

The use of non-medicinal plants by the community of Ayah Village in South Gombong Karst Area, Kebumen, Central Java, Indonesia

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Abstract. Hanun Z, Athaya DN, Sholekha AM, Damayanti CE, Nazar IA, Cahyaningsih AP, Junaedi E, Buot JR IE Setyawan AD. 2023. *The use of non-medicinal plants by the community of Ayah Village in South Gombong Karst Area, Kebumen, Central Java, Indonesia. Nusantara Bioscience 15: 68-78.* In the homegardens of the people of Kebumen District, Central Java Province, Indonesia, especially in the karst area of Ayah Village, usually planted various plant species with many benefits. However, the knowledge of the people of Ayah Village, Kebumen, about the various benefits of plants is only known from generation to generation, passed on orally and in daily practice habits, so a study is needed to document this information. This study aimed to determine the knowledge of local communities and various types of non-medicinal plants used to fulfill people's daily lives. Data was collected through survey techniques and open interviews with a purposive sampling method with 40 respondents. An inventory of non-medicinal plants resulted in findings of 118 plant species from 59 families. The plants used consisted of 51 species of food plants, 40 species of ornamental plants, 19 species of spices, six species of animal feed, six species of firewood, five species of building materials, and two species of hedges. Some species have more than one use. Our study showed that most of the local community uses plants as food with more diverse plant species compared to other uses.

Keywords: Ethnobotany, karst area, Kebumen, non-medicinal plants

INTRODUCTION

Ethnobotany is the scientific study of indigenous peoples' cultural and ecological practices, including traditional plant knowledge. Ethnobotanical studies provide a repository for the knowledge of indigenous peoples about the medicines and other uses of plants. The study encompasses using plants as food, building materials, medicine, clothing, and traditional ceremonies (Saravanan 2022). In some way, at the very least, for sustenance, every community depends on a different set of plants, each with its own set of regional and cultural features (Potapov et al. 2018). In addition, over a hundred plant species are often recognized as current-day food sources, although historically, thousands of plant species have been used worldwide.

Most homes in rural areas, particularly in the karst mountains of Central Java, Indonesia, have expansive homegardens. The community uses this homegarden to plant various species with different benefits; therefore, the karst region is utilized for agroforestry. Residential homegardens can serve as a habitat for plant growth and maintain a high level of biodiversity (Aronson et al. 2017).

A region's plant diversity creates environmental sustainability. Therefore the homegarden plays a significant part in supplying daily demands and providing a comfortable residential. On the other hand, utilizing house homegardens is an alternative to achieving household food self-sufficiency (Suryani et al. 2020).

South Gombong karst is a range of karst mountains located southwest of Kebumen in Central Java, Indonesia. Karst is characterized by caves, surface drainage, and closed depressions (Yanna et al. 2020). As a result, karst has unique qualities and potential that can be utilized. These karst potentials include mineral potential, copious water sources, tourism potential, and scientific potential, all of which will favor the improvement of human welfare in the future (Geekiyana et al. 2019).

Karst regions offer great potential for living and nonliving natural resources (Kuniansky et al. 2016). The community of Ayah Village, particularly the karst region, has a large homegarden for planting various plant species. Locals cultivate plant varieties they deem helpful in meeting their daily needs. They grow non-medicinal plants in their homegardens, typically utilized by the community as food ingredients, seasonings, ornamental plants, and

firewood. Frequently utilized plant parts include leaves, fruit, flowers, rhizomes, seeds, shoots, tubers, and roots (Fenetahun and Eshetu 2017).

It is feared that the expansion of agricultural, modern industry, urbanization, and, notably, tourism activities in the Ayah village region of Kebumen will negatively impact the local community's ability to meet its fundamental needs as time passes. Access to rural areas has improved with time, which can alter people's habits toward using plants for daily requirements (Wahyuni 2019). People who previously relied on their homegardens to satisfy their daily requirements will begin to rely on the market. Thus they will prefer to purchase products rather than cultivate by themselves. Therefore, it affects the decline of rural homegardens. In addition, there will be direct or indirect local transmission to the younger generation, hindering the transmission of local knowledge from the older generation. It is supplemented by the oral transmission of the local community's knowledge of the various medicinal properties of plants from generation to generation.

As a result, a study should be conducted to determine the current gardening knowledge of the local population. This study intends to assess the local community's knowledge and usage of non-medicinal plants of homegardens in Ayah Village, Kebumen District, Central Java, Indonesia, in fulfilling their daily needs.

MATERIALS AND METHODS

Study area

This study was conducted in the South Gombang karst area, Ayah Village, Kebumen District, Central Java, Indonesia. The South Gombang karst area is a series of karst mountains located southwest of Kebumen, Central Java, Indonesia which includes three sub-districts, namely

Ayah, Buayan, and Rowokele. Ayah Village is located at coordinates 7°42'58.7"S, 109°23'19.7"E, and has a karst area that stretches for 277.80 hectares with a height of 335 m above sea level (BPS 2020). The village is located 42.8 km from Kebumen District. A map of the study area can be seen in Figure 1.

Data collection

The study was conducted in November 2022. Data were collected using survey techniques and open interviews using a purposive sampling method (Tongco 2007; Leksikowati et al. 2019) with 40 respondents. The interview was conducted by asking about using various non-medicinal plants grown in the homegardens. The information obtained included the local names of the plants used, the parts of the plants, the benefits, and how the plants were used. In addition, conversations were recorded during the interviews, and the information obtained was recorded. Plants obtained from the survey, including their local names, were identified. The scientific names of these plants were validated using the Plants of the World Online (POWO).

