

# Ethnoecological study on the utilization of plants in Ciletuh-Palabuhanratu Geopark, Sukabumi, West Java, Indonesia

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**Abstract.** Wulandari I, Iskandar BS, Parikesit, Hudoso T, Iskandar J, Shanida SS, Megantara EN, Gunawan EF. 2021. *Ethnoecological study on the utilization of plants in Ciletuh-Palabuhanratu Geopark, Sukabumi, West Java, Indonesia. Biodiversitas 22: 659-672.* Plants can provide benefits for community as food, medicine, fuel, building materials, furniture, and others. Plant utilization should be conducted sustainably in a region with high importance of geological, biological, and cultural diversity, such as in Ciletuh-Palabuhanratu Geopark, Sukabumi, West Java, Indonesia. This study aimed to reveal: (i) plant utilization by local community in Ciletuh-Palabuhanratu Geopark based on land cover; and (ii) community dependence on the plants being utilized. Method used in this study was mixed of qualitative and quantitative methods using direct observation, semi-structured and structured interviews data collection techniques. The result of study showed that the community in Ciletuh-Palabuhanratu Geopark still uses plants for food (80 species), medicinal plants (73 species), livestock fodder (9 species), firewood (27 species), building materials, furniture (38 species), and others (23 species). The highest plant utilization came from gardens (131 species), home gardens (99 species), natural forests (77 species), dry-paddy fields, and wet-paddy fields (7 species). Generally, various agroecosystems and also forest in Ciletuh-Palabuhanratu Geopark have an important role in providing plant products to fulfill the daily needs of rural people.

**Keywords:** Ciemas Village community, Pelabuhanratu Geopark, plant utilization

## INTRODUCTION

There is a strong relationship between humans and the environment, making environmental conditions strongly influence human life behavior and vice versa. Human behavior in an environment will be affected by ecosystems' ability to provide resources that can be used to maintain human life. Through continuous thinking, reasoning, and experience, one will take immediate resources available to support his daily activities or the needs of his group (Hutauruk et al. 2018). One of such resources provided by ecosystem is the plant.

Plants provide a wide range of uses, such as food, traditional medicines, fuel, building materials, furniture, etc. For example, bamboo is very closely related to people's lives, especially in rural areas. People make household items and livings from this species. Many Indonesian ethnicities, including Sundanese living rural villages in West Java, cannot be separated from bamboo. Bamboo has been used widely for various purposes, such as building materials, home furnishings, handicrafts, foodstuffs, and medicines (Tamang et al. 2013; Honfo et al. 2015; Partasasmita et al. 2017; Setiawati et al. 2017).

In terms of ecological functions, bamboo produces the highest amount of oxygen among other trees. Its ability to absorb carbon is also high enough to overcome CO<sub>2</sub> concentration in air as known as one of the greenhouse gases that can cause global warming and climate change (MaCCracken 2019). In addition, bamboo serves as a water purifier that can be used to remediate critical soil (Mishara et al. 2014).

Geopark is an area that has outstanding geology, including archaeological, ecological, and cultural values by involving local communities to play a role in protecting and enhancing natural heritage. Geopark is different from other natural conservation areas. Geopark is a protected area on a national scale containing a number of important geological heritage that have important attractions that can be developed as part of an integrated concept of conservation, education, and local economics. Geopark is a form of utilization to achieve sustainable development. Geopark presents natural beauty, harmony of location, archeology, geology, and culture (Yanuar et al. 2018). Meanwhile, the natural conservation areas based on law no.5, 1990 on Conservation of Living Natural Resources and their Ecosystems, natural conservation areas can be divided into 2 categories, namely "Nature Reserve Areas

(*Kawasan Suaka Alam-KSA*)" consisting of 'Cagar Alam' (protection of flora and fauna and natural landscapes) and 'Suaka Margasatwa', wildlife reserves (protection of special and unique animal species); and "Nature Conservation Areas (*Kawasan Pelestarian Alam-KPA*)" consisting of National Parks, 'Taman Nasional', 'Taman Wisata Alam', Nature Tourism Parks; Taman Hutan Raya' Grand Forest Parks, including 'Cagar Biosfer', Biosphere Reserves (Wiratno et al. 2004).

Currently, in the world it has been recorded as having 161 UNESCO Global Geoparks in 44 countries. There are 4 UNESCO Global Geoparks in Indonesia, including Batur UNESCO Global Geoparks (Bali), Gunung Sewu UNESCO Global Geopark (Yogyakarta), Ranjani-Lombok Global Geopark (West Nusatenggara), and Ciletuh-Palabuhanratu Unesco Global Geoparks (West Java). The Ciletuh-Pelabuhanratu Geopark, Sukabumi Regency, West Java, was officially declared a national geopark on 22 December 2015 (Andriany et al. 2016; Yanuar et al. 2018). It has approximately 128,000 hectares, consisting of 74 villages across eight districts, namely Cisolok, Cikakak, and Palabuanratu. Simpenan, Ciemas, Ciracap, Waluran and Surade. The Ciletuh-Palabuhanratu Geopark is characterized by rare geological diversity classified into three zones: uplifted rock subduction zones, the Jampang Plateaus landscape, and ancient magmatic zone shift and forearm evolution (UNESCO 2017). In addition, it has rich biodiversity and local cultural diversity. To preserve nature in Ciletuh-Pelabuhanratu, the geopark concept is used as a sustainable conservation effort (UNESCO 2017).

Some researches on various aspects of the Ciletuh-Palabuhanratu Geoparks were undertaken, including study on exploration of rock diversity and other geological elements (Andriany et al. 2016; Hadian et al. 2016; Ikhrum et al. 2017a; Ikhrum et al. 2017b; Wahidah et al. 2017; Pradana et al. 2017; Hardini, et al. 2018); and study on terrestrial and aquatic biodiversity (Sulaksana et al. 2015; Partasasmita et al. 2016; Permatasari et al. 2016; Triana et al. 2017; Wulandari et al. 2018; Winantris et al. 2018; Wulandari et al. 2019; Suhanda et al. 2019; Uniarti et al. 2019; Riyantini et al. 2020). In addition, study on culture (Supendi 2017; Sobandi et al. 2019) and tourism aspects (Darsiharjo et al. 2016; Yuliawati et al. 2016; Yanuar 2018; Rahardjo et al. 2018; Mustikaningsih et al. 2019) were carried out in the Ciletuh-Palabuhanratu Geopark.

Excellent and appropriate management is needed to support sustainable development in the Ciletuh-Palabuhanratu Geopark (Wulandari et al. 2018). One important information that can serve as reference for policy and management of the geopark is information on traditional ecological knowledge (TEK) of the local communities. The traditional ecological knowledge is culturally inherited from generation to generation, including traditional knowledge, innovations, beliefs, and practices of indigenous peoples and local communities embodying traditional lifestyles relevant to conservation

and sustainable use of biological diversity (Toledo 2002; Berkes 2012; Halim et al. 2012; Iskandar 2018).

Based on an exploratory study undertaken by Padjadjaran University in 2017 (unpublished), 194 plant species (cultivated and non-cultivated) were found in the Ciletuh-Palabuhanratu Geopark. Yet, the information about plant species presented in such study was not completed with local knowledge about plant utilization. Documenting ethnoecological information in the Ciletuh-Palabuhanratu Geopark is immediately important since traditional ecological knowledge owned by the community is only transmitted in oral form from generation to generation (Wulandari et al. 2019). Therefore, written documentation on plant utilization by local community is necessary to avoid knowledge loss. This study aimed to elucidate: (i) plant utilization by local community in Ciletuh-Palabuhanratu Geopark based on land cover; and (ii) community dependence on the plants being utilized.

