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# Ethnobotany of food plant used by Sundanese Ethnic in Nyangkewok Hamlet, Kalaparea Village, Sukabumi District, Indonesia

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**Abstract.** *Cita KD. 2020.Ethnobotany of food plant used by Sundanese Ethnic in Nyangkewok Hamlet, Kalaparea Village, Sukabumi District, Indonesia. Asian J Ethnobiol 3: 16-22.* Food insecurity is an important threat in West Java Province. Ethnobotany in Food Plant of Sundanese Ethnic can be an alternative to a food crisis. In this study, we looked for insights on how Sundanese Ethnic inhabiting around the Gede Mountain, Nyangkewok Village, interact with their environments and how they use ecological knowledge on plants for their existence. This study used the exploration and in-depth interview method with 30 respondents from March until June 2019 and analyzed with the Cultural Food Cultivated Significant Index. This study recorded 101 species of valuable plants, 48 families, dominated by Cucurbitaceae. The highest Cultural Food Cultivated Index is pare (*Oryza sativa*). Sundanese Ethnic living in the Nyangkewok Village has been undergoing extreme changes in both social and ecological conditions. This study recommends conservation plans that include traditional environmental knowledge, plant monitoring, and participation with Nyangkewok communities.

**Keywords:** Ethnobotany, food security, plants, Sukabumi, Sundanese

## INTRODUCTION

Research studies on food plants have been carried out with various objectives, to identify new food sources (Campos et al. 2018), conserve food plants and gene diversity as alternative food sources in the food crisis (Nesbitt et al. 2010), bioprospection (Rizza et al. 2017) and cultural preservation (Surata et al. 2015). Previous studies recorded that 80% of the population in developing countries used plants (World Health Organization, 1999). The use of plants for food may be vital for human beings, followed by medicine (Wiryono et al., 2017). Based on (Zuhud 2009), Indigenous people in Indonesia utilize more than 239 species of food plants. Various studies state that ethnobotany is a significant aspect for developing plant utilization models that can help policy planning, support the conservation of local food crops, and improve the food welfare of local communities. Ethnobotany can function as a platform to study the special relationship between community culture in utilizing local food plants (Iswandono et al., 2015; Moteetee et al., 2018; Rodríguez et al., 2018). Traditional ecological knowledge is still important for daily needs, especially for rural people, and for better future conservation (Wiryono et al., 2019).

Food plants are plants that have nutrients for human energy needs. (Morin et al. 2019) Local food is food that local people consume by the potential and local knowledge (Law of the Republic of Indonesia No. 18 of 2012 concerning Food). Each region has different local food advantages according to production and consumption. Local food development has a strategic role in developing food security and independence (Syarief et al., 2017).

Food Security is a condition for the fulfillment of food for households which is reflected in the availability of sufficient food, both in quantity and quality, safe, equitable, and affordable. According to the Ministry of Trade of the Republic of Indonesia, 85% of food comes from plants. Selection of food based on plants has several advantages compared to animals, among others: healthier and relatively protected from the risk of diabetes, obesity, cancer, cheaper, easier to obtain, and easier to process, so choosing the type of food correlates with health (Cramer et al. 2017; Cui et al. 2019).

Ethnobotany is commonly found in traditional communities in various tribes in Indonesia (Iswandono et al., 2015). Batak ethnic utilize tinuktuk (traditional ingredients of different species of Zingiberaceae and Rutaceae) (Silalahi et al. 2015) Kanum ethnic communities in Papua utilize Dioscorea spp to fulfill their carbohydrate needs (Rauf and Lestari, 2009). Sukabumi District is included in a food-crisis area; the products obtained cannot meet household consumption needs until the next harvest. The results of research on food security in Sukabumi stated that food availability was insufficient, stability was less stable, food affordability was low, and food quality in the village was lacking (Bangsawan 2012).