Data analysis

The obtained data were analyzed descriptively and quantitatively and presented using tables and figures (Sholikhah 2016). Use value calculates how much people use a plant species for the same purpose. The index indicates the relative importance of locally known plant species and is determined by the number of use reports described by each informant for each species (Abe and Ohtani 2013).

$$\text{Use Value (UV)} = \frac{\text{Number of citations per species (U)}}{\text{Number of informants (N)}}$$

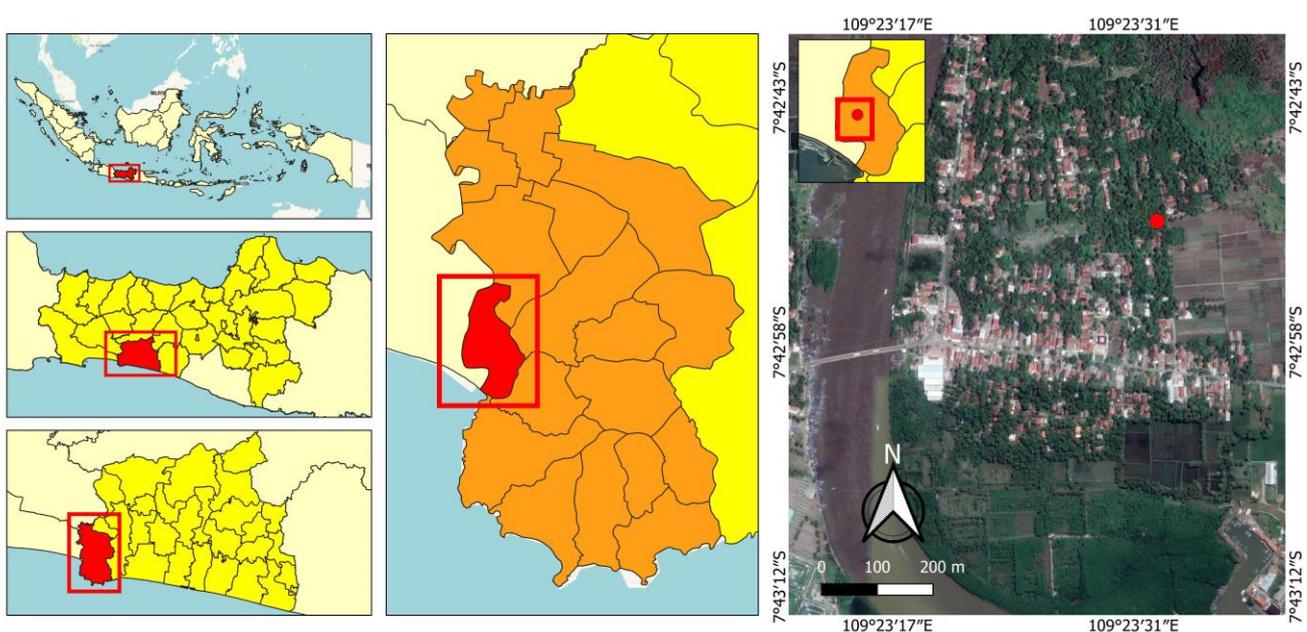


Figure 1. Map of the study area in the South Gombang karst area, Ayah Village, Kebumen, Central Java, Indonesia

RESULT AND DISCUSSION

In this study, 40 respondents were interviewed. Thirty-two of them were female, and eight of them were male. Respondents had varied educational backgrounds, from elementary to college. The junior high school has the largest educational background, with 16 people. The average age of respondents ranges from under 25 to 85 years. However, the highest proportion falls between 25 and 45 years (Table 1). Demographic data shows that most respondents are women, particularly housewives, because they are frequently at home. In addition, despite the broad age range of the respondents, the population's knowledge regarding the usage of non-medicinal plants remained unaffected. That indicated the population's knowledge regarding the use of non-medicinal plants was maintained throughout all age groups.

Uses of plants

The people of Ayah Village use 118 species from 59 families of non-medicinal plant species for various purposes. They use plants for various purposes, i.e., edible plants, cooking spices, ornamental plants, animal feed, firewood, house-building materials, and hedges. The highest use of plants was for edible plants (42.86%), ornamental plants (33.61%), and cooking spices (15.97%). Utilization with a small percentage includes firewood (5.04%), animal feed (5.04%), house-building materials (4.2%), and hedges (1.68%).

The people of Ayah village still use plants for building materials and household furniture, especially woody plants such as *Tectona grandis* L.f., *Falcataria moluccana* (Miq.) Barneby & J.W.Grimes, and *Cocos nucifera* L. Communities also use plants as animal feed for goats, ducks, and chickens, although with a small percentage. Our study found that the community uses several species for more than one usage, such as *C. nucifera*, which is used as food, firewood, and building materials.

Rural communities generally have large homegardens and use them as home gardens (Figure 2). Home gardens are used to grow various plants such as vegetables, fruit, spices, ornamental plants, and medicinal plants, and even livestock can provide a source of food and income (Galhena et al. 2013). The people of Ayah Village also cultivate more plants in their fields to meet their daily needs. Even though the dubious fields are public lands that the entire community can use on condition that they take care of these fields.

Food plants

There are 51 plant species from 21 families that the people of Ayah Village use as food plants, with the highest percentage of uses compared to others (Table 3). Most food crops grown by the community are fruit and vegetable crops they can consume directly or cook. Table 2 shows that the people of Ayah's village use more fruit parts as food plants than other plants. In addition, it indicated that the people of Ayah's village planted more fruit trees in their homegardens.

Table 1. The demographic structure of informants

Parameter	Specification	Frequency
Number of respondents		40
Gender	Male	8
	Female	32
Age	<25	2
	25-45	23
	46-65	14
	66-85	1
Education	Elementary school	12
	Junior high school	16
	Senior high school	8
	University	4

Table 2. Types of use of non-medicinal plants in Ayah Village, Kebumen District, Indonesia

Purpose	Total species	Total genus	Total family	Percentage
Edible plant	51	45	21	42.86%
Ornamental plant	40	39	29	33.61%
Spices	19	17	13	15.97%
Animal feed	6	6	5	5.04%
Firewood	6	6	4	5.04%
Building material	5	5	4	4.20%
Household appliance	2	2	2	1.68%
Fence	2	2	2	1.68%
Firestarter	1	1	1	0.84%
Broomstick	1	1	1	0.84%

Ayah Village is very close to the tourist areas of the beaches and mangrove forests. It will indirectly affect the culture and daily life of the villagers in fulfilling their daily needs. The development of the tourism area has caused residential areas to become denser and village facilities more diverse. It impacts the residents' homegardens which are not too large to plant. The people will prefer to buy at the market for their food needs than plant alone. Therefore, the community grows more fruiting trees which can be consumed when they bear fruit. These trees can meet food needs, reducing household expenses and shading. Most respondents were women aged 25 to 65, and most were housewives. Thus, people's knowledge of food crops was also limited to the plants they planted in their homegardens and used for daily consumption. Their needs and habits usually require knowledge of plants used in the local culture (Leal et al. 2018).

