Ethnobotany and the structure of Home garden in Pujon Sub-distict Malang Regency, East Java Indonesia

Tika Putri Agustina, Hasmiati, Musma Rukmana and Fernando Andre Watung

Tika Putri Agustina[1]*, Hasmiati[1], Musma Rukmana[1] and Fernando Andre Watung[1]

[1]Department of Biology, Manado State University, Indonesia

*Corresponding Author: tika_agustina@unima.ac.id

Ethnobotany Research and Applications 27:31 (2024) - http://dx.doi.org/10.32859/era.27.31.1-32
Manuscript received: 14/02/2024 – Revised manuscript received: 20/08/2024 - Published: 21/08/2024

Research

Abstract

Background: Indonesia's rich biodiversity supports and cultural practices, especially in Java, where ethnic groups have unique ethnobotanical knowledge. The present study aimed to assess the ethnobotany knowledge of home garden in Pujon Sub-district.

Methods: The research involves a plant inventory and ethnobotanical data collection. Plants will be quantified and identified, and ethnobotanical information will be gathered through structured and semi-structured interviews with home garden owners. Scoring, using the Pebble Distribution Method, will occur in Focus Group Discussions. Statistical analysis will be performed with IBM SPSS Statistics 29.0.1.0.

Results: A total of 385 plant species were identified in the study. The Pebble Distribution Method (PDM) resulted in a home garden landscape value of 16. According to the Shannon-Wiener index, gardens that are closer to road access and those that are smaller in size exhibit higher plant diversity. The Kruskal-Wallis test found no significant differences in the Index of Cultural Significance (ICS) values among different home gardens ($p = 0.763$). Similarly, the Mann-Whitney test revealed no significant differences in ICS values between genders ($p = 0.856$). Additionally, the Spearman rank correlation test showed no significant correlation between ICS values and the Importance Value Index (IVI) ($p = 0.147$).

Conclusions: This research documents the local knowledge regarding the utilization and management of species within home gardens, that can be utilized to address future strategic issues such as mitigating global warming, conserving biodiversity, identifying new medicinal resources, and food security.

Keywords: Ethnobotany; Ethnobotany, Home garden Structure, Pujon Sub-district, East Java, Indonesia.

Background

As one of the countries with the highest biodiversity in the world, Indonesia boasts a wide array of endemic plant species that support its diverse ecosystems, ranging from rainforests to savannas. This rich biodiversity is not only crucial for ecological balance but also for the cultural practices of various ethnic groups in Indonesia (Partasasmita *et al.* 2016).

On the island of Java, different sub-groups have developed unique ethnobotanical knowledge over centuries. These sub-groups, including the Tenggerese, Osing, and others, have distinct traditions and practices regarding plant use. For example, the Tengger people, who live around Mount Bromo, utilize local plants for medicinal purposes, religious ceremonies, and daily life (Geertz, 1960).

Home gardens, typically enclosed spaces near houses that contain a variety of plants and often include homes and animal pens, play a significant role in these communities (Verheij & Waaijenberg, 2008). Ethnobotanical studies have reported that the management patterns of these home gardens vary across different regions in Indonesia. These patterns generally depend on needs, socio-cultural conditions, customs, education, physical factors, and local ecology (Andriansyah et al., 2015; Mengitu & Fitamo, 2016; Whitney et al., 2017). Research on home gardens has been extensive in Indonesia, with diverse results due to differences in ethnicity and geographical conditions. Each ethnic group has its own culture, and each environmental condition has unique flora and fauna.

Home gardens in Java are renowned for their high biodiversity, comprising various plants and animals that benefit the owners (Soemarwoto, 1992). Previous studies have documented the types of plants used for food and spices (Bejo et al., 2019; Elfrida *et al.* 2020; Robi et al., 2019; Rohmatullayaly & Irawan, 2022), medicinal purposes (Sari et al., 2015; Silalahi, 2015; Agustina et al., 2022), and ornamentation (Sihombing et al., 2015; Krisnandika, 2023) across different regions of Indonesia.

Pujon Sub-district, an area in East Java, has experienced significant growth in the tourism sector. Effective local government management has earned Pujon Sub-district recognition as a tourism village by the Indonesia Ministry of Villages. Its topography, including hilly and mountainous areas, contributes to its appeal as a tourist destination and enhances its agricultural productivity (Central Statistics Agency of Malang Regency, 2018). According to local government reports, the number of visitors to Pujon Kidul village increased from 26,133 in 2016 to 497,654 in 2018, indicating the rising popularity of this area as a tourist destination (Lestari, 2019).

While tourism can boost the local economy by providing new sources of income, it also poses threats to local culture, including local ethnobotanical knowledge (Sunlu, 2003 & Shahzalal, 2016). Several ethnic groups in Indonesia have experienced degradation of local knowledge, with the utilization of biological resources being more economically motivated rather than based on traditional knowledge and beliefs (Partasasmita et al., 2016). The shift towards commercial agriculture to meet tourist preferences, such as growing ornamental plants instead of traditional crops, can erode traditional knowledge about medicinal plants and other valuable flora. Although the economic benefits of increased tourism are undeniable, it is crucial to balance this growth with efforts to preserve and document traditional knowledge.

Specific research focusing on the Javanese people living in the Pujon Sub-district has yet to be conducted, especially in analyzing the relationship between local ecological conditions and cultural practices that shape home garden structures and plant use. This study aims to describe how different land uses lead to the formation or development of home gardens in the Pujon Sub-district, investigate the spatial and functional organization of these gardens, examine how cultural practices and traditional knowledge influence the composition and management of home gardens, document the various types of plants found in these gardens and their uses, explore the role of home gardens in household economy and local livelihoods, and assess the contribution of home gardens to local biodiversity and ecological sustainability.

Materials and Methods

Study area

This study was conducted in Pujon Sub-district, Malang Regency, East Java, Indonesia. The study area is geographically located between 112° 26'113"—122° 28'923" east longitude and 7° 52'203''—7° 49'373" south latitude (Muttaqin 2014). Pujon Sub-district covers a total area of 13,075.144 hectares. The residential area, including its yards, is 454.20 hectares (Central Statistics Agency of Malang Regency, 2018). Pujon Sub-district is one of the Sub-districts in Malang Regency. It is situated in a highland area with mountainous terrain and steep slopes, at an elevation ranging from 1,000 to 2,500 meters above sea level (masl). Due to this elevation, Pujon Sub-district experiences an annual rainfall ranging from 1,620 mm to 2,756 mm. More than 90% of this rainfall occurs over a six-month period, from November to April, while less than 10% falls between May and October (Kurniawan et al., 2010). The 10 villages in Pujon Sub-district are Bendosari, Madiredo, Ngabab, Ngroto, Pandesari, Pujon Kidul, Pujon Lor, and Sukomulyo (Figure 1). In Pujon Sub-district, there are five distinct landscapes: (1) Forest are protected areas managed by the Indonesia Ministry of Environment and Forestry, where logging is prohibited; (2) Fallow land is production forest areas that can be leased by the community for growing crops such as coffee, vegetables and grass; (3) Dry land is rain-fed agricultural land used primarily for cultivating fruit trees like oranges, apples, coffee, and

guavas, but also for various vegetables and crops; (4) Fields are lands with efficient irrigation systems mainly used for growing rice, though some also support vegetable cultivation; and (5) Home garden is areas adjacent to homes where various plants are grown and used for livestock and other household activities.

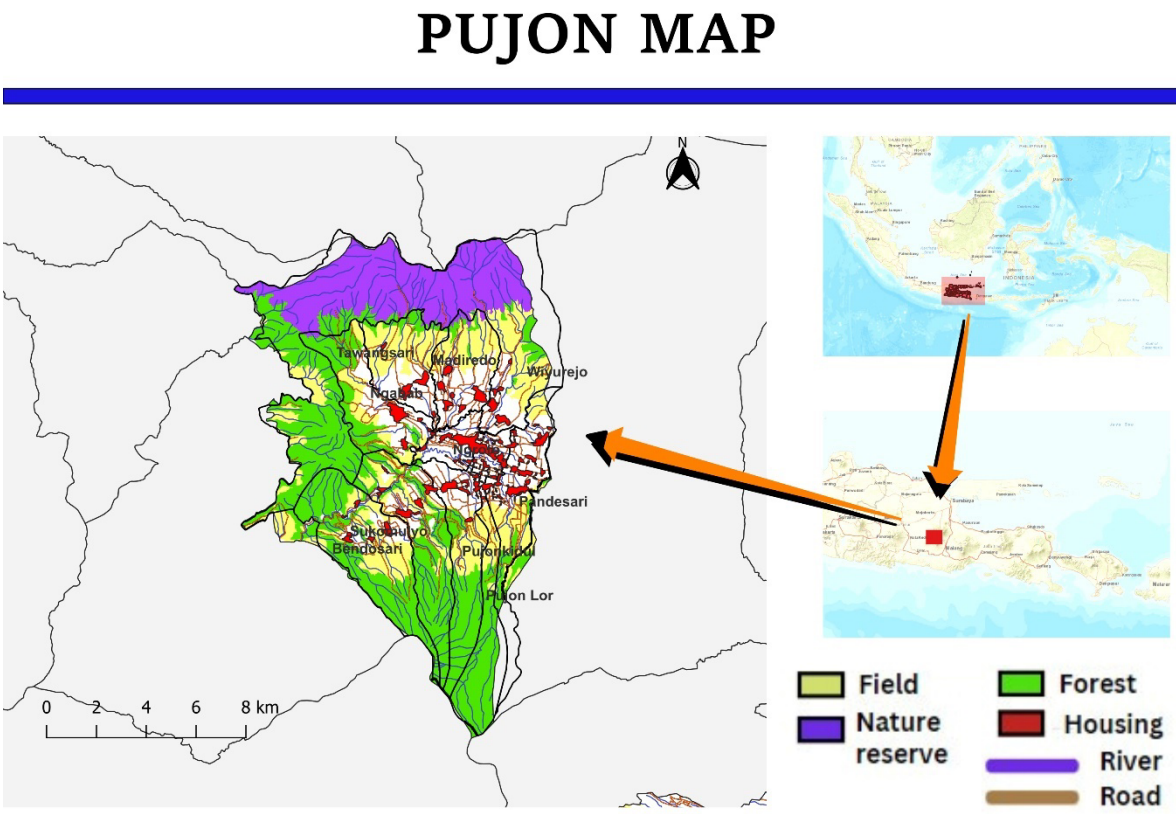

Figure 1. Map of the Research Area

Data collection

To determine the research locations, key informants with expertise in the environmental and geographical conditions of these areas were utilized. These key informants provided information about the environmental conditions and the estimated sizes of home gardens in each village. Based on these criteria, the first type of key informant selected was the village chief in each village within the Pujon Sub-district. Subsequently, each village chief nominated two individuals who have the most comprehensive understanding of their respective villages. Thus, the total number of key informants amounts to 30 individuals (three in each village).

Using the information provided by the key informants, literature review, and field surveys, home garden sampling was conducted using stratified random sampling based on environmental conditions, as shown in Table 1:

Table 1. Distribution of Home Gardens Based on Environmental Conditions and Villages

No	Village	Near the River	Near the Road	Near the Forest
1	Pujon Lor	9	8	1
2	Ngabab	7	-	5
3	Sukomulyo	5	1	-
4	Wiyurejo	4	-	-
5	Bendosari	3	-	9
6	Ngroto	2	7	1
7	Pandesari	-	11	-
8	Pujon Kidul	-	2	11
9	Tawangsari	-	1	1

10	Madiredo	-	-	2
		30	30	30

A total of 90 home gardens with a combined area of 27,465 m² have been designated as research sites. This number is considered sufficient because the types of plants found started to become repetitive. The figure includes 30 home gardens situated near rivers, with a total area of 8,616 m²; 30 home gardens located near roads, with a total area of 9,769 m²; and 30 home gardens near forests, with a total area of 9,060 m² (Table 2.). The categorization of home garden sizes uses the tertile method to divide the home gardens into three groups. The home garden measurements were taken using a measuring tape.

Table 2. The Number and Area of Sampled Home Gardens

Size of home garden	Near the River	Near the Road	Near the Forest	Total area
	The total area of home garden			
Big (575-423 m^2)	2551	3600	2631	8782
Medium (422-270 m^2)	3427	2880	2035	8342
Small (269-117 m^2)	2638	3309	4394	10341
Total area	8616	9789	9060	27465

In each sampled home garden, the number of individual plants of each species is counted, and their names are recorded. For any species whose scientific botanical name is unknown, specimens are collected for identification at the Biology Laboratory of Muhammadiyah Malang University, Indonesia.

The collection of local community knowledge regarding home gardens and the utilization of plants within these gardens was carried out through interviews with garden owners, using both structured and semi-structured interviews (Martin 1995; Amberber 2014; Berihun & Mola 2017). Questions in the semi-structured interviews were prepared beforehand but remained flexible during the interview (Martin 1995; Hakim 2014). These questions included topics such as the length of residence in the village, the use and origin of plants in the home garden, the purpose of creating the garden (Carvalho 2013), the function of the garden, inputs and outputs from the garden, issues in garden management, and the use of products derived from the garden (Kehlenbeck & Maass 2004).

To evaluate the types of plants in each category for scoring purposes, group scoring activities were conducted using the Pebble Distribution Method (PDM) (Sheil *et al.* 2004). A total of 45 respondents participated in the Focus Group Discussion, consisting of 15 people from each environmental condition. The criteria for respondents in the scoring activity were based on age categories as used by Idohou *et al.* (2014) and Gbedomon *et al.* (2015), with informants divided into three age categories: young informants aged <30 years, adult informants aged 30-60 years, and elderly informants aged >60 years (Table 3).

