are known to treat various ailments, including cough, fever, and digestive disorders, and possess antibacterial and antifungal properties (Silalahi et al., 2015).

4.4. Sustainability and environmental considerations

The considerable number of wild plants sold in the traditional JMA market proves that people living in cities, despite leading a modern lifestyle, still use wild plants in everyday life. Although no protected species were found in our study, the constant demand for wild plants could eventually lead to biodiversity loss in the regions supplying JMA markets. Future research is needed to address the importance of sustainable sourcing practices and conservation efforts to maintain the diversity of wild plants.

5. Conclusions

This market survey provided information on the use of wild plants, which are closely linked to cultural, medicinal, and culinary traditions. A total of 115 wild plant species belonging to 56 families were documented in the traditional markets of the JMA, demonstrating the significant role of wild plants in fulfilling various needs of the population. We documented the various uses of wild plants, ranging from culinary purposes, such as vegetables, which are the most utilized plants, spices, and fruits, to medicinal, spiritual, and cultural applications. Wild plants sold in markets are not only consumed directly but are also used for food packaging, tools, and traditional practices such as customs and rituals. Notably, the diversity of wild plants found in the markets reflects the rich cultural heritage and traditions of the diverse ethnic groups living in the JMA. Our study shows a strong connection between people and wild plants. Owing to the increasing urbanization of the JMA, the forest areas of Java are inevitably decreasing. This necessitates the protection of natural areas rich in species and the promotion of environmentally friendly practices in recognition of the indisputable role of traditional markets in the protection of cultural heritage and maintaining food security in the JMA.

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