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Utilization of Araceae by local community in Cisoka Village, Cikijing Sub-district, Majalengka District, West Java, Indonesia

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Abstract. *Mutaqin AZ, Fatharani M, Iskandar J, Partasasmita R. 2018. Utilization of Araceae by local community in Cisoka Village, Cikijing Sub-district, Majalengka District, West Java, Indonesia. Biodiversitas 19: 640-651.* Various species of Araceae plants are widely used by the tribes of Sunda as food. However, cultivation is increasingly rare inWest Java region, and is found in some places only. One area where many people still grow Araceae plants is Cisoka Village, Cikijing Sub-district, Majalengka District, West Java Province, Indonesia. This paper aims to explain the reason for the cultivation of Araceae by the local community in the Village of Cisoka. This study used a combination of qualitative and quantitative methods, but the former was used more than the latter The primary data were collected through structured and semi-structured interviews, participant observation, exploration, and plant sample collection. The data were analyzed descriptively with emic and ethic approaches. The results of the study showed that 20 species and 13 varieties (landraces) of Araceae plants were used by the community. The parts of plant traditionally used by the commumity were tuber, petiole, and leaf. The utilization of the Araceae plants were categorized into 4 main functions, namely, as food, medicine, decoration, and fish feed. The species of Araceae were commonly cultivated in various agroecosystem types, mainly home gardens, gardens, and rice fields.

Keywords: Araceae, Cisoka Village, utilization

INTRODUCTION

Indonesia has been known as a country having high diversity of ethnic groups (cf. Sastrapradja 2010; Wijaya et al. 2014; Iskandar 2016). At least 159 ethnic groups have been recorded throughout Indonesian islands. These Indonesian local communities have various cultures and sources of household income. Indeed, various local plants have been utilized by the local people which is strongly related to economic, spiritual values, culture, health, cosmetic, and medicine (Prananingrum 2007). According to Maffi (2004), Ellen (2006), and Partasasmita et al. (2017), cultural diversity and biodiversity have a strong correlation in various aspects of the bio-cultural system. The level of local knowledge of utilization of various plants by each local community group is determined by many factors, including the level of differences in culture and local condition. This is the basis of ethnobiology studies (cf. Lizarralade 2004; Sunderland 2004; Cunningham and Choge 2004; Zen and Kopez-Zent 2004; Iskandar 2012).

On the basis of the human ecology and ethnobiology, the local communities have strong interrelationship with their environment components. To fulfill their daily needs, the local communities need various biotic and abiotic components, such as food, oxygen, and water, as primary human needs. They also have secondary needs, including communication among the community members, education system, fulfillment of material and wealth (Suparlan 2005). The village ecosystem consists of many components. The main component is the rural people. This is continuously interrelated with various natural resources. Each village ecosystem has various local potential natural resources. The rural people have been determined by availability of the local natural resources (Kurniawan and Asih 2012).

Plants are considered as the main natural resources essentially needed to support the human life because humans are not able to produce self-generated natural ingredients such as those produced by plants to support their daily lives. The plants are commonly used by people for various purposes, including food, clothes, indigenous textiles, medicines, poisoning materials, building materials, craft materials, and dye materials (Polunin 1994; Balick and Cox 1996; Iskandar et al. 2017; Partasasmita et al. 2017). The Araceae or *talas* family has been recognized as one of the largest monocot families and it is widely used by local communities. Various plants categorized as the family of Araceae have played important roles in social and economic functions such as *daun sente* (*Alocasia macrorrhizos* (L) Schott) (Bachtiar 2002) and *umbi suweg* (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) (Firman et al. 2016). *Umbi suweg* is mainly used as medicinal materials. In addition, several species are used as food, aesthetic, and rituals. Leaves, stems, and tubers are predominantly used as food source and medicinal materials (Heyne 1987).

Cisoka, is one of the villages in the Sub-district of Cikijing, District of Majalengka, West Java Province, having diverse species of Araceae. The local community of Cisoka has utilized plants of the Araceae family for various purposes. However, the local knowledge of the Cisoka people on utilization of various plants of the Araceae

family has not been studied and documented. Therefore, this study aimed to explain the reason for the cultivation of Araceae by the local community in the village of Cisoka. The results of the study may be used for the government to manage and to conserve the plants of the Araceae family to be used for supporting the sustainable development. Three aspects are discussed in this paper, namely the species and landraces, utilization of plants, and cultivation of the plants.