## MATERIALS AND METHODS

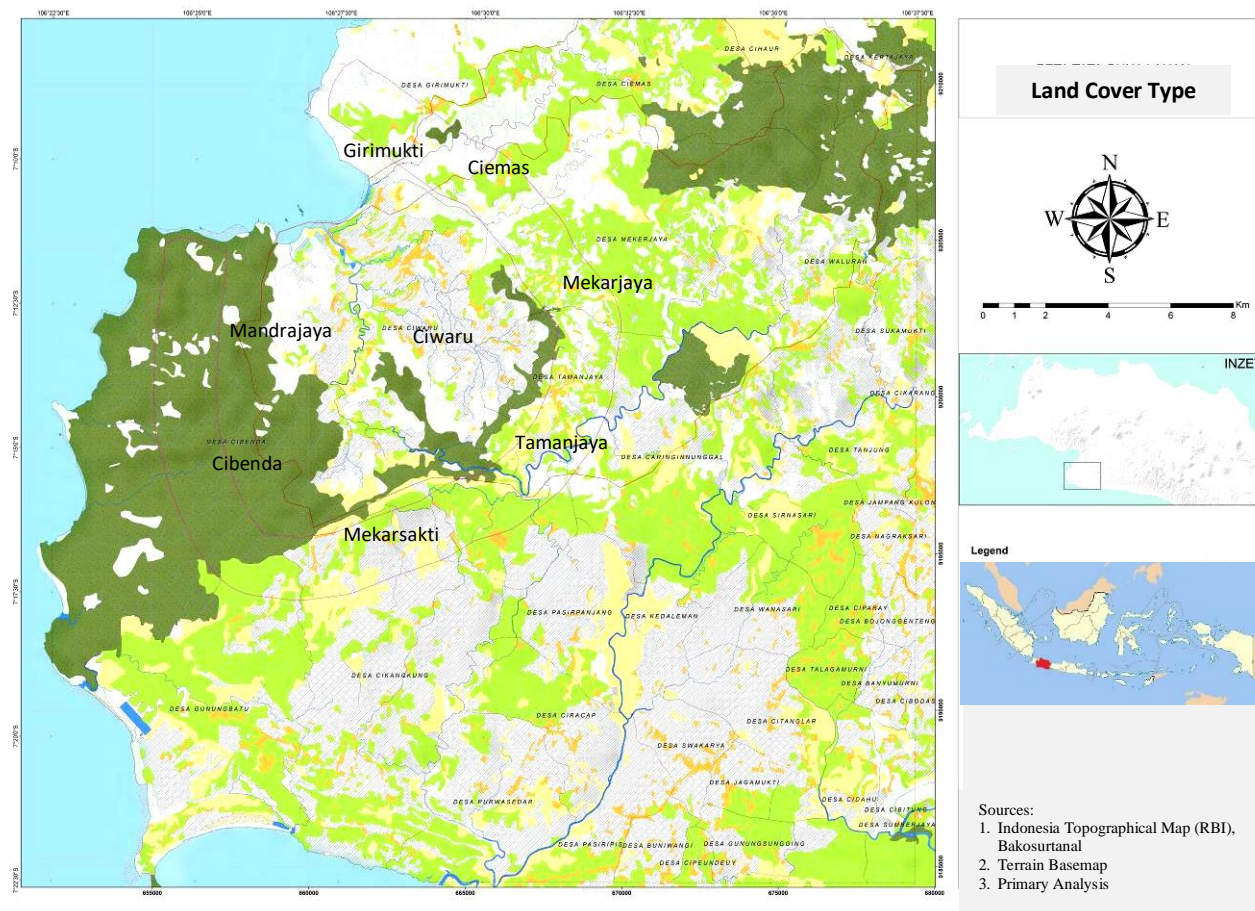
### Study period and area

This study was carried from February to May 2020 in Ciemas Sub-district, Sukabumi District, West Java Province, Indonesia (Figure 1). Administratively, Ciemas Subdistrict is bordered by Simpenan Subdistrict to the north, the Indian Ocean to the south and to the west, and Ciracap Subdistrict to the east. Ciemas Subdistrict is situated at an altitude of 10-400 meters above sea level (m asl.). Ciemas Subdistrict consists of nine villages, namely Tamanjaya, Mekarjaya, Ciemas, Girimukti, Mekarsakti, Cibenda, Mandrajaya, Ciwaru, and Sidamulya. In this study, however, Sidamulya is not included since this is a new village as the result of expansion program (*program pemekaran desa*). Besides, Sidamulya is also culturally different from the other eight villages as the residents are majority of Javanese immigrants.

### Data collection

Data collection method used in this study was mixed-method of qualitative and quantitative using ethnoecological approach as prescribed by Albuquerque et al. (2014) and Iskandar (2018). Based on this approach, the researchers study the point of view of local people who have traditional ecological knowledge on plants embedded with their culture (Berkes 2012). Some techniques in collecting the primary data, including observation, semi-structured and structured interviews were employed in this study (Creswell 2009).

The observation was undertaken to obtain general information on local environmental conditions of the villages. The researchers visited and observed village community settlements, forest ecosystems, and various agroecosystem types, including homegardens, gardens, wet-rice paddy fields and dry-paddy fields (swidden cultivation system).



**Figure 1.** Study area in Ciletuh-Palabuhanratu Geopark, Ciemas Subdistrict, Sukabumi, West Java, Indonesia (7°13'7.31" S 106°29'29.98" E)

The semi-structured interview was conducted to determine plant species used based on the land cover types and community's dependence on plant utilization. The semi-structured interview was conducted through depth interviews with nine key informants of local experts that were purposively selected (Iskandar et al. 2016; Iskandar 2018), with the guidelines for interviews made previously and developed during the interview (Husodo et al. 2019). Informants were chosen through snowball sampling technique by selecting one local expert with excellent knowledge on plant utilization, then based on this initial informant, some other local experts were recognized and purposively selected as informants (Albuquerque et al. 2014). The informants included formal village leaders and their staff, non-formal village leaders, old male and female farmers, village middlemen, agricultural extensions, and tourism managers.

While the structured interview was employed to determine plant species used based on the land cover types only. The interview was conducted using a questionnaire for respondents who were randomly selected. Respondents selected were the household's head, assuming he/she representing his/her family knowledge. The number of respondents was determined based on the Lynch et al. (1974) formula as following:

$$n = \frac{N.Z^2.P.(1-P)}{N.d^2 + Z^2(1-P)}$$

Where;

- n : Number of samples
- N : Population size (15,787 families)
- Z : Number of normal variables (1,96)
- P : The greatest possible proportion (0,50)
- d : Error (0,10)

The respondents were selected randomly to be proportional to the population of each village which resulted in a total of 94 respondents (Husodo et al. 2019).

In order to identify unknown plant species, herbarium specimens were made and identified in the laboratory of plant taxonomy, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Padjadjaran, Sumedang, Indonesia.

#### Data analysis

The qualitative data was analyzed by cross-checking, summarizing and synthesizing as the basis for developing narrative writing (Newing et al. 2011; Partasmita et al. 2019). Cross-checking data was conducted using triangulation method using the information obtained from

informants collected from the interview, observation, and participant observation. While the quantitative data were analyzed using descriptive statistics, including the frequency and proportion of respondents' answers on particular issues (Wulandari et al. 2019).