Based on Syarief and Fatciya (2014) research, empowering food crisis to communities shows that the development of agriculture to support food security is the most appropriate option; the experience of the community in agriculture becomes the initial capital to build independence. Nyangkewok Village is one of the villages located in the Sukabumi District. It is near the Gunung Gede Pangrango National Park area, so the interaction between the community and plants is still close.

Nyangkewok Hamlet community has traditional knowledge of meeting food needs by utilizing food plants. However, the use and spread of food plants by the people of Kampung Nyangkewok has not been well documented. For this reason, research on the ethnobotany of food plants by the Nyangkewok Village Community is essential.

Meanwhile, researches on the ethnobotany of Sundanese ethnic in Nyangkewok Hamlet have not been intensively carried out. For that purpose, this research on the ethnobotany of Sundanese ethnic in Nyangkewok Hamlet was to understand the local knowledge by CFCI Index and retention index of food plants in Nyangkewok Hamlet.

## MATERIALS AND METHODS

### Study area

The research was carried out in Nyangkewok Hamlet, Kalaparea Village Sukabumi District, West Java Province, Indonesia, in March-June 2019. Kalaparea Village, Sukabumi District of West Java Province, Indonesia, has an area of 638.08 ha, and Nyangkewok Hamlet is one of the parts of Kalaparea Village. The map area of Kalaparea Village is shown in Figure 1.

In general, the topography of this area is surging with steep slopes of approximately 25°. The altitude of the study area is 550 meters above sea level (masl.). Based on the classification of Schmidt and Ferguson (1951), the climate in this region has a category of climate B with an average rainfall of 2,000-3,000 mm/year, with temperatures at 20° - 45 ° C. The western, eastern, southern, and northern regions of the village are Balekambang Village, Darmareja Village, Babakan Panjang village, and Gunung Gede Pangrango National Park. There are about 8,747 people and 2,616 households residing in this village. Education of people in Kalaparea Village was recorded in the dominant primary school, while the main livelihood of people as farmers and farm workers (Kalaparea Village Report 2019)

### Procedures

The method used in this study was mixed-methods, between qualitative and quantitative with the ethnobotanical approach (Campos et al. 2018; Martin 1995), semi-structured interviews, structured interviews were carried out to gather information on local names, parts of the plants, benefits of plants and how plants are used. Informants were selected using the snowball sampling method. Snowball sampling is used to collect data obtained from the primary sources that can be branched into multiple sources of information (Bernard 2006). Informants were determined based on data from community leaders, tribal leaders, village heads, heads of family, and other reliable sources who know things that are strictly related to the research. The number of informants consisted of 3 respondents.

### Data analysis

The collected data were analyzed descriptively and presented in tables and graphs. Quantitative data analysis used Cultural Food Cultivated Index (CFCI). Local knowledge data on food plants in Nyangkewok Hamlet were analyzed using qualitative and quantitative descriptive methods based on primary and secondary data. Qualitative descriptive is used to describe data from interviews, whose data analysis includes data reduction (selection, simplification, and making abstraction) and data presentation. Data collection is arranged and analyzed; they are presented in narrative forms supported by pictures, tables, and charts to obtain conclusions. Secondary data, relevant to the purpose of the study, compared with the data from structured interviews for primary data. Meanwhile, quantitative description analysis describes the data derived from structured data interviews, which are then Analyzed with simple statistics (Creswell 2016; Iskandar and Iskandar 2017; Suryana et al. 2018).


Figure 1. Location of Nyangkewok Hamlet, Kalaparea Village, Sukabumi District, West Java, Indonesia