Table 3. The distribution of informants that participated in Focus Group Discussion (FGD)

Location of	Man			Woman			Total
Homegarden	Young	Adult	Old	Young	Adult	Old	
	<30 Yo	30-60 Yo	>61 Yo	<30 Yo	30-60 Yo	>61 Yo	
Near the river	3	3	2	2	2	3	15
Near the road	3	3	3	2	2	2	15
Near the forest	3	3	3	2	2	2	15

The Focus Group Discussion addressed the categorization of plant uses in home gardens and their importance levels. First, scoring was done on the use categories obtained from the interviews with garden owners. Subsequently, respondents were asked to select plants that had been grouped based on their use categories (food, clothing, shelter, medicine, etc.). Focus group discussion also evaluates the importance of the landscape in Pujon Sub-district. The scoring activity was conducted in groups according to the gender and age category of the respondents. Further scoring was also carried out on the types of plants within each use category.

To obtain more detailed information regarding the use of plants in home gardens, three plants with the highest PDM scores in each category were selected. Key informants were then chosen to provide information about local knowledge regarding these plants. These key informants were individuals who were knowledgeable about the utilization of plants in home gardens. A total of six key informant that are elders or shamans who frequently use plants for traditional medicine and cultural ceremonies were selected, consisting of one male and one female from each environmental condition. Data was obtained from these key informants through ICS (index cultural of significance).

Data Analysis

Important value index (IVI)

From the collected data, frequency and density can be calculated. This is possible because most of the plants found in the research location are herbs and seedlings. The importance value is calculated by summing the relative frequency (FR) and relative density (kR) (Widhaningsih 1992). To calculate the relative frequency and relative density, the following formulas are used:

$$\text{K Individual Density} = \frac{\text{Number of Individual}}{\text{Sample plot area}}$$

$$\text{Relative Density KR} = \frac{\text{K}}{\text{Total density of all species}} \text{ x } 100\%$$

$$\text{Frequency F} = \frac{\text{Number of the species plot}}{\text{Total number of plot used}}$$

$$\text{Relative Frequency FR} = \frac{\text{F}}{\text{Total frequernсy of all species}} \text{ x } 100\%$$

Plant Diversity Index (H')

To assess the level of floral diversity in the yards, the Shannon-Wiener index was employed (Kent, 1950; Barbour et al.1998). The Shannon-Wiener index is commonly used as an indicator of plant community diversity. The comparison of home garden diversity was conducted for each environmental condition and home garden size category within each condition. Plant diversity was calculated using the Shannon-Wiener formula (1949) as follows: H'= - ∑ Pi x ln Pi; where H'= Shannon-Wiener Index; Pi = Proportion of individuals of a species in the sample. The criteria for Shannon-Wiener index values range from 0-7, with values between 0-2 considered low, 2-3 moderate, and >3 high.

Index Cultural of Significance (ICS)

To determine the importance of each type of useful plant based on community needs, it is measured using the Index of Cultural Significance (ICS). The ICS value is calculated based on usability and cultural value. The informant gave a score to each species of garden plant based on quality, intensity and exclusivity values. This activity was carried out by looking at the categorization table of the utility value of each type of garden plant used by the community. The formula for calculating the Index of Cultural Significance (ICS) is as follows:

$$ICS = \sum_{i=1}^{n} (q \; x \; i \; x \; e)_{ni}$$

Statistical analysis

Collected data were statistically analysed using IBM SPSS Statistics 29.0.1.0. ICS value between different condition of home garden and between gender were analysed using Kruskal Wallis. The Spearman rank statistical test is used to determine the relationship between the ICS value and the IVI value of the plant in home garden.

Results and Discussion

Landscape Importance and Utilization in Pujon Sub-district

Communities in Pujon Sub-district categorize the landscape into five groups: (1) forest, (2) dryland, (3) fallow land, (4) fields, and (5) home gardens, with each unit holding significant importance for them (Figure 2). The Pebble Distribution Method (PDM) indicates that residents near road access and close to the forest prioritize fields as the most important landscape unit, due to the fact that 65% of the area is covered by rice fields and many residents are farmers (Pujon Kidul Village Government, 2017). In contrast, the village of Karangwangi uses a different classification system, dividing the landscape into four agroecosystem types: the huma system, the garden system, the rice field system, and the home garden system (Iskandar & Iskandar 2016). Meanwhile, in Kudus, the Samin community recognizes their local environment based on the shape and function of the land, categorizing it into five units: the home garden, dryland, rice fields, rivers, and swamps (Jumari *et al.*

2012). These varying classification systems reflect the diverse ways in which different regions value and utilize their landscapes.

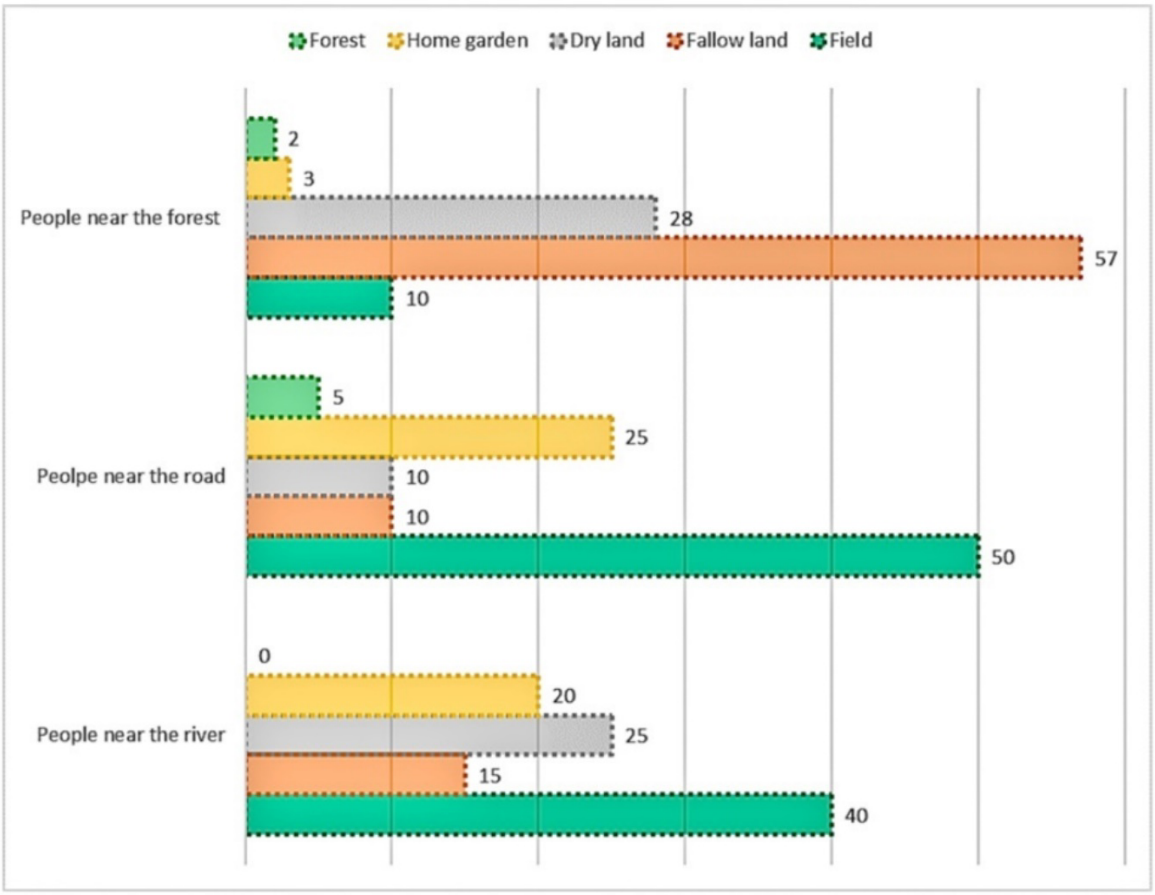

Figure 2. Diagram of landscape important value in Pujon Sub-district

For communities residing near forests, fallow land holds paramount importance. Fallow land refers to production forest areas that can be utilized by the community under specific conditions regulated by forestry authorities. Typically obtained through leasing, fallow land in Pujon Sub-district is predominantly used for cultivating crops such as coffee, vegetables, and particularly *suket gajah* (*Panisetum purpureum*). According to the Central Statistics Agency of Malang Regency (2015), the protected forest area in Pujon Sub-district covers 6,423.60 hectares, while the production forest spans 3,157.80 hectares. The extent of production forest correlates with the availability of fallow land.

Dryland, or rainfed agricultural land, is primarily utilized by the community in Pujon Sub-district for cultivating fruit crops like oranges, apples, coffee, and guavas. Additionally, various types of vegetables and crops are also cultivated on drylands, thereby diversifying agricultural practices in the region. Home gardens have become a significant landscape for the community in Pujon Sub-district, especially those near road access. Residents near roads often utilize their home gardens for selling ornamental plants. These gardens also serve as buffers against pollution and heat in the relatively hot and polluted settlements along the roads. Conversely, residents near forests and rivers, which offer cooler and less polluted environments, have fewer incentives to cultivate plants for pollution filtering.

Characteristics of Home Gardens in Pujon Sub-district

In Pujon Sub-district, 19 home gardens are situated in front of houses, while the remaining gardens are located in various other areas including the left, right, and back of the properties (see Figure 3). Of the 90 home gardens surveyed, only eight are not positioned in front of the houses. Interviews reveal that placing gardens in front of homes is a common practice, encouraged by village chiefs who hope that such gardens will attract tourists. This practice aligns with the community-based eco-tourism approach followed in Pujon Sub-district. Research by Ira & Muhammad (2020) in Pujon Kidul Village emphasizes that residents preserve the original spatial layout, environmental aesthetics, traditional architectural styles, and local rural

culture. Notably, the home garden is considered a unique and authentic element of rural spatial planning (Putri et al., 2016).

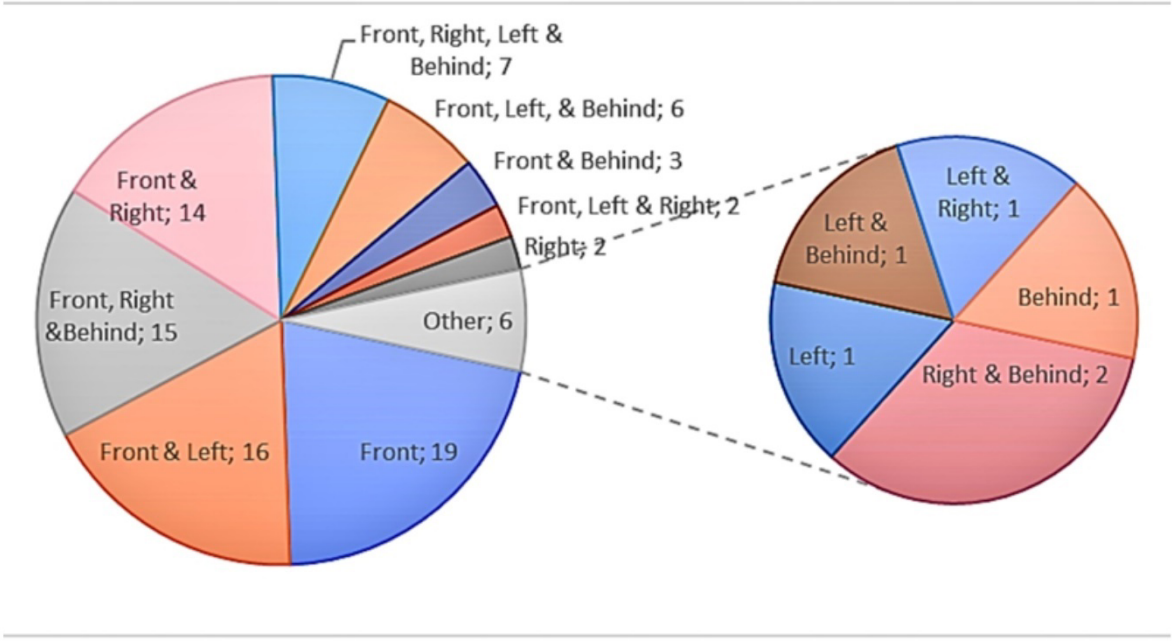

Figure 3. The position of home garden toward the house

The horizontal and vertical distribution of home gardens in Pujon Sub-district is illustrated in Figures 4,5, and 6 Typically, the front section of home gardens is adorned with various ornamental and boundary plants (living fences). On the left and right sides, a variety of vegetables, medicinal plants, or fruit trees are commonly found. The backyard is often cultivated with a diverse range of trees, including bananas and guavas, while plants like taro are frequently grown near drainage channels or behind the house.

Similar patterns of horizontal distribution have been observed in other studies. In Vietnam, for instance, ornamental plants are typically planted in front of houses, medicinal and herbal plants on the sides, and fruits at the back (Trinh et al., 2001). A comparable pattern is also evident in home gardens in Kopendukuh, Banyuwangi Regency, East Java, where ornamental plants are in the front, a mix of ornamental and fruit plants on the sides, and various plants at the back, often including tall, large trees (Sihombing et al., 2015). Variations in plant distribution have been described in different regions, such as Bukoba district in Tanzania and Catalonia in the Iberian Peninsula (Rugalema et al., 1994; Agelet et al., 2000).

Carvalho *et al.* (2013) suggest that the horizontal distribution of gardens is influenced by plant functions, resulting in divisions such as ornamental plants at the front, medicinal and food-producing plants at the back, fruits near the house, timber plants farther away, and shade plants in front for fencing. However, in Pujon Sub-district, while some similarities exist, such as ornamental plants in front and herbs or vegetables on the sides, variations are observed in tree planting. Not all houses plant trees behind or on the sides; some on hillsides plant trees in front for windbreaks.The geographic location of houses in Pujon Sub-district also influences planting behaviors. Furthermore, religious and cultural beliefs play roles in shaping the composition and diversity of tropical gardens (Akinnifesi et al., 2010). For instance, in Bali, moringa trees (*Moringa oleifera*) are planted in front of kitchens to deter evil spirits (Hazrinah et al., 2016).