MATERIALS AND METHODS

Study area

This study was carried out in the Village of Cisoka. This area is situated in the Sub-district of Cikijing, the District of Majalengka, the Province of West Java, Indonesia (Figure 1).

On the basis of the agricultural land use systems, the Village of Cisoka has several agroecosystem types, namely the home garden (*pekarangan*), garden (*kebun*) and mixed garden (*kebun campuran*), *talun*, and rice fields (cf. Iskandar and Iskandar 2011). Home garden is the land surrounding the house commonly planted with mixed annual and perennial crops, having various functions, namely providing staple foods, traditional medicines, spices, vegetables, fruits, and ritual materials and adding aesthetic views. Like home garden, mixed garden is predominantly planted with mixed annual and perennial crops, but it is located outside the home garden and hamlet area. Unlike both home garden and mixed garden system, the garden is commonly planted with monoculture crops, such as corn, cassava, etc.

The home garden, mixed garden and *talun* systems can be categorized as traditional ecosystems. Because those agroecosystems are predominantly planted with mixed annual and perennial plants, their vegetation structure is similar to that of the forest vegetation. As a result, they also have various ecological functions, including hydrological function, protection of soil from erosion, provision of wildlife habitats, and conservation of local plant genetic or gene pool.

The rice fields of the Cisoka Village can be divided into two types, namely the irrigated rice field system and the rain-fed rice field. The irrigated rice fields are predominantly cultivated with rice two or three times in a year, while the rain-fed rice fields are commonly planted with rice only one or two times a year. In dry season, the rain-fed rice fields are traditionally cultivated with non-rice crops, such as corn, onion, and sweet potatoes.

On the basis of tradition, the plants of the Araceae family, such as *talas*, have been planted by the people of Cisokan, in different agroecosystems, including homegarden, garden, mixed garden, and rain-fed rice fields, particularly in dry season.