## RESULTS AND DISCUSSION

### Results

Our study revealed at least 182 species of plants used by village community of Ciemas Subdistrict, consisting of food (80 species), medicinal plants (73 species), livestock fodder (9 species), firewoods (27 species), building materials and furniture (38 species), and others (23 species). For more detailed complete species can be seen in Table 1.

Based on the type of land cover, plants obtained from forest (70 species), gardens (81 species), homegardens (69 species), dry-paddy fields (5 species), and wet-paddy fields (8 species). Based on the data obtained from the interviews, in total the respondents mentioned 116 species, while all the informants mentioned 96 species (Table 2).

### Species diversity across land cover types

As can be seen from Table 1, most plant species used by community in the studied area were documented with various uses including for food, livestock fodder, and fuelwood. However, most plant species for food in the garden is secondary food, while most of the essential foods were cultivated in wet-paddy fields and dry-paddy field. On the other hand, plants used for medicinal purposes were mostly found in the homegardens, while building materials and furniture, and other uses were primarily found in the forests. Despite the low level of species diversity on the paddy field and dry-paddy field, community's dependence on these land-use types was high because their utilization is to fulfill essential food needs in daily life.

#### Forest

Based on study results, it revealed that the village people tend to use the forest to obtain firewood. Only a few people use the forest to get food, livestock fodder, and medicinal plants. In addition, logging activities in the Ciletuh-Palabuhanratu Geopark have been banned by the local government and environmentalist communities. Over time, the use of firewood decrease due to concerns that this activity could damage the habitat of *Rafflesia patma* although many people don't know about the *Rafflesia patma* and its conservation status, so it needs further education.

Food plants obtained from the forest included billygoat-weed (*Ageratum conyzoides* L.), the barrelier's woodsorrel (*Oxalis barrelieri* L.), argus pheasant tree (*Dracontomelon mangiferum* (Blume) Blume), leaved yam (*Diocorea hispida* Dennst), queensland-cherry (*Antidesma bunius* L.), cluster fig (*Ficus racemosa* L.), banana (*Musa* sp), melastome clearweed (*Pilea trinervia* Wight), and salak hutan (*Eleiodoxa conferta* (Griff.) Buret). Only a few people use this food plant. Besides, this food plant is only a side dish, not an essential food.

**Table 2.** Plant species being utilized by village community in the studied area in Ciletuh-Palabuhanratu Geopark, West Java, Indonesia based on land cover types

Land cover types	Number of species	Number of plant species in each type of use					
		F	M	L	FW	B	O
Forest	47	11	24	4	6	18	14
Garden	81	49	31	6	18	17	10
Home garden	69	43	38	1	7	4	6
Dry paddy field	5	3	1	3	0	0	1
Wet paddy field	8	3	1	2	0	0	1

Note: F: Food; M: Medicines; L: Livestock Fodder; FW: Fire woods; B: Building Material and Furniture; O: Other

Some people knew the use of plants as medicine from the forest with informants and people who live close to forests, such as Girimukti Village, tended to use this utilization. Some traditional medicine plants, including *Ageratum conyzoides* L, *Blumea balsamifera* L, *Centella asiatica* (L) Urb, *Curcuma longa* L, and *Orthosiphon aristatus* (Blume) Miq.

Livestock fodder obtained from the forest included banana (*Musa* sp), pinto peanut (*Arachis pintoi* Krapov & W.C. Greg), and elephant grass (*Pennisetum purpureum* cv. Mott). These species can still be found in other land covers such as gardens. Usually, breeders herd their livestock by eating wild grass along the roadside, including the natural forests' edge.

Plant species found in the forest used as firewood included *hampelas* (*Ficus ampelas* Burm.fil.), njaval (*Syzygium densiflorum* Wall. ex Wt & Arn), teak (*Tectona grandis* L.f), *ki sampang* (*Melicope latifolia* (DC) T.G Hartley), *nangsi* (*Villebrunea rubescens* Bl), and *rengas* (*Gluta renghas* L.). The community knew that various timber plants can be used as firewood when these are dry. Even though there were restrictions in accessing the forest, people tended to take firewood from the gardens, both privately owned and from neighbors, so that the need for firewood for daily life can still be adequately fulfilled.

Timber trees that were used as building materials and furniture can be found in the forest. However, the use of timber trees from the forest was no longer occurring due to the geopark ban. The knowledge on the use of wood from the forest was passed down from previous parents who used the wood.

Other species with various uses, such as spiny bamboo (*Bambusa blumeana* J.A & J.H Schultes), whorled bamboo (*Gigantochloa verticillata* (Willd) Munro), common bamboo (*Bambusa vulgaris* Schrad ex J.C.Wendl), giant clumping bamboo (*Gigantochloa nigrocillata* Kurtz), string bamboo (*Gigantochloa apus* (Schult F.) Curtz), tamiang bamboo (*Schizostachyum blumei* Nees), terap (*Artocarpus elasticus* Reinw. ex Blume), hairy fig (*Ficus hispida* L.f.), the barrelier's woodsorrel (*Oxalis barrelieri* L.), mother of cacao (*Gliricidia sepium* (Jacq) Steud), winged boot tree (*Sterculia campanulata* Wall. ex Mast), fig tree (*Ficus sumatrana* Miq), *pisang batu* (Banana sp.), and *pisang*

*kepok* (*Musa acuminata* L. x *balbisana*), can be found in the forest.

Similar study in Talang Mamak Tribe in Riau, Indonesia (Titisari et al. 2019), the utilization of plants varied widely which the plants were obtained from cultivation or extraction from the forest. In this tribe, plants were used for construction materials, foods, medicines and traditional and cultural ceremonies with the utilization of bioresources was carried out by considering the sustainability, function and productivity of forests (Titisari et al. 2019).

#### *Garden and home garden*

Usually, people grew various plant species in their garden and homegarden including woods, bamboos, fruits, spices, medicinal plants, etc. Often the home garden was planted with decorative plants. This result is similar to other studies which found that home garden system in West Java is planted with various diversity of plants which has an important role for ecological and socio-economic functions (Iskandar and Iskandar 2016). Some species of foods, including species and fruits, are commonly grown in both garden and homegarden, such as *Allium cepa* L, *Allium sativum* L, *Alpinia galanga* (L.) Willd, *Amomum compactum* Soland ex Maton, *Capsicum annuum* L, *Cucumis sativus* L, *Musa x paradisiaca*, *Carica papaya* L, *Lansium domesticum* Corr, *Muntingia calabura* L, and *Nephelium lappaceum* L.

#### *Dry paddy field and wet paddy field*

Various cultivars of paddy/rice (*Oryza sativa* L) were cultivated in the studied area. The rice cultivars that grow in the dry field included brown rice (*pare pupuay*), *pare begog*, black rice (*pare hideung*) and glutinous rice (*pare sticky rice*). In the dry paddy field, the Sundanese people are familiar with the intercropping system (*tumpang sari*) by growing rice and chayote, banana, cassava, and cucumber. On the other hand, the rice cultivar grown in the wet field was white rice. In this field, the community also grew several species, including maize (*Zea mays* L), cayenne pepper (*Capsicum annuum* L.), cowpeas (*Vigna unguiculata* (L.) Walp) and bananas (*Musa* sp).