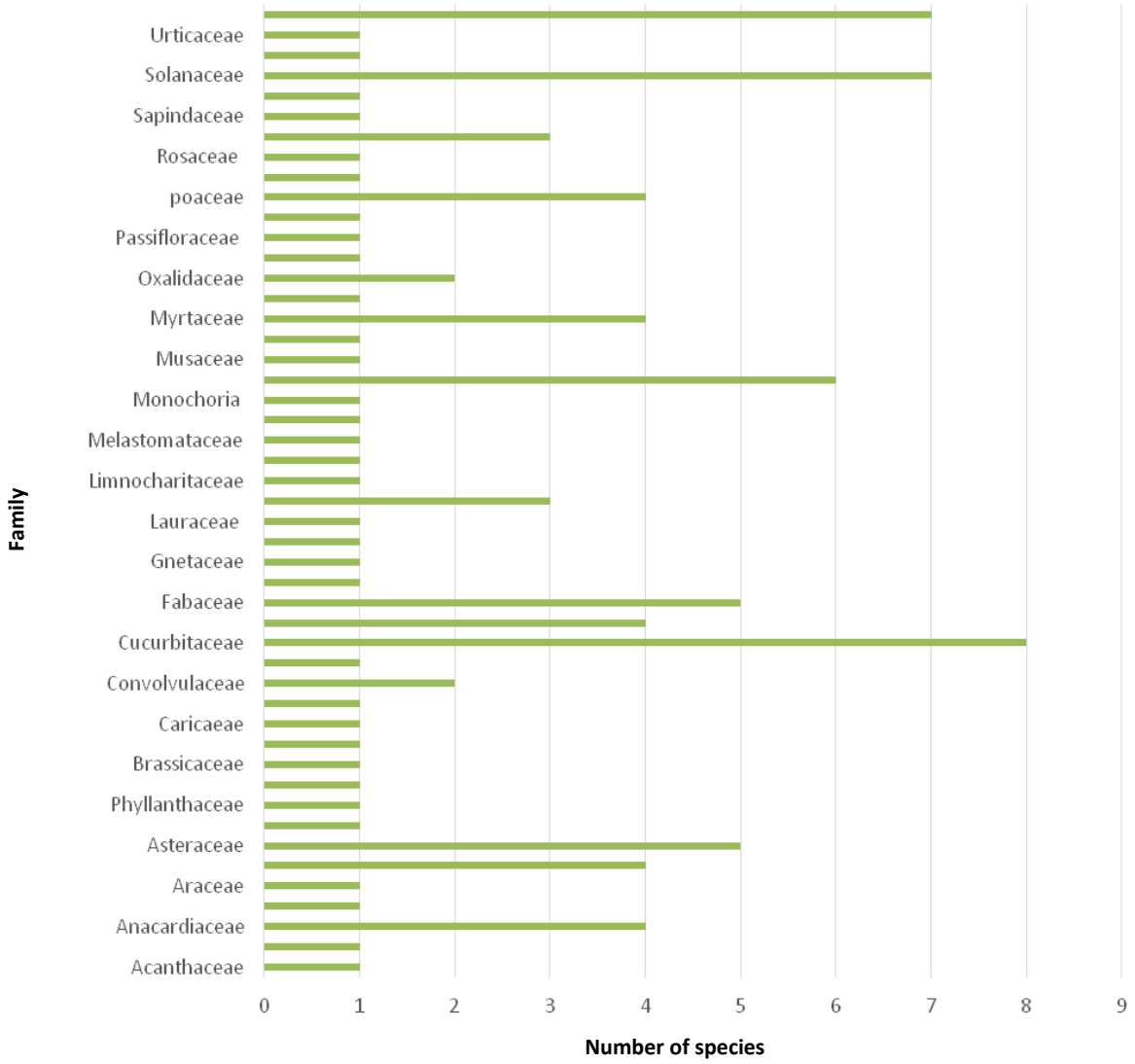


**Figure 2.** Diversity of Family in food plant in Nyangkewok Hamlet, Kalaparea Village, Sukabumi District, West Java, Indonesia

CFCI = QI x (Ai + Ful + CoL) x EI
CFCI: Cultural Food Cultivated Index;
QI: Quotation Index
AI: Availability Index;
CoI: Commercial Index
FuI: Food Use Index; and
EI: Exclusivity Index

Determining the category of food cultivation are classified into three categories which are less important (<130), is important 130- 38 2, and very important (> 38 2 modified. (Pieroni 2001)

## RESULTS AND DISCUSSION

### Diversity of food plant

Food plants become the primary source of life in rural communities. The results showed 101 types of food plants with 48 families and were dominated by cucurbitae (Figure 2). Cucurbitaceae is a type of family widely used by the local people in Nyangkewok Hamlet as the primary source of food.