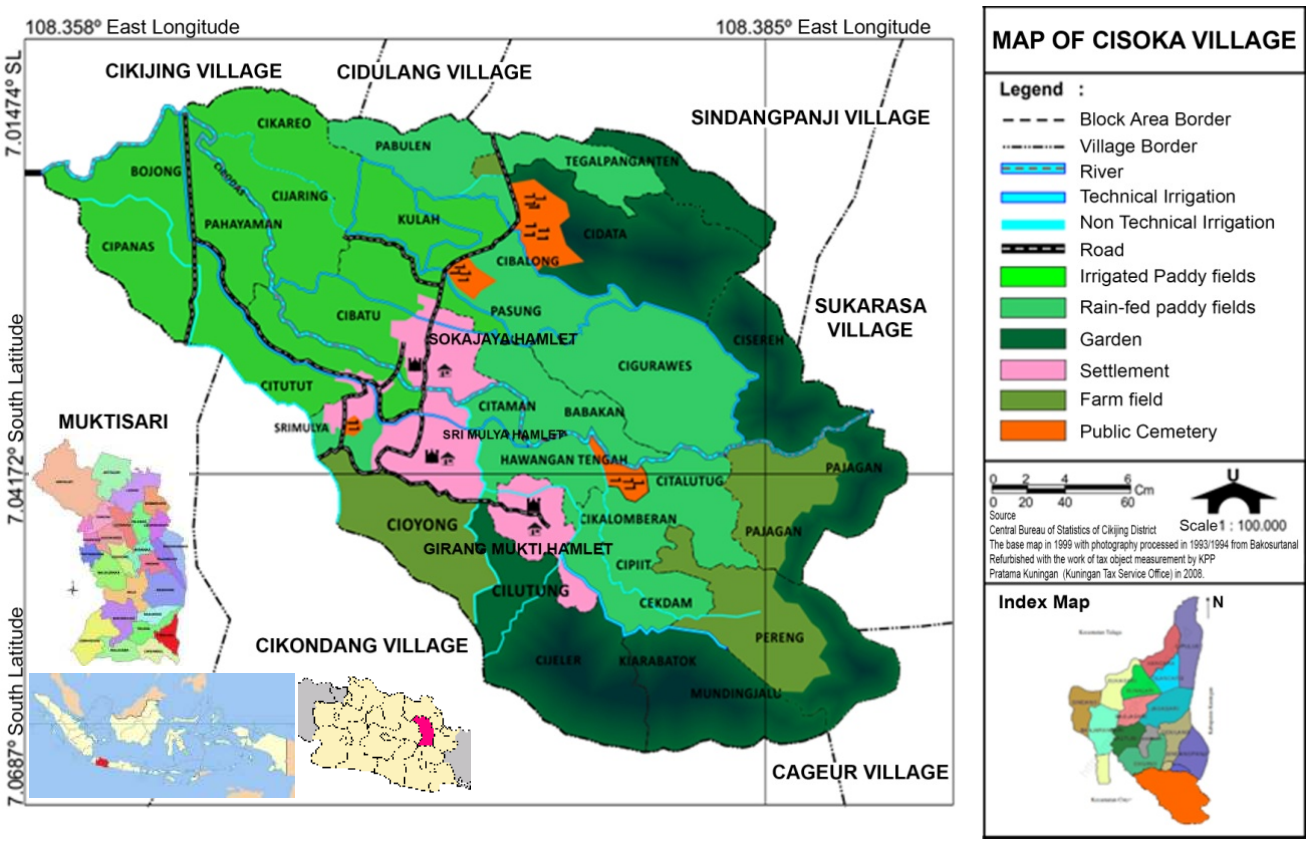

Figure 1. Location of research in the Village of Cisoka, the Sub-district of Cikijing, the District of Majalengka, West Java, Indonesia

Procedures

This study used both qualitative and quantitative methods, but the qualitative one was used more than the quantitative one (Creswell 2009). The qualitative method was emic based on ethnobiological approach, mainly used to assess local knowledge of the Cisoka community of various plant species and varieties (landraces) of Araceae. The quantitative method was applied to assess the percentage of the community who predominantly cultivated the plants of Araceae and used these plants for various purposes. The qualitative data were mainly collected by various means, including observation, semi-structured or in-depth interview, and participant observation, while the quantitative data were collected by the structured interview (cf. Martin 1995; Cunningham 2001; Newing et al. 2011).

Observation and participant observation

Observation technique was applied to observe general conditions of the agroecosystem types, namely the homegarden, garden and rice field. In addition, some activities of informants, such as in preparing traditional food made of the plant species of the Araceae family were observed. While the participant observation technique was carried out by observing what people did, listening what they said, and participating in their activities, such as planting, harvesting, and cooking of traditional food made of the plants of Araceae family (cf. Sugiyono 2014).

Semi-structured interview

The semi-structured interview was carried out by conducting in-depth interview with informants purposively selected and considered as competent. They were selected by snowball techniques to obtain information based on recommendations in the selection of informants in this interview with the snowball sampling method. Informants were selected based on the recommendations of basic informants, village leaders, hamlet leaders, and community leaders. The selection was expected to result in qualified informants with deep knowledge of species diversity and the uses of Araceae family plants, so the informants were said to be key informants. Moreover, information on the next prospective informant was obtained from the previous informants (cf. Sugiyono 2014). This interview stage also recorded supporting data, including data of informants' name, age, occupation, and gender. Interviews were conducted based on interview guides that had already been made, as well as additional questions related to the study. These questions were asked by interviewer and referred to questions on plant species of the Araceae family and the utilization of those species.

Structured interview

Structured interview technique was undertaken using questionaire. Respondents were selected randomly, the number of which was determined using the following formula (Lynch et al. 1974) :

$$n_t = \frac{N_t . z^2 . P\ (1-P)}{N_t . d^2 + Z^2 . P\ (1-P)}$$

Where,
Nt = number of samples (respondents)
Nt = total population
P = largest possible proportion (0.50)
Z = normal variable value (1.96)
d = error (0.1)

Respondents were determined by profession, namely as farmers or garden owners. On the basis of the formula, from the total population (N) of 130 households of farmers, 55 households were selected.

$$n_t = \frac{130.1{,}96^2.0{,}5\ (1-0{,}5)}{130.0{,}1^2 + 1{,}96^2.0{,}5\ (1-0{,}5)}$$

$$= 55.23 \approx 55$$

Exploration and collection of plants

Exploration and collection of plant herbaria were done for species identification. Identification of specimens was done in herbarium laboratory of Department of Biology, Padjadjaran University (cf. Santhyami and Endah 2006).