Fabaceae is widely used as a food plant in Ayah Village (Figure 3). Plant species from this family include *Parkia speciosa* Hassk., *Pachyrhizus erosus* L., *Vigna unguiculata* (L.) Walp., and *Leucaena leucocephala* (Lam.) de Wit. This family is the world's third most populous plant and includes cosmopolitan plants found in areas with cold to warm temperatures (Anugrah et al. 2022). Overall, the Fabaceae family is also the most widely planted family by Ayah Village people for various purposes, especially food. Of the four species, only *P. erosus* is a fruit plant, while the others are used as vegetables. *L. leucocephala* has various uses and is known as the miracle tree because of its worldwide benefits (Zayed and Samling 2016). Several countries also

use *L. leucocephala* as a food plant, such as Thailand, India, and the USA, which uses young leaves, seeds, and flowers for salads, soups, or other food ingredients (Zayed and Samling 2016). Apart from being used as a vegetable, the old seeds can also be used as a substitute for coffee (Nehdi et al. 2014).

Our study also found that several ornamental plants are consumed by Ayah Village people in their daily lives, such as *Aloe vera* (L.) Burm f., *Polyscias scutellaria* (Burm.f.) Fosberg, and *Portulaca grandiflora* Hook. The *A. vera* is used as a food by eating directly or making it into a salad mix. The *A. vera* grown by the local community does not taste bitter, so it can be consumed raw. The plant is native to the African Continent, especially North and South Africa (Sanchez-Machado et al. 2017; Maan et al. 2018). The *A. vera* has transparent gel, which is the edible part, with around 98-99% of the gel being water (Maan et al. 2018). The main component bears low-calorie carbohydrates (Sanchez-Machado et al. 2017; Maan et al. 2021), protein, fiber, soluble sugars, vitamins, minerals, and phenolic compounds (Maan et al. 2018).

Polyscias scutellaria, also known as *mangkogan*, is one of Indonesia's indigenous vegetable plants, which people in West Java, Central Java, East Java, and Yogyakarta consume (Yurlisa 2016). The people of Ayah village use

the leaves of *mangkogan* as food by cooking it. On the other hand, the Sundanese people of West Java usually consume *P. scutellaria* as fresh vegetables. They also eat raw or boiled without additional spices or other ingredients (Hernawati et al. 2022). Whereas *P. grandiflora*, also known as Indian purslane, which is a weed with a high degree of adaptation, is an edible plant and can fulfill most of the nutrients needed by humans. Therefore, it can potentially become a food ingredient supporting nutritional needs (Srivastava et al. 2021). The leaves and stems of *P. grandiflora* are rich in nutrients such as omega-3 fatty acids (five times higher than spinach), alpha-linoleic acid, vitamin A, vitamin C, and vitamin E, electrolytes such as potassium and sodium, minerals such as calcium, magnesium, and phosphorus (Uddin et al. 2014). The people of Ayah's village use these leaves by cooking them. In the Himalayan region, precisely in Pakistan, *P. grandiflora* is a wild plant with young leaves used as food crops. At the same time, other aerial parts are used as animal feed (Abbasi et al. 2015). Apart from that, various countries also use it as a food crop, such as in India, it is used as a vegetable ingredient to make curry, and in Cyprus, it is eaten raw by making processed salads (Iranshahy et al. 2017).



Figure 2. Several homegardens of the people of Ayah Village in Kebumen District, Central Java, Indonesia

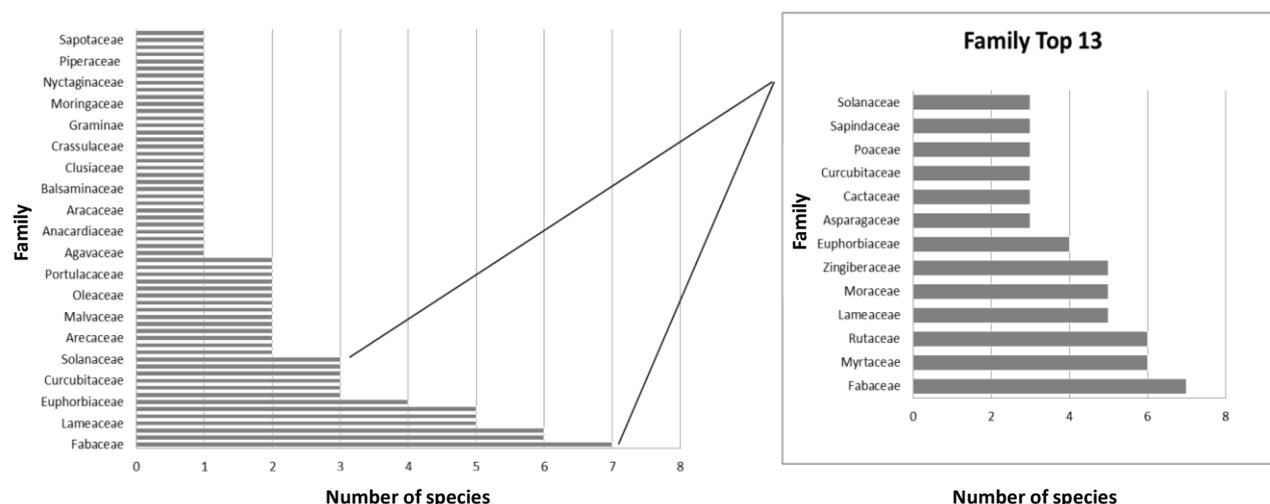


Figure 3. All families and the top 13 families of non-medicinal plants used by the people of Ayah Village, Kebumen District, Indonesia

Table 3. Food plants used by the people of Ayah Village, Kebumen District, Indonesia