Beyond plant cultivation, home gardens in Pujon Sub-district also serve for livestock and fish rearing (Peyre et al., 2006; Yulida, 2012). Livestock pens are typically built for larger animals like goats and cows, with smaller animals like poultry and rabbits enclosed with bamboo partitions. Chickens are often allowed to roam freely in kitchen areas. These practices align with findings from Nuevo Triunfo, Peru (Coomes & Ban, 2004), and Bogor Regency, Indonesia (Azra et al., 2014), where livestock freely roam for fertilization.

In Pujon Sub-district, residents often place cattle or goat pens behind their houses, and fish ponds are commonly found in front. Dairy cows are predominant. Moreover, home gardens are utilized for beekeeping, with beehives known locally as *gumbung* made from hollowed tree trunks, is placed in the forest to attract a bee colony. The timing for placing the *gumbung* in the forest is determined by local customs and specific days. Once a bee colony is acquired, the *gumbung* is brought home

and hung from the roof of the house. In conclusion, home garden utilization and arrangement in Pujon Sub-district are influenced by geographic conditions, economic status, and cultural beliefs, resulting in diverse management practices

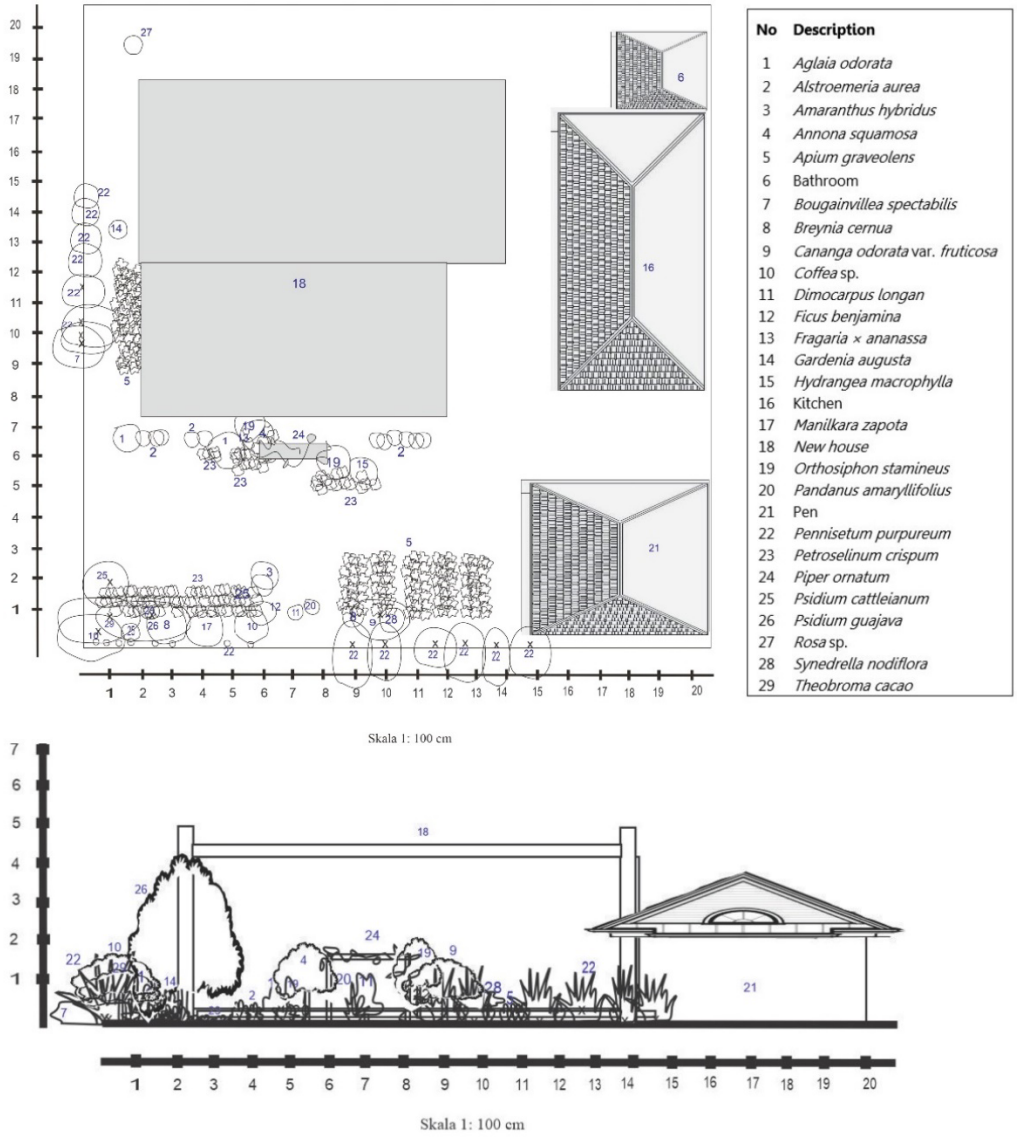

Figure 4. Horizontal and vertical structure of big size home garden (423 m2-820 m2) in Pujon Sub-district

In the Pujon Sub-district, most home gardens exhibit a relatively simple vertical structure, predominantly featuring a lower stratum dominated by herbaceous plants such as vegetables, medicinal herbs, and ornamental plants. This pattern mirrors the findings of Agelet *et al.* (2000) in Catalonia, where home gardens also display a less complex vertical arrangement. Despite this simplicity, the home gardens in Pujon can be categorized into three distinct strata: Tree Stratum: This includes plants over six meters tall, such as fruit trees and wood-producing species, which are relatively few and typically planted near rivers to help control soil erosion. Shrub Stratum: Comprising plants ranging from 1.5 to 6 meters in height, this layer includes various ornamental and fruit plants. Herbaceous Stratum: Featuring plants less than 1.5 meters tall, this stratum encompasses ornamental, vegetable, and medicinal plants.

In contrast, home gardens in Upper Assam, India, display a more complex vertical structure with five strata: Emergent (>20 m), Canopy (>10-20 m), Understorey (>5-10 m), Shrub (1-5 m, including tree saplings), and Ground (<1 m, including seedlings of both trees and shrubs) (Saika et al., 2012). Similarly, home gardens in Mexico have a five-level vertical structure: herbaceous stratum (<0.5 m), lower shrub stratum (0.5-1.5 m), tall shrub stratum (1.5-3 m), lower tree stratum (3-6 m), and tall tree stratum (6-12 m). In Brazil, the vertical structure varies with an upper stratum (7-12 m), mid-stratum (3-7 m), and

lower stratum (1-3 m) (Huai & Hamilton, 2009). These differences in vertical garden structures highlight how factors such as culture, location, geographical conditions, garden age, and size influence home garden design.

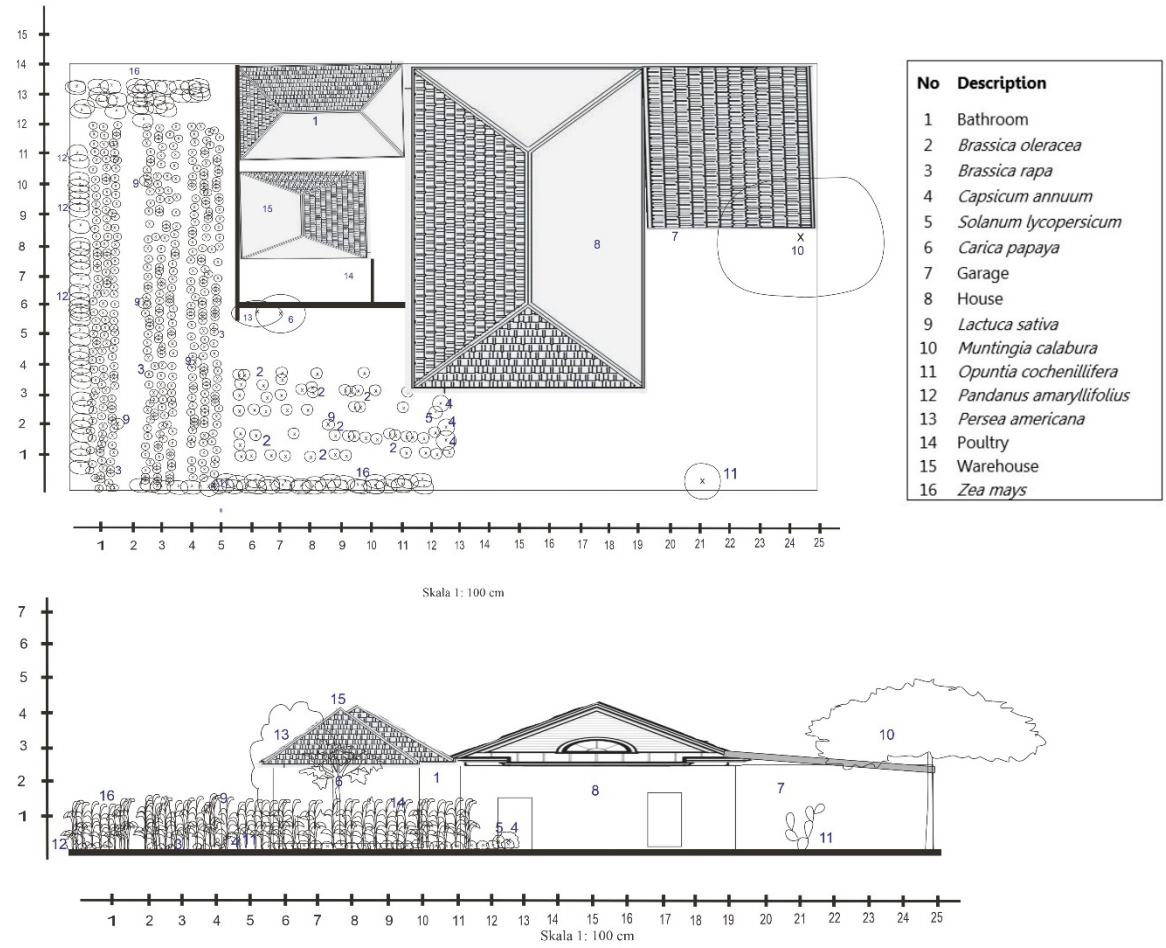

Figure 5. Horizontal and vertical structure of medium size home garden (270 m2-422m2) in Pujon Sub-district

Management of Home Garden

As a small-scale traditional agroforestry system, home gardens are typically managed by family members. Placing home gardens around the house provides several advantages, including easy access to fresh produce, saving time, money, and energy. Owners can conveniently control the use of chemicals in plant care, and the proximity to residential areas has positive environmental impacts.

In the Pujon Sub-district, home garden management involves general activities such as planting, maintenance, and harvesting. Planting begins with clearing the garden area of previous plants, which are usually dried and either burned or stored for kitchen fuel. The next step is soil preparation, involving digging and creating furrows if necessary, and mixing the soil with organic fertilizer like compost or manure, sometimes with added chemical fertilizers. Planting is typically performed by both male and female family members. Women usually select the plant species for cultivation, but in large-scale vegetable farming, this decision is often made by the head of the household, typically a man. The size of the garden influences the choice of species to be planted. This phenomenon is also observed in gardens in São Luís City, Maranhão State, Brazil, where garden size and available planting area play a significant role in determining plant species (Akinnifesi et al., 2010).

Children play a minor role in managing home gardens. In Pujon Sub-district, the dominant role in gardening is determined by the type of plant and its intended function. In home gardens where vegetables are grown for sale, men typically handle the management. In contrast, women usually manage gardens planted with ornamental plants intended for personal enjoyment. However, when ornamental plants are cultivated for sale, both men and women equally share the management responsibilities. This finding differs from the observations of WinklerPrins & de Souza (2005), Mekonen (2015), and Ortiz-

Sánchez *et al.* (2015), who suggest that women generally dominate home garden management, including decisions on plant types, layout, planting times, and task assignments.