### Correlation between age and retention index of food plant

Based on the results of the study (Figure 3), it can be seen that the respondents at the age of KU 40-69 years have higher knowledge about traditional food plants than others with the number MG value (0.916).

### Cultural Food Cultivated Index (CFCI)

CFCI of Food Plant is a quantitative method used by ethnobotanists to determine the cultural value of food plants used by indigenous people. The index value of the Food Plant in Nyangkewok Hamlet varied between Very Important-Important and Less Important (Table 1).

**Table 1.** Cultural food cultivated index in Nyangkewok Hamlet, Kalaparea Village, Sukabumi District, West Java, Indonesia

| Local Name | Scientific Name | F | CFCI |
|---|---|---|---|
| Padi | *Oryza sativa* L. | Poaceae | 422 |
| Jagung | *Zea mays* L. | Poaceae | 418 |
| Singkong | *Manihot utilissima* Pohl. | Euphorbiaceae | 410 |
| Ubi jalar | *Ipomoea batatas* Poir. | Convolvulaceae | 408 |
| Bonteng | *Cucumis sativus* L. | Cucurbitaceae | 408 |
| Buncis | *Phaseolus vulgaris* L. | Fabaceae | 408 |
| Kacang panjang | *Phaseolus radiatus* L. | Fabaceae | 408 |
| Pisang | *Musa paradisiaca* L. | Musaceae | 408 |
| Cacim | *Brassica rapa* var. parachinensis L. | Brassicaceae | 404 |
| Bayam | *Amaranthus tricolor* L. | Amarantaceae | 402 |
| Kangkung | *Ipomoea reptana* Poir. | Convolvulaceae | 402 |
| Cabe rawit | *Capsium frutescens* L. | Solanaceae | 380 |
| Bawang merah | *Allium cepa* L. | Liliaceae | 376 |
| Bawang putih | *Allium sativum* L. | Liliaceae | 370 |
| Supa lemer | *Auricularia polytricha* | Auriculariaceae | 368 |
| Mangga | *Mangifera indica* L. | Anacardiaceae | 368 |
| Sereh | *Andropogon nardus* L. | Arecaceae | 368 |
| Duku | *Lansium domesticum* Corr | Meliaceae | 368 |
| Pala | *Myristica fragrans* Houtt. | Myristicaceae | 368 |
| Rambutan | *Nephelium lappaceum* L. | Sapindaceae | 368 |
| Cabe merah | *Capsium annum* L. | Solanaceae | 368 |
| Kemiri | *Aleurites moluccana* (L.) Willd. | Euphorbiaceae | 368 |
| Jambu biji | *Psidium guajava* | Myrtaceae | 366 |
| Duren | *Durio zibethinus* Murr | Bombacaceae | 366 |
| Kupa | *Eugenia polycephala* Miq. | Myrtaceae | 364 |
| Nanas | *Ananas comosus* (L.) Merr | Bromeliaceae | 364 |
| Pepaya | *Carica papaya* L. | Caricaeae | 364 |
| Manggis | *Garcinia mangostana* L. | Clusiaceae | 364 |
| Tebu | *Saccharum officinarum* L. | Poaceae | 362 |
| Tomat | *Solanum Lycopersicum* L. | Solanaceae | 362 |
| Antanan | *Ficus quercifolia* BI | Moraceae | 360 |
| Jahe | *Zingiber officinale* Rosc. | Zingiberaceae | 360 |
| Kelapa | *Cocos nucifera* | Arecaceae | 358 |
| Terong | *Solanum melongena* L. | Solanaceae | 356 |
| Gamas | *Sechium edule* (Jacq.) Sw. | Cucurbitaceae | 354 |
| Paria | *Momordica charantia* L. | Cucurbitaceae | 352 |
| Kol | *Brassica oleracea* | Cruciferae | 352 |
| Oyong | *Luffa cylindrica* Rum. | Cucurbitaceae | 352 |
| Talas | *Colocasia esculenta* Schott. | Araceae | 352 |
| Kawung | *Arenga pinnata* Merr. | Arecaceae | 352 |
| Genjer | *Limnocharis flava* (L.) Buch | Limnocharitaceae | 352 |
| Nangka | *Artocarpus heterophyllus* Lamk. | Moraceae | 352 |
| Salam | *Syzygium polyanthum* Wight. | Myrtaceae | 352 |
| Pedes | *Piper nigrum* L. | Piperaceae | 352 |
| Takokak | *Solanum torvum* Swartz. | Solanaceae | 352 |
| Koneng | *Curcuma domestica* Val. | Zingiberaceae | 352 |
| Laja | *Alpinia galanga* (L.) Willd. | Zingiberaceae | 352 |
| Lengkuas | *Alpinia galanga* SW. | Zingiberaceae | 352 |
| Cikur | *Kaemferia galanga* L. | Zingiberaceae | 352 |
| Sirsak | *Annona muricata* L. | Annonaceae | 350 |
| Bawang Daun | *Allium fistulosum* L. | Liliaceae | 350 |
| Jambu air | *Syzygium aquea* Burm. F | Myrtaceae | 350 |
| Honje | *Etlingera elatior* (Jack.) R.M. Sm. | Zingiberaceae | 350 |
| Katuk | *Sauropus androgynus* (L.) Merr. | Euphorbiaceae | 350 |
| Jarak | *Jatropha curcas* L. | Euphorbiaceae | 346 |
| Waluh gede | *Lagenaria leucantha* (Duch.) Rusby | Cucurbitaceae | 344 |
| Sawo | *Manilkara zapota* L | Sapotaceae | 342 |
| Teh | *Camellia sinensis* (L). O. K | Theaceae | 342 |
| Randa midang | *Cosmos coudatus* Kunth. | Asteraceae | 342 |
| Sukun | *Artocarpus communis* Forst. | Moraceae | 330 |
| Labu | *Lagenaria leucantha* Rusby. | Cucurbitaceae | 322 |
| Salak | *Zalacca edulis* Reinw. | Arecaceae | 320 |
| Jengkol | *Pithecolobium lobatum* Benth. | Fabaceae | 320 |
| Alpukat | *Persea Americana* Mill | Lauraceae | 300 |