Scientific name	Local name	Family	Growth form	Part of used	Method of used	UV
<i>Aloe vera</i> (L.) Burm f.	<i>Lidah buaya</i>	Liliaceae	Herbaceous	Leaf	Raw, salads	0.05
<i>Amaranthus</i> sp.	<i>Bayam</i>	Amaranthaceae	Herbaceous	Leaf	Cooked	0.12
<i>Ananas comosus</i> (L.) Merr.	<i>Nanas</i>	Bromoliaceae	Herbaceous	Fruit	Raw	0.02
<i>Apium graveolens</i> L.	<i>Seledri</i>	Apiaceae	Herbaceous	Leaf	Raw, cooked	0.02
<i>Artocarpus altilis</i> (Parkinson) Fosberg	<i>Sukun</i>	Moraceae	Tree	Fruit	Steam, fried	0.02
<i>Artocarpus heterophyllus</i> Lam	<i>Nangka</i>	Moraceae	Tree	Fruit	Raw, cooked	0.17
<i>Averrhoa carambola</i> L.	<i>Belimbing</i>	Oxalidaceae	Tree	Fruit	Raw	0.1
<i>Carica papaya</i> L.	<i>Pepaya</i>	Caricaceae	Tree	Fruit	Raw	0.27
<i>Citrus limon</i> (L.) Osbeck	<i>Jeruk lemon</i>	Rutaceae	Tree	Fruit	Ingredient for beverage	0.02
<i>Citrus maxima</i> (Burm.) Merr	<i>Jeruk Bali</i>	Rutaceae	Tree	Fruit	Raw	0.05
<i>Citrus sinensis</i> (L.) Osbeck	<i>Jeruk baby</i>	Rutaceae	Shrub	Fruit	Raw	0.05
<i>Cocos nucifera</i> L	<i>Kelapa</i>	Araceae	Tree	Fruit	Raw	0.25
<i>Cosmos</i> Cav.	<i>Kenikir</i>	Asteraceae	Herbaceous	Leaf	Raw, boiled	0.02
<i>Cucumis sativus</i> L.	<i>Timun</i>	Cucurbitaceae	Climber	Fruit	Raw	0.02
<i>Dimocarpus longan</i> Lour.	<i>Kelengkeng</i>	Sapindaceae	Tree	Fruit	Raw	0.05
<i>Durio zibethinus</i> L.	<i>Durian</i>	Malvaceae	Tree	Fruit	Raw	0.07
<i>Fragaria</i> L.	<i>Stroberi</i>	Rosaceae	Scrub	Fruit	Raw	0.02
<i>Garcinia mangostana</i> L.	<i>Manggis</i>	Clusiaceae	Tree	Fruit	Raw	0.12
<i>Gnetum gnemon</i> L.	<i>Melinjo</i>	Gnetaceae	Tree	Leaf, fruit, seed	Cooked, fried	0.12
<i>Hylocereus polyrhizus</i> (F.A.C.Weber) Britton & Roses	<i>Buah naga</i>	Cactaceae	Climber	Fruit	Raw	0.05
<i>Ipomoea aquatica</i> Forssk.	<i>Kangkung</i>	Convolvulaceae	Herbaceous	Leaf	Cooked	0.02
<i>Ipomoea batatas</i> (L.) Lam	<i>Ketela</i>	Convolvulaceae	Climber	Tuber, leaf	Steamed, cooked	0.15
<i>Lansium parasiticum</i> (Osbeck) Mabb.	<i>Duku</i>	Meliaceae	Tree	Fruit	Raw	0.05
<i>Leucaena leucocephala</i> (Lam.) de Wit	<i>Klandingan</i>	Fabaceae	Tree	Seed	Cooked	0.02
<i>Luffa acutangula</i> (L.) Roxb.	<i>Oyong</i>	Curcubitaceae	Climber	Fruit	Raw	0.02
<i>Lycopersicon esculentum</i> Mill	<i>Tomat</i>	Solanaceae	Herbaceous	Fruit	Raw, cooked, juiced	0.02
<i>Mangifera indica</i> L.	<i>Mangga</i>	Anacardiaceae	Tree	Fruit	Raw	0.37
<i>Manihot esculenta</i> Crantz	<i>Singkong</i>	Euphorbiaceae	Shrub	Tuber, leaf	Steamed, cooked	0.02
<i>Manilkara zapota</i> (L.) P.Royen	<i>Sawo</i>	Sapotaceae	Tree	Fruit	Raw	0.05
<i>Mentha x piperita</i> L.	<i>Mint</i>	Lamiaceae	Herbaceous	Leaf	Ingredient for beverage	0.02
<i>Momordica charantia</i> L.	<i>Pare</i>	Curcubitaceae	Climber	Leaf	Cooked	0.05
<i>Morinda citrifolia</i> L.	<i>Mengkudu</i>	Rubiaceae	Tree	Fruit	Raw	0.07
<i>Moringa oleifera</i> Lam.	<i>Kelor</i>	Moringaceae	Shrub	Leaf	Cooked	0.02
<i>Muntingia calabura</i> L.	<i>Karsen</i>	Muntingiaceae	Tree	Fruit	Raw	0.02
<i>Musa acuminata</i> Colla	<i>Pisang kepok</i>	Musaceae	Herbaceous	Fruit	Raw	0.12
<i>Musa x paradisiaca</i> L.	<i>Pisang</i>	Musaceae	Herbaceous	Fruit	Raw	0.32
<i>Nephelium lappaceum</i> L.	<i>Rambutan</i>	Sapindaceae	Tree	Fruit	Raw	0.10
<i>Ocimum sanctum</i> L.	<i>Kemangi</i>	Lamiaceae	Scrub	Leaf	Raw	0.05
<i>Pachyrhizus erosus</i> L.	<i>Bengkoang</i>	Fabaceae	Climber	Tuber	Raw	0.02
<i>Parkia speciosa</i> Hassk.	<i>Pete</i>	Fabaceae	Tree	Fruit	Raw, cooked	0.07
<i>Persea Americana</i> Mill.	<i>Alpukat</i>	Lauraceae	Tree	Fruit	Raw	0.07
<i>Plinia cauliflora</i> (Mart.) Kausel	<i>Anggur brazil</i>	Myrtaceae	Climber	Fruit	Raw	0.02
<i>Polyscias scutellaria</i> (Burm.f.) Fosberg	<i>Mangkoan</i>	Araliaceae	Shrub	Leaf	Cooked	0.07
<i>Polyscias filicifolia</i> (c. Moore ex E.Fourn.) L.H.Bailey	<i>Cakla cikli</i>	Araliaceae	Shrub	Leaf	Cooked	0.02
<i>Pometia pinnata</i> J.R.Forst.& G.Forst.	<i>Matoa</i>	Sapindaceae	Tree	Fruit	Raw	0.02
<i>Portulaca grandiflora</i> Hook	<i>Krokot</i>	Portulacaceae	Herbaceous	Leaf	Cooked	0.02
<i>Psidium guajava</i> L.	<i>Jambu biji</i>	Myrtaceae	Tree	Fruit	Raw	0.20
<i>Sauropus androgynous</i> (L.) Merr.	<i>Katuk</i>	Phyllanthaceae	Shrub	Leaf	Cooked	0.10
<i>Solanum melongena</i> L.	<i>Terong</i>	Solanaceae	Herbaceous	Fruit	Cooked	0.12
<i>Syzygium aqueum</i> (Burm.f.) Alston	<i>Jambu air</i>	Myrtaceae	Tree	Fruit	Raw	0.20
<i>Vigna unguiculata</i> (L.) Walp.	<i>Kacang panjang</i>	Fabaceae	Climber	Fruit	Raw, cooked	0.02