### **Species diversity across utilization categories**

#### *Food*

Most people in the studied area still relied on agricultural products to meet their daily needs, both commercial and subsistence. The foods referred to in this study include essential food, fruits, vegetables, and spices. In the land with flat contour, most of the people grew wet rice, while at higher and sloping areas, such as Girimukti, the community tended to grow dry rice.

Based on our observation, people did not have other food alternatives if there is a failure in rice cultivation or other disasters that might cause a reduction in the food supply. For example, if the community experiences a failed rice harvest and runs out of rice stocks, the community borrows rice from neighbors and repay the rice loan when the next crop is made. Besides, people who commercialize

rice will experience a decrease in farmers' income. Because of that, people are very dependent on agricultural products.

Of the many plants used as food sources, leaved yam (*Dioscorea hispida* Dennst) was used as a side dish in the form of chip despite it has risk of poisoning. The use of yam for chip was one of the characteristics of Ciletuh-Palabuhanratu Geopark in which the community processed the poisonous leaved yam or *gadung* into chips that are safe for consumption. To get rid of the poison, they have to go through the drying-boiling process for up to 10 days. After that, it can be cooked either steamed or fried into chips, according to taste. Even though it has gone through a long process, hangover symptoms sometimes occur when consumed in large quantities.

#### *Medicinal plants*

The results of the study showed that the community used medicinal plants to cure various diseases. For example, Asiatic pennywort (*Centella asiatica* (L.) Urb) is to treat gout, garden onion (*Allium cepa* L.) to cure fever, kepel fruit (*Stelechocarpus burahol* (Blume) Hook and Thomson) to reduce body odor, sea holly (*Acanthus ilicifolius* L.), god's crown (*Phaleria macrocarpa* (Sheff) Boerl), white lead tree (*Leucaena leucocephala* (Lam.) De Wit.), and calabura (*Muntingia calabura* L) to treat diabetes and high blood pressure. Medicinal plants are a vital source to combat human diseases and play an essential role in healing many serious diseases worldwide due to active phytochemical compounds (Rahmawati et al. 2020). According to Islam and Sarwar (2020), *Terminalia arjuna* (Roxb.) W & A) is used to treat heart diseases, *Ipomoea alba* L. for snakebites, *Moringa oleifera* Lam. for chickenpox, *Vitex negundo* for gout, *Centella asiatica* (L.) Urb) is used to treat itching in the eye, dry catarrh, and bronchitis. According to Rana et al. (2010), *Centella asiatica* (L.) Urb) is also used against flatulence, dysentery, and piles bleeding. Other ethnic groups said that *Centella asiatica* (L.) Urb) is used against diarrhea, menstrual problems, stomach pain, and stimulants (Mohiuddin et al. 2012). Parts of plants commonly used as medicines include leaves, stems, roots, and rhizomes. Leaf, root, bark, herbaceous parts, and seed are the five highest utilization parts of plants (Rahmawati et al. 2020; Karthiyayini 2012; Town 2018).

Besides there were various medicinal plants available in the studied area, some people choose treatment at clinics, health centers, midwives (*bidan*), *mantri* (traditional healer), or drugs sold freely in the conventional market. Also, every village has a health center. The rationale of preferring these modern medications is that it is easier to obtain and quicker in the healing process. In addition, not all the parent's knowledge is passed down, so they do not know the dosage of medicinal plants, and they never even try to use medicinal plants. According to Agbor and Naidoo (2016), the main reasons for attending a traditional healer were linked to the educational level, the type of dwelling, and the patient's residence place.

Some people grew medicinal plants in their home garden or asked neighbors' home gardens. The long-distance between the house and the health center/clinic and

free of cost were the reasons why medicinal plants still being used by the community, especially for first aid, but people turn to modern medicine if they have not recovered. The knowledge on medicinal plants was generally passed down from mothers to daughters, although this knowledge can also be transferred to sons in few cases.

#### *Livestock fodder*

Some people in the studied area owned livestock, such as cows, goats, and sheep. The people used the remaining harvested rice plants and some plants as livestock fodder to feed this livestock. In this study, because only a few people raise livestock, the level of dependence on forage plants was low. Also, as long as there is wild grass on the roadside, livestock can still be used. According to Shiferaw et al. (2018), the primary livestock feed resources were natural grazing lands, crop residues, and cultivated forages such as sesbania (*Sesbania sesban*), pigeon pea (*Cajanus cajan* (L) Millsp), and napier grass (*Pennisetum purpureum* S).

#### *Firewood*

Firewood was obtained from various species of wood plants, mostly from the tree branches and wood/bamboo handicraft waste. Some examples of plants are usually used as firewoods, namely *Paraserianthes falcataria* L.Nielsen, *Bambusa glaucophylla* Widjaja, *Bambusa vulgaris* Schrad ex J.C. Wendl, and *Hevea brasiliensis* (Willd) Juss Muel.Arg. Also, firewood can be brought from a used lift net. These used lif net only used by fishing communities, such as in Ciwaru and Mandrajaya Villages. People tended to use firewoods for cooking that take a long time, such as boiling water, and people tended to use gas stoves for short cooking times. Firewood was freely available, and people believe that cooking with firewood makes food taste and smell better than using a gas stove. Based on the observation, some of the gas stoves owned were subsidized by the government, so that many people had gas stoves. However, the people were still very dependent on firewood even though they already have a gas stove.

#### *Building material and furniture*

The community in the studied area commonly depends on the use of woods or bamboos for building materials and furniture (Table 1 and Table 2). Some plants are commonly used for building and materials, such as *Paraserianthes falcataria* L.Nielsen, *Albizia procera* (Roxb.) Benth, *Alstonia scholaris* (L) R.Br and *Gigantochloa apus* (Schult.f) Kurz. The utilization of building materials is predominantly undertaken by men who work as construction workers. Construction workers can build houses (*rumah panggung*), *saung*, and furniture such as bamboo benches and tables. According to Setiawati et al. (2017), giant black bamboo is commonly used to make

furniture such as tables and chairs. People rarely use timber plants. Also, utilization for buildings is carried out every few years. People tend to buy wood, so people do not depend on this use. Hutaarung et al. (2018) said that the timber is obtained from outside the protected forest area or bought from the village or elsewhere for people who want to build the house.