| | | | |
|---|---|---|---|
| Jeruk nipis | *Citrus aurantifolia* (Christm.) Swing | Rutaceae | 300 |
| Bunut | *Ficus relgiiosa* L. | Moraceae | 288 |
| Jeruk limo | *Citrus decumana* | Rutaceae | 288 |
| Campedak | *Artocarpus champeden* (Lour.) Stokes | Moraceae | 278 |
| Sintrong | *Erechtites valerianifolia* Raf. | Asteraceae | 258 |
| Surawung | *Ocimum sanctum* L. | Lamiaceae | 252 |
| Pakis | *Diplazium esculentum* Swartz | Ophioglossaceae | 220 |
| Belimbing wuluh | *Averrhoa bilimbi* | Oxalidaceae | 202 |
| Leunca | *Solanum nigrum* L. | Solanaceae | 202 |
| Kedondong | *Spondias dulcis* Forst. | Anacardiaceae | 200 |
| Jeruk bali | *Citrus maxima* Merr. | Rutaceae | 188 |
| Markisa | *Passiflora edulis* Sims | Passifloraceae | 180 |
| Pandan | *Pandanus amaryllifolius* Roxb | Pandanaceae | 178 |
| Eceng | *Monochoria vaginalis* (Burm.) Presi | Monochoria | 140 |
| Calicingcing | *Oxalis barrelier*i L. | Oxalidaceae | 132 |
| Kemang | *Mangifera caesia* Jack. | Anacardiaceae | 130 |
| Limus | *Mangifera foetida* Lour. | Anacardiaceae | 130 |
| Delima | *Punica granatum* L. | Punicaceae | 130 |
| Arben | *Fragaria chiloensis* | Rosaceae | 130 |
| Pohpohan | *Pilea trinervia* Wight. | Urticaceae | 130 |
| Rebung | *Gigantochloa apus* Kurz. | Poaceae | 128 |
| Melinjo | *Gnetum gnemon* L. | Gnetaceae | 124 |
| Menteng | *Baccaurea racemosa* Mell. Arg. | Phyllanthaceae | 118 |
| Kacang suuk | *Arachis hypogeae* L. | Fabaceae | 116 |
| Coklat | *Teobroma cacao* L. | Malvaceae | 106 |
| Kalingsir | *Gynura sarmentosa* DC. | Asteraceae | 102 |
| Reundeu | *Staurogyne elongata* (BI.) O. Kuntze | Acanthaceae | 100 |
| Kukuk | *Lagenaria leucantha* | Cucurbitaceae | 100 |
| Palanding | *Leucaena glauca* Benth. | Fabaceae | 100 |
| Bolostrok | *Erechtites hieracifolia* L. | Asteraceae | 98 |
| Jocong jotang | *Spilanthes acmella* Murr | Asteraceae | 98 |
| Cecenet | *Physalis angulata* L. | Solanaceae | 98 |
| Tepus | *Etlingera solaris* (Blume) R. M. Sm. | Zingiberaceae | 98 |
| Jaat | *Psophocarpus tetragonolobus* L. | Fabaceae | 92 |
| Picung | *Pangium edule* Reinw. | Flacourtiaceae | 92 |
| Harendong | *Melastoma polyanthum* BL. | Melastomataceae | 90 |
| Tereup | *Artocarpus elastica* Reinw. | Moraceae | 90 |