Data analysis

The qualitative data, including the results of observation, participant observation, and semi-structure interviews were analyzed by cross-checking, summarizing and synthesizing to develop narrative of descriptive and evaluative analyses (cf. Newing et al. 2011). The quantitative data were analyzed by calculating the simple statistics, based on the percentage of respondent answers to develop narrative of descriptive and evaluative analyses.

RESULTS AND DISCUSSION

Species and landraces

Thirty-two landraces of Araceae family were locally used by the local community of Cisoka Village (Table 1). Landraces are used here to distinguish the category of Cisoka people for the sub-division of folk taxonomic species with modern taxonomy. Therefore, in this context, a landrace is a local category for grouping of cultivated plants species of Araceae family according to common characteristics reflected in a specific local name or vernacular name (cf. Iskandar and Ellen 1999).

The utilization of plants

Some species of the Araceae family have been used locally for various purposes, such as food, fish feed, traditional medicines, and ornamental plants (Table 2). Thus, members of the Araceae family had important socio-economic and cultural functions. Approximately 54 per cent of respondents of the Cisoka community predominantly used the species of Araceae for additional staple food (Table 2). The part of plant mostly used was tuber (Table 3). The boiled *talas* (*kulub taleus*) and baked *talas* (*beuleum taleus*), have been popularly consumed with coffee or tea, by the community of Salamungkal Hamlet, Cigentur Village, Majalaya Sub-district, Bandung District,

West Java as a morning refreshment called morning beverage (*ngaleueut enjing-enjing*) and in the afternoon called the afternoon drink (*ngaleueut sonten*). The baked, boiled, and fried *talas* has also been commonly consumed by local community in Palintang hamlet, Bandung, West Java as additional food for refreshment in the morning and afternoon (Iskandar et al. 2017).

Utilization for additional staple food

Some plant species of the Araceae family which have been utilized by the local community in Cisoka Village as additional staple food, were *talas* Bogor (*Colocasia esculenta*), *talas* Gena (*Colocasia esculenta*), *suweg* (*Amorphophallus paeoniifolius*), and *talas* Padang (*Xanthosoma sagittifolium*). The tuber of those species is traditionally processed in various ways, such as steamed, boiled, fried, salted, or sweetened. Ekowati et al. (2015) mentioned that although tubers of Araceae can be consumed directly, but they are rarely consumed directly as they contain calcium oxalate crystals that can cause irritation and itchiness. The informants mentioned that edible *talas* tubers were harvested from plants aged six to

Table 1. Araceae plants commonly utilized by the local community of Cisoka Village, Cikijing Sub-district, Majalengka District, West Java, Indonesia

Local names	Scientific names	Types of utilization
Talas Bogor	*Colocasia esculenta* (L.) Schott.	Food, fish feed, fence, medicine
Sente hias/talas hias	*Alocasia macrorrhizos* (L.) G.Don.	Ornamental plant
Sente	*Alocasia macrorrhizos* (L.) G. Don.	Fish feed
Keladi gergaji	*Alocasia sanderiana* W. Bull.	Ornamental plant
Suweg	*Amorphophallus paeoniifolius* (Dennst.) Nicolson	Food, fish feed, medicine
Iles-iles	*Amorphophallus variabilis* Blume.	Medicine
Talas padang	*Xanthosoma sagittifolium* (L.) Schott.	Food, fish feed, medicine
Cariang	*Homalomena rubescens* (Roxb.) Kunth.	Ornamental plant
Aglaonema Dud Anjamani	*Aglaonema*	Ornamental plant
Aglaonema Red Cochin	*Aglaonema*	Ornamental plant
Aglaonema Chinese Evergreen	*Aglaonema*	Ornamental plant
Aglaonema Emerald Beauty	*Aglaonema*	Ornamental plant
Aglaonema Green Sun	*Aglaonema*	Ornamental plant
Aglaonema Butterfly	*Aglaonema*	Ornamental plant
Aglaonema Lady Valentine	*Aglaonema*	Ornamental plant
Aglaonema Crispum	*Aglaonema*	Ornamental plant
Aglaonema White Rain	*Aglaonema*	Ornamental plant
Aglaonema Pride of Sumatera	*Aglaonema*	Ornamental plant
Kuping gajah	*Anthurium crystallinum* Landen & Andre	Ornamental plant
Anthurium pilo	*Anthurium andreanum* Linden ex. Andre.	Ornamental plant
Gelombang cinta	*Anthurium plowmanii* Croat.	Ornamental plant
Keladi Snow White	*Caladium humboldtii* var. Myriostigma Engl.	Ornamental plant
Keladi hias	*Caladium bicolor* var. *mirabile* (Lem.) Vent.	Ornamental plant
Keladi hias	*Caladium bicolor* Florida Red Ruffles	Ornamental plant
Talas beureum/keladi dua warna	*Caladium bicolor* (Aiton) Vent.	Ornamental plant, medicine
Keladi tiga warna	*Caladium bicolor* var. Rubicundum Engl.	Ornamental plant
Kembang	*Spathiphyllum wallisii* Regel.	Ornamental plant, rainwater retainer (ecological)
Syngonium	*Syngonium podophyllum* Schott.	Ornamental plant
Philodendron	*Philodendron bipinnatifidum* Schott ex Endl.	Ornamental plant
Kembang hias	*Dieffenbachia seguine* (Jacq.) Schott.	Ornamental plant
Kembang hias	*Dieffenbachia camille* Engl.	Ornamental plant
Kembang hias	*Dieffenbachia amoena* Bull.	Ornamental plant