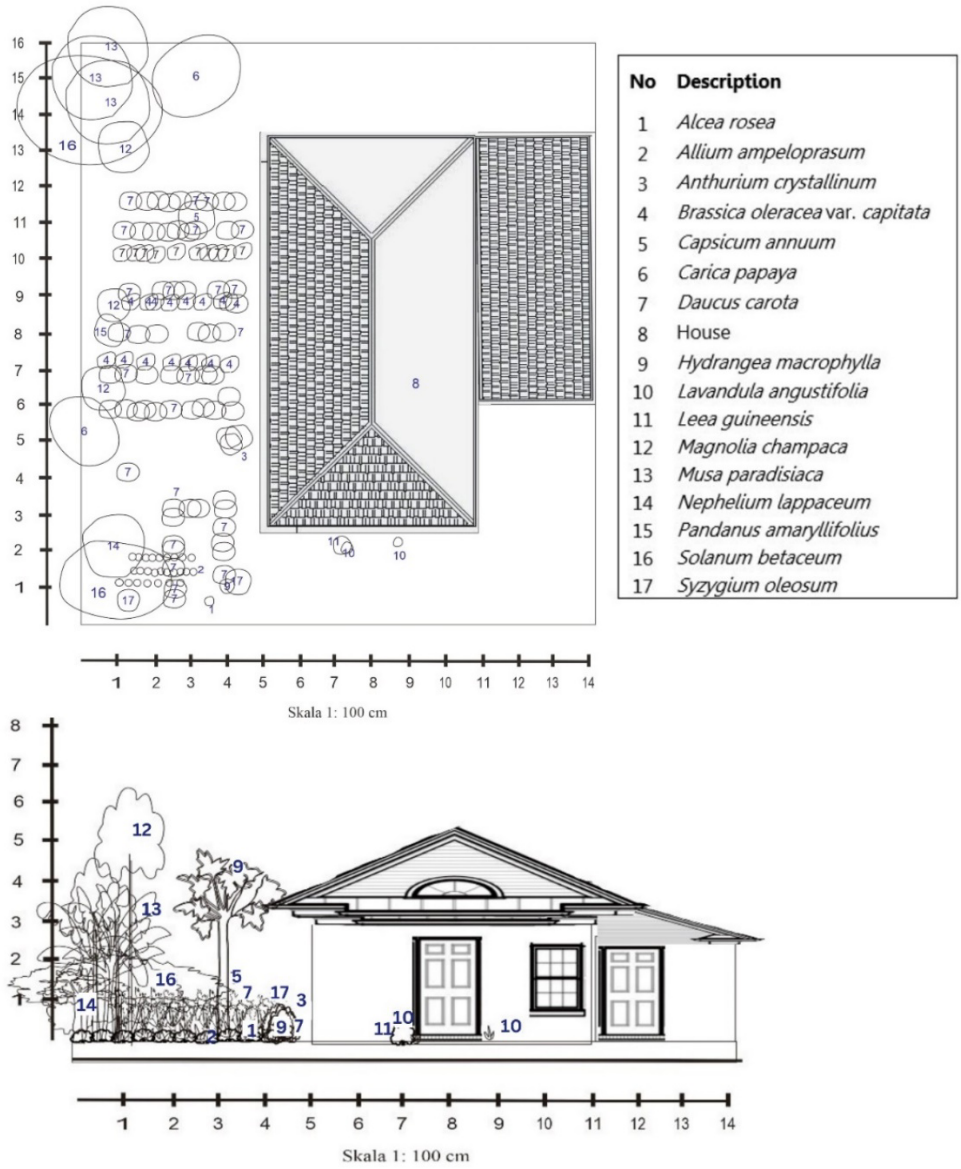

Figure 6. Horizontal and vertical structure of small size home garden (116 m2-269 m2) in Pujon Sub-district

The management of ornamental and vegetable plants is quite similar. Before planting, the soil is mixed with manure. The plants are usually watered daily when young and then weekly as they mature. However, flower sellers tend to water their plants daily. Ornamental plants are fertilized approximately every six months. If there is any leftover chemical fertilizer from the fields, it is added to the less fertile ornamental plants in home garden. Challenges in managing home gardens include pests like caterpillars, butterflies, snails, and aphids. Aphids are treated with pesticides and soap, while caterpillars, snails, and butterflies are sprayed with regular pesticides. Caterpillars found on avocado trees are left alone because it is believed that more caterpillars lead to more abundant fruit. In some areas, grass is allowed to grow around vegetables to protect them from fog, which usually causes wilting. This is only done when vegetables are mature; grass around young carrots (*Daucus carota*) must be trimmed, or the leaves will not open, and the tubers will not grow large.

As a tourist destination, it's not surprising that the Pujon Sub-district government beautifies the characteristic rural landscape, including home gardens. Some villages implement regulations for managing home gardens, distributing plant seedlings to residents and requiring them to plant ornamental, vegetable, and medicinal plants, such as *Coffea* sp., *Persea americana*, *Fragaria × ananassa*, *Eupatorium capillifolium*, and *Allium ampeloprasum*. To motivate residents, village governments often organize environmental beautification competitions. Most home gardens in Pujon Sub-district are well-

maintained. The shift from conventional tourism to special interest tourism is closely linked to increased development activities in rural areas. This special interest tourism model tends to indicate that tourists have a greater appreciation for the environment, nature, and culture (Priyanto & Safitri, 2015). One prevalent form of special interest tourism is ecotourism, particularly the village-based tourism model, which involves preserving spatial arrangements, environmental beauty, traditional structures, and local culture (Andriyani et al., 2017). Therefore, the initiative by the Pujon Sub-district government to empower home gardens is highly appropriate to support tourism in the Pujon Sub-district. Considering that one distinctive and picturesque form of spatial arrangement in rural areas is the home garden (Putri et al., 2016).

Plant Diversity in Home Garden in Pujon Sub-district

A total of 385 plant species 269 genus belong to 95 family were identified in this research. 276 species were found in home garden near the river, while 284 species were discovered in the home garden near the road access, and 316 species were observed in the home garden near the forest.

The Shannon-Wiener diversity index (H') for plant species in home gardens located near highway access, near the forest, and near the river is 3.67, 3.88, and 3.39, respectively (Table 4). Despite the gardens near the forest having the highest number of plant species, they exhibit the smallest diversity index. This discrepancy arises because the Shannon-Wiener index not only considers species richness at a specific site but also reflects the distribution of species abundance. As Djufri (2003) explains, a high number of species does not necessarily translate to a high diversity index. The species diversity index is more influenced by the variation in importance values for each species in each sampling unit.

Table 4. Plant species diversity index in the home garden of Pujon Sub-district based on environmental conditions and size.

Categorize of home garden based on their location	Wide average	H' Total		
		River	Road	Forest
H' Total	-	3.39	3.88	3.30
Big home garden	423 m^2-820 m^2	3.08	3.24	3.02
Medium home garden	270 m^2-422m^2	2.29	2.48	2.01
Small home garden	116 m^2-269 m^2	3.19	3.99	3.20

Many home gardens in the Pujon Sub-district are used for cultivating large quantities of vegetables, which impacts the H' value in gardens near the forest. Vegetables grown in large quantities include *Apium graveolens* with 1,792 individuals per hectare, *Allium ampeloprasum* with 1,427 individuals per hectare, *Lactuca sativa* with 3,452 individuals per hectare, and *Zea mays* with 3,607 individuals per hectare. Gardens near the forest are often utilized for vegetable or seedling cultivation, either for personal consumption or for sale. Some gardens are specifically dedicated to seedling cultivation, known locally as *ndeder*, with these seedlings (*dederan*) used personally or sold to other farmers.

A similar pattern is observed in home gardens near the river, but fewer gardens there are used for vegetable cultivation. Gardens near the river often feature a variety of tree species, especially along the riverbanks. The emphasis on tree vegetation in these gardens helps protect against soil erosion. The roots of trees bind the soil, preventing it from being washed away during heavy rains or floods, acting as a natural barrier against erosion. Gardens near the road have the highest H' value because they primarily focus on growing ornamental plants, both for sale and to attract tourists. Additionally, the distribution of species abundance in these gardens is relatively even, as there are fewer plants cultivated in very large quantities, such as agricultural crops.

Based on their size, small home garden exhibit high species diversity, followed by large home garden and medium-sized home garden This pattern is consistent across all three types of gardens, whether they are near road access, by the river, or near the forest. Small home gardens are the most diverse because they focus on planting a variety of ornamental and useful plants due to limited space. Larger home gardens are often dedicated to economic activities, cultivating large quantities of specific vegetables like *Brassica rapa*, *Allium ampeloprasum*, and *Capsicum annuum*. However, there is still space for ornamental plants, strategically placed near roads as living fences with plants such as *Duranta erecta*, *Hibiscus rosa-sinensis*, *Pluchea indica*, and *Dracaena fragrans* to protect economic crops. Medium-sized home gardens have the lowest diversity, as owners often prioritize planting economic crops like vegetables, leaving little room for other plants.

In the Pujon Sub-district, vegetables are commonly grown in large quantities but are limited to specific types, while ornamental plants are cultivated in smaller quantities but include a variety of species, making small home gardens more diverse compared to larger vegetable gardens. Conversely, in Ethiopia, small gardens generally show lower diversity as households focus on a few highly useful plant species, while large gardens often include space for additional activities like livestock rearing and recreation, leading to less plant diversity (Mengitu and Fitamo, 2015). Bernholt *et al.* (2009) note that the species richness and diversity of home gardens are influenced by factors such as garden size, the gardener's ethnic background and gender, and socioeconomic conditions. Overall, plant species richness and diversity vary widely among home gardens, with both complex multi-layered gardens and simpler monocultures present, which could impact long-term sustainability since diversity is crucial for maintaining positive agroecosystem functions (Krishnal & Weerahewa, 2014).

Index of Cultural Significance (ICS) and Important Value Index (IVI)

Home gardens provide vital biological resources used for decoration, food, and medicinal purposes. Additionally, species in home gardens serve various other functions such as firewood, compost, supplementary income, rituals, cultural symbols, shade, animal feed, crafts, fencing, and as indicators of social status (Lope-Alzina & Howard 2012). In the Pujon Sub-district, plants in home gardens are categorized into thirteen uses based on the Pebble Distribution Method (PDM): Food (PDM: 13.3); Vegetables (PDM: 11.6); Spice and condiment (PDM: 9.4); Fruits (PDM: 8.6); Beverages (PDM: 8.1); Medicinal (PDM: 7.9); Animal feed (PDM: 7.7); Ornamental (PDM: 7.6); Construction material (PDM: 7.1); Ritual (PDM: 6.5); Fencing (PDM: 5.3); Dye (PDM: 4.6) and Nuisance plants (PDM: 2.3)

Similar results were found in research conducted by Wakhidah & Silalahi (2020) in Tanjungan, Tanggamus Regency, Indonesia, where thirteen categories of plant uses in home gardens were identified. This contrasts with the categorization of plant uses in home gardens in Sajang village, Sembalun, East Lombok, where the community categorizes plants into ornamental plants, fruits, vegetables, and medicinal plants (Swandayani *et al.* 2016). The categorization of plants in home gardens depends on local knowledge within the community, resulting in varying uses and quantities. However, for the community in Pujon Sub-district, the primary benefit of home gardens is to generate a source of food from both plants and animals.

The Index of Cultural Significance (ICS) is computed to assess the cultural importance of plants across various categories. Through discussions with informants, the most significant plants in each category were identified. A total of 39 plants were selected, and their ICS values were determined by considering their cultural importance within the specified categories. Based on the Kruskal-Wallis test, the obtained Asymp. Sig value of 0.763, which is higher than 0.05, indicates that the ICS values among home gardens near the river, forest, and road do not differ significantly. Similarly, the Mann-Whitney test shows no significant difference in ICS values between women and men, with an Asymp. Sig (2-tailed) value of 0.853, also higher than 0.05. The lack of significant differences suggests that the shared cultural knowledge likely stems from a common Javanese ancestry, facilitating the transmission of similar traditional practices.

Although overall differences in ICS values are not significant, a detailed analysis reveals variations in local knowledge based on proximity to different environments. For example, *Cocos nucifera* (coconut) shows higher ICS values among residents living near the forest compared to those residing near roads or rivers (see Table 5). This suggests that the community near the forest has a more extensive understanding of the uses of this plant species. On average, the community near the forest exhibits the highest ICS values, indicating a broader knowledge of the 39 plant species compared to those near rivers or roads. This community appears to use these species more frequently. Conversely, residents near the road have the lowest ICS values, which may be due to less frequent use of these plants in their daily lives. This lower utilization could be related to easier access to public services such as healthcare, markets, and shopping centers, or a gradual decline in traditional knowledge about these plants.

Plants with multiple uses tend to have higher ICS values. The cultural significance of biological resources varies across cultures due to differences in intensity, quality, and exclusivity of species usage within communities. A plant with a high ICS value in one location may not necessarily have the same value in another (Helida *et al.* 2015). Various studies in different Indonesian communities, including those in Sumbermanjing Wetan (Pamungkas and Hakim 2013), the lowland forest of Bodogol, Sukabumi (Rahayu *et al.* 2012), the Kerinci Seblat National Park (Helida *et al.* 2015), and Pariman City, West Sumatra (Hulyati *et al.* 2014), demonstrate this variability in ICS values.

The lack of significant differences in ICS values between males and females can be attributed to the absence of gender-based restrictions on certain activities, such as cooking. Although cooking is traditionally associated with women, men in Pujon

Sub-district also actively participate in this activity. Similarly, in traditional medicine, both men and women can serve as village healers without facing gender constraints.

The Spearman rank correlation test reveals a significance value (2-tailed) of 0.243, indicating no significant correlation between ICS values and IVI. This implies that the cultural significance of certain plants, such as coconut and banana, does not necessarily align with their abundance in home gardens. For instance, despite its high ICS value, coconut is found in only a few home gardens with a low IVI because it is primarily sourced from markets and the environmental conditions in Pujon Sub-district are not ideal for its growth. In contrast, bananas, which hold the second-highest ICS value, are frequently cultivated in home gardens across the region. This suggests that extensive local knowledge about a plant's usefulness does not directly impact the quantity of that plant cultivated. Instead, economic factors play a significant role in determining the IVI. Crops with higher economic value, such as *Allium cepa* (onions), *Zea mays* (corn), and *Daucus carota* (carrots), are grown in larger quantities by the community due to their income-generating potential.

Home Gardens in Pujon Sub-district: Multifaceted Benefits and Roles

Home gardens are crafted to fulfill a wide range of social, cultural, and economic needs—including providing sustenance, medicinal resources, aesthetic value, spiritual significance, animal feed, firewood, and income generation—and offer substantial benefits to residents (Kunwar & Bussmann 2008; Musotsi *et al.* 2008; Purnomo 2009; Pala *et al.* 2010; Bajpai *et al.* 2013; Papp *et al.* 2013; Swandayani *et al.* 2016; Shukla *et al.* 2017). In the Pujon Sub-district, plants in home gardens are categorized into thirteen functional groups: Food, Vegetables, Spices and Condiments, Fruits, Beverages, Medicinal, Animal Feed, Construction Materials, Ritual Uses, Fencing, Dye, and Nuisance Plants. This extensive classification underscores how home gardens in Pujon Sub-district not only meet economic and nutritional needs but also enhance understanding of the distribution of cultivated species. Home gardens are indeed a vital source of nutrition and economic support, enriching local knowledge about plant cultivation (Abebe 2005; Abdoellah *et al.* 2006; Uzokwe *et al.* 2016; Da Cunha Ávila 2017).

