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Plants Sold in a Traditional Marketplace in the West Java Highlands: An Ethnobotanical Analysis

Lia Fitriah[1]*, Dede Mulyanto[2]

[1]Anthropology Undergraduate Program, Faculty of Social and Political Sciences, Universitas Padjadjaran, West Java, Indonesia
[2]Department of Antropologi, Faculty of Social and Political Sciences, Universitas Padjadjaran, West Java, Indonesia

Abstract

Traditional markets are crucial for sustaining plant diversity, local food systems, and cultural heritage. They also serve as learning spaces for the diversity and cultural connections of food plants. This study documented the diversity and utilization of plant species traded in a traditional marketplace in the West Java highlands, Indonesia. Data were collected through stall surveys, observations, and semi-structured interviews with 38 traders. A total of 96 species from 31 families were recorded. Fabaceae and Solanaceae were the most represented families (11 species each). Vegetables constituted the largest category of use (47%); fruits (53%) and leaves (25%) were the most frequently used parts. Most (83%) of the plants sold were exotic, with only 21% being native species. Eight edible wild plant species, including *Centella asiatica* and *Solanum nigrum*, remain an essential part of the traditional diet. Women dominated the vegetable trade (64.51%), and most vendors reported having 5–20 years of experience. These findings highlight that traditional markets play a crucial role in preserving and serving as learning spaces for plant diversity, local food systems, and cultural heritage.

Keywords: ethnobotany, plant diversity, Sundanese, traditional market, wild edible plants

Introduction

Biocultural diversity refers to the combination of biological diversity (genes, species, ecosystems) and cultural diversity (languages, religions, ethnicities) (Iswandono et al., 2015; Metananda et al., 2023). This diversity is important because it demonstrates the close relationship between humans and their natural environment. Indonesia is one of four biocultural diversity hotspots, alongside Papua New Guinea, Colombia, and Cameroon. Indonesia ranks as the world's number one country in biocultural diversity (Loh & Harmon, 2005). Biocultural diversity specifically refers to the interdependence between biodiversity (flora and fauna) and human cultural diversity (traditions, knowledge, languages, and practices) (Iswandono et al., 2015; Metananda et al., 2023; Sitanggang et al., 2022).

One key aspect of biocultural diversity is food, which serves not only as a biological necessity for humans but also as an integral part of the culture, identity, and heritage of a community (Hendariningrum, 2018; Iskandar et al., 2018; Manzanero-Medina et al., 2020; Nguyen et al., 2019). A tangible manifestation of the link between biodiversity and culture can be seen in local food practices, especially in the dynamics of traditional markets. In West Java, local commodities are traded more frequently in traditional markets than imported commodities. Various local agricultural products, such as staple foods, fruits, and

*Corresponding Author: Lia Fitriah, email: lia22002@mail.unpad.ac.id Anthropology Undergraduate Program, Faculty of Social and Political Sciences, Universitas Padjadjaran, Jln. Raya Ir. Soekarno Km 21 Sumedang, 45363, Indonesia

vegetables, are predominantly traded in traditional markets in fresh condition (Iskandar et al., 2018).

Traditional markets play an essential role in ethnobotanical studies because they are not only places of transaction, but also serve as sources of ethnobotanical information and as representations of biocultural and ethnic diversity in a region (Agboola et al., 2018; Deanova et al., 2021; Franco et al., 2020; Iskandar et al., 2018, 2021, 2024). Numerous studies have documented the diversity of plant species traded in markets, such as vegetables, fruits, spices, and medicinal plants.

Research in traditional markets in Indonesia has revealed the diversity of plant species traded, including not only food plants but also medicinal plants and cooking spices, and how social and cultural factors influence this trade (Deanova et al., 2021; Iskandar et al., 2018, 2021, 2024). One example is a study on the safety of turmeric and tamarind herbal medicines sold in several traditional markets in Malang city (Kesuma, 2021).

Furthermore, research by Franco et al. (2020) shows that the primary reason people visit markets is the availability of fresh fruits and vegetables, followed by the desire to buy local foods. This highlights that markets play an important role in connecting biodiversity with communities, while also contributing to increased food diversity, which offers many benefits (Franco et al., 2020; Iskandar et al., 2018).

Thus, traditional markets not only function as places for food transactions but also as venues that reflect and preserve cultural identity through the utilization of plants, whether as sources of food, medicine, or other materials, as seen in the habits of the Sundanese people in rural West Java, who utilize a variety of vegetables and local food plants.

The Sundanese community in rural West Java, Indonesia, has traditionally utilized various types of plants, including food crops, to meet their daily needs (Hendariningrum, 2018; Iskandar et al., 2018, 2024). The Sundanese people enjoy fresh vegetables as part of their daily meals, such as lettuce, cabbage, and eggplant as side dishes, and spinach, cucumber, and water spinach as main dishes. Spices and *sambal* (a spicy chili-based condiment or sauce) have become essential elements of their daily menu, reflecting the cultural identity of the Sundanese community (Hendariningrum, 2018; Iskandar et al., 2018; Rahman, 2018). The habit of consuming raw vegetables among the Sundanese is strongly influenced by local ecosystem conditions, such as the cool mountain climate and fertile soil, which support the growth of various types of vegetables (Iskandar et al., 2018; Mulyanto et al., 2018; Rahman, 2018).

According to several studies (Cahyanto et al., 2018; Hernawati et al., 2022; Santosa et al., 2015; Septiani et al., 2020), the diversity of vegetable species used as *lalab* in rural areas of West Java is also thought to be high. Vegetables are defined according to cultural and botanical criteria. In different cultures, vegetables are plant-based foods that are typically cooked or eaten as non-sweet side dishes. Botanically, vegetables are defined as the non-reproductive parts of plants, such as leaves, stems, and roots. For instance, cucumbers are considered fruits botanically, but vegetables culturally because they are often used in savory dishes. Another example is mushrooms, which are considered vegetables in cultural terms, but are not physiologically plants (Abdullah & Pratiwi, 2021).

