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

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Abstract. Cita KD. 2019. Ethnobotany of food plant used by Sundanese Ethnic in Kalaparea Village, Nyangkewok Hamlet, Sukabumi District, Indonesia. Asian J Ethnobiol 2: 16-22. Food insecurity is an essential 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 exploration and in-depth interviewed method with 30 respondents which conducted in March until June 2019 and analysed with Cultural Food Cultivated Significant Index. This study recorded 101 species useful plants, 48 families, dominated by Cucurbitaceae. The highest number of 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 scenarios. This study recommends conservation plans that include traditional ecological knowledge, plant monitoring, and participative action with Nyangkewok communities.

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

INTRODUCTION

Research studies on food plants have been carried out with various objectives, identify new food sources (Campos et al. 2018), conserve of 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 the most essential one for human being followed by the use for 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; Moetee 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 is consumed by local people 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 the level of production and consumption. Local food development has a strategic role in the development of food security and independence (Syarief et al. 2017).

Food Security is a condition for the fulfillment of food for households which 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 various 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 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 Fatiyya (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 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 in meeting food needs by utilizing food plants that are around the village. However, use and spread the use 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, the aim of 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 approximately in 25°. The altitude of the study area is at 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. In the western, eastern, southern, and northern regions of the village are bordered by Balekambang Village, Darmareja Village, Babakan Panjang village, and Gunung Gede Pangrango National Park. There are about 8747 people and 2616 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 information from community leaders, tribal leaders, village heads, heads of villages, 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 the form of 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 process includes data reduction (selection, simplification, and making abstraction), and data presentation. Data collection is arranged and analyzed, and they are presented in narrative forms supported by pictures, tables, and charts to obtain conclusions. Secondary of data, relevant to the purpose of the study, compare with the data from structured interviews for basic of data, meanwhile quantitative descriptive analysis is used to describe the data derived from structured interviews of data, which is then Analyzed with simple statistics (Creswell 2016; Iskandar and Iskandar 2017; Suryana et al. 2018).
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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; CoL: Commercial Index; FuL: Food Use Index; and EI: Exclusivity Index.

Determining the category of food cultivation are classified into three categories which are less important (<130), it is important 130-382 and very important (>382) modified. (Pieroni 2001)

RESULTS AND DISCUSSION

Diversity of food plant

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

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 the higher knowledge about traditional food plant than others with the number MG value (0.916).

Cultural Food Cultivated Index (CFCI)

CFCI of Food Plant is a quantitative method used by ethnobotanist to determine the cultural value of food plants used by indigenous people. The index value of 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                        | Famil    | 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.                  | Amaranpaceae | 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.                    | Areceaceae | 368  |
| Duku             | Lantian domesticum Corr                | Meliaceae | 368  |
| Pala             | Myristica fragrans Houtt.               | Myristiciaceae | 368 |
| Rambutan         | Nepheleium lappaceum L.                 | Sapindaceae | 368 |
| Cabe merah       | Capsium annuum L.                       | Solanaceae | 368  |
| Kemiri           | Aleurites moluccana (L.) Willd.         | Euphorbiaceae | 368 |
| Jambu biji       | Psidium guajava                        | Myrtaceae | 366  |
| Duren            | Durio zibethinus Murr                   | Bombacaceae | 366 |
| Kupa             | Eugenia polycaphla Miq.                | Myrtaceae | 364  |
| Nanas            | Ananas comosus (L.) Merr               | Bromeliaceae | 364 |
| Pepaya           | Carica papaya L.                        | Cariciaceae | 364 |
| Manggis          | Garcinia mangostana L.                 | Clusiaceae | 364  |
| Tebu             | Saccharum officinarum L.                | Poaceae  | 362  |
| Tomat            | Solanum lycopersicum L.                | Solanaceae | 362 |
| Antanan          | Ficus quercfolia BI                     | Moraceae  | 360  |
| Jahe             | Zingiber officinale Rosc.              | Zingiberaceae | 360 |
| Kelapa           | Cocos nucifera                         | Areaceae  | 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.                   | Areaceae  | 352  |
| Genjer           | Linnochis flavus L. (L.) Buch           | Linnochirctaceae | 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           | Anona muricata L.                       | Anonaceae | 350  |
| Bawang daun      | Allium fistulosum L.                   | Liliaceae | 350  |
| Jambu air        | Syzygium aqua Burm. F                  | Myrtaceae | 350  |
| Honje            | Etlingera elatior (Jack.) R.M. Sm.     | Zingiberaceae | 350 |
| Katuk            | Saurosopus 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.                  | Areaceae | 320  |
| Jengkol          | Pithecolobium lobatum Benth.           | Fabaceae | 320  |
| Alpukat          | Persea americana Mill                  | Lauraceae | 300  |
Jeruk nipis  Citrus aurantifolia (Christm.) Swing  Rutaceae  300
Bunut  Ficus religiosa 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 barrelieri 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  128
Pohpohan  Pilea trinervia Wight.  Urticaceae  130
Rebung  Gigantochloa apus Kurz.  Poaceae  128
Melinjo  Gnetum gnemon  Gnetaceae  124
Mentieng  Baccaurea racemosa Mell. Arg.  Phyllanthaceae  118
Kacang suuk  Arachis hypogaea L.  Fabaceae  116
Coklat  Theobroma cacao L.  Malvaceae  106
Kalingsir  Gynura salmontosa DC.  Asteraceae  102
Reundeu  Staurogyne elongata (BL) O. Kuntze  Acanthaceae  100
Kukuk  Lagenaria leucantha  Cucurbitaceae  100
Palanding  Leucaena glauca Benth.  Fabaceae  100
Bolostrok  Echites hieracifolia L.  Asteraceae  98
Jocong jotang  Spilanthes acmella Murr  Asteraceae  98
Cecenet  Physalis angulata L.  Solanaceae  98
Tepus  Etingeria solaria (Blume) R. M. Sm.  Zingiberaceae  98
Jaat  Psophocarpus tetragonolobus L.  Fabaceae  92
Picung  Pangium edule Reinw.  Flacourtiaeae  92
Harendong  Melastoma polyanthum BL.  Melastomataceae  90
Tereup  Artocarpus elastic Reinw.  Moraceae  90