Table 2. The percentage of utilization of the Araceae family according to local community respondents in Cisoka Village, Cikijing Sub-District of Majalengka, West Java, Indonesia

Types of utilization	Number of respondents	Percentage of the total (%)
Food	30	54
Ornamental plant	13	23
Fish food	8	14
Medicine	4	8
Ecological purpose	1	1
Total	55	100

Table 3. The percentage of part of the plant used in the Araceae family according to local community respondents in Cisoka Village, Cikijing Sub-district of Majalengka, West Java, Indonesia

Parts of the plant used	Number of respondents	Percentage of the total (%)
Tuber	41	74
Petiole	11	20
Leaf	3	6
Total	55	100

eight months, preferably after eight months, but no older than one year. The reason was that the size of the bulb is large enough, so the tubers can be consumed, and they taste good. In addition, large tuber has economic value if it is traded. Usually, *suweg* can be consumed at the age of 4-6 months. If the plant is less than 4 months, the size of the tuber is still considered small. Traditionally, both tubers of *talas* and *suweg* are used for consumption after several treatments.Firstly the tubers are cleaned with clean water, then peeled and sliced. Secondly, the pieces of *suweg* tubers are soaked in salt water for 15-20 minutes and drained. Finally, the *suweg* is cooked, i.e., boiled or fried. The function of soaking tubers of *suweg* in salt water is to ease the itchiness when consumed (Erti and Nono, pers. comm.), because the *suweg* and *talas* tubers contain calcium oxalate crystals that can cause itchiness in the mouth. In general, calcium oxalate crystals can be reduced even removed by soaking in salt solution, steaming, boiling, frying, baking, or combined treatments (Permana et al. 2017). The crystalline calcium oxalate is a waste product from cell metabolism that is no longer used by plants (Nugroho 2007). In the tuber, Ca oxalate is in the form of a single raphide having a pointed or needle-like tip, and this oxalic crystal can cause allergies or itchiness if touched (Jintan et al. 2015).

Some members of the Araceae family have potential as food because they contain high carbohydrates as well as other substances, such as proteins, fats, vitamins, and minerals. One component of carbohydrates in the Araceae family is glucomannan (Chairul et al. 2006). Glucomannan is a water-soluble fiber. The content of glucomannan in Araceae tubers is beneficial to human health when it is consumed (Ekowati et al. 2015). The largest content of carbohydrates are found in *suweg* tuber, but this tuber has little amount of protein and fat (Septiani et al. 2015). On the other hand, Faridah (2005) mentions that the *suweg* tuber has a high fiber and protein content, but the fat content is little. After soaking, washing is done to remove the salt. Then the *talas* or *suweg* tuber is steamed or fried. According to informants, the tubers of Bogor *talas* and *suweg* are usually steamed, while tuber of Padang *talas* is considered as delicious and suitable to be made into chips. *Suweg* is steamed and not made into chips because it absorbs a lot of water and oil, make it difficult to dry when it is fried (Richana and Sunarti 2004). Moreover, Nurjanah et al. (2009) states that substitution of noodle snack with steamed *suweg* tubers can improve the taste and crunchiness. Meanwhile, Chotimah and Fajarini (2013) mentions that steaming can minimize the nutrient lost during the cooking process. The steaming process can also increase phytochemical content of phenol, tannin, and flavonoids of the raw extract of *Colocasia esculenta* (L) Schoot (Mubayinah 2015). Both Bogor *talas* and Padang *talas* tuber are different in character, so the methods of processing for food are also different. According to the informants, to make *talas* chips *talas* tuber of Padang is better than Bogor *talas* because Padang *talas* tuber is more *teuas* (in Sundanese) or hard than Bogor *talas* tuber. A visual description of processing of *talas* and *suweg* tubers for food can be seen in Figure 2.