Ethnobotanical studies of vegetables are important because they record local knowledge and community practices in utilizing biodiversity as daily food, for example, the tradition of consuming *lalab* among the Sundanese, which is passed down through Traditional Ecological Knowledge (TEK) and influenced by the local ecosystem (Nguyen et al., 2019; Rahman, 2018). Ethnobotanical studies can also describe the linguistic diversity in naming plants used by a community in their everyday language, reflecting how communities understand, classify, and use plants in their lives (Franco et al., 2022).

Traditional markets also serve as spaces that represent biocultural diversity, where various ethnic groups and local knowledge converge, and as distribution centers for vegetables and local foods that support food diversity and cultural

preservation (Albuquerque et al., 2023; Franco et al., 2020; Iskandar et al., 2018). Therefore, this study aimed to identify the diversity of local plant products, such as vegetables, fruits, spices, and flowers for ceremonies, as well as to explore local knowledge about these plant products among market vendors, including aspects of linguistic and gastronomic diversity.

Research Methods

Study Area

The study was conducted in Cikembang Village, Kertasari District, Bandung Regency, West Java (7°12'38.5" S, 107°41'20.1" E). Cikembang Village covers approximately 1,370 hectares, with a population density of 547 people per square kilometer. Geographically, the village is situated at the foot of Mount Wayang and Mount Windu, at an elevation of 1,200–1,800 meters above sea level, and forms part of the upper reaches of the Citarum River Basin (DAS) (see **Figure 1**).

The area is known for its colonial-era tea and cinchona plantations, some of which remain active, while others have been converted for different uses. South of the village lies the Santosa Tea Plantation and the Kertasarie Tea Factory, both still operational. Meanwhile, the cinchona plantation, spanning roughly 1,000 hectares, is now mostly managed by the local community as agricultural land for crops such as potatoes, cabbage, carrots, and onions. To this day, most residents earn their livelihoods as farm laborers and land cultivators in these plantations.

One of the primary centers of economic activity for the local community is the Cibeureum Market, located in Cibeureum Village, Kertasari District. This market is the only traditional market in the area, covering approximately 1,600 m^2, with 40 stalls inside and 10 stalls outside (see **Figure 2**), selling necessities such as vegetables, fruit, spices, and other daily needs.

The goods sold at Cibeureum Market come from various sources. Some are obtained directly from local farmers who sell their harvests to market traders or retailers. Other items are purchased by market traders from Maruyung Market, another traditional market in the area that functions as a wholesale center for small-scale bulk purchases. Additionally, some commodities are sourced directly from Caringin Central Market, which serves as a regional hub for agricultural products. It is not uncommon for goods purchased at Maruyung Market to have originated at Caringin Central Market before being sent to Cibeureum Market.

With this system, Cibeureum Market functions as a local retail market serving the daily needs of the village community, rather than as a distribution channel for other regions. The market is located on the main village road, with adequate access for both two-wheeled and four-wheeled vehicles, and is equipped with a parking area to support trading activities.

The existence of the Cibeureum Market has made it the center of economic interaction for the rural community in Kertasari District. It also reflects the supply chain for basic necessities in the highlands of Bandung Regency, which depends on a combination of supplies from local farmers, traditional collection markets, and regional central markets.

Figure 1. *Study Site Map: Cikembang Village, Kertasari District, Bandung Regency, West Java, Indonesia*

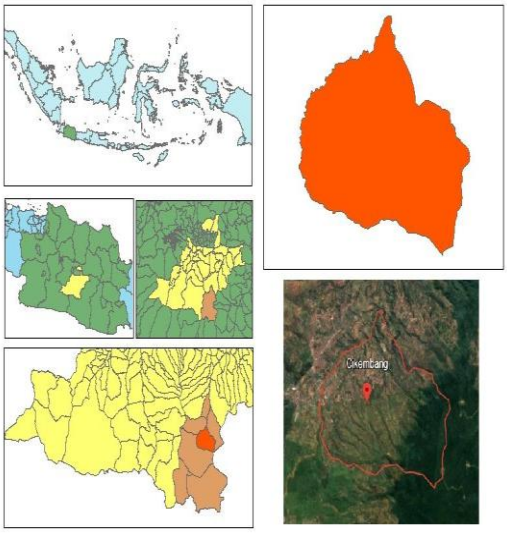


Figure 2. *Location of Cibeureum Traditional Market, Cikembang Village, Kertasari District, Bandung Regency, West Java, Indonesia*

Data Collection

This study used several data collection techniques, including market stall surveys, observation, interviews, and specimen collection. The survey was conducted using the free listing method and direct observation to identify the number, distribution, and diversity of plant products at Cibeureum Market, supported by photographic documentation. Observations focused on market behavior, such as buying and selling transactions by the sellers. In-depth and semi-structured interviews were conducted to explore information about plant species, prices, origins, and parts sold, using questionnaires and recording devices.

The study involved 38 informants, consisting of 24 vegetable stall owners, eight spice stall owners, seven fruit stall owners, and one tuber stall owner, aged 20–65 years. Each stall was privately owned and had operated for an average of more than 5 years. Interviews were conducted while observing the sale of vegetables at each stall from 5:30 AM to 10:00 AM at Cibeureum Market. This activity aimed to document the diversity of plant products through photography and identification. Unidentified plants were collected as voucher specimens and photographed for further identification by taxonomists at the Jatinangor Herbarium, accompanied by complete data and detailed visual documentation. Additionally, to ensure the validity and currency of nomenclature, all scientific names were rechecked and updated using Plants of the World Online (https://powo.science.kew.org/).

Data Analysis

The interview data were classified by local names, parts sold, prices, sales weights, and forms of utilization, and summarized using Microsoft Excel 2016. Furthermore, the data were displayed in descriptive tables to facilitate interpretation. The entire dataset was then analyzed using the Relative Frequency of Citation (RFC) index to measure the popularity and level of usefulness of each species in the community, according to the following formula (Whitney, 2021).

$$RFC_S = \frac{FC_S}{N}$$

Where FC represents the number of informants citing a species, and N indicates the total number of informants. The RFC value ranges from 0 to 1, with one indicating that all informants mentioned the species.