In the Pujon Sub-district, home gardens play a crucial role in meeting families' nutritional needs by providing a variety of fresh and healthy vegetables, including *Brassica rapa, Brassica oleracea, Daucus carota, Sechium edule*, and *Phaseolus vulgaris*. They also offer staple foods such as *Zea mays* (corn), *Manihot utilissima* (cassava), *Alocasia macrorrhizos* (taro), and *Canna edulis* (edible canna), as well as beverages like *Coffea* sp. (coffee) and *Zingiber officinale* (ginger). Additionally, these gardens supply a range of fruits, including *Musa x paradisiaca* (banana), *Citrus reticulata* (orange), *Malus sylvestris* (apple), and *Persea americana* (avocado). Some fruit trees, such as *Artocarpus heterophyllus* (jackfruit), are also utilized for their wood, while other wood-producing plants like *Bambusa* sp. (bamboo) and *Eucalyptus polyanthemos* are cultivated within these gardens.

The home gardens in Pujon Sub-district also serve as sources of various culinary spices. Spices such as *Capsicum annuum*, *Allium cepa*, *Andropogon nardus*, *Syzygium polyanthum*, and *Cinnamomum burmanni* are used to add flavors, aromas, and colors in cooking. In addition to adding flavor, these spices are also used to eliminate unpleasant odors from food (Silalahi 2017). Wild plants growing in home gardens, including *Galinsoga parviflora*, *Sinapis* sp., and *Crassocephalum crepidioides*, are frequently consumed by Pujon Sub-district residents. Less commonly consumed wild plants, such as *Portulaca oleracea*, *Oxalis corniculata*, and *Oxalis articulata*, are often avoided due to their sour taste. The use of wild or uncultivated plants as vegetables is less common because they often have a tougher texture, a more acidic or bitter taste, and smaller size compared to cultivated vegetables (Silalahi *et al.* 2017). Wild plants are only used when available in sufficient quantities, to add variety to diets, or for specific health benefits. However, the limited cultivation of wild plants and preference for cultivated vegetables over wild plants, which are more economically valuable and easier to grow, may accelerate the loss of local knowledge and biodiversity.

Home gardens in Pujon Sub-district play a crucial role in providing animal protein. Some households raise rabbits and chicken for daily consumption. Many residents, who are also cattle breeders, consume fresh cow's milk, often processed with sugar and ginger (*Zingiber officinale*) to enhance taste and provide a warming effect. The integration of gardens and livestock contributes to self-sufficiency in food sources. These findings are consistent with the research of Titisari *et al.* (2012) on the rural landscape in Bendosari Village, Pujon Sub-district, where locals use the areas around their homes for gardens and livestock, aiming for self-sufficiency in food sources.

Table 5. The Index of Cultural Significance (ICS) and IVI

Family	Species	Local name	ICS	ICS	ICS	∑ Woman's ICS	∑ Man's ICS	∑ ICS	IVI
			Forest	Road	River				
Acoraceae	*Acorus calamus* L.	*Dringu*	36.00	38.00	36.00	38.00	35.33	36.67	0.81
Amaryllidaceae	*Allium cepa* L.	*Brambang*	34.50	27.00	23.25	32.50	24.00	28.25	2.66
Annonaceae	*Cananga odorata* var. *fruticosa* (Craib) J.Sinclair	*Kenongo*	10.00	7.00	11.50	12.33	6.67	9.50	0.24
Apiaceae	*Daucus carota* L.	*Wartel*	7.50	22.25	23.75	19.67	16.00	17.83	4.47
Araceae	*Colocasia antiquorum*	*Tales*	10.00	15.00	10.00	10.00	13.33	11.67	0.39
Arecaceae	*Cocos nucifera* L.	*Klopo*	85.50	69.75	60.25	75.83	67.83	71.83	0.08
Asparagaceae	*Dracaena angustifolia* (Medik.) Roxb.	*Pandan wiji*	3.00	10.50	4.50	5.50	6.50	6.00	0.33
Asteraceae	*Pluchea indica* Less	*Luntas*	14.00	7.50	26.00	14.67	17.00	15.83	0.32
Brassicaceae	*Brassica rapa* subsp. *pekinensis*	*Sawi putih*	14.00	20.50	12.50	15.67	15.67	15.67	0.41
Brassicaceae	*Brassica oleracea* var. *capitata*	*Gobes*	10.50	16.25	11.75	11.83	13.83	12.83	0.41
Convolvulaceae	*Ipomoea batatas* (L.) Lam.	*Telo rambat*	13.50	6.50	12.00	11.83	9.50	10.67	0.22
Cyperaceae	*Cyperus rotundus* L.	*Suket teki*	4.50	18.00	3.00	5.50	11.50	8.50	3.10
Euphorbiaceae	*Manihot utilissima*	*Pohong*	24.50	33.50	23.00	27.50	26.50	27.00	1.59
Fabaceae	*Calliandra calothyrsus* Meisn.	*Kaliandra*	10.50	11.50	11.50	11.67	10.67	11.17	0.49
Lamiaceae	*Tectona grandis* L.f.	*Jati*	6.00	5.00	10.00	8.67	5.33	7.00	0.04
Lauraceae	*Persea americana* Mill.	*Pukat*	26.00	27.75	24.50	24.83	27.33	26.08	0.47
Malvaceae	*Hibiscus rosa-sinensis* L.	*Ribang*	9.00	5.25	4.00	6.00	6.17	6.08	0.38
Musaceae	*Musa × paradisiaca* L.	*Gedhang*	70.00	54.75	64.25	55.17	70.83	63.00	1.38
Myrtaceae	*Eucalyptus polyanthemos* Schauer	*Eucalyptus*	16.00	14.50	8.00	12.00	13.67	12.83	0.05
Myrtaceae	*Syzygium oleina* Wight	*Pucuk merah*	3.00	2.50	3.50	3.00	3.00	3.00	0.75
Oleaceae	*Jasminum sambac* (L.) Aiton	*Melati*	8.00	15.00	7.50	9.33	11.00	10.17	0.32
Orchidaceae	*Vanda tricolor* Lindl.	*Anggrek vanda*	3.00	3.00	3.00	3.00	3.00	3.00	0.73
Piperaceae	*Piper betle* L.	*Suroh*	26.98	31.00	33.20	31.66	29.13	30.39	0.68
Poaceae	*Andropogon nardus* L.	*Sere*	36.00	30.00	33.00	34.00	32.00	33.00	1.00
Poaceae	*Bambusa* sp.	*Pring*	20.00	26.50	48.25	29.50	33.67	31.58	0.35

Poaceae	*Cynodon dactylon* (L.) Pers.	*Suket grinting*	20.50	2.50	4.50	8.50	9.83	9.17	0.25
Poaceae	*Eleusine indica* (L.) Gaertn.	*Suket Lulangan*	4.50	4.50	5.25	5.00	4.50	4.75	1.92
Poaceae	*Imperata cylindrica* (L.) Raeusch.	*Alang-alang*	9.00	6.00	12.50	12.33	6.00	9.17	0.25
poaceae	*Pennisetum purpureum* Schumach & Thonn	*Suket gajah*	16.50	20.00	11.50	17.50	14.50	16.00	0.81
Poaceae	*Zea mays* L.	*Gandum*	28.50	41.25	32.75	40.83	27.50	34.17	14.35
Rosaceae	*Malus sylvestris* (L.) Mill.	*Apel*	20.00	26.00	17.75	17.33	25.17	21.25	0.81
Rosaceae	*Rosa* sp.	*Mawar*	7.00	15.00	12.50	13.00	10.00	11.50	1.27
Rubiaceae	*Coffea* sp.	*Kopi*	24.50	52.00	33.75	29.33	44.17	36.75	1.39
Rutaceae	*Citrus reticulata* Blanco	*Jeruk keprok*	17.00	18.00	9.00	15.50	19.00	17.25	0.71
Solanaceae	*Capsicum annuum* var. *longum*	*Lombok gede*	6.00	21.00	13.50	20.00	7.00	13.50	0.71
Solanaceae	*Capsicum frutescens* L.	*Lombok cilik*	30.00	31.50	46.50	36.00	36.00	36.00	10.69
Verbenaceae	*Duranta erecta* L.	*Cemiti*	9.00	6.50	5.00	7.00	6.67	6.83	0.49
Zingiberaceae	*Curcuma longa* L.	*Kunir*	52.50	41.81	37.88	43.13	45.00	44.06	0.32
Zingiberaceae	*Zingiber officinale* Roscoe	*Jahe*	44.00	39.00	29.91	24.10	51.17	37.64	0.33

Plants in Pujon Sub-district's home gardens are also utilized as food natural dyes. Preferred by the local community, dyes are obtained from plants like *Curcuma longa*, *Capsicum annuum*, *Ipomoea batatas*, *Dracaena angustifolia*, and *Pandanus amaryllifolius*. *Apium graviolens* is used for green coloring and aroma enhancement, while dried banana leaves, known as klaras, are used for black coloring by burning them until charred and then pounding them.

The home gardens in the Pujon Sub-district also serve as a source of materials for ritual activities. For example, plants such as *Rosa* sp., *Piper betle*, *Jasminum sambac* and *Cananga odorata* are used. A variety of flowers are also integral to the customary ritual known as *kembang borah*. This ritual involves presenting an assortment of flowers, notably *Jasminum sambac* and *Magnolia champaca*. The arrangement of these offerings is typically entrusted to mature women or those who have reached menopause. This practice is based on the community's belief that improper arrangement of offerings could lead to infertility for the individual responsible. In addition to flowers, staple foods like rice, cassava, and sweet potatoes are also utilized for ritual purposes. Furthermore, certain spices, such as *Curcuma longa*, are employed in ceremonial practices. *Musa × paradisiaca* and *Cocos nucifera* are frequently included in wedding offerings. The fruits of these plants are significant in ceremonies, while their leaves are used both as containers for offerings and as decorative elements. Similar practices are observed among the Rejang people in Indonesia. The Rejang utilize plants like *Cocos nucifera*, *Curcuma longa, Cylea barbata, Piper nigrum, Alpinia galanga, Citrus aurantifolia, Zingiber officinale, Arenga pinnata*, and *Setaria italica* for their rituals (Zikri et al., 2017).

In Pujon Sub-district, home gardens are important sources of medicinal plants, used to treat minor ailments such as external wounds, fever, cough, and colds. Common medicinal plants found in these gardens include *Andrographis paniculata*, *Piper betle*, *Acorus calamus*, *Anredera cordifolia*, and *Curcuma aeruginosa*. Despite the availability of adequate healthcare facilities, some community members still rely on traditional medicine. Certain ailments, especially those believed to have supernatural causes, are often treated with plants like *Acorus calamus* and *Moringa oleifera*. Traditional healers are recognized as experts for more specific or severe conditions, possessing the necessary knowledge for effective treatment. The use of traditional remedies reflects the local communities' unique insights into plant utilization, shaped by geographical and cultural differences. This traditional knowledge is typically passed down through generations, often learned by specific individuals like village healers (Wardiah *et al.* 2015). In rural areas, particularly among women, the practice of planting medicinal plants is common and effective for treating various diseases without incurring high costs (Bajpai *et al.* 2013). Research by Sari *et al.* (2015) on the use and cultivation of medicinal plants in the yards of West Java, Central Java, East Java, and Bali indicates that mothers often carry out the cultivation of medicinal plants, having inherited this knowledge through generations.

Therefore, home gardens in Pujon Sub-district not only provide medicinal resources but also play a crucial role in conserving biological diversity and preserving local knowledge. The presence of specific plant species in these gardens helps maintain traditional knowledge about their uses. Research by Raj *et al.* (2018) supports this, indicating that species with multiple uses may be threatened by unrestricted harvesting from their natural environments. However, cultivating these plants in home gardens can enhance their chances of conservation.

Home gardens in Pujon Sub-district also serve as psychological refuges, offering tranquility and peace for their owners. Residents often gather in their gardens with family after work, while children use them as playgrounds. These gardens provide a space for gardening enthusiasts and allow the elderly to engage in daily gardening activities, fulfilling their desire to work on farmland despite health limitations. The plant resources in home gardens are used as basic food ingredients, help provide cool air, and improve environmental quality (Pamungkas et al., 2013), making them a comfortable place to gather with family and neighbors.

One of the primary goals of home gardens in Pujon Sub-district is to attract visitors. The rapid tourism development earned Pujon Kidul village the Agro Tourism Village award from the Indonesia Ministry of Villages. This significant growth has also encouraged other villages to join in the tourism industry. The designation of Pujon Sub-district as a tourist area has driven the village government to actively manage the rural landscape. As part of this effort, home gardens are being revitalized, and competitions for cleanliness and environmental beauty are held among neighborhoods, hamlets, and villages. Winners of these competitions express pride and happiness, which boost motivation for garden management.

The Pujon Sub-district government is focusing on increasing the variety of ornamental plants, vegetables, and fruits. Ornamental plants, known for their vibrant colors and attractive flowers such as *Rosa* sp., *Vanda tricolor*, *Jasminum sambac*, and *Hydrangea macrophylla*, enhance visual appeal and attract more tourists. Roses and jasmine are also common in the

home gardens of Purwodadi Regency, East Java, along with *Hibiscus rosa-sinensis* and *Sansevieria trifasciata* (Oktavianti & Hakim, 2013). However, this development has both positive and negative effects. On the positive side, it creates a more uniform and organized appearance for Pujon Sub-district's rural environment. On the negative side, is that this practice reduces the number of local plants grown in home gardens. This decline can undermine the role of home gardens as conservation areas for local plant species, potentially leading to a loss of local knowledge within the community.