In addition, the base of leaf stalk (petiole) of Araceae family can also be used as food. The base of leaf stalk which is widely used by the community is *talas* Bogor (*Colocasia esculenta* (L.) Schott.). According to Rahayu (2013) the leaf stalks of the young Araceae are made into processed food, such as vegetable soup or *angeun lompong* (in Sundanese). *Lompong* is usually consumed by old people who do not have teeth. *Lompong* is very soft; the longer it is boiled, the more tender it will be, make it easy to eat. The informants mentioned that if the old leaf stalks of Bogor *talas* are processed into food, the food causes itchiness when eaten. So, only young stalk, aged about 4 months, that is used as vegetable.

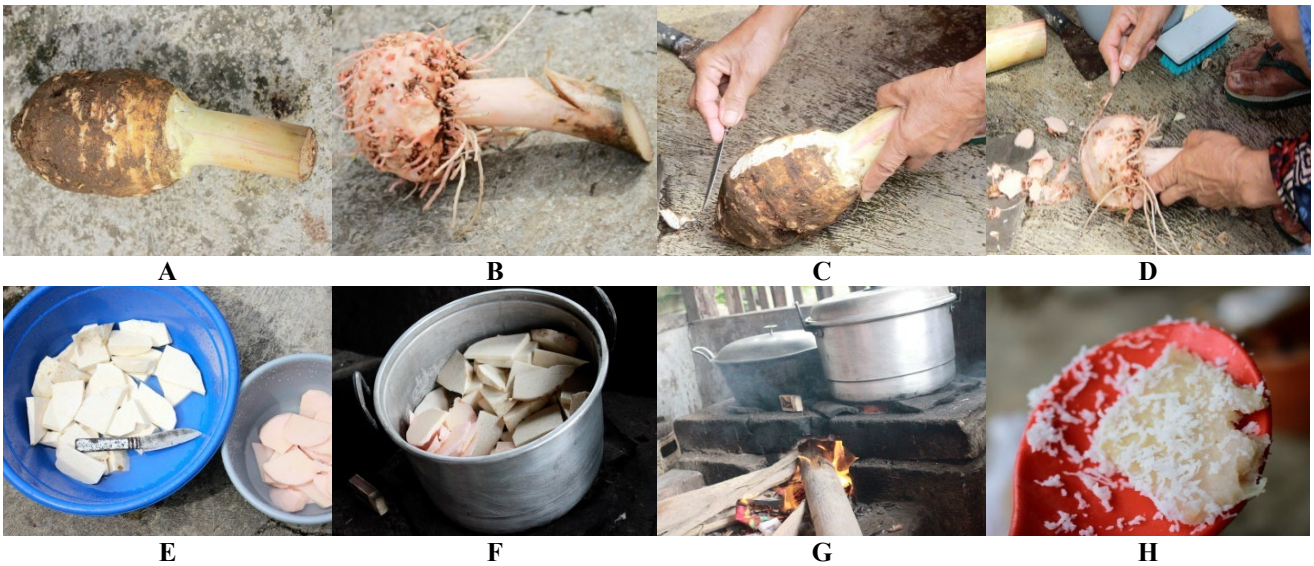

Figure 2. *Talas* and *suweg* tuber are used as foodstuff: A. Bogor *talas,* B. *Suweg* tuber, C. and D. Cleaning process of tuber from the skin, E. Tuber cut into pieces, F. Boiling process of tuber, G. Bogor *talas* tuber after boiled, H. *Suweg* tuber after being boiled

The processing of Bogor *talas* leaf stalks into vegetable *lompong* requires some special techniques. The process of making vegetable *lompong* should be done properly, because the leaf stalks of Bogor *talas* produce sap that causes itchiness. To make them into *lompong*, the stalks of Bogor *talas* need to be peeled first. Otherwise, they will be hard and fibrous. Then, the stalks are cut into pieces and soaked in salt water. Then, the pieces of stalks are boiled until they become white. The boiling process of stalks is intended to remove the sap out of the stalks. If the boiling time of stalks is very short, less than 30 minutes, the food will cause itchiness in the mouth when eaten. Therefore, in boiling of the leaf stalks, some spices, namely garlic, shallot, turmeric, cutcherry (*Kampferia galanga* or *kencur*), and bay leaves, and salt are added, until the stalks become tender. Visual descriptions related to the making soup of *lompong* can be seen more clearly in Figure 3.