Research Results and Discussion

The diversity of plants commonly traded and their utilizations

The research results show that among the 31 plant families and 96 species found in the Cibeureum traditional market, the two most dominant families were Fabaceae and Solanaceae, each represented by 11 species, followed by Brassicaceae with eight species (see **Table 1** and **Figure 4**). These three families were generally used as vegetables and cooking spices, and their items were sold at almost every market stall. Some examples of species from the Fabaceae family with the highest RFC values were green beans (*Phaseolus vulgaris* L.) and adzuki beans (*Vigna angularis*), which reflect the high utilization of

plant-based protein sources and seed- and fruit-based vegetables in the daily food consumption of the local community.

Fabaceae is also dominant in some other traditional markets in Indonesia, such as those in Bengkulu, Yogyakarta, and Bogor (Deanova et al., 2021; Farhan Nurilah et al., 2025; Nurliana & Wiryono, 2021). Besides being a food source, Fabaceae is widely recognized locally and internationally as a multifunctional plant group. Studies in Pakistan and Tanzania have shown that Fabaceae species are also sold for traditional medicinal purposes, such as treating rheumatism and urinary tract infections (Hilonga et al., 2019; Palabaş Uzun & Koca, 2020; Zahoor et al., 2021).

Meanwhile, the Solanaceae family also showed a high level of dominance, with RFC values ranging from 0.91 to 1 (see **Table 1**), as seen in species such as *Capsicum annuum* (various chili varieties) and *Solanum nigrum* (black nightshade) (see **Figure 3**). This indicates their high frequency of use in daily life, especially as cooking spices and main vegetables.

This finding aligns with research on the Cijambu community in West Java by Iskandar et al. (2023), which also noted the high utilization of Solanaceae, particularly chili and tomatoes, as primary commodities in Sundanese cuisine for sambal. Not only in the Sunda region, but fruits from the Solanaceae family, such as tomatoes, are also a staple in the daily cuisine of Central Java and are generally cultivated locally (Deanova et al., 2021).

Figure 3. *Left: Various Types of Chili Traded. Right:* Solanum nigrum *L. (*leunca*) Traded in the Market*

These two families are also mentioned in ancient manuscripts such as the Old Javanese Ramayana (10th century) and Bujangga Manik (15th century). Several Fabaceae species found in Cibeureum Market, such as *Vigna unguiculata* (long beans) and *Psophocarpus tetragonolobus* (winged beans), are recorded in Bujangga Manik. Meanwhile, legumes such as *Vigna* spp. are mentioned in the Ramayana.

Several Solanaceae species, such as *Solanum nigrum* (*leunca* or *ranti*), are also recorded in the Ramayana and are known in ancient Sundanese culture. Additionally, *Solanum melongena* (eggplant) and *Capsicum annuum* (chili pepper) are mentioned in Bujangga Manik. The presence of these species in both ancient sources indicates that legumes from the Fabaceae family and certain Solanaceae species have long been used as important food sources. This is consistent with the current high RFC value of Fabaceae in the market, reflecting sustainable consumption of plant-based protein (Mulyanto et al., 2023, 2024a).

Figure 4. *Families of plants commonly traded in Cibeureum Market, Bandung, West Java, Indonesia*

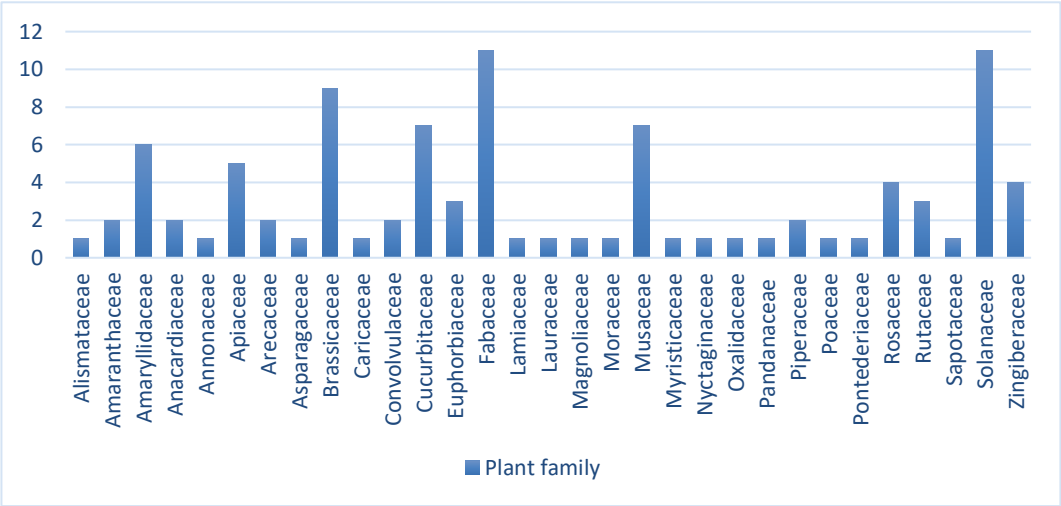


Table 1. *Diversity of Plants Commonly Traded in Cibeureum Market, Bandung, West Java*

Taxa	Vernacular Name	Plant Parts Used	Category Used	Life Form	Phytocoriation	RFC
Alismataceae						
Limnocharis flava (L.) Buchenau	*Genjer*	Leaf	Food – Vegetable	Perennial herb	Nt	0.12
Amaranthaceae						
Amaranthus blitum L.	*Bayam liar*	Leaf	Food – Vegetable	Annual herb	Nt	0.08
Amaranthus hypochondriacus L.	*Bayam*	Leaf	Food – Vegetable, Medicine	Annual herb	Nt & Ho	0.12
Amaryllidaceae						
Allium cepa var. Aggregatum L.	*Kembang bawang*	Bulb	Food – Vegetable	Herb (B/A)	Sa	0.20
Allium cepa var. Aggregatum L.	*Bawang merah*	Bulb	Food – Spice, Vegetable	Herb (B/A)	Sa	0.87