Another significant benefit of home gardens in Pujon Sub-district is their role as a supplementary income source. Residents treat their home gardens like farmland, cultivating plants not only for personal consumption but also for sale. Some intentionally manage their gardens to increase their income, while others benefit indirectly when their neighbors' plants are in demand for purchase. Those who intentionally sell plants from their gardens offer a variety, including ornamental plants, fruits, and vegetables. The vegetables grown are usually similar to those cultivated in fields for easier management, as they require similar treatments such as fertilizers and harvesting schedules. Gardens also serve as sites for seedling production, either for sale or for replanting in personal fields. Consequently, plants from home gardens are typically sold as seedlings, vegetables, or fruits.

Home gardens in Pujon Sub-district also provide livestock feed, including *Pennisetum purpureum* and corn stems and leaves (*Zea mays*). Nuisance plants like *Cyperus rotundus* and *Dactylon cynodon* are also used as animal feed. *Cyperus rotundus* tubers have economic value, occasionally ordered by middlemen for medicinal and cosmetic purposes, priced at IDR 45,000 per kilogram. *Dactylon cynodon* is believed to have the ability to ward off lightning; during thunderstorms, individuals may carry a piece of it in their pocket to avoid lightning strikes.

Home gardens in Pujon Sub-district not only yield various food sources but also provide ecosystem services like soil retention, especially for houses built on steep slopes. The community continues to plant valuable and beneficial plants, often nurturing those significant to the family (Agbogidi & Adolor 2013). Thus, home gardens in Pujon Sub-district serve as places for conserving local biodiversity and preserving local knowledge on plant utilization.

Conclusion

The home garden landscape in Pujon Sub-district is shaped by a mix of environmental, economic, and cultural factors. Tourism has increased the variety of plants, particularly ornamental and vegetable species, in these gardens. However, there is concern that this trend might displace local ornamental plants and medicinal herbs, potentially diminishing the community's traditional knowledge. Understanding these dynamics is essential for sustainable landscape management and community well-being. This assessment provides valuable insights into agroforestry systems and landscape dynamics across different cultural and geographical contexts

Declarations

List of abbreviations: N/A

Ethics approval and consent to participate: The data were collected with respect to confidentiality, anonymity and we obtained oral informed consent from the respondents who were informed about the aim of this study before the interviews.

Consent for publication: Not applicable

Availability of data and materials: Request for data can be directed to the first author

Competing interests: The authors declare that they have no competing interests.

Funding: -

Author contributions: TPA collected the data and wrote the first draft while H, MR and FAW read and corrected the manuscript.

Acknowledgements

We extend our deepest gratitude to Dr. Nisyawati, M.S. and Prof. Dr. Eko Baroto Walujo, M.Sc for their invaluable and constructive feedback on this research. We greatly appreciate the engaging and insightful discussions we had

Literature cited

Abdoellah OS, Hadikususmah HY, Takeuchi K, Okubo S, Parikesit. 2006. Commercialization of homegardens in an Indonesian village: vegetation composition and functional changes. Agroforestri System 68: 1-13.

Agbogidi OM, Adolor EB. 2013. Home gardens in the maintenance of biological diversity. Appllied Science Report 1(1): 19-25.

Abebe T. 2005. Diversity in homegarden agroforestri system of Southern Ethiopia. Thesis. Wageningen University.

Agelet A, Bonet MA, Valles J. 2000. Homegardens and their role as a main source of medicinal plants in mountain regions of catalonia (iberian peninsula). Economic Botany 54 (3): 295-309.

Akinnifesi FK, Sileshi G, da Costa J, de Moura EG, da Silva RF, Ajayi, Linhares JFP, Akinnifesi AI, de Arauj M, Rodrigues MAI. 2010. Floristic composition and canopy structure of home-gardens in São Luís city, Maranhão State, Brazil. Journal of Horticulture and Forestry 2(4): 72-86.

Amberber M, Argaw M, Asfaw Z. 2014. The role of homegardens for in situ conservation of plant biodiversity in Holeta Town, Oromia National Regional State, Ethiopia. International Journal of Biodiversity and Conservation 6(1): 8-16.

Andriyani AAI, Martono E, Muhamad. 2017. Pemberdayaan masyarakat melalui pengembangan desa wisata dan implikasinya terhadap ketahanan sosial budaya wilayah (Studi Di Desa Wisata Penglipuran Bali). Jurnal Ketahanan Nasional 23(1): 1-16.

Andriansyah SN, Lovadi I, Linda R. 2015. Keanekaragaman jenis tanaman pekarangan di desa Antibar kecamatan Mempawah Timur kabupaten Mempawah. Protobiont 4(1): 226-235.

Azra ALZ, Arifin HS, Astawan M, Arifin NHS. 2014. Analisis karakteristik pekarangan dalam mendukung penganekaragaman pangan keluarga di Kabupaten Bogor. Jurnal Lanskap Indonesia 6(2): 1-11.

Bajpai S, Sharma AK, Kanungo VK. 2013. Traditional home gardens: A preserve of medicinal plants. International Journal of Herbal Medicine 1(2): 152-162.

Barbour MG, Burk JH, Pitts WD, Gilliam FS, Schwartz MW. 1998. Terrestrial plant ecology. 3rd ed. the Benjamin Cummings Publishing Co. Inc, Menlo Park, US.

Bejo AB, Harmawan T, Mukhtar E, Syamsuardi. 2019. The diversity of wild edible fruit plants and traditional knowledge in West Aceh region, Indonesia. Journal of Medicinal Plants Studies, 7(4), 285–290.

Berihun T, Molla E. 2017. Study on the Diversity and Use of Wild Edible Plants in Bullen District Northwest Ethiopia. Journal of Botany 2017: 1-10.

Bernholt H, Kehlenbeck K, Gabauer J, Buerkert A. 2009. Plant Species Richness and Diversity in Urban and Peri-Urban gardens of Niamey, Niger. Agroforest Syst 77(2009): 159-179.

Carvalho TKN, de Oliveira ADB, de Lucena CM, Pedrosa KM, de Vasconcelos Neto CFA, Alves CAB, Félix LP, Florentino ATN, da Nóbrega Alves RR, de Andrade LA, de Lucena RFP. 2013. Structure and Floristics of Home Gardens in an Altitudinal Marsh in Northeastern Brazil. Ethnobotany Research & Applications 11: 29-48.

Central Statistics Agency of Malang Regency. Luas Kawasan Hutan Menurut Kecamatan Di Kabupaten Malang, 2015. https://malangkab.bps.go.id/statictable/2015/03/19/473/luas-kawasan-hutan-menurut-kecamatan-di-kabupaten-malang-2015.html (Accessed 04/04/2024).

Central Statistics Agency of Malang Regency. Kecamatan Pujon Dalam Angka 2018. 2018. https://malangkab.bps.go.id/publication/2018/09/26/82de7b46c6c9dae4457522ca/kecamatan-pujon-dalam-angka-2018.html (Accessed 04/04/2024).

Coomes OT, Ban N. 2004. Cultivated plant species diversity in home gardens of an amazonian peasant village in Northeastern Peru. Economic Botany 58(3): 420-434.

Da Cunha Ávila JV, de Mello AS, Beretta ME, Trevisan R, Fiaschi P, Hanazaki N. 2017. Agrobiodiversity and in situ conservation in quilombola home gardens with different intensities of urbanization. Acta Botanica Brasilia 31(1): 1-10.

Djufri. 2003. Analisis Vegetasi Spermatophyta di Taman Hutan Raya (Tahura) Seulawah Aceh Besar. Biodiversitas 4(1): 30-34

Elfrida, Mubarak A, Suwardi AB. 2020. Short communication: The fruit plant species diversity in the home gardens and their contribution to the livelihood of communities in rural area. Biodiversitas 21(8), 3670–3675. https://doi.org/10.13057/biodiv/d210833

Geertz, C. 1960. The Religion of java. The University of Chicago Press, Chicago, U.S.

Gbedomon RC, Fandohan AB, Salako VK, Idohou AFR, Kakaï RG, Assogbadjo AE. 2015. Factors affecting home gardens ownership, diversity and structure: a case study from Benin. Journal of Ethnobiology and Ethnomedicine 11(56): 1-15.

Hazrinah ND, Nihayati E, Sitawati. 2016. Culture Effect in Determination of Plants in The Balines Garden. Jurnal Produksi Tanaman 4(3): 240-246.

Hakim. 2014. Etnobotani dan manajemen kebun-pekarangan rumah: ketahanan pangan, kesehatan dan agrowisata. Penerbit selaras perum, Malang, Indonesia.

Helida A, Zuhud EAM, Hardjanto, Purwanto, Hikmat A. 2015. Index of cultural significance as a potential tool for conservation of plants diversity by communities in The Kerinci Seblat National Park. Jurnal Manajemen Hutan Tropika 21 (3): 192-201.

Huai H, Hamilton H. 2009. Characteristics and functions of traditional homegardens: a review. Frontiers of Biology in China 4(2): 151-157.

Hulyati R, Syamsuardi, Arbain A. 2014. Studi etnobotani pada tradisi balimau di Kota Pariaman, Sumatera Barat. Jurnal Biologi Universitas Andalas 3(1): 14-19.

Idohou R, Fandohan B, Salako VK, Kassa B, Gbèdomon RC, Yédomonhan H, Kakaï LG, Assogbadjo AG. 2014. Biodiversity conservation in home gardens: traditional knowledge, use patterns and implications for manajemen. International Journal of Biodiversity Science, Ecosystem Services & Manajemen 10(2): 89-100.

Ijinu TP, Anish N, Ahiju H, George V, Pushpangadan P. 2011. Home garden for nutritional and primary health security of rural poor of South Kerala. Indian Journal of Traditional Knowledge 10(3): 413-428

Ira WS, Muhammad. 2020. Partisipasi Masyarakat pada Penerapan Pembangunan Pariwisata Berkelanjutan (Studi Kasus Desa Wisata Pujon Kidul, Kabupaten Malang). Jurnal Pariwisata Terapan 3(2): 124-235.

Iskandar J, Iskandar BS. 2016. Etnoekologi dan pengelolaan agroekosistem oleh penduduk Desa Karangwangi Kecamatan Cidaun,Cianjur Selatan Jawa Barat. Jurnal Biodjati 1(1): 1-12.

Jumari, Setiadi D, Purwanto Y, Guhardja E. 2012. Etnoekologi masyarakat Samin Kudus Jawa Tengah. Bioma 14(1): 7-6.

Kehlenbeck K, Mass BL. 2003. Crop diversity and classification of homegardens in Central Sulawesi, Indonesia. Agroforestri System 63: 53—62.

Kent M. 1950. Vegetation description and data analysis: a practical approach. 2nd ed. John Wiley & Sons, Oxford, U.K

Krishnal S, Weerahewa J. 2014. Structure and species diversity of traditional homegardens in batticaloa district. The Journal of Agricultural Science 9(3): 139-146.

Krisnandika AAK, Kohdrata N, Dharmadiatmika IMA, Arisena GMK, Gawryszewska BJ. 2023. Diversity of Home Garden Plants in Traditional Tourism Villages. SOCA: Jurnal Sosial Ekonomi Pertanian 17(2): 116-128.

Kunwar WR, Bussmann RE. 2008. Ethnobotany in the Nepal Himalaya. Journal of Etnobiology and Ethnomedicine 4(24): 1-8.

Kurniawan S, Prayogo C, Widianto, Zulkarnain MT, Lestari ND, Aini FK, Hairiah K. 2010. Estimasi Karbon Tersimpan di Lahan-lahan Pertanian di DAS Konto, Jawa Timur. World Agroforestri Centre, Bogor, Indonesia.

Lestrai, FD. 2019. Pengaruh Motivasi terhadap Keputusan Berkunjung: Survei pada Pengunjung Desa Wisata Pujon Kidul , Kabupaten Malang. Skripsi. Universitas Brawijaya.

Lope-Alzina DG, Howard PL. 2012. Structure, compotition, and fungtion of homegardens: focus on the Yucatan Peninsula. Etnocologica 9(1): 17-41.

Martin GJ. 1995. Ethnobotany: A methods manual. Chapman & Hall, London, United Kingdom.

Mekonen T, Giday M, Kelbessa E. 2015. Ethnobotanical study of homegarden plants in Sebeta-Awas District of the Oromia Region of Ethiopia to assess use, species diversity and manajemen practices. Journal of Ethnobiology and Ethnomedicine 11(64): 2-13.

Mengitu M, Fitamo D. 2015. Plant Species diversity and composition of the homegardens in Dilla Zuriya Woreda, Gedeo Zone, SNNPRS, Ethiopia. Plant 3(6):80-86.

Musotsi AA, Sigot AJ, Onyango MOA. 2008. The role of home gardening in household food security in Butere Division of Western Kenya. African Journal of Food Agriculture Nutrition and Development 8(4): 376-390.

Muttaqin T. 2014. Evaluasi kekritisan lahan di kawasan lindung Kecamatan Pujon Kabupaten Malang Jawa Timur dengan teknologi sistem informasi geografis. Jurnal Gamma 10(1): 135-142.

Oktavianti E, Hakim L. 2013. Etnobotani pekarangan rumah inap (homestay) di Desa Wisata Tambaksari, Purwodadi, Pasuruan, Jawa Timur. Journal of Indonesian Tourism and Development Studies 1(1): 39-45

Ortiz-Sánchez A, Monroy-Ortiz C, Romero-Manzanares A, Luna-Cavazos M, Castillo-España P. 2015. Multipurpose functions of home gardens for family subsistence. Botanical Science 93(4): 791-806.