Ornamental plants

Forty species from 29 families are used by the people of Ayah Village as ornamental plants and are the second most use-category after food (Table 4). Ayah Village is very close to the karst forest area. It caused many villagers to take plants from the forest to be planted in their homegardens as home gardens and used as ornamental plants. Ornamental plants are planted directly in the house's front yard or in pots (Figure 4).

Of the 29 families, the Araceae family has the highest number of species used as ornamental plants. These species are *Aglonema commutatum* Schott, *Anthurium plowmanii* Croat, *Caladium bicolor* (Aiton) Vent, *Epipremnum aureum* (Linden&Andre) G.S.Bunting, *Monstera adansonii* Schott, and *Colocasia esculenta* (L.) Schott. Apart from the people of Ayah Village, the people of Cisoka Village, Majalengka, West Java, also use the Araceae family as ornamental plants. They are usually planted in the homegarden or used as decorations at certain events, such as weddings and celebrations of Indonesian Independence Day (Mutaqin et al. 2018).

The community widely cultivates ornamental plants to increase aesthetic value around their homegarden and beautify homes (Vivek et al. 2021). For example, the people of Rajegwesi Village, Banyuwangi, Central Java, Indonesia use the same species as those of Ayah Village as ornamental plants. These species include *Codiaeum variegatum* (L.) rumph. Ex A.Juss and *Ixora* sp. The cultural difference between the people of Rajegwesi Village, Banyuwangi, and Ayah Village is in managing their homegardens. The people of Rajegwesi Village houses have three zones, namely *mburitan*, located in the backyard; *iringan*, located on the sides of the house; and *jogan*, located in the house's front yard. That *jogan* zone is explicitly used for ornamental plants (Pamungkas et al. 2013). Like the people of Lampung, Indonesia ornamental plants are placed in the house's front yard (*hadap* or *tengebah*) (Wakhidah et al. 2020).

Spices

The people of Ayah Village use 19 species from 13 plant families as cooking spices (Table 5). These species include *Zingiber officinale* Roscoe, *Ammomum cardamomum* L., *Kaempferia galangal* L., *Alpinia galanga* (L.) Willd., and *Curcuma domestica* Valetton. The part used by the people of Ayah Village is the rhizome for the five species. The community uses it by grinding, bruising, and boiling to make delicious, fragrant, enriching food taste. Aside from being a spice in cooking, several Zingibaceae plants are mainly used by the community to get rid of the fishy smell of fish or meat, namely *Z. officinale* or *C. domestica*, by grinding it first and then smearing it on fish or meat and letting it sit for a few minutes before processing. The Zingiberaceae family is the most spice plant use. Similarly, there were also found in other areas in Indonesia such as Aceh Tamiang District, Aceh, Indonesia (Navia et al. 2020), Tidung tribe of Kalimantan (Listiani and Abrori 2018), and Saibain Lampung (Wakhidah et al. 2020).

The community's seasoning plants are generally the basic spices used in Javanese dishes. Even so, some people grow *Cinnamomum burmanni* (Nees & T.Nees) Blume as a spice plant even though it is less commonly used in Javanese specialties. The *C. burmanni* is one of the oldest spices, with a sweet and warm sensation that stands out after pepper (Kumar and Kumari 2019). The species is one of Indonesia's endemic plants (Menggala et al. 2019). As the oldest spice, cinnamon has also been used in various traditional dishes in various countries. For example, the people of India generally use cinnamon as a spice in making curry (Bharali et al. 2017), and the people of Bulgaria used it as one of the spices in making *Gornooryahovski Sudzhuk* or traditional sausages (Ivanova et al. 2022).



Figure 4. The *jogan* (front yard) is a zone for the use of ornamental plants by the people of Ayah Village, Kebumen District, Central Java, Indonesia

Table 4. Ornamental plants used by the people of Ayah Village, Kebumen District, Central Java, Indonesia