Allium cepa var. cepa L.	*Bawang bombay*	Bulb	Food – Spice, Vegetable	Herb (B/A)	Sa	0.04
Allium fistulosum L.	*Bawang daun*	Leaf	Food – Spice, Vegetable	Perennial herb	Ho	0.20
Allium sativum L.	*Bawang putih*	Bulb	Food – Medicine, Spice, Vegetable	Herb (A/P)	Sa & Ho	0.91
Narcissus pseudonarcissus L.	*Kembang narjis (Kembang narcis)*	Flower	Ceremony	Perennial herb	Ho	0.02
Anacardiaceae						
Mangifera indica L.	*Mangga*	Fruit	Food – Dessert	Perennial tree	Im & Ho	0.28
Spondias dulcis Parkinson	*Pucuk daun kedondong*	Leaf, Fruit	Food – Vegetable, Dessert	Tree	Im	0.04
Annonaceae						
Annona muricata L.	*Sirsak*	Fruit	Food – Dessert	Perennial tree	Nt	0.14
Apiaceae						
Apium graveolens L.	*Seledri*	Leaf, Stem	Food – Spice, Vegetable, Medicine	Herb (B/A)	Sa, Ho, Af	0.33
Centella asiatica L. Urb	*Antanan*	Leaf	Food – Vegetable, Medicine	Perennial herb	Native	0.04
Coriandrum sativum L.	*Ketumbar*	Fruit	Food – Spice	Annual herb	Sa & Ho	1

Daucus carota L.	*Wortel*	Tuberous root	Food – Vegetable, Medicine	Herb (B/A)	Sa, Ho, Af	0.5
Oenanthe javanica (Blume) DC.	*Tespong*	Leaf	Food – Vegetable	Perennial herb	Native	0.04
Arecaceae						
Cocos nucifera L.	*Kelapa sayur*	Fruit	Spice	Tree	Au & Im	0.08
Salacca zalacca (Gaertn.) Voss	*Salak*	Fruit	Dessert	Shrub	Native	0.16
Asparagaceae						
Dracaena angustifolia (Medik.) Roxb.	*Suji*	Leaf	Spice	Shrub	Native	1
Brassicaceae						
Brassica oleracea L. var. botrys	*Burkol (kembang kol)*	Leaf	Food – Vegetable	Herb (B/A)	Ho	0.33
Brassica oleracea L. var. capitata	*Engkol*	Leaf	Food – Vegetable	Herb (B/A)	Ho	0.12
Brassica oleracea L. var. capitata	*Kiciwis (tunas kol)*	Leaf	Food – Vegetable	Herb (B/A)	Ho	0.04
Brassica oleracea L. var. italica	*Brokoli*	Leaf	Food – Vegetable	Herb (A/P)	Ho	0.08
Brassica rapa L.	*Sosin*	Leaf	Food – Vegetable	Annual herb	Sa, Ho & Af	0.95
Brassica rapa L.	*Sawi putih*	Leaf	Food – Vegetable	Annual herb	Sa, Ho & Af	0.20
Lactuca sativa L.	*Selada bokor*	Leaf	Food – Vegetable	Annual herb	Sa	0.04
Nasturtium officinale W.T.Aiton	*Selada air*	Leaf	Food – Vegetable, Medicine	Perennial herb	Sa, Ho & Af	0.29

			Perennial			
Raphanus raphanistrum subsp. sativus (L.) Schmalh.	*Lobak*	Tuberous root	Food – Vegetable	Annual herb)	Sa & Ho	0.20
Caricaceae						
Carica papaya L.	*Pepaya*	Fruit	Dessert	Small Tree	Nt	0.5
Convolvulaceae						
Ipomoea aquatica Forssk.	*Kangkung*	Leaf, Stem	Food – Vegetable	Perennial herb	Native	0.62
Ipomoea batatas (L.) Lam.	*Ubi jalar*	Tuber, Leaf	Food – Vegetable	Vine (Perennial)	Nt	0.12
Cucurbitaceae						
Citrullus lanatus (Thunb.) Matsum. & Nakai	*Semangka hijau*	Fruit	Food – Dessert	Annual vine	Sa & Af	0.16
Cucumis melo L.	*Melon*	Fruit	Food – Dessert	Vine (Annual)	Sa, Af, & Au	0.33
Cucumis sativus L.	*Bonteng (mentimun)*	Fruit	Vegetable	Vine (Annual)	Im & Ho	1
Cyclanthera brachystachya (DC.) Cogn.	*Bebontengan*	Fruit	Vegetable	Vine (Annual)	Nt	0.04
Momordica charantia L.	*Paria (pare)*	Fruit	Food – Vegetable, Medicine	Vine (Annual)	Native	0.83
Sicyos edulis Jacq	*Pucuk daun waluh*	Leaf	Food – vegetable	Vine (Annual)	Nt	0.12
Sicyos edulis Jacq	*Waluh*	Fruit	Food – vegetable	Vine (Annual)	Nt	0.29
Euphorbiaceae						

Aleurites moluccanus (L.) Willd.	*Kemiri*	Fruit	Food – Spice, Medicine	Tree	Native	1
Manihot esculenta Crantz	*Daun singkong*	Leaf	Food – Vegetable	Shrub (PN)	Nt	0.83
Manihot esculenta Crantz	*Singkong*	Tuber	Food – Vegetable	Shrub (PN)	Nt	0.04
Fabaceae						
Arachis hypogaea L.	*Kacang suuk (kacang tanah)*	Seed	Food – Vegetable	Annual herb	Nt	0.04
Archidendron pauciflorum (Benth) I.C.Nielsen	*Jengkol*	Fruit	Food – Vegetable	Tree	Im	0.45
Leucaena leucocephala subsp. glabrata	*Selong (petai cina)*	Fruit	Food – Vegetable	Shrub	Nt	0.04
Parkia speciosa Hassk.	*Peuteuy (petai)*	Fruit	Food – Vegetable	Tree	Native	0.04
Phaseolus lunatus L.	*Katopes (kacang roway)*	Fruit	Food – Vegetable	Annual herb	Nt	0.12
Phaseolus vulgaris L.	*Buncis*	Fruit	Food – Vegetable	Vine (Annual)	Nt	0.91
Psophocarpus tetragonolobus (L.) DC	*Jaat (kecipir)*	Fruit	Food – Vegetable	Vine (Perennial)	Af	0.04
Tamarindus indica L.	*Asem jawa*	Fruit	Food – Spice	Tree	Af	1
Vigna angularis L.	*Kacang beureum (kacang merah)*	Fruit	Food – Vegetable	Annual herb	Im & Ho	0.87