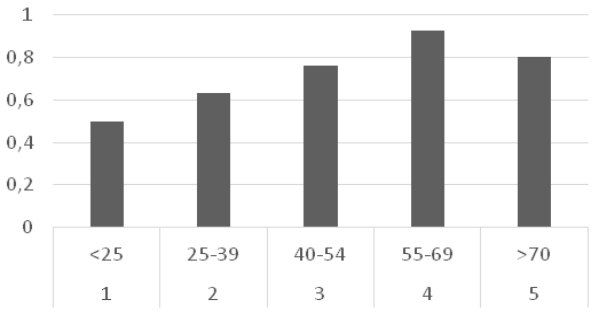


**Figure 3.** Retention index of food plant

## Discussion

Traditional food is an essential instrument in rural development at the local level. Each region has different local food advantages according to production and consumption. Local food development has a strategic role in the development of food security. Cucurbitaceae family is a type of family that is widely used by the community in the village of Nyangkewok as the primary commodity in their food needs. Cucurbitaceae or pumpkins are widely used because of their diverse species and wide distribution in the tropics. (Cui et al. 2019) This species of the Cucurbitaceae family, for example, squash, pumpkin, has a high protein content and is very important to support the process of metabolism because it has a range of terpenoids, carotenoids, steroids, and alkaloids, which are sources of secondary metabolites (Jeffrey C 1980).

The result shows that KU IV is respondents with the highest score, considered the most mastery of ethnobotany knowledge. KU V lives with the most extended period that controls overall ethnobotany knowledge by life experience. Through trial and error, knowledge is relatively stored well; for example, determine a type of plant that can or cannot be consumed. Still, the knowledge of plant names and uses was not affected by gender, as it's related to previous research in Bengkulu. The regression analyses showed that knowledge of plant names and plant uses was positively correlated with age but was not determined by gender. The t-test in local people in Bengkulu showed no difference between males' and females' knowledge. On average, male respondents correctly identified 70% of the plants and females 71% (Wiryono et al. 2017). The second highest knowledge begins to decline at the age of > 69 years; this is caused by decreased brain memory with age. However, for the age of 60-69 years tended to decline, it is predicted that the older people do not have adequate