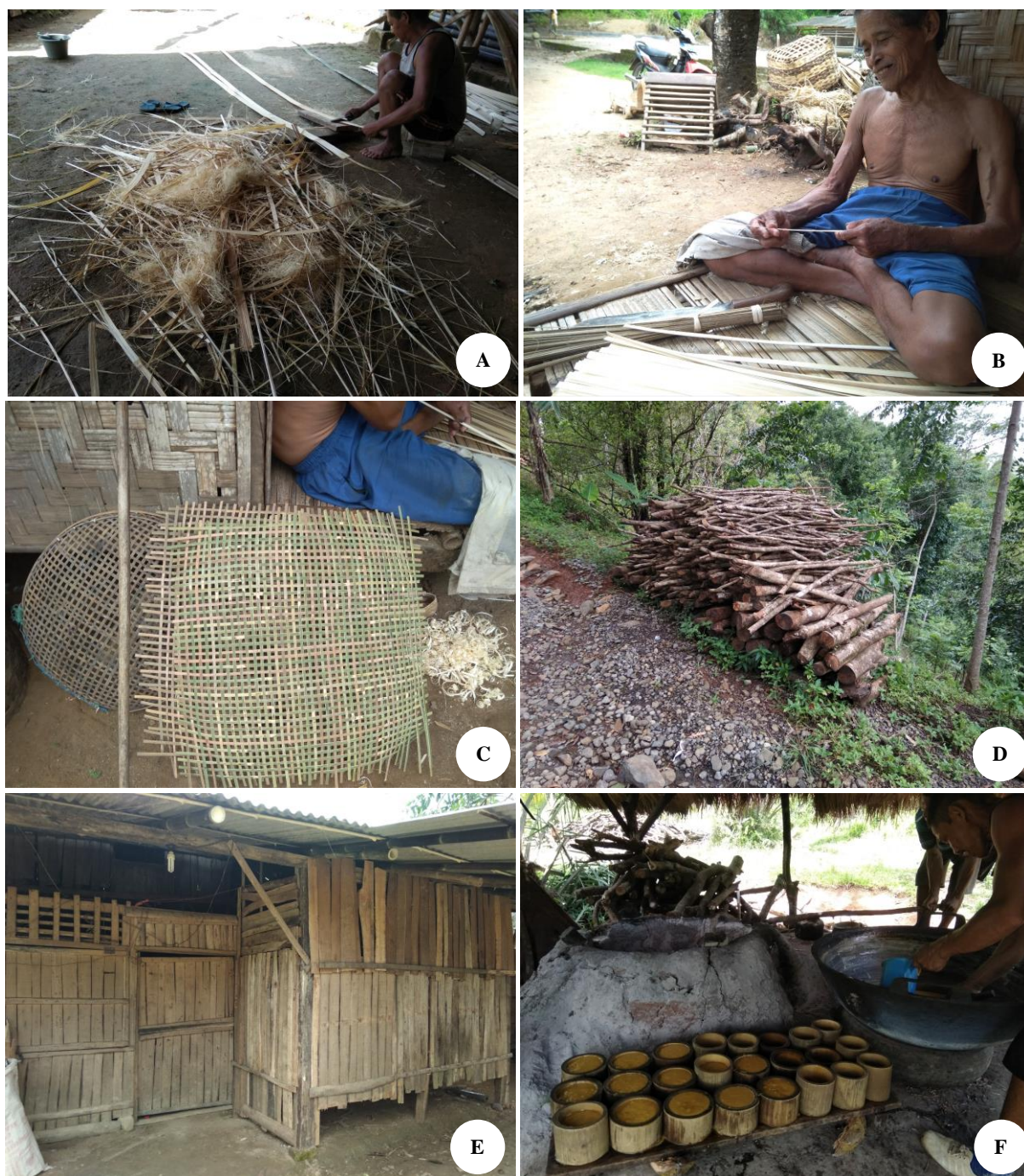
#### *Other uses*

Several plant species were used traditionally as ropes and fibers, such as string bamboos (*Gigantochloa apus* Kurz), giant clumping bamboos (*Gigantochloa nigrocillata* Kurz), hairy figs (*Ficus hispida* L.f) and sugar palms (*Arenga pinnata* Merr) (Figure 2). Some bamboos were used as lift nets, such as common bamboo (*Bambusa vulgaris* Schrad. ex W.C. Wendl.) and spiny bamboo (*Bambusa bumeana* J.A & J.H Schultes)) Giant black bamboo (*Gigantochloa atroviolacea* Widjaja) can be used as a coconut sugar molder, while several bamboos can also be used to make musical instruments, such as bamboo tamiang (*Schizostachyum blumei* Nees). Several species can be used as additional fertilizers, such as whorled bamboo (*Gigantochloa verticillata* Willd.) Munro) and mother of cacao (*Gliricidia sepium* (Jacq) Steud).

The community used terap (*Artocarpus elasticus*) and banana (*Musa* sp) for food wrappers, while the barrelier's woodsorrel (*Oxalis barrelieri* L.) can be used as a hand sanitizer. Several species were used as decorative plants, including hogplum (*Spondias mombin* L.) and *kiara beas*/bonsai (*Ficus sumatrana* Miq). The sap from terap (*Artocarpus elasticus* Reinw ex. Blume) can be used to catch birds, while *beurih* (*Sterculia campanulata* L.) can be used as a bioindicator for forest honey (i.e., if the leaves have fallen off and are left with flowers, it signifies the best quality forest honey season). The honey from the *beurih* tree is the best honey than the other trees.

Charcoal can use several bamboos, such as spiny bamboo (*Bambusa blumeana* J.A & J.H. Schultes ) and common bamboo (*Bambusa vulgaris* Schrad. ex. W.C. Wendl ). Sassen et al. (2015) said that wood fuel, such as charcoal or firewood, is the most common form of biomass utilized in Sub-Saharan African Countries. Charcoal is a highly consumed form of biomass in Uganda due to the lack of modern alternatives (Dastan et al. 2017; Bamwesigye and Hlavackova 2018; Lee 2013).

Based on this study, it can be concluded that rural people in Ciemas Sub-district, which is the part of Ciletuh-Palabuhanratu Geopark, still used various plants to meet their daily needs, such as food, medicinal plants, livestock fodder, firewood, building materials, furniture, etc. This variety of uses was provided by high plant diversity on various land covers including forest, garden, home garden, dry paddy field, and wet paddy field.



**Figure 2.** The various utilizations of plants by local communities in Ciletuh-Palabuhanratu Geopark. A-B-C. Bamboo handicraft; D. Collecting of firewood; E. Timber as building material; F. Bamboo as the mold for coconut sugar

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**Table 1.** Plants and various utilizations recorded in the community of Ciletuh Pelabuhanratu Geopark, West Java, Indonesia