Vigna radiata (L.) R.Wilczek	*Toge*	Shoot	Food – Vegetable	Annual herb	Sa, Im, & Af	0.62
Vigna unguiculata (L.) Walp.	*Kacang panjang*	Fruit	Food – Vegetable	Vine (Annual)	Af	0.45
Lamiaceae						
Ocimum basilicum L.	*Surawung (kemangi)*	Leaf	Food – Vegetable, Medicine	Annual herb	Native	0.16
Lauraceae						
Cinnamomum burmanni (Nees & T.Nees) Blume	*Kayu manis*	Stem	Food – Spice	Tree	Native	1
Magnoliaceae						
Magnolia champaca (L.) Baill. ex Pierre	*Bunga cempaka*	Flower	Ceremony	Tree	Native	0.02
Moraceae						
Artocarpus heterophyllus Lam.	*Nangka sayur*	Fruit	Food – Vegetable	Tree	Im	0.04
Musaceae						
Musa acuminata colla	*Cau muli*	Fruit	Food – Dessert	Herbaceous	Native	1
Musa acuminata colla	*Cau kapas*	Fruit	Food – Dessert	Herbaceous	Native	1
Musa acuminata colla	*Cau bubuyan*	Fruit	Food – Dessert	Herbaceous	Native	1
Musa acuminata colla	*Cau rajabulu*	Fruit	Food – Dessert	Herbaceous	Native	0.28
Musa X paradisiaca L.	*Cau nangka*	Fruit	Food – Dessert	Herbaceous	Im	1
Musa X paradisiaca L.	*Cau kepok*	Fruit	Food – Dessert	Herbaceous	Im	1

Musa X paradisiaca L.	*Daun cau kepok*	Leaf	Food – Spice	Herbaceous	Im	0.08
Myristicaceae						
Myristica fragrans Houtt.	*Pala*	Seed	Food – Spice, Medicine	Tree	Im	1
Nyctaginaceae						
Bougainvillea peruviana Bonpl.	*Kembang kertas*	Flower	Ceremony	Shrub	Nt	0.02
Oxalidaceae						
Averrhoa carambola L.	*Belimbing*	Fruit	Food – Dessert	Perennial tree	Native	0.14
Pandanaceae						
Pandanus amaryllifolius Roxb.	*Pandang wangi*	Leaf	Ceremony	Shrub	Im	0.02
Piperaceae						
Piper betle L.	*Daun sirih*	Leaf	Food – Spice	Vine Perennial	Im	0.04
Piper nigrum L.	*Lada*	Seed	Food – Spice	Vine Perennial	Im	1
Poaceae						
Zea mays L.	*Jagung manis*	Fruit	Food – Vegetable	Annual herb	Nt	0.12
Pontederiaceae						
Pontederia vaginalis Burm.f	*Eceng*	Leaf & Stem	Food – Vegetable	Aquatic Herb	Native	0.04
Rosaceae						
Malus domestica (Suckow) Borkh	*Apel merah*	Fruit	Food – Dessert	Tree	Sa & Ho	0.14
Pyrus bretschneideri L.	*Pir madu*	Fruit	Food – Dessert	Tree	Ho	0.14
Pyrus communis L.	*Pir biasa*	Fruit	Food – Fruit	Tree	Sa & Ho	0.14

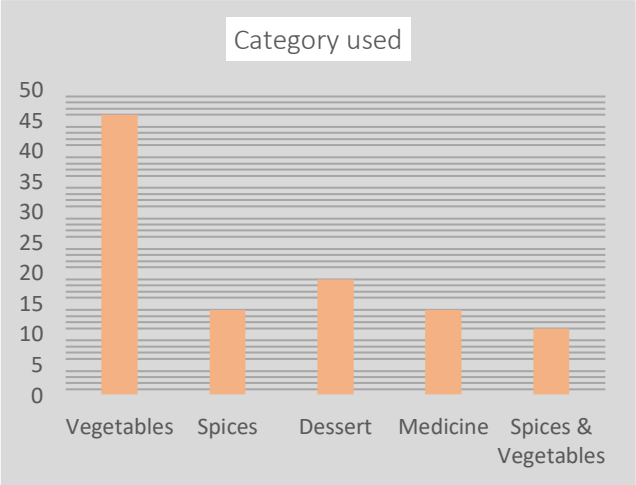
Rosa L.	*Kembang ros*	Flower	Ceremony	Shrub	Sa, Im, Af, & Ho	0.02
Rutaceae						
Citrus hystrix DC.	*Daun jeruk*	Leaf	Food – Spice	Tree	Im & Ho	1
Citrus hystrix DC.	*Jeruk*	Fruit	Food – Dessert	Tree	Im & Ho	0.57
Citrus reticulata Blanco	*Jeruk mandarin*	Fruit	Food – Dessert	Tree	Ho	0.14
Sapotaceae						
Manilkara zapota (L.) P.Royen Sawo Fruit Fruit Tree	*Sawo*	Fruit	Food – Dessert	Tree	Nt	0.28
Solanaceae						
Capsicum annuum L.	*Cabe tanjung hijau*	Fruit	Spice, Vegetable	Annual herb	Nt& Ho	0.91
Capsicum annuum L.	*Cabe tanjung merah*	Fruit	Spice, Vegetable	Annual herb	Nt& Ho	0.91
Capsicum annuum L. var. annuum	*Cabe keriting merah*	Fruit	Spice, Vegetable	Annual herb	Nt& Ho	0.91
Capsicum chinense Jacq.	*Cabe gendot*	Fruit	Spice, Vegetable	Annual herb	Nt	0.91
Capsicum frutescens L.	*Cabe rawit hijau*	Fruit	Spice, Vegetable	Annual herb	Nt	0.91
Capsicum frutescens L.	*Cabe rawit merah*	Fruit	Spice, Vegetable	Annual herb	Nt	0.91
Solanum lycopersicum L.	*Tomat merah*	Fruit	Vegetable	Annual herb	Nt	0.91
Solanum melongena L.	*Terong hejo*	Fruit	Vegetable	Annual herb	Native	0.91