memory (Iswandono et al., 2015). Increased age underlies the existence of memory deficits within the nerve mechanisms. In addition, local food plants' knowledge tends to decrease in young age classes. It indicated that the lifestyle of young people is changed in line with the theory of evolutionary ethnobiology (EE) and the idea of cultural evolution (CE), which is altered in information flow and lifestyle phenomena in young age groups. The knowledge possessed by ancestors (old age groups) is not necessarily applied to the younger generation's behavior, resulting in younger groups tending less understanding of ethnobotany (Santoro et al., 2018). MG values of KU I and II respondents are relatively low because their interaction with food plants is still low. In addition, the learning process as a life experience has not become the most crucial part in maintaining traditional knowledge of the Nyangkewok Hamlet. It shows that respondents in KU I and II were affected by the many types of modernization and technology, causing a lack of interest in traditional food plant species, such as mobile phones in the younger generation.

Some respondents in the KU I age group failed to name even single plant food, indicating that local knowledge on the use of food plants is not being passed from one elderly to the next by word of mouth as expected. It suggests that the current means of passing local knowledge orally from one generation to another is not practical. A study carried out by (Amir et al. 2019) in Ethnobotany of *Aloe* found that above 45 age groups have significantly higher knowledge on the use of *Aloe* species than those in 15-20 age. It suggests that local knowledge must be integrated into the formal education system because most young people attend formal training at this lower age. The ecological knowledge can be maintained among young people if they are involved in activities that allow them to interact with the plants (Wiryono et al., 2019). This result is also similar to the ethnobotany of tree fern in Pasir Menyan Hamlet that has increased from the ages of 20-29, 60-69, and 50-59 years, but for the age of 60-69 years tended to decrease (Suryana et al. 2018) Based on previous research, it can be revealed that knowledge of indigenous people, some factors impact on the varying understanding of indigenous people such as age, subsistence practice, gender, and bilingualism (Crepaldi et al. 2016). However, decreasing local knowledge is due to (1) difficulty in passing this information orally to the young generation (Silalahi et al. 2018; Silalahi et al. 2015), and (2) Changes in cultural value. Knowledge in local communities is one of the important indicators of efforts to conserve food plants because the decline in ethnobotany knowledge will reduce plant genetic diversity. Decreasing ethnobotany knowledge is the beginning of lowering gene conservation of plants due to the declining role of local institutions for plant conservation. This condition causes the source of wild food plants to be limited to areas of inland forest communities or indigenous peoples who use it in a tiny scope (Zuhud 2011). According to Neelo et al. (2015), the local communities have to be educated on conserving plants, especially those commonly used for various important activities. Pare, Jagong, Singkomg are species that have the highest CFCI category of carbohydrate as a source of carbohydrates, as the primary food source. Pare is the main source of livelihood for Nyangkwok Village, and it is the most important staple food in more than half of the world's population (Lee et al., 2018). Other carbohydrate sources, namely jagong and singkong The interview results stated that after consuming jagong or singkong, the people did not consume rice for the next meal, that is indicated that jagong and singkong had great potential as a secondary processed staple food. Meanwhile, cengek, bawang beureum, and bawang bodas are utilized in small amounts to supplement the staple food that provides added value to food. Some supplementary, flavoring, or complementary ingredients. Such as; Rebung, Melinjo, and menteng are underutilized only as a source of vegetables and fruits. Research states (Widiarti 2017) that rebung contain vitamins, minerals, and essential amino acids needed for the digestive system and energy. Consuming rebung regularly is a preventive measure to inhibit various diseases, including cancer (Rachmadi 2011).

A total of 101 food plants (48 families) were used by Sundanese ethnic Nyangkewok Hamlet of West Java. Index of retention showed that the local knowledge of food plants was lower in the younger generation than the older group (>50 years old). Pare (*Oryza sativa*) is the highest Cultural Food Cultivated Index. Environmental conservation depends not only on ecological values but also on socio-cultural, political, and Econo.

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