Family	Scientific name	Vernacular name	Utilizations						Main function
			Fo	M	L	Fi	B	O	
Acanthaceae	<i>Acanthus ilicifolius</i> L.	<i>Daruju</i>		√				√	
Amaranthaceae	<i>Achyranthes aspera</i> L.	<i>Jarong</i>		√				√	
Rutaceae	<i>Acronychia pedunculata</i> (L.) Miq.	<i>Kayu Semidra</i>						√	Decorative plants (bonsai)
Asteraceae	<i>Ageratum conyzoides</i> L.	<i>Babadotan</i>	√	√					Side dishes and stop the nose bleed
Fabaceae	<i>Albizia chinensis</i> (Osbeck) Merr	<i>Sengon</i>					√		Building material
Fabaceae	<i>Albizia falcataria/ Paraserianthes falacatria</i> L. Nielsen	<i>Albasiah</i>				√			Firewood
Fabaceae	<i>Albizia procera</i> (Roxb.) Benth.	<i>Weru</i>					√		Building material
Amaryllidaceae	<i>Allium cepa</i> L.	<i>Bawang Beureum</i>	√	√					Kitchen spices and reduce fever
Amaryllidaceae	<i>Allium sativum</i> L.	<i>Bawang Putih</i>		√					Kitchen spices
Amaryllidaceae	<i>Allium tuberosum</i> Rottler Ex Spreng	<i>Kuca</i>		√					Kitchen spices
Zingiberaceae	<i>Alpinia galanga</i> (L.) Willd	<i>Lengkuas</i>	√	√					Kitchen spices and lowering blood sugar
Apocynaceae	<i>Alstonia scholaris</i> (L.) R.Br.	<i>Lame Putih</i>					√		Building material
Apocynaceae	<i>Alstonia</i> sp.	<i>Lame Kuning</i>					√		Building material
Amaranthaceae	<i>Amaranthus spinosus</i> L.	<i>Bayam</i>		√					Sidedishes
Zingiberaceae	<i>Amomum compactum</i> Soland Ex Maton	<i>Kapulaga Jawa</i>	√	√					Kitchen spices and treat smell breath
Zingiberaceae	<i>Amomum dealbatum</i> Roxb	<i>Wresah</i>		√					Reduce fever
Anacardiaceae	<i>Anacardium occidentale</i> L.	<i>Jambu Monyet</i>	√	√					Sidedishes and treat diarrhea
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr.	<i>Nanas</i>		√					Sidedishes
Acanthaceae	<i>Andrographis paniculata</i> Nees	<i>Sambiloto</i>		√					Reduce blood sugar
Annonaceae	<i>Annona muricata</i> L.	<i>Sirsak</i>	√	√		√			Firewood, side dishes, reduce back pain and blood pressure
Annonaceae	<i>Annona squamosa</i> L.	<i>Srikaya</i>	√						Sidedishes
Basellaceae	<i>Anredera cordifolia</i> (Ten.) Steenis	<i>Binahong</i>		√					Relieve fatigue
Phyllanthaceae	<i>Antidesma bunius</i> (L.) Spreng	<i>Huni</i>		√					Side dishes
Apiaceae	<i>Apium graveolens</i> L.	<i>Seledri</i>	√	√					Lowering blood pressure
Fabaceae	<i>Arachis pintoi</i>	<i>Kacang Hias</i>			√				Livestock fodder
Fabaceae	<i>Archidendron pauciflorum</i> (Benth.) I.C. Nielsen	<i>Jengkol</i>		√					Reduce blood sugar
Primulaceae	<i>Ardisia elliptica</i> Thunb	<i>Lempeni</i>	√						Side dishes
Arecaceae	<i>Arenga pinnata</i> Merr.	<i>Aren</i>	√					√	Firewood rope, broomsticks making, and as a sweetener
Moraceae	<i>Artocarpus altilis</i> (Parkinson) Fosberg.	<i>Sukun</i>	√	√					Side dishes and treat uric acid
Moraceae	<i>Artocarpus elasticus</i> Reinw Ex Bl	<i>Benda</i>						√	Catching the bird (sap)
Moraceae	<i>Artocarpus heterophyllus</i> Lam.	<i>Nangka</i>	√				√		Side dishes and kitchen furniture
Poaceae	<i>Axonopus compressus</i> (Sw.) P.Beauv	<i>Rumput Pahit</i>		√					Adding body insulin
Poaceae	<i>Bambusa blumeana</i> Schult & Schult.f.	<i>Bambu Duri</i>						√	Charcoal and lift net making
Poaceae	<i>Bambusa glaucophylla</i> Widjaja	<i>Bambu Putih</i>				√			Firewood
Poaceae	<i>Bambusa tuldoidea</i> Munro	<i>Bambu Hijau</i>					√		Wicker fence and kitchen furniture
Poaceae	<i>Bambusa vulgaris</i> Schrad ex. J.C. Wendl	<i>Bambu Kuning</i>				√	√	√	Building material, firewood, and lift net

Asteraceae	<i>Blumea balsamifera</i> (L.)	<i>Sembung</i>	√				Body deodorizer and reduce smell breath
Zingiberaceae	<i>Boesenbergia rotunda</i> (L.) Mansfeld	<i>Temu Kunci</i>	√				Relieve cough
Crassulaceae	<i>Bryophyllum pinnatum</i> (Lnk) Oken	<i>Buntiris</i>	√				Reduce fever
Fabaceae	<i>Cajanus cajan</i> (L.) Millsp	<i>Hiris</i>	√				Side dishes
Cannaceae	<i>Canna discolor</i> Lindl.	<i>Ganyong</i>	√				Drying out the external wound
Solanaceae	<i>Capsicum annuum</i> L.	<i>Cengek</i>	√				Kitchen spices
Caricaceae	<i>Carica papaya</i> L.	<i>Pepaya</i>	√	√			Treat back pain and lowering the blood pressure
Malvaceae	<i>Ceiba pentandra</i> (L) Gaertn.	<i>Kapuk Randu</i>	√	√		√	Clean the eyes
Apiaceae	<i>Centella asiatica</i> (L.) Urb	<i>Antanan</i>	√	√			Side dishes and treat ulcers
Poaceae	<i>Centotheca lappacea</i> (L.) Desv.	<i>Rumput Lilit Kain</i>			√		Livestock fodder
Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.) Matsumura & Nakai	<i>Semangka</i>	√				Side dishes
Arecaceae	<i>Cocos nucifera</i> L.	<i>Kelapa</i>	√		√		Side dishes and firewood
Araceae	<i>Colocasia esculenta</i> (L.) Schott.	<i>Talas</i>	√	√			Treat ulcers
Asparagaceae	<i>Cordyline fruticosa</i> (L) A.Chev.	<i>Hanjuang</i>	√	√			Treat dysentery
Asteraceae	<i>Cosmos caudatus</i> Kunth.	<i>Kenikir</i>				√	Decorative plants
Costaceae	<i>Costus speciosus</i> (Koen ex Retz.) Sm	<i>Pacing</i>	√				Eye drops
Asteraceae	<i>Crassocephalum crepidioides</i> (Benth) ex. S.Moore	<i>Sintrong</i>	√	√			Side dishes and lowering blood pressure
Cucurbitaceae	<i>Cucumis sativus</i> L.	<i>Bonteng</i>	√				Sidedishes
Cucurbitaceae	<i>Cucurbita moschata</i> Durch.	<i>Waluh</i>	√				Side dishes
Zingiberaceae	<i>Curcuma longa</i> Linn.	<i>Kunyit</i>	√	√			Kitchen spices and treat stomach pain
Zingiberaceae	<i>Curcuma zanthorrhiza</i> Roxb	<i>Temulawak</i>	√	√			Treat ulcers
Menispermaceae	<i>Cyclea barbata</i> L.M	<i>Cincau</i>	√				Drink
Poaceae	<i>Cymbopogon citratus</i> (DC.) Stapf	<i>Sereh</i>	√	√			Kitchen spices and clean the eyes
Urticaceae	<i>Dendrocnide stimulans</i> (L.fil.) Chew	<i>Pulus</i>		√			Remove numb body parts
Dilleniaceae	<i>Dillenia sp.</i>	<i>Sempur</i>				√	Building material
Sapindaceae	<i>Dimocarpus longan</i> Lour	<i>Lengkeng</i>	√		√		Firewood
Poaceae	<i>Dinochloa scandens</i> (Blume ex Nees) Kuntze	<i>Bambu Cangkoreh</i>		√			Eye drops
Dioscoreaceae	<i>Dioscorea hispida</i> Dennst	<i>Gadung</i>	√				Side dishes
Anacardiaceae	<i>Dracontomelon mangiferum</i> (Blume) Blume	<i>Dahu</i>	√				Food
Malvaceae	<i>Durio zibethinus</i> Murr	<i>Kadu</i>	√			√	Food
Meliaceae	<i>Dysoxylum densiflorum</i> Miq	<i>Kapinango</i>				√	Building material
Poaceae	<i>Echinochloa crus-galli</i> (L.) P.Beauv	<i>Rumput Jajagoan</i>			√		Livestock fodder
Arecaceae	<i>Eleiodoxa conferta</i> Burret	<i>Salak Hutan</i>	√				Side dishes
Asteraceae	<i>Elephantopus scaber</i> L.	<i>Tapak Liman</i>		√			Treat rheumatism
Poaceae	<i>Eleusine indica</i> (L.) Gaertn	<i>Rumput Belulang</i>			√		Livestock fodder
Araceae	<i>Epipremnum aureum</i> (Lind & Andre) G.S	<i>Sirih Gading</i>		√			Antibiotics
Zingiberaceae	<i>Etilingera elatior</i> (Jck) R.M. Smith	<i>Honje</i>	√				Kitchen spices
Myrtaceae	<i>Eugenia polyantha</i> (Wight) Walp	<i>Salam</i>	√	√			Antidote bitter taste in drinks, reduce cholesterol
Moraceae	<i>Ficus ampelas</i> Burm.f	<i>Hampelas</i>			√	√	Making huts and stables
Moraceae	<i>Ficus hispida</i> L.f.	<i>Bisoro</i>				√	Fire wood ropes
Moraceae	<i>Ficus racemosa</i> Linn	<i>Loa</i>	√				Side dishes
Moraceae	<i>Ficus sumatrana</i> Miq	<i>Kiara Beas</i>				√	Decorative plants (bonsai)
Clusiaceae	<i>Garcinia mangostana</i> L.	<i>Manggis</i>	√				Side dishes
Rubiaceae	<i>Gardenia augusta</i> Merr	<i>Kacapiring</i>		√			Reduce fever