Solanum melongena L.	*Terong ungu*	Fruit	Vegetable	Annual herb	Native	0.91
Solanum nigrum L.	*Leunca*	Fruit	Vegetable	Annual herb	Sa, Im, Af, & Ho	1
Solanum tuberosum L.	*Kentang*	Tuber	Vegetable	Perennial herb	Nt& Cp	0.83
Zingiberaceae						
Alpinia galanga (L.) Willd.	*Lengkuas*	Rhizome	Food – Spice, Medicine	Perennial herb	Native	1
Curcuma longa L.	*Kunyit*	Rhizome	Food – Spice, Medicine	Perennial herb	Im	1
Kaempferia galanga L.	*Cikur (kencur)*	Rhizome	Food – Spice, Medicine	Perennial herb	Im & Ho	1
Zingiber officinale Roscoe	*Jahe*	Rhizome	Food – Spice, Medicine	Perennial herb	Im & Ho	1

Note exotic phythocorion: Af=African realm, Sa=Saharo-Arabian realm, Im=Indo-Malesian realm (exclude Java), Au=Australian realm, Nt=Neotropical realm, Cp=Chile-Patagonian realm, Ha=Holarctic realm
Note life form: Herb (B/A)= Herb biennial/annual, Herb (A/P)= Herb annual/perennial, Shrub (PN)= Shrub perennial

Of the 96 plant species sold at the Cibeureum market, vegetables were the most dominant utilization category, with 45 species (47%), followed by fruits or desserts with 20 species (21%), and then spices and medicines with 15 species each (16%). Additionally, there were 10 species that served as combinations of vegetables and spices (see **Figure 5**). According to historical records, Sundanese people have long been more dominant in consuming plant-based proteins rather than animal-based proteins (Iskandar et al., 2023).

Figure 5. *Main use-categories of plant species commonly traded in the Cibeureum market*



Vegetables were the most frequently sold category and were available at nearly every stall in the Cibeureum market. Species with the highest RFC values (0.91 to 1; see **Table 1**) in this category included *Brassica rapa* L. (sosin) from Brassicaceae, *Phaseolus vulgaris* L. (green beans) from Fabaceae, and *Solanum nigrum* L. (*leunca*) from Solanaceae (see **Figure 6**). This further reinforces historical findings that Sundanese people have traditionally relied more on plant-based rather than animal-based protein sources (Iskandar et al., 2023).

Meanwhile, the dessert category was dominated by the Musaceae family, which included various local banana varieties such as *muli*, *bubuyan*, *kapas*, and *kepok* bananas (see **Figure 7**), all commonly consumed as desserts by the local community.

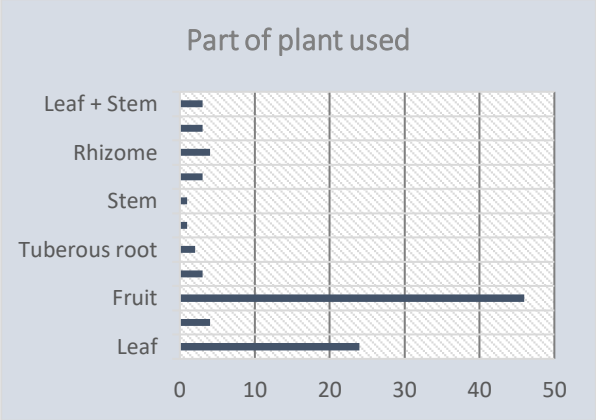
This pattern mirrors other traditional markets, such as Ujungberung and Beringharjo, where vegetables, fruits, and spices are the primary commodities traded (Iskandar et al., 2018, 2021). For instance, at the Ujungberung market, dominant species in the vegetable category numbered 103, followed by spices (58 species) and fruits (39 species). This aligns with the consumption habits of Sundanese people, who prefer fresh vegetables for daily meals, supported by the mountainous geographical conditions that are highly suitable for vegetable cultivation (Iskandar et al., 2018).

Figure 6. *A)* Brassica rapa *L. (sosin), B)* Phaseolus vulgaris *L. (buncis), C)* Solanum nigrum *L. (leunca)*

Figure 7. *Local bananas commonly traded in Cibeureum Market: 1)* Pisang muli*, 2)* Pisang bubuyan*, 3)* Pisang kapas*, 4)* Pisang kepok

Parts of the Plant Used

Figure 8. *Plant Parts Commonly Traded in Cibeureum Traditional Market, West Java, Indonesia*



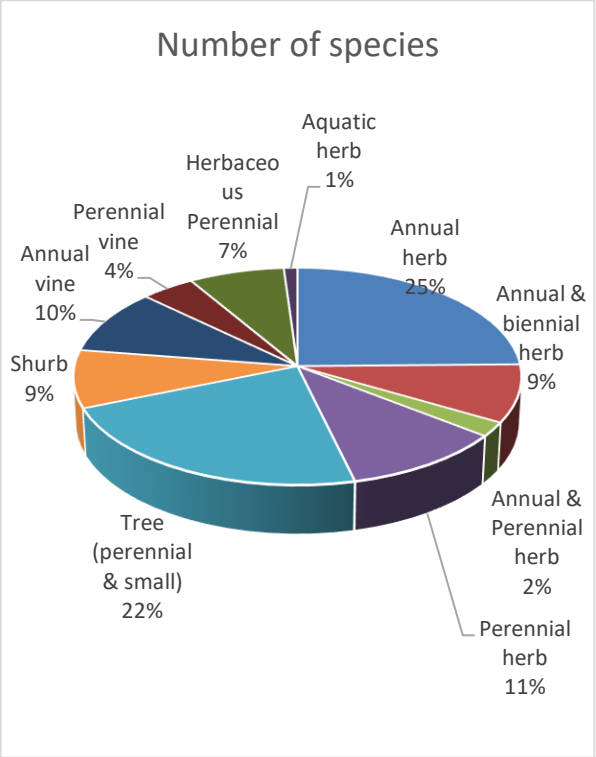
The diversity of plant species in the Cibeureum market was influenced not only by family and category of use but also by the variety of plant parts utilized. Eleven plant parts were used, with fruits being the most common, accounting for 46 out of 96 species (53%), followed by leaves (24 species), and other parts such as rhizomes, tubers, seeds, and stems in smaller numbers (see **Figure 8**). The Fabaceae, Solanaceae, and Musaceae families dominated the utilization of fruit parts, including commodities such as cucumbers, squash, eggplants, tomatoes, and legumes, which are botanically classified as fruits.