Scientific name	Local name	Family	Growth form	UV
<i>Adenium obesum</i> (Forssk.) Roem. & Schult.	<i>Kamboja</i>	Apocynaceae	Herbaceous	0.05
<i>Adiantum capillus-veneris</i> L.	<i>Suplir</i>	Pteridaceae	Herbaceous	0.02
<i>Aeschynanthus</i> Jack	<i>Bunga lipstick</i>	Gesneriaceae	Climber	0.02
<i>Aglaonema commutatum</i> Schott.	<i>Sri rejeki</i>	Araceae	Herbaceous	0.07
<i>Aloe vera</i> (L.) Burm.f.	<i>Lidah buaya</i>	Asphodeloideae	Herbaceous	0.25
<i>Anthurium plowmanii</i> Croat	<i>Gelombang cinta</i>	Araceae	Scrub	0.05
<i>Bougainvillea spectabilis</i> Willid.	<i>Bunga kertas</i>	Nyctaginaceae	Shrub	0.17
<i>Caladium bicolor</i> (Aiton) Vent.	<i>Keladi</i>	Araceae	Herbaceous	0.07
<i>Cananga odorata</i> (Lam.) Hook f. & Thomson	<i>Kenanga</i>	Annonaceae	Shrub	0.07
<i>Chlorophytum comosum</i> (Thunb.) Jacques	<i>Rekmo putri</i>	Asparagaceae	Shrub	0.02
<i>Codiaeum variegatum</i> (L.) rumph. Ex A.Juss.	<i>Puring</i>	Euphorbiaceae	Shrub	0.07
<i>Coleus scutellarioides</i> (L.) Benth.	<i>Iler</i>	Lamiaceae	Scrub	0.07
<i>Colocasia esculenta</i> (L.) Schott	<i>Talas</i>	Araceae	Herbaceous	0.02
<i>Cordyline fruticosa</i> (L.) A.Chev.	<i>Andong</i>	Asparagaceae	Herbaceous	0.12
<i>Cuphea hyssopifolia</i> Kunth	<i>Taiwan beauty</i>	Lythraceae	Scrub	0.02
<i>Dendrobium</i> sp.	<i>Anggrek</i>	Orchidaceae	Herbaceous	0.12
<i>Dracaena sanderiana</i> Mast.	<i>Bambu cina</i>	Asparagaceae	Herbaceous	0.07
<i>Drynaria sparsisora</i> (Desv.) T.Moore	<i>Simbar</i>	Polypodiaceae	Herbaceous	0.02
<i>Epiphyllum anguliger</i> (Lem.) G.Don	<i>Wijaya kusuma</i>	Cactaceae	Herbaceous	0.05
<i>Epipremnum aureum</i> (Linden&Andre) G.S.Bunting	<i>Sirih gading</i>	Araceae	Climber	0.02
<i>Ficus coreana</i>	<i>Dolar</i>	Moraceae	Herbaceous	0.05
<i>Hibiscus tiliaceus</i> L.	<i>Waru</i>	Malvaceae	Tree	0.02
<i>Impatiens balsamina</i> L.	<i>Pacar air</i>	Balsaminaceae	Herbaceous	0.05
<i>Ixora javanica</i> (Blume) DC.	<i>Soka</i>	Rubiaceae	Shrub	0.02
<i>Jasminum sambac</i> (L.) Aiton	<i>Melati</i>	Oleaceae	Shrub	0.05
<i>Kalanchoe pinnata</i> (Lam.) Pers.	<i>Cocor bebek</i>	Crassulaceae	Herbaceous	0.02
<i>Lantana camara</i> L.	<i>Lantana</i>	Verbenaceae	Shrub	0.05
<i>Michelia x alba</i> DC	<i>Kantil</i>	Magnoliaceae	Shrub	0.02
<i>Michelia champaca</i> (L.)	<i>Cempaka</i>	Magnoliaceae	Shrub	0.02
<i>Monstera adansonii</i> Schott	<i>Janda bolong</i>	Araceae	Climber	0.02
<i>Opuntia monacanthos</i> (Willd.) Haw	<i>Kaktus</i>	Cactaceae	Herbaceous	0.02
<i>Oxalis triangularis</i> A.St.-Hill	<i>Bunga kupu-kupu</i>	Oxalidaceae	Herbaceous	0.02
<i>Phalaenopsis amabilis</i> (L.)	<i>Anggrek bulan</i>	Orchidaceae	Herbaceous	0.02
<i>Polyscias scutellaria</i> (Burm.f.) Fosberg	<i>Mangkokan</i>	Araliaceae	Shrub	0.05
<i>Portulaca grandiflora</i> Hook	<i>Cantik manis</i>	Portulacaceae	Herbaceous	0.05
<i>Rosa multiflora</i> Thunb.	<i>Mawar</i>	Rosaceae	Shrub	0.1
<i>Sansevieria trifasciata</i> (Prain) Mabb.	<i>Lidah mertua</i>	Agavaceae	Herbaceous	0.15
<i>Streblus asper</i> Lour.	<i>Serut</i>	Moraceae	Shrub	0.05
<i>Syzygium paniculatum</i> Gaertn.	<i>Pucuk merah</i>	Myrtaceae	Shrub	0.1
<i>Tradescantia pallida</i> (Rose) D.R.Hunt	<i>Adam hawa</i>	Commelinaceae	Herbaceous	0.05

Table 5. Cooking plant spices used by the people of Ayah Village, Kebumen District, Central Java

Species name	Local name	Family	Growth form	Part of used	Method of used	UV
<i>Allium sativum</i> L.	<i>Bawang</i>	Amaryllidaceae	Herbaceous	Tuber	Crushed, mashed	0.03
<i>Alpinia galanga</i> (L.) Willd.	<i>Laos</i>	Zingiberaceae	Herbaceous	Rhizome	Crushed	0.15
<i>Amomum cardamomum</i> L.	<i>Kapulaga</i>	Zingiberaceae	Herbaceous	Rhizome	Boiled	0.03
<i>Capsicum annum</i> L.	<i>Cabai</i>	Solanaceae	Shrub	Fruit	Cut, mashed	0.23
<i>Cinnamomum burmanni</i> (Nees & T.Nees) Bl.	<i>Kayu manis</i>	Lauraceae	Tree	Bark, leaf	Cooked, brewed	0.03
<i>Citrus x aurantifolia</i> (Christm.) Swingle	<i>Jeruk nipis</i>	Rutaceae	Tree	Fruit	Squeezed	0.03
<i>Citrus hystrix</i> DC.	<i>Jeruk sambal</i>	Rutaceae	Tree	Fruit	Squeezed	0.03
<i>Citrus limon</i> (L.) Osbeck	<i>Jeruk lemon</i>	Rutaceae	Tree	Fruit	Squeezed	0.08
<i>Cocos nucifera</i> L.	<i>Kelapa</i>	Araceae	Tree	Flower sap	Boiled	0.10
<i>Coriandrum sativum</i> L.	<i>Ketumbar</i>	Apiaceae	Herbaceous	Seed	Mashed	0.03
<i>Curcuma domestica</i> Valetton	<i>Kunyit</i>	Zingiberaceae	Herbaceous	Rhizome	Mashed, boiled	0.38
<i>Cymbopogon citratus</i> (DC.) Stapf	<i>Serai</i>	Poaceae	Herbaceous	Stem	Crushed, cut	0.28
<i>Kaempferia galanga</i> L.	<i>Kencur</i>	Zingiberaceae	Herbaceous	Rhizome	Mashed, boiled	0.05
<i>Myristica fragrans</i> Houtt.	<i>Pala</i>	Myristicaceae	Tree	Seed	Boiled	0.03
<i>Pandanus amaryllifolius</i> Roxb. Ex Lindl	<i>Pandan</i>	Pandanaceae	Herbaceous	Leaf	Boiled	0.13
<i>Piper nigrum</i> L.	<i>Merica</i>	Piperaceae	Climber	Fruit	Mashed, cooked	0.03
<i>Syzygium polyanthum</i> (Wight) Walp	<i>Salam</i>	Myrtaceae	Tree	Leaf	Dried, boiled	0.13
<i>Tamarindus indica</i> L.	<i>Asam jawa</i>	Fabaceae	Tree	Fruit	Cooked	0.10
<i>Zingiber officinale</i> Roscoe	<i>Jahe</i>	Zingiberaceae	Herbaceous	Rhizome	Crushed, boiled	0.40