Papp N, Birka´s-Frendl K, Farkas A, Pieroni A. 2013. An ethnobotanical study on home gardens in a Transylvanian Hungarian Csa´ngo´ village (Romania). Genetic Resources Crop Evolution 60: 1423-1432.

Pala NA, Negi AK, Todaria NP. 2010. Traditional uses of medicinal plants of Pauri Garhwal, Uttrakhand. Natural Science 8(6): 57-61.

Pamungkas RN, Indriyani S, Hakim L. 2013. The ethnobotany of homegardens along rural corridors as a basis for ecotourism planning: a case study of Rajegwesi village, Banyuwangi, Indonesia. Journal of Biodiversity and Environmental Sciences 3(8): 60-69.

Pamungkas RN, Hakim L. 2013. Ethnobotanical Investigation to Conserve Home Gardens's Species of Plants in Tambakrejo, Sumbermanjing Wetan, Southern of Malang. The Journal of Tropical Life Science 3(2): 96-103.

Partasasmita R, Iskandar J, Malone N. 2016. Karangwangi people's (South Cianjur, West Java, Indonesia) local knowledge of species, forest utilization and wildlife conservation. Biodiversitas 17(1): 154-161.

Pujon Kidul Village Government. Desa Wisata Pujon Kidul. 2017. http://pujonkidul.desa.id/. (Accessed 02/03/2024).

Peyre A, Guidal A, Wiersum KF, Bongers F. 2006. Dynamics of homegarden structure and function in Kerala, India. Agroforestri System 66: 101-115.

Priyanto, Safitri D. 2015. Pengembangan potensi desa wisata berbasis budaya tinjauan terhadap desa wisata di Jawa Tengah. Jurnal Vokasi Indonesia 4(1): 1-9.

Purnomo. 2009. Studi etnobotani: Pekarangan sebagai sumber pangan di desa Sendangsari, Pajangan, Bantul, Yogyakarta, Prosiding Seminar Nasional Etnobotani IV/Y (381-389). LIPI Press.

Putri WK, Hakim L, Batoro J. 2016. Ethnobotanical Survey of Home Gardens in Pandansari and Sumberejo to Support Ecotourism Program in Bromo Tengger Semeru National Park, Indonesia. International Journal of Research Studies in Agricultural Sciences 2(1): 6-12.

Rahayu M, Purwanto Y, Susiarti S. 2012. Nilai kepentingan budaya keanekaragaman jenis tumbuhan bergunadi hutan dataran rendah bodogol, Sukabumi, Jawa Barat. Berita Biologi 11(3): 313-320.

Raj AJ, Biswakarma S, Pala NA, Shukla G, Vineeta, Kumar M, Chakravarty S, Bussmann RW. 2018. Indigenous uses of ethnomedicinal plants among forest-dependent communities of Northern Bengal, India. Journal of Ethnobotany & Ethnomedicine 14 (8): 1-28.

Robi Y, Kartikawati Am, Muflihati. 2019. Etnobotani Rempah Tradisional di Desa Empoto Kabupaten Sanggau Kalimantan Barat. Jurnal Hutan Lestari 7(1): 130-142.

Rohmatullayaly EN, Irawan B. 2022. Optimalisasi Fungsi Pekarangan untuk Ketahanan Pangan dan Pemenuhan Gizi Keluarga Pada Masa Pandemi Covid-19. Kumawula: Jurnal Pengabdian Kepada Masyarakat 5(2): 373-383.

Rugalema GH, Johnsen FH, Rugambisa J. 1994. The homegarden agroforestry system of Bukoba district, North-Western Tanzania. 2. Constrainsts to farm productivity. Agroforestry Systems 26: 205-214.

Saika P, Choudhury BI, Khan ML. 2012. Floristic composition and plant utilization pattern in homegardens of Upper Assam, India. Tropcal Ecology 53(1): 105-118.

Sari ID, Yuniar Y, Siahaan S, Riswati, Syaripuddin M. 2015. Tradisi Masyarakat dalam penanaman dan pemanfaatan tumbuhan obat Lekat di Pekarangan. Jurnal Kefarmasian Indonesia 5(2): 123-132.

Shahzalal, Md. 2016. Positive and Negative Impacts of Tourism on Culture: A Critical Review of Examples from the Contemporary Literature. Journal of Tourism, Hospitality and Sports 20: 30-34.

Sheil D, Puri RK, Basuki I, van Heist M, Wan M, Liswanti N, Rukmiyati, Sardjono MA, Samsoedin I, Sidiyasa, Chrisandini K, Permana E, Angi EM, Gatzweiler F, Jhonson B, Wijaya A. 2004. Mengeksplorasi keanekaragaman hayati, lingkungan dan pandangan masyarakat lokal mengenai berbagai lanskap hutan. CIFOR, Bogor, Indonesia.

Shukla G, Vineeta A. Kumari, Chakravarty S. 2017. Plant diversity, structure and uses of the plants in homegarden of Jharkhand, India. Indian Journal of Tropical Biodiversity 25(1): 40-50.

Sihombing MAL, Rohie AMC, Februyani N, Swandayani RE. 2015. Ornamental plants of home garden along the coridor of Kopendukuh village, Banyuwangi, East java-Indonesia as a basis for ecotourism planning. Journal of Indonesian Tourism and Development Studies 3(1): 19-24.

Silalahi M, Nisyawati, Anggraeni R. 2017. Studi etnobotani tumbuhan pangan yang tidak dibudidayakan oleh masyarakat lokal sub-etnis batak toba, di Desa Peadungdung Sumatera Utara, Indonesia. Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan 8 (2) : 241-250.

Soemarwoto O, Conway GR. The Javanese Homegarden. 1992. http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/4070/The_Javanese_Homegarden.pdf?sequence=1 (Accessed 12/01/2024).

Sunlu, U. 2003. Environmental Impacts of Tourism. Options Méditerranéennes 57: 263-270.

Swandayani RE, Hakim L, Indriyani S. 2016. Home garden of Sasak people in Sajang Village, Sembalun, East Lombok, Indonesia. International Journal of Research Studies in Agricultural Sciences 2(1): 32-40.

Titisari EY, Triwinarto J, Suryasari N. 2012. Konsep Ekologis pada Arsitektur di Desa Bendosari. Jurnal Ruas 10(2): 20-31.

Trinh LN, Hue NTN, De NN, Minh NV, Chu PT. 2002. Role of home gardens in the conservation of plant genetic resources in Vietnam Luu Ngoc. J.W. Watson and P.B. Eyzaguirre eds. Home gardens and in situ conservation of plant genetic resources in farming systems: Proceeding of second international homegardens workshop (97-104). International Plant Genetic Resources Institute.

Uzokwe UN, Giweze EA, Ofuoku AU. 2016. Contribution of home gardening to family food security in Delta North Agricultural Zone, Delta State, Nigeria. International Journal of Agricultural Extension and Rural Development Studies 3(2): 26-33.

Verheij Ed, Waaijenberg H. 2008. The home garden in the tropics. Agromisa Foundation and CTA, Wageningen, Holland.

Wakhidah AZ, Silalahi M. 2020. Inventarisasi tanaman pekarangan dan Pemanfaatannya sebagai bahan pangan oleh Masyarakat tanjungan, di kabupaten Tanggamus, lampung Jurnal Pendidikan Matematika dan IPA 2(2020):243-256.

Wardiah, Hasanuddin, Mutmainah. 2015. Etnobotani medis masyarakat kemukiman Pulo Breueh Selatan Kecamatan Pulo Aceh Kabupaten Aceh Besar. Jurnal Edu Bio Tropika 3(1): 1-50.

Whitney CW, Bahati J, Gebauer J. 2017. Ethnobotany and agrobiodiversity: valuation of plants in the homegardens of Southwestern Uganda. Ethnobiology Letters 9. https://doi.org/10.14237/ebl.9.2.2018.503.

Widhaningsih N. 1992. Diversitas gulma pada perkebunan di Pamegatan Cikajang Garut. Skripsi. Universitas Jenderal Soedirman.

WinklerPrins A, Barrera-Bassols N. 2005. Ethnoecology. Journal of Latin American Geography 4(1): 7-8.

Yulida R. 2012. Kontribusi usaha tani lahan pekarangan terhadap ekonomi rumah tangga petani di Kecamatan Kerinci Kabupaten Pelalawan. Indonesian Journal of Agricultural Economics 3(2): 135-154.

Zikri M, Hikmat A, Zuhud EAM. 2017. Retensi pengetahuan tumbuhan pangan suku rejang di kampung rindu hati dalam ketahanan pangan. Media Konservasi 21(3): 270-277.

Appendix

No	Family	Species	Local Name	Part used	Folk used	Description	ICS Forest	ICS Road	ICS River	ICS Woman	ICS Man	∑ICS	IVI
1	Acoraceae	*Acorus calamus* L.	*Dringu*	Leaves	Medicine	Remedy for baby fever: Leaves and *Allium sativum* are mashed and applied on baby's skin.	36	38	36	38	35.33	36.67	0.81
						For an anti-infection remedy, mix *Allium sativum* (garlic) with inactive limestone (*injet anyang*), *Piper betle* leaves, and *Areca catechu* seed. Crush the mixture and heat it with a little oil until cooked. Allow it to cool, then apply it to the infected area.							
						For relieving pain in babies believed to be caused by supernatural disturbances (locally known as *sawanen*), mix leaves with 2 pieces of *Kaempferia galanga*, 2 rhizomes of *Zingiber officinale* (ginger), 1 spoon of *Oryza sativa* seeds, 2 pieces of *Curcuma longa* (turmeric), 2 cloves each of *Allium sativum* (garlic) and *Allium cepa* (onion), and rock sugar. Crush and squeeze the mixture to extract the juice, and then have the baby consume it.							
					Local technology	Tobacco odor remover: Leaves and garlic are placed in tobacco storage							
					Ritual	Baby birth ritual: Placed on the table with offerings.							
2	Amaryllidaceae	*Allium cepa* L.	*Brambang*	Tuber	Seasoning	Used in various dishes.	34.5	27	23.25	32.5	24	28.25	2.66
					Medicine	Stamina booster medicine: 3 cloves of *Allium cepa* mashed, mixed with honey, consumed on an empty stomach.							
					Medicine	Breast milk booster: Mixed with *Curcuma longa* and *Sonchus arvensis* leaves. Pounded and squeezed, added with *Tamarindus indica* and rock sugar, then consumed.							
					Medicine	Remedy for fever in babies: Pounded and mixed with water, applied to the crown of the head.							
					Medicine	Remedy for ear wound (due to piercing): Burned until soft and applied on the wound.							

				Leaves	Medicine	Remedy for feverish. Boiled until soft, added with honey and consumed.							
3	Annonaceae	*Cananga odorata* var. *fruticosa* (Craib) J.Sinclair	*Kenongo*	Whole plant	Flower	Planted	10	7	11.5	12.33	6.67	9.5	0.24
				Flower	Medicine	Postnatal Medicine: Combine *Citrus × aurantiifolia* (lime), *Boesenbergia rotunda* (fingerroot), *Piper betle* leaves, *Curcuma longa* (turmeric) rhizome, *Kaempferia galanga* (aromatic ginger) rhizome, *Ros*a sp. (rose) flowers, *Jasminum sambac* (jasmine) flowers, and palm sugar. Crush and squeeze the mixture, then consume it one week postpartum.							
				Flower	Ritual	Various cultural rituals such as complementing the bride's foot washing procession, offerings, and as scattered flowers							
4	Apiaceae	*Daucus carota* L.	*Wartel*	Tubers	Vegetables	Made into various dishes	7.5	22.25	23.75	19.67	16	17.83	4.47
					Beverage	Crushed and consumed							
					Animal feed	Given in fresh condition							
					Food dye	Crushed, the juice squeezed out, then used for coloring							
					Medicine	Eye medicine: Eaten in fresh condition							
5	Araceae	*Colocasia antiquorum*	*Tales*	Stems and young leaves	Food	Sautéed with salted fish	10	15	10	10	13.33	11.67	0.39
				Tubers	Staple food	Boiled/steamed							
6	Arecaceae	*Cocos nucifera* L.	*Klopo*	Fruit	Food complement	The grated coconut flesh is used to extract its milk, which is then combined with other ingredients.	85.5	69.75	60.25	75.83	67.83	71.83	0.08
					Beverage	The young fruit is typically used to make beverages and can also be consumed directly by adding it to food or drinks, such as water with ice and sugar.							
					Medicine	Young coconut water is used as a treatment for poisoning.							