Brassicaceae, on the other hand, dominated the use of leaves, for example, in sosin. Leaves are often favored because they can be harvested repeatedly without damaging the plant, supporting conservation practices (Alfinandah et al., 2025; Hendariningrum, 2018). Many vegetable species also serve dual purposes as medicinal plants, reflecting the multifunctional use of plants typical in rural communities (Ammar et al., 2021; Kesuma, 2021). In addition to being consumed, leaves are also used as wrappers and as ingredients in traditional foods (Iskandar et al., 2021; Metananda et al., 2023).

Life Form

Analysis of the life forms of plant products sold in the market revealed that annual herbs were the most dominant group, accounting for 25% of all recorded species, followed by perennial and small trees at 22%, and perennial herbs at 11% (see **Figure 9**). The dominance of annual herbs reflects the preferences of traders and consumers for plants that are easy to grow, quick to harvest, and abundantly available in the surrounding environment. Most annual and perennial herbs are utilized for their leaves, as they can be harvested repeatedly throughout the season, unlike other plant parts such as fruits or flowers, which are more seasonal.

Figure 9. *Distribution of Plant Life Forms*

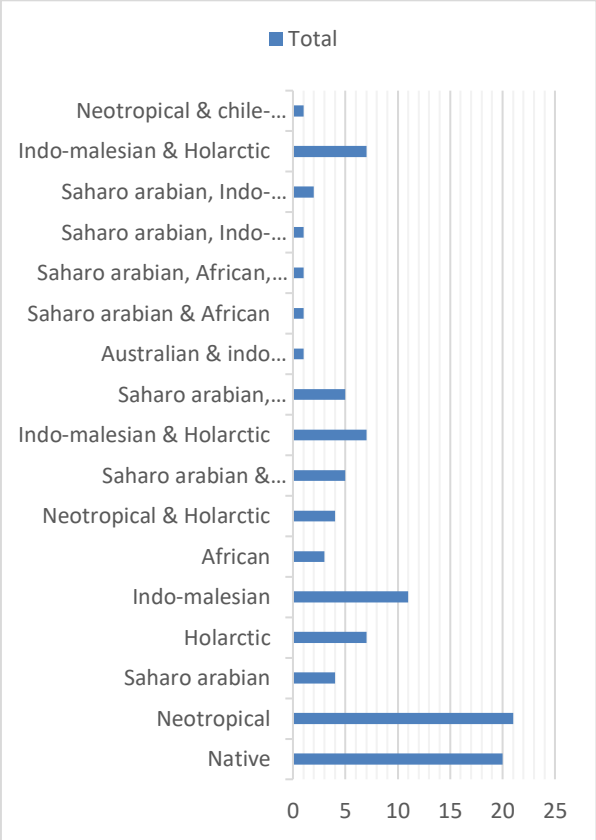


In addition to herbs, other important life forms included annual vines (10%), shrubs (9%), and annual/biennial herbs (9%), which were generally used as sources of fruits, spices, or specific cooking ingredients. Meanwhile, annual vines (10%) and perennial vines (4%) were typically used for seasonal fruits or seeds, such as pumpkins or beans.

Categories with smaller proportions included annual and perennial herbs (2%), herbaceous perennials (7%), and aquatic herbs (1%). Species in these groups tend to have more specialized habitats or limited uses. Overall, the diversity of life forms among market commodities demonstrates the combined use of plants from various vegetation strata, from low herbs to woody trees, to meet food and spice needs sustainably.

Distribution of Plant Biogeographies

Figure 10. *Distribution of native plants*



This study found 21 species originating exclusively from the Neotropical region. In addition, 20 species sold in traditional markets in West Java were native plants, 11 species came from the Indo-Malayan region, seven from the Holarctic region, and seven more from a combination of the Indo-Malayan and Holarctic regions (see **Figure 10**). There were also several species originating from other region combinations, such as Saharo-Arabian, Australian, and Chile–Patagonian. One example from the Neotropical region was *Capsicum annuum* (red chili), which originated in Central and South America.

These findings indicate that, although local commodities still dominate traditional markets in West Java, the diversity of plants sold reflects the integration of global biological resources. The Neotropical region, stretching from southern Mexico to southeastern Brazil, is the origin of many global food crops, some of which were likely introduced to West Java following the Columbian Exchange, the period of global plant exchange after European colonial expansion (Liu et al., 2023). Conversely, the presence of Indo-Malayan–Holarctic and other species with transcontinental distributions may reflect archaeophytes, species introduced before European colonization, such as *Allium cepa* (onion), which was brought via Indianization, Austronesian migration, or trade along the maritime silk route (Liu et al., 2024).