Other uses

The people of Ayah Village use 23 plant species from 12 families for other uses, such as animal feed, building materials, firewood, and hedges (Table 6). There are several plant species with many use-category. For example, *C. nucifera* is used by the community as a material for broomsticks, building materials, firewood, and lighters. It is also used by the people of Rajegwesi Village, Banyuwangi, Central Java, Indonesia for their household needs, such as food, firewood, building materials, and furniture (Pamungkas et al. 2013). Another plant with multiple usage categories is *P. scutellaria* which is used as an animal feed and hedge plant.

The people of Ayah Village use three species from the Poaceae family. This family has the highest number of species for other uses. The community uses *Oryza sativa* L. and *Pennisetum purpureum* Schumach. as animal feed for cattle and goats and *Dendrocalamus asper* (Schult. & Schult.f.) Backer as a building material. Some people in Ayah's village still use the leaves of *Areca catechu* L. and *Nypa fruticans* Wurmb to make *welit*. *Welit* is a collection of leaves arranged in rows and strung together, usually used as a roof on traditional buildings. Currently, *welit* (Figure 5) as a roof for houses is limited to specific uses. In some areas, *welit* is no longer applied to residential buildings and is only used as a tradition. For example, the people of Cirebon, West Java, use *welit* in the *memmayyu* ceremony to replace the old *welit* roof at the Trusmi Mosque once a year (Lestari 2013).

The part of the plant used

Our study revealed that the people of Ayah Village strongly used fruiting plants (40%). The fruiting plant parts can be utilized and processed using various methods. The most common method is being eaten directly, i.e., mango (*Mangifera indica* L.), dragon fruit (*Hylocereus polyrhizus* (F.A.C.Weber) Britton & Roses), and crystal guava (*Psidium guajava* L.). The other uses are cooked, such as tomatoes (*Lycopersicon esculentum* Mill), *petai* (*P. speciosa*), and eggplant (*Solanum melongena* L.). The second largest part is the leaves, with a percentage of 27%, and most of them are used as vegetables. The community also uses wood (7%), rhizomes and stems (5% each), tubers (4%), branches and seeds (2% each), and leaf bones, dry leaves, flower sap (1% each) (Figure 6). Based on the percentage of plant parts that are widely used, it is known that the community preference is practical and easy to get. It may be related to the study area being in a village in a tropical karst area, so local people prefer to grow food plants that are easy to grow in their homegardens (Suhendar et al. 2018).

The life form of the plants used

The plants planted and used by the people of Ayah Village have various life-form characteristics. Figure 7 is the percentage of how plants grow. The community's most plant growth uses are herbaceous, trees, shrubs, scrubs, and climbers. In the karst area of Ayah Village, the characteristics of plants are dominated by trees at 39 of 118 species (33%).

The second largest form of plants' characteristic growth is occupied by 32% or 38 species of herbaceous. The life-form of shrubs, scrub, and climbers are 17, 15, and 10 plants from 118 species, respectively. Tree life-form includes teak (*T. grandis*) and acacia (*Acacia auriculiformis* A.Cunn. ex Benth.). The *T. grandis* can grow optimally at 700 m above sea level. The plant has shallow roots and can grow well on soil with a thin layer, like in karst areas. Apart from *T. grandis*, another dominant species is *A. chinensis*, a member of the Fabaceae family. It was the dominant plant because it can grow in almost all soil conditions, including dry land (Tabun et al. 2020). In addition, its roots are shallow patterns, suitable to grow in karst areas. Therefore, these two species are abundant and dominate the South Gombang Karst Area.



Figure 5. Leaves used as *welit*

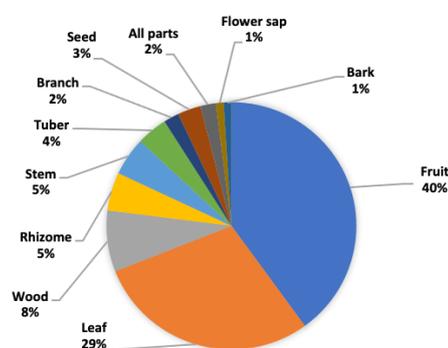


Figure 6. Part of the plant used by the community of Ayah Village, Kebumen District, Central Java, Indonesia

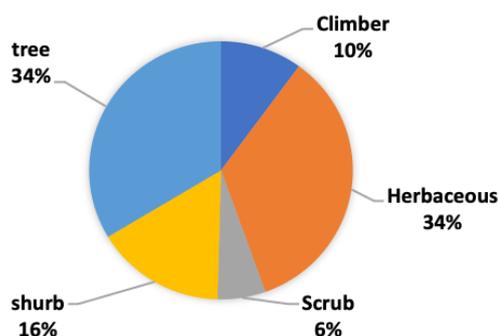
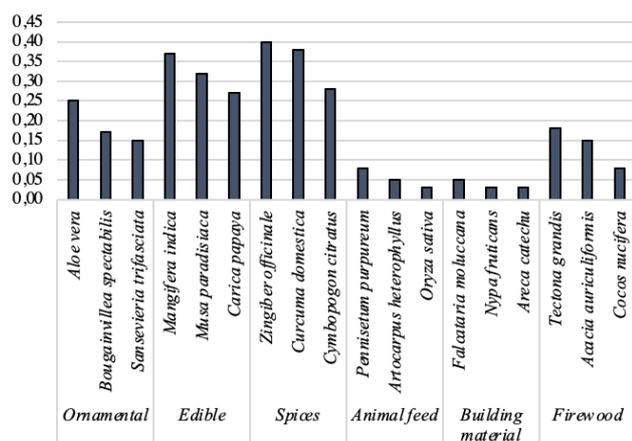