					Ritual	Both mature and young fruits are used as complements to offerings in wedding rituals and seven-month pregnancy rituals, along with rice, bananas, and palm sugar.							
						The mature fruit is processed into coconut oil, which is then given to pregnant women at seven months gestation.							
				Trunk	Building material and firewood	The trunk is used as building material for making livestock pens and is also occasionally used as firewood.							
				Leaves	Toys	The leaves are woven into toys for children.							
					Food wrap	The young leaves are also used as wrappers for ketupat (rice cakes) and as containers for offerings.							
				Leaf ribs	Household appliances	Leaf ribs are used as brooms.							
7	Asparagaceae	*Dracaena angustifolia* (Medik.) Roxb.	*Pandan wiji*	Leaves	Food dyes	Crushed and squeezed, the juice is mixed with the food to be colored	3	10.5	4.5	5.5	6.5	6	0.33
				Whole plant	Ornamental	Planted							
8	Asteraceae	*Pluchea indica* Less	*Luntas*	Leaves	Vegetables	Young leaves are used in various dishes	14	7.5	26	14.67	17	15.83	0.32
					Medicine	Breast Milk Stimulant: Crush *Oryza sativa* roots, *Curcuma longa* (turmeric) rhizome, *Plantago major* leaves, young leaves of *Tamarindus indica* (locally known as sinom), and *Zingiber officinale* (ginger) rhizome. Squeeze the mixture to extract the juice, mix it with a little water, and add pieces of fired pottery to the medicinal water. After the mixture has cooled, remove the pottery, and the medicine is ready to be consumed.							
				Whole plant	Ritual	Immunity Removal Ritual: In the Pujon community, to remove perceived astral immunity (such as resistance to sharp objects or fire), the individual must recite specific							

						mantras and then crawl under the stalks of the *Plucea indica* plant.							
9	Brassicaceae	*Brassica rapa* subsp. *pekinensis*	*Sawi putih*	Leaves	Vegetables	Used in various dishes	14	20.5	12.5	15.67	15.67	15.67	0.41
					Animal feed	Given in fresh condition							
				Whole plant	Firewood	Dried stems and leaves							
10	Brassicaceae	*Brassica oleracea* var. *capitata*	*Gobes*	Flowers	Vegetables	Used in various types of dishes	10.5	16.25	11.75	11.83	13.83	12.83	0.41
				Whole plant	Firewood	Dried							
					Animal feed	Given in fresh condition							
11	Convolvulaceae	*Ipomoea batatas* (L.) Lam.	*Telo rambat*	Young leaves	Vegetables	Made into various dishes	13.5	6.5	12	11.83	9.5	10.67	0.22
				Tubers	Staple food	Boiled							
				Leaves and stems	Animal feed	Scalded for at least 1 day beforehand							
				Umbi	Food dyes	Boiled, mashed, and mixed with food ingredients							
12	Cyperaceae	*Cyperus rotundus* L.	*Suket teki*	Leaves	Animal feed	Given in fresh condition	4.5	18	3	5.5	11.5	8.5	3.1
				Tubers	Viagra	Five *Cyperus rotundus* tubers are crushed, squeezed, and the juice is consumed							
13	Euphorbiaceae	*Manihot utilissima*	*Pohong*	Tuber	Staple food	Tubers is dried, pounded, and mixed with rice.	24.5	33.5	23	27.5	26.5	27	1.59
					Medicine	Stomach ailment medicine: Mashed and squeezed the tubers for its juice, half a glass of which is directly consumed every morning for 3 days.							
					Snack	Tubers are cooked into various snacks such as chips.							
				Stem	Fire wood	Dried stems							
				Young leaves	Vegetables	Used in various dishes.							

14	Fabaceae	*Calliandra calothyrsus* Meisn.	*Kaliandra*	Stems	Building material	For building houses and furniture making	10.5	11.5	11.5	11.67	10.67	11.17	0.49
				Leaves	Animal feed	Given in fresh condition							
				Branches and stems	Firewood	Dried							
15	Lamiaceae	*Tectona grandis* L.	*Jati*	Stems	Home material	Used for building houses and furniture	6	5	10	8.67	5.33	7	0.04
				Stems	Medicine	Hemorrhoid medicine: The *Tectona grandis* stem is first turned into charcoal. It is then mixed with *Acorus calamus* leaves and one clove of *Allium sativum*. All ingredients are ground, then a little water is added and squeezed. The juice then consumed directly.							
16	Lauraceae	*Persea americana* Mill.	*Pukat*	Fruit	Food	Ripe fruit.	26	27.75	24.5	24.83	27.33	26.08	0.47
					Local technology	Young fruit. 3-4 young avocados pounded until smooth, placed in a container, and covered together with bananas. This will accelerate the ripening of bananas.							
					Beverage	Ripe fruit is usually made into juice or mixed with other ingredients such as young coconut and other fruits to make fruit salad.							
				Leaves	Medicine	High blood pressure medicine: Young leaves, boiled with water and drink.							
				Trunk and branches	Wood and Fire wood	Used in house and furniture construction.							
17	Malvaceae	*Hibiscus rosa-sinensis* L.	*Ribang*	Whole plant	Ornamental and living fence	Planted as a living fence	9	5.25	4	6	6.17	6.08	0.38
18	Musaceae	*Musa × paradisiaca* L.	*Gedhang*	Fruit	Food	Young fruit is used for banana chips, and mature fruit is eaten directly.	70	54.75	64.25	55.17	70.83	63	1.38
					Ritual	They are used as complements to offerings in many ceremonies.							
				Leaves	Food wrap	They are used as food wrappers.							

					Ritual	The leaves used as containers for the offerings locally known as *takir*.						
				Whole plant	Animal feed	They are chopped into small pieces and given fresh.						
19	Myrtaceae	*Eucalyptus polyanthemos* Schauer	*Eucalyptus*	Stems	Building material	Used in house construction and furniture making	16	14.5	8	12	13.67	12.83	0.05
				Leaves	Animal feed	Given in fresh condition							
20	Myrtaceae	*Syzygium oleina* Wight	*Pucuk merah*	Whole plants	Ornamental	Planted as a living fence	3	2.5	3.5	3	3	3	0.75
21	Oleaceae	*Jasminum sambac* (L.) Aiton	*Melati*	Whole plant	Ornamental	Planted	8	15	7.5	9.33	11	10.17	0.32
				Flowers	Ritual	Used as scattered flowers and offerings							
22	Orchidaceae	*Vanda tricolor* Lindl.	*Anggrek vanda*	Whole plants	Ornamental	Planted as a ornamental plant or cultivated for sale	3	3	3	3	3	3	0.73
23	Piperaceae	*Piper betle* L.	*Suroh*	Leaves	Medicine	Stomach Ache: Boil leaves of *Piper betle* with *Boesenbergia rotunda* and consume the water.	26.98	31	33.2	31.66	29.13	30.39	0.68
					Medicine	Eye Ache: Boil the leaves with water, let it cool, and use the mixture to wash the eyes.							
					Medicine	Tooth Health: Mix leaves of *Piper betle* with inactive limestone and *Areca catechu* seed, then use as a treatment.							
					Ritual	For a death ritual, roll the leaves, tie them with thread, and then throw them together with yellow rice.							
24	Poaceae	*Andropogon nardus* L.	*Sere*	Stem	Seasoning	Used in various dishes, especially as flavor enhancers.	36	30	33	34	32	33	1
					Beverage	Boiled and sweetened with palm sugar.							
					Medicine	Remedy for Asthma: Boil stems mixed with *Zingiber officinale* (ginger) and *Curcuma longa* (turmeric). Drink the water after boiling.							
						Remedy for Rheumatism: Mix stems with *Curcuma longa* (turmeric) and *Zingiber officinale* (ginger), then boil and consume the liquid.							

						Immune Booster: Boil stems of *Andropogon nardus* and stems of *Ruta graveolens* , *Curcuma zedoaria*, 7 cloves of *Syzygium aromaticum*, and add three drops of eucalyptus oil. Consume the water after boiling.						
25	Poaceae	*Bambusa* sp.	*Pring*	Stem	Home material and living fence	Fences: Sometimes planted and sometimes cut into pieces as fences.	20	26.5	48.25	29.5	33.67	31.58	0.35
						Woven and smoothed on the surface.							
						Woven for various containers.							
				Shoots	Vegetables	The outer skin of young shoot cleaned and processed for various types of food.							
26	Poaceae	*Cynodon dactylon* (L.) Pers.	*Suket grinting*	Leaves	Animal feed	Given in the form of fresh plants	20.5	2.5	4.5	8.5	9.83	9.17	0.25
				Young shoots	Lightning rod	Inserted between the ears, or placed inside pockets							
27	Poaceae	*Eleusine indica* (L.) Gaertn.	*Suket Lulangan*	Leaves	Animal feed	Given in fresh condition	4.5	4.5	5.25	5	4.5	4.75	1.92
28	Poaceae	*Imperata cylindrica* (L.) Raeusch.	*Alang-alang*	Leaves	Beverage	Boiled with sugar	9	6	12.5	12.33	6	9.17	0.25
				Leaves	Animal feed	Given in fresh condition							
				Tubers	Fever and stomachache medicine	Tubers boiled then the water is consumed							
				Tubers	Medicine for sore feet	Mixed with *Morinda citrifolia* and rock sugar, then boiled and consumed							
				Tubers	Post-hospitalization weakness medicine	Tubers mixed with root of *Saccharum officinarum*, *Curcuma aeruginosa*, and *Foeniculum vulgare*, then crushed and applied							
29	poaceae	*Pennisetum purpureum*	*Suket gajah*	Whole plant	Living fence	Planted around the house	16.5	20	11.5	17.5	14.5	16	0.81

		Schumach & Thonn											
					Animal feed	Given directly							
30	Poaceae	*Zea mays* L.	*Gandum*	Seed	Staple food	Mature seeds ground and then cooked with rice.	28.5	41.25	32.75	40.83	27.5	34.17	14.35
					Food	Young seeds and baby corn used in various dishes							
					Medicine	Goiter remedy: young seeds grated then applied to the goiter area							
						Chickenpox remedy: young seeds grated then applied to the areas affected by chickenpox							
						Lactation aid medicine: Mature seeds boiled with inactive limestone water until soft, then dried after that fried and eaten directly as a snack.							
					Animal feed	Fresh leaves and stems: Given fresh or dried.							
				Whole plant	Firewood	It must be dried before used as firewood,							
31	Rosaceae	*Malus sylvestris* (L.) Mill.	*Apel*	Fruit	Fruit	Apples can be eaten directly or made into snacks like apple chips.	20	26	17.75	17.33	25.17	21.25	0.81
					Beverage	Ripe apples are typically juiced.							
32	Rosaceae	*Rosa* sp.	*Mawar*	Whole plant	Ornamental	Planted	7	15	12.5	13	10	11.5	1.27
				Flowers	Ritual	Used as complements in offerings and scattered flowers							
33	Rubiaceae	*Coffea* sp.	*Kopi*	Seed	Beverage	For making coffee.	24.5	52	33.75	29.33	44.17	36.75	1.39
					Medicine	Wound from sharp object: Pure coffee powder, sprinkled on the wound.							
					Medicine	For a Viagra-like effect, mix 2 spoons of pure coffee, 3 spoons of soy sauce, 1 yolk from a free-range chicken egg, a sufficient amount of *Zingiber officinale* (ginger), and 1/2 spoon of pepper. Add warm water to the mixture and drink.							
				Leaves	Beverage	Young leaves use for make tea coffee, young leaves boiled and added with sugar.							

34	Rutaceae	*Citrus reticulata* Blanco	*Jeruk keprok*	Fruit	Fruit	Consumed directly	17	18	9	15.5	19	17.25	0.71
					Beverage	Squeezed and consumed							
35	Solanaceae	*Capsicum annuum* var. *longum*	*Lombok gede*	Fruit	Seasoning	Used in various types of dishes	6	21	13.5	20	7	13.5	0.71
					Food dyes	Crushed and mixed with food							
36	Solanaceae	*Capsicum frutescens* L.	*Lombok cilik*	Fruit	Seasoning	Used in various dishes.	30	31.5	46.5	36	36	36	10.69
				Leaves	Medicine	Remedy for muscle pain: Leaves are pounded and mixed with oil, then applied on the skin.							
						Remedy for sore breasts after childbirth: Chili leaves and inactive limestone locally known as *injet anyang*, all of them are pounded and applied on the breasts.							
37	Verbenaceae	*Duranta erecta* L.	*Cemiti*	Whole plant	Living fence	Planted as a living fence	9	6.5	5	7	6.67	6.83	0.49
38	Zingiberaceae	*Curcuma longa* L.	*Kunir*	Rhizome	Seasoning and food dyes	Used in various dishes, especially as a coloring agent.	52.5	41.81	37.88	43.13	45	44.06	0.32
					Medicine	Two mature turmeric rhizomes are ground to extract the juice, which is then mixed with a spoonful of honey and consumed as a remedy for fever.							
						To relieve fever in babies: The tip of the rhizome is cut, treated with inactive lime, pierced with a skewer, and then rubbed onto the ground or applied to the baby's forehead.							
						For infant stomach aches, it is applied in a cross shape on the navel, aligning with the body's axis.							
						For wounds caused by sharp objects, the rhizome is ground and applied directly to the affected area.							
					Ritual	Umbilical cord cutting ritual: Rhizome used as a base for cutting the umbilical cord.							

				Food dye	Rhizome is ground, its juice extracted, sometimes fibers are not removed. Depends on usage								
39	Zingiberaceae	*Zingiber officinale* Roscoe	*Jahe*	Rhizome	Beverage	Cleaned and steeped with hot water. Sometimes is mixed with fresh milk	44	39	29.91	24.1	51.17	37.64	0.33
					Medicine	Rheumatism medicine: rhizome mashed and mixed with half a clove of yeast. Then mixed and applied to the affected area of rheumatism.							
						Gout medicine: Rhizome of *Zingiber officinale* and *Curcuma xanthorrhiza* made into powder then dried and consumed daily.							
						For anti-flatulence, boil one thumb-sized piece of *Zingiber officinale* (ginger) and three stalks of *Andropogon nardus* (lemongrass) in one glass of water. After boiling, consume the mixture.							
						For boosting the immune system, pound together *Zingiber officinale*, *Curcuma xanthorrhiza, Curcuma longa*, *Kaempferia galanga*, *Morinda citrifolia* , *Curcuma aeruginosa*, dried *Tamarindus indica*, and palm sugar. Squeeze the juice from the mixture and consume it directly.							
						For a cold remedy, grind one thumb-sized piece of *Zingiber officinale* (ginger), one clove of *Allium cepa* (onion), and one clove of *Allium sativum* (garlic) with one teaspoon of pepper until smooth. Swallow the mixture.							
					Seasoning	Used in various dishes.							