Poaceae	<i>Gigantochloa apus</i> (Schult.f) Kurz	<i>Bambu Tali</i>			√	√	√	Building material and bamboo bench straps
Poaceae	<i>Gigantochloa atroviolacea</i> Widjaja	<i>Bambu Hitam</i>			√	√	√	Firewood, the material for making roof hut, booths, and lift net
Poaceae	<i>Gigantochloa nigrocillata</i> Kurz	<i>Bambu Lengka</i>					√	Bamboo bench straps
Poaceae	<i>Gigantochloa verticillata</i> (Willd.) Munro	<i>Bambu Gombong</i>				√	√	Building material, lift net, and making liquid fertilizer
Fabaceae	<i>Gliricidia sepium</i> (Jacq.) Steud	<i>Cebreng</i>			√		√	Clean the eyes
Phyllanthaceae	<i>Glochidion borneense</i> (Mull.Argr.) Boerl	<i>Mareme</i>	√					Side dishes
Anacardiaceae	<i>Gluta renghas</i> L.	<i>Rengas</i>			√	√		Firewood and building material
Malvaceae	<i>Grewia acuminata</i> Juss	<i>Derewak</i>			√			Firewood
Sapindaceae	<i>Guioa diplopetala</i> (Hassk) Radlk	<i>Kihoe</i>				√		Bamboo bench straps
Euphorbiaceae	<i>Hevea brasiliensis</i> (Willd ex Juss) Muel.Arg	<i>Karet</i>			√			Firewood
Malvaceae	<i>Hibiscus tiliaceus</i> L.	<i>Waru</i>		√				Treat dysentery
Campanulaceae	<i>Hippobroma longiflora</i> (L.) G.Don	<i>Kitolod</i>		√				Clean the eyes
Cactaceae	<i>Hylocereus undatus</i>	<i>Buah Naga</i>	√					Side dishes
Balsaminaceae	<i>Impatiens balsamina</i> L.	<i>Bunga Pacar Air</i>					√	Decorative plants
Poaceae	<i>Imperata cylindrica</i> Raeusch	<i>Ilalang</i>			√	√		Making roof hut
Convolvulaceae	<i>Ipomoea aquatica</i> Forssk	<i>Kangkung</i>	√					Side dishes
Convolvulaceae	<i>Ipomoea batatas</i> L.	<i>Ubi Jalar</i>		√				Treat ulcers
Rubiaceae	<i>Ixora javanica</i> (Blume) DC	<i>Bunga Asoka</i>					√	Decorative plants
Zingiberaceae	<i>Kaempferia galanga</i> Reviw	<i>Kencur</i>	√	√				Kitchen spices, treat coughs, and relieve body bruises
Lythraceae	<i>Lagerstroemia speciosa</i> (L) Pers	<i>Bungur</i>				√		Building material
Meliaceae	<i>Lansium domesticum</i> Corr	<i>Dukuh</i>	√					Side dishes
Verbenaceae	<i>Lantana camara</i> Linn	<i>Saliara</i>		√				Antibiotics
Fabaceae	<i>Leucaena leucocephala</i> (Lam) De Wit	<i>Petai Cina</i>	√	√		√		Treat diabetes
Cucurbitaceae	<i>Luffa acutangula</i> Roxb	<i>Oyong</i>	√					Side dishes
Lygodiaceae	<i>Lygodium</i> sp.	<i>Paku Hata</i>					√	Kitchen furniture making
Rhamnaceae	<i>Maesopsis eminii</i> Engl	<i>Kayu Afrika</i>				√	√	Firewood and building material
Anacardiaceae	<i>Mangifera indica</i> L. var.	<i>Mangga</i>	√			√		Side dishes and firewood
Euphorbiaceae	<i>Manihot esculenta</i> Crantz	<i>Sampeu</i>	√					Side dishes
Sapotaceae	<i>Manilkara zapota</i> (L.) P.Royen	<i>Sawo</i>	√					Side dishes
Melastomataceae	<i>Melastoma affine</i> D.Don	<i>Harendong</i>		√				Treat vaginal discharge
Rutaceae	<i>Melicope latifolia</i> (DC.) T.G Hartley	<i>Kisampang</i>				√	√	Firewood and building material
Rutaceae	<i>Micromelum minutum</i> Wight & Arn	<i>Kihuu</i>					√	Building material
Fabaceae	<i>Mimosa pudica</i> Linn	<i>Putri Malu</i>		√				Blood circulation
Rubiaceae	<i>Morinda citrifolia</i> L	<i>Mengkudu</i>		√				Antibiotics
Moringaceae	<i>Moringa oleifera</i> Lam	<i>Kelor</i>		√				Body growth
Moraceae	<i>Morus alba</i> L.	<i>Murbei</i>	√	√				Reduce cholesterol
Muntingiaceae	<i>Muntingia calabura</i> L.	<i>Kersen</i>	√	√				Side dishes, reduce blood pressure, uric acid, and cholesterol
Musaceae	<i>Musa acuminata</i>	<i>Pisang Kole</i>	√					Side dishes
Musaceae	<i>Musa acuminata</i> × <i>balbisiana</i>	<i>Pisang Kepok</i>	√	√	√		√	Sidedishes, treat diarrhea, livestock fodder, and food wrapper
Musaceae	<i>Musa balbisiana</i>	<i>Pisang Batu</i>	√	√	√		√	Side dishes, treat diarrhea, livestock fodder, and food wrapper
Musaceae	<i>Musa</i> sp.	<i>Pisang</i>	√	√	√		√	Side dishes, treat diarrhea, livestock fodder, and food wrapper
Rubiaceae	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	<i>Jabon</i>				√	√	Firewood and building material
Sapindaceae	<i>Nephelium lappaceum</i> L.	<i>Rambutan</i>	√			√		Side dishes and firewood