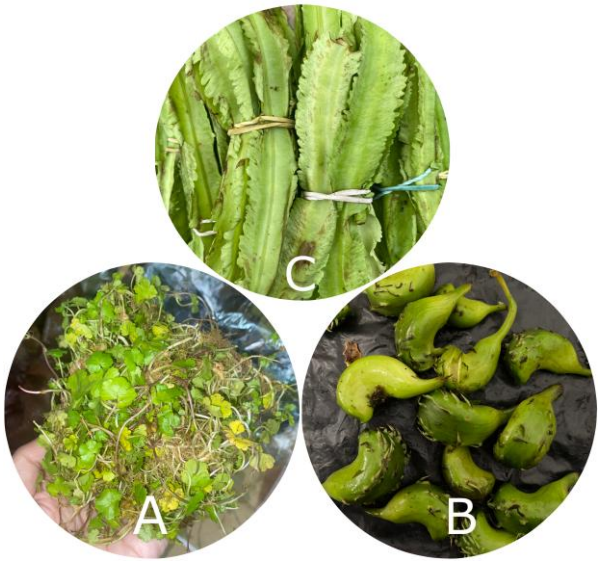
Most of these non-native species are classified as neophytes, plants introduced after the 15th century, either intentionally as food and medicine (e.g., *Solanum lycopersicum* [tomato], *Daucus carota* [carrot]) or unintentionally via trade or transportation (Mulyanto et al., 2023). The presence of these neophytes is closely linked to the colonial history of the Dutch East Indies, which introduced exotic plants through botanical gardens and trade networks (Neswati et al., 2023). On the other hand, a small proportion are archaeophytes that have long been integrated into the local botanical knowledge system, such as *Cocos nucifera* (coconut) and *Oryza sativa* (rice), both of which have been used since the pre-colonial era (Mulyanto et al., 2024b). This proportion underscores that traditional markets in West Java not only serve as distribution centers for local vegetables but also as convergence points for plant diversity from various world regions that have adapted to local culture and consumption practices.

Wild Plants

At Cibeureum Market, there were eight species of edible wild plants: *antanan* (*Centella asiatica*), *bebontengan* (*Cyclanthera brachystachya*), *kecipir/jaat* (*Psophocarpus tetragonolobus*) (see **Figure 11**), *petai cina* (*Leucaena leucocephala*), *eceng* (*Pontederia vaginalis*), *genjer* (*Limnocharis flava*), watercress (*Nasturtium officinale*), and *leunca* (*Solanum nigrum*). This indicates that the market does not only sell cultivated plant commodities. Consistent with the findings of Az and Aulia (2024), several of these species, such as *Centella asiatica*, *Limnocharis flava*, *Nasturtium officinale*, and *Solanum nigrum*, are also sold in other

traditional markets in West Java, with the parts used including leaves, shoots, or fruits.

Figure 11. *Some Examples of Wild Plants: A.* Antanan (Centella asiatica)*, B.* Bebontengan (Leptochloa chinensis)*, C.* Kecipir/jaat (Psophocarpus tetragonolobus)



Historical data show a continuity in the use of some of these species since ancient times. In the Old Javanese Ramayana (9th century), *Centella asiatica* and *Solanum nigrum* are recorded as among the known and utilized species, including in food contexts (Mulyanto et al., 2024a). *Antanan* is also found in traditional markets in Cianjur and is known for its health benefits for the skin and stomach (Iskandar et al., 2020; Sun et al., 2020). Furthermore, *kecipir* is high in protein and nearly all parts of the plant can be utilized (S. et al., 2023). Meanwhile, a study at Ujung Berung Market in Bandung recorded 120 species, some of which are wild varieties, as part of efforts to conserve local food diversity (Iskandar et al., 2018).

These wild plants have good nutritional value, are locally available at low cost, and are linked to the culinary culture of the community. The consumption of *genjer* and *leunca*, for example, has become part of the food tradition in West Java (Iskandar et al., 2023; Mulyanto et al., 2018; Santosa et al., 2015). This is supported by an ethnobotanical study in Cijambu Village, Sumedang, which identified 67 vegetable plant species traded in the market and examined consumer preferences. This reinforces the fact that wild species like genjer and leunca are still regularly traded despite their relatively small share of total consumption (Iskandar et al., 2020).

Thus, several types of wild plants currently available in the market have been recorded in ancient manuscripts, demonstrating the continuity of knowledge and sustainable food practices over centuries in Java. The uniqueness of Cibeureum Market is not only reflected in the diversity of wild plants sold, but also in its social, economic, and cultural functions, which contribute to the preservation of local biodiversity and the revitalization of traditional culinary knowledge.

Socio-cultural Aspects

Based on the research, vegetable traders were predominantly women (64.51%) compared to men (38.7%) (see **Table 2**). These findings indicate that female traders can build a loyal customer base through intensive social interaction, bargaining skills, maintaining product quality, and adapting to market changes. In the field, it was found that the majority were in the productive age range of 30–50 years and played a crucial role in arranging displays, maintaining emotional connections with buyers, and efficiently managing inventory. These findings align with those from Beringharjo Market in Yogyakarta and Brazilian communities, where over 60% of traders were women, and they played a central role in market sustainability through social networks and distinctive sales strategies (da Costa et al., 2021; Supangkat et al., 2021). The same was observed at Panorama Market in Medan, where women were the primary drivers of the fresh commodity trade through relationship-based marketing strategies, maintaining customer loyalty amid modern market competition (Pendapatan et al., 2025).

Table 2. *Socio-cultural Characteristics of Traders in Cibeureum Market*

Category	Percentage (%)
Gender	
Male	38.7
Female	64.51
Age (years)	
20-40	45.16
41-50	35.48
51->60	19.35
Duration of Selling (years)	
5-10	32.25
11-20	32.25

This dominance also affected the economic and social sustainability of the market. As many as 64.5% of traders had been selling for 5–20 years, demonstrating strong business resilience. One of the main reasons for trading was often to help support the family, especially when a husband's income was insufficient, as was also found in Bancah Kapeh Market (Pitri et al., 2024). Meanwhile, some stalls were run by married couples, but husbands typically handled physical work such as purchasing goods at the central market and transporting large quantities of vegetables.

Conclusions

The results of this study indicate that traditional markets not only function as centers of economic activity but also as spaces for interaction that preserve biodiversity, culture, and livelihoods. At Cibeureum Market, 96 plant species from 31 families were recorded, dominated by Fabaceae, Solanaceae, and Brassicaceae, with vegetables as the primary commodity. Most of the plants sold were non-native or globally introduced species, totaling 80 species (83%), while native species accounted for only 20 species (21%). The presence of wild plants and the mix of native and introduced species reflect food security, botanical exchange, and cultural ties within the community. Women play a dominant role in trade, maintaining the market's sustainability and supporting household economies through their experience and marketing skills. The market also serves as a learning platform about the diversity and cultural connections of food plants. Thus, the Cibeureum Market functions as a center for biocultural conservation that integrates ecological resources, cultural identity, and socio-economic resilience, making its preservation crucial amid the tide of modernization.

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