![Figure 3. Retention index of food plant](image)

**Discussion**

Traditional food is an essential instrument in rural development at the local level. Each region has different local food advantages according to the level of 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 meeting food needs. Cucurbitaceae or pumpkins are widely used because of their diverse species and have a wide distribution in the tropics. (Cui et al. 2019) species of the Cucurbitaceae family, for example, squash, pumpkin which has a high protein content and is very important to support the process of metabolism because it has a content of terpenoids, carotenoids, steroid alkaloids which are sources of secondary metabolites (Jeffrey C 1980).

Result show that KU IV respondents who have the highest score are considered to have the most mastery in ethnobotany knowledge. KU V lives with the longest period that controls overall ethnobotany knowledge because of life experience. Through trial and error so that knowledge is relatively stored well, for example, determine a type of plant that can and cannot be consumed, but the knowledge of plant names and uses was not affected by gender its related to previous research in Bengkulu, the regression analyses showed that knowledge of plant names as well as plant uses was highly significantly correlated positively with ages, but was not determined by gender test in local people in Bengkulu showed that there was no difference between male and female’s knowledge. On average, male respondents correctly identified 70% of the plants and females 71% (Wiryono et al. 2017). The second highest knowledge and begins to decline at the age of 69 years, this is caused by the factor of decreased brain
memory with age. However, for the age of 60-69 years tended to decrease, it is predicted that the older people are not properly memory (Iswandono et al. 2015). Increased age underlies the existence of memory deficits with nerve mechanism (Rizio and Dennis 2014). In addition, in young age classes, the use of local food plants tends to decrease. It indicated that the lifestyle of young people is changed in line with the theory of evolutionary ethnobiology (EE) and the theory of cultural evolution (CE) which is changed in information flow and lifestyle phenomena in young age groups. The knowledge possessed by ancestors (old age groups) is not necessarily applied to the behavior of the younger generation resulting in younger age groups tending to have less understanding of ethnobotany (Santoro et al. 2018). MG values of respondents of KU I and II are relatively low because the 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. 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, for example, the use of mobile phones in the younger generation.

Some respondents in the KU I age group failed to name even a single food of plant, indicating that local knowledge on use of food plant is not being passed from elder to the next by word of mouth as expected. In fact, it indicates that the current means of passing local knowledge by orally from one generation to another is not effective. A study carried out by (Amir et al. 2019) in Ethnobotany of Aloe found that above 45 age groups have significantly higher knowledge on use of Aloe species than those in 15-20 age. It suggests that local knowledge must be integrated into the formal education system because at this lower age, most of young people are at school attending formal training. The ecological knowledge can be maintained among young people if they are involved in activities which give them chance to interact with the plants (Wiryono et al. 2019). This result is also similar to ethnobotany of tree fern in Pasir Menyan Hamlet 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, there are some factors that impact on varying knowledge of indigenous people such as age, subsistence practice, gender, and bilingualism (Crepaldi et al. 2016). Decreasing of local knowledge is due to (1) difficulty in passing this information through oral ways to the young generation (Silalahi et al. 2018; Silalahi et al. 2015) Changes in cultural value. Knowledge in local communities is one of the important indicators efforts to conserve food plants, because the declining in ethnobotany knowledge will have an impact on the decline in plant genetic diversity. Decreasing ethnobotany knowledge is the beginning of genetic conservation of plant, 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 conservation of plants, especially those mostly used for various important activities. Pare, Jagong, Singkong are species that have the highest CFCI category of carbohydrate as a source of carbohydrates, as the main food source. Pare is the main source of livelihood for the people of Nyangkwok Village, and it is the most important staple food in more than half world’s population (Lee et al. 2018). Other carbohydrate sources, namely jagong and singkong The results of the interview 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 staple food that was processed. Meanwhile, cengek, bawang beureum, bawang bodas utilizes in small amounts to supplement the staple food that serves to provide added value to food. Some supplementary, flavoring, or complementary ingredients. 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 that are needed to digest system and energy. By consuming rebung regularly is a preventive measure to inhibit various types of diseases, including cancer (Rachmadi 2011).

A total of 101 species of 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 that of the older group (>50 years old). Pare (Oryza sativa) is the highest number of Cultural Food Cultivated Index. Environmental conservation is not only depend to ecological values but also in terms of socio-cultural, political, and economic.

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