Lamiaceae	<i>Ocimum sanctum</i> Linn.	<i>Kemangi</i>	√					Side dishes
Lowiaceae	<i>Orchidantha longifolia</i> Ridl	<i>Lobak Hutan</i>		√				Sore throat
Lamiaceae	<i>Orthosiphon aristatus</i> (Blume) Miq	<i>Kumis Kucing</i>		√				Body deodorizer and reduce smell breath
Poaceae	<i>Oryza sativa</i> L. var.	<i>Padi</i>	√		√			Food and livestock fodder
Oxalidaceae	<i>Oxalis barrelieri</i> L.	<i>Calincing</i>	√				√	Side dishes and hand sanitizer
Acanthaceae	<i>Pachystachys lutea</i> Nees	<i>Bunga Lolipop</i>					√	Decorative plants
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb	<i>Pandan Wangi</i>		√			√	Relieve stiffness
Pandanaceae	<i>Pandanus</i> sp.	<i>Pandan Pecut</i>					√	Mat making
Pandanaceae	<i>Pandanus tectorius</i> Parkisin ex Zucc	<i>Pandan Gobang</i>					√	Mat making
Poaceae	<i>Pennisetum purpureum</i> Schumach	<i>Rumput Gajah</i>			√			Livestock fodder
Lauraceae	<i>Persea americana</i> Mill	<i>Alpukat</i>	√	√		√		Firewood
Thymelaeaceae	<i>Phaleria macrocarpa</i> Scheff	<i>Mahkota Dewa</i>		√				Reduce blood sugar
Fabaceae	<i>Phaseolus lunatus</i> L.	<i>Kacang kratok</i>	√					Side dishes
Fabaceae	<i>Phaseolus vulgaris</i> L.	<i>Buncis</i>	√					Side dishes
Phyllanthaceae	<i>Phyllanthus emblica</i> Linn	<i>Malaka</i>	√			√		Sweetener and firewood
Solanaceae	<i>Physalis peruviana</i> L.	<i>Cecenet</i>		√				Body deodorizer and reduce smell breath
Urticaceae	<i>Pilea trinervia</i> Wight	<i>Pohpohan</i>	√					Side dishes
Piperaceae	<i>Piper aduncum</i> L.	<i>Sirihan</i>		√				Reduce aches and improves blood circulation
Piperaceae	<i>Piper betle</i> L.	<i>Sirih</i>		√				Treat nosebleed
Piperaceae	<i>Piper caducibracteum</i> C.DC	<i>Sirih Hutan</i>		√				Reduce nausea
Piperaceae	<i>Piper nigrum</i> L.	<i>Lada Hutan</i>		√				Treat bruises
Lamiaceae	<i>Plectranthus scutellarioides</i> (L.) R.Br	<i>Jawer Kotok</i>		√				Reduce aches
Asteraceae	<i>Porophyllum ruderale</i> (Jacq)	<i>Ketumbar Bolivia</i>		√				Treat tinea versicolor
Myrtaceae	<i>Psidium guajava</i> L.	<i>Jambu Biji</i>	√					Treat diarrhea
Fabaceae	<i>Psophocarpus tetragonolobus</i> (L.) DC	<i>Jaat</i>	√					Sidedishes
Sterculiaceae	<i>Pterospermum javanicum</i> Jungh	<i>Bayur</i>					√	Building material
Euphorbiaceae	<i>Ricinus communis</i> L.	<i>Jarak</i>		√				Treat rheumatism
Poaceae	<i>Saccharum edule</i> Hassk	<i>Trubuk</i>	√					Sidedishes
Phyllanthaceae	<i>Sauropus androgynus</i> (L.) Merr	<i>Katuk</i>	√	√				Side dishes and launch a bowel movement
Theaceae	<i>Schima wallichii</i> (DC) Korth	<i>Puspa</i>					√	Building material
Poaceae	<i>Schizostachyum blumei</i> Nees	<i>Bambu Tamiang</i>					√	Making flute
Cucurbitaceae	<i>Sechium edule</i> (Jacq) Swartz	<i>Lejet</i>	√					Side dishes
Malvaceae	<i>Sida rhombifolia</i> L.	<i>Sidagori</i>		√				Treat uric acid
Asteraceae	<i>Smalanthus sonchifolius</i> (Poepp & Endl) H.Robinson	<i>Insulin</i>		√				Treat diabetes
Solanaceae	<i>Solanum lycopersicum</i> L.	<i>Tomat</i>	√					Side dishes
Solanaceae	<i>Solanum melongena</i> L.	<i>Terong Ungu</i>	√					Side dishes
Solanaceae	<i>Solanum nigrum</i> L.	<i>Leunca</i>	√					Side dishes
Solanaceae	<i>Solanum torvum</i> L	<i>Takokak</i>	√					Side dishes
Anacardiaceae	<i>Spondias mombin</i> L	<i>Kedondong Cina</i>	√				√	Decorative plants and side dishes
Annonaceae	<i>Stelechocarpus burahol</i> (Blume) Hook & Tomson	<i>Burahol</i>		√				Body deodorizer
Malvaceae	<i>Sterculia campanulata</i> Wall ex. Mast	<i>Beurih</i>				√	√	Firewood, building material, and forest honey bioindicator
Malvaceae	<i>Sterculia foetida</i> L.	<i>Kepuh</i>					√	Building material
Acanthaceae	<i>Strobilanthes crispa</i> (L.) Blume	<i>Kijibeling</i>	√	√				Treat kidney stone
Meliaceae	<i>Swietenia mahagoni</i> (L) Jcq	<i>Mahoni</i>				√		Firewood

Myrtaceae	<i>Syzygium aqueum</i> (Burm.f) Alston	<i>Jambu Air</i>	√		√		Firewood and side dishes
Myrtaceae	<i>Syzygium aromaticum</i> L	<i>Cengkeh</i>	√		√	√	Firewood, building material, and kitchen spices
Myrtaceae	<i>Syzygium cumini</i> (L.) Skeel	<i>Jamblang</i>				√	Building material
Myrtaceae	<i>Syzygium densiflorum</i> Wall ex Wight & Arn	<i>Jambu Kopo</i>			√	√	Building material and firewood
Lamiaceae	<i>Tectona grandis</i> L.f.	<i>Jati</i>		√	√	√	Building material, firewood, and clean the eyes
Combretaceae	<i>Terminalia catappa</i> L	<i>Ketapang</i>			√		Firewood
Menispermaceae	<i>Tinospora cordifolia</i>	<i>Akar Ali-Ali</i>		√			Treat uric acid, ulcer, blood sugar, and malaria
Fabaceae	<i>Vigna unguiculata</i> (L) Walp	<i>Kacang Panjang</i>	√				Side dishes
Urticaceae	<i>Villebrunea rubescens</i> (Bl.) Bl	<i>Nangsi</i>			√	√	Firewood and huts making
Lamiaceae	<i>Vitex glabrata</i> R.Br	<i>Bihbul</i>				√	Building material
Poaceae	<i>Zea mays</i> L	<i>Jagong</i>	√				Food
Zingiberaceae	<i>Zingiber cassumunar</i> Roxb	<i>Panglay</i>	√				Kitchen spices
Zingiberaceae	<i>Zingiber officinale</i> Roscoe	<i>Jahe</i>	√	√			Kitchen spices and treat rheumatism
Zingiberaceae	<i>Zingiber zerumbet</i> (L.) Smith	<i>Lempuyang Gajah</i>		√			Antibiotics
Rhamnaceae	<i>Ziziphus mauritiana</i> Lamm	<i>Bidara</i>		√			Relieve fatigue

Note: Fo: Food; M: Medicines; L: Livestock Fodder; Fi: Firewoods; B: Building Material and Furniture; O: Others

# BIODIVERSITAS

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