Figure 7. The life-form plants used by the people of Ayah Village, Kebumen District, Central Java, Indonesia

Table 6. The use of plants for various purposes by the people of Ayah Village, Kebumen District, Central Java, Indonesia

Scientific name	Local name	Family	Growth form	Part of used	Uses	UV
<i>Acacia auriculiformis</i> A.Cunn. ex Benth.	Akasia	Fabaceae	Tree	Wood	Firewood	0.15
<i>Areca catechu</i> L.	Jambeh	Aracaceae	Tree	Leaf	Building material	0.03
<i>Artocarpus heterophyllus</i> Lam.	Nangka	Moraceae	Tree	Leaf	Animal feed	0.05
<i>Carica papaya</i> L.	Pepaya	Caricaceae	Tree	Leaf	Animal feed	0.03
<i>Cocos nucifera</i> L.	Kelapa	Araceae	Tree	Bone leaves	Broomstick	0.03
<i>Cocos nucifera</i> L.	Kelapa	Araceae	Tree	Stem	Building material	0.03
<i>Cocos nucifera</i> L.	Kelapa	Arecaceae	Tree	Stem	Firewood	0.08
<i>Dendrocalamus asper</i> (Schult. & Schult.f.) Backer	Bambu	Poaceae	Tree	Stem	Building material	0.03
<i>Falcataria moluccana</i> (Miq.) Barneby & J.W.Grimes	Sengon	Fabaceae	Tree	Wood	Building material	0.05
<i>Falcataria moluccana</i> (Miq.) Barneby & J.W.Grimes	Sengon	Fabaceae	Tree	Wood, branch	Firewood	0.05
<i>Lagistrum ovalifolium</i> Hassk.	Teh-tehan	Oleaceae	Shrub	All parts	Fence	0.03
<i>Manihot carthaginensis</i> subsp. <i>Glaziovii</i>	Singkong	Euphorbiaceae	Shrub	Leaf	Animal feed	0.03
<i>Nephelium lappaceum</i> L.	Rambutan	Sapindaceae	Tree	Wood	Firewood	0.05
<i>Nypa fruticans</i> Wurmb	Daonan	Arecaceae	Tree	Leaf	Building material	0.03
<i>Oryza sativa</i> L.	Padi	Poaceae	Scrub	Leaf	Animal feed	0.03
<i>Pennisetum purpureum</i> Schumach.	Rumput gajah	Poaceae	Scrub	Leaf	Animal feed	0.08
<i>Polyscias scutellaria</i> (Burm.f.) Fosberg	Mangkakan	Araliaceae	Shrub	Leaf	Animal feed	0.03
<i>Polyscias scutellaria</i> (Burm.f.) Fosberg	Mangkoan	Araliaceae	Shrub	All parts	Fence	0.03
<i>Tectona grandis</i> L.f.	Jati	Lamiaceae	Tree	Branch	Firewood	0.18
<i>Vitex pinnata</i> L.	Laban	Lamiaceae	Tree	Wood, branch	Firewood	0.03

**Figure 8.** Top five use values for each use of plants by the people of Ayah Village, Kebumen, Central Java, Indonesia

Use Value (UV)

The villagers of Ayah village use the plants as food, ornamental, cooking spices, animal feed, firewood, household furnishings, building materials, and hedges (Figure 8). The *M. indica*, with a UV of 0.37, is the most common plant used for food. *A. vera*, with a UV of 0.25, is commonly planted as an ornamental plant. The *Z. officinale*, with a UV of 0.4, is the most valuable plant for cooking spices. Finally, with a UV of 0.08, *P. purpureum* has the highest value as an animal feed. *M. indica* is native to tropical and subtropical regions, where its fruit can be consumed directly. Mango fruit is edible when ripe or unripe and can be processed into food and beverages. In comparison, *A. vera* is widely cultivated and used as an

ornamental plant and food. In addition to their an ornamental plant, *A. vera* has another application such as a hair cosmetic (García et al. 2019). In addition, the species does not require a large growing area and is commonly grown in containers.

Studies have shown that many plants serve multiple purposes; one is the coconut (*C. nucifera*), in which every part of the species can be used, from the roots and stems to the leaves, flowers, fruit, and beyond. The coconut is called the "tree of a thousand benefits" (Kappally et al. 2015).

In karst regions, particularly the tropics, *Z. officinale* is widely used as a cooking spice to stimulate appetite (Rahayu et al. 2021). In addition, this species can be used to remove fishy odors from processed fish, chicken, and meat and as an ingredient in hot beverages. Moreover, villagers in Ayah use *P. purpureum* (elephant grass) as animal feed due to the plant's excellent adaptation to the dry season, particularly in karst regions. Elephant grass is characterized by its easy and rapid growth and high nutrient content (De Conto et al. 2016). In addition, the species can be utilized as animal feed for grazing. The *P. purpureum* is also the most widely utilized plant species in the Pacitan karst region of East Java for livestock forage (Cahyaningsih et al. 2022).

In conclusion, the people of Ayah Village in the Kebumen District of Central Java, Indonesia use plants as food, spices, ornamentals, animal fodder, firewood, furniture, building materials, and even hedges, according to the study's results. Villagers cultivate the plants in their homegardens and the surrounding area to serve their needs. The leaves and fruit are the most commonly consumed parts, explaining why people prefer cultivating them. In addition, trees and herbs of various sizes are planted and

used extensively throughout the neighborhood. Community knowledge regarding the use of non-medicinal plants is also well maintained across all age groups, and there is a relatively high diversity of plants used for various uses.

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