Futhermore, leaves of some species of Araceae family are also used by the community as food, especially Bogor *talas* (*Colocasia esculenta*). Leaves of Bogor *talas* are commonly used as vegetable called as *lompong* and *buntil* (a kind of processed vegetable). The leaves of Bogor *talas* used for the vegetable are the young ones, aged about 4 months. The young leaves of Bogor *talas*, after having been cooked, do not cause itchiness when eaten, while the old leaves do. Widhyastini and Hutagaol (2014) mention that the leaves of Bogor *talas* contain calcium oxalate which can cause itchiness.

There are several species of Araceae used by the local community in the Cisoka Village mostly as ornamental plants. They are usually planted in the front of the home gardens (Figure 4). They are traditionally used as decoration of the stage in wedding parties or commemoration of independence day of the Republic of Indonesia. These ornamental plants consist of *keladi gergaji*, *Aglaonema dud anjamani*, *Aglaonema* red cochin, *Aglaonema* Chinese evergreen, *aglaonema* emerald beauty, *Aglaonema* green sun, *Aglaonema* butterfly, *Aglaonema* lady valentine, *Aglaonema crispum*, *Aglaonema* white rain, *Aglaonema* pride of Sumatera, *kuping gajah, gelombang cinta*, *Dieffenbachia seguine, Dieffenbachia camille, Dieffenbachia amoena, Keladi* Snow White, *Caladium bicolor* var. *mirabile*, *keladi hias*, *talas beureum/ keladi dua warna, keladi tiga warna*, *Syngonium, Anthurium pilo, Philodendron*, and *sente hias* (see Table 1). The Cisoka community mentioned that some species of plants of Araceae are used as decorative plants because they have attractive shapes and colors. For example, the species of the genus *Anthurium* are categorized as ornamental plants (Solvia et al. 2004). In addition, Muspiroh and Kurniawan (2014) mention that Anthurium is one of the species often used as an ornamental plant and placed in the room. Similarly, Amiarsi et al. (2006) mention that *Anthurium adreanum*

Figure 3. The process of making vegetable *lompong* that is made of petiole and leaf of *talas* (A-L)

Figure 4. Species of Araceae family are predominantly used as an ornament in the Cisoka Village, Cikijing Sub-district of Majalengka, West Java, Indonesia

Linden x Andre is considered as an ornamental plant that has long-lasting flowers although they are stored in rooms.

Many people are interested in ornamental plant species of the Araceae family because the seeds of these plants are easy to obtain; for example, seeds of *Spathiphyllum wallisii*, can grow anywhere, whether planted directly on the ground or in pots, have no serious pests, and do not depend on a particular climate. Seeds or seedlings of ornamental plants of the Araceae family are generally obtained from their relatives or neighbors.

Utilization for fish feed

It has been known that there are several species of Araceae, including *talas* Bogor (*Colocasia esculenta)*, *talas* Padang (*Xanthosoma sagittifolium)*, *sente* (*Alocasia macrorrhizos*) dan *suweg* (*Amorphophallus paeoniifolius*) have been commonly used as fish feed materials. The stems and leaves of *sente* (*Alocasia macrorrhiza* (L) Schott) are traditionally used as feed for *gurame* fish (*Ospronemus goramy*). Susanto (1989) mentions that sente (*Alocasia macrorrhiza* (L.) Schott) has been known as natural feed of the adult and young of fish of *gurame*. According to informants, fish that have been fed with leaves of *sente*, Padang *talas*, Bogor *talas*, and *suweg* will experience rapid growth so that the fish body becomes bigger and fatter (Figure 5). This is because Araceae leaves have high carbohydrate content, protein, fat, vitamins, and minerals. One component of carbohydrates in the leaves of the family Araceae is glucomannan (Chairul et al. 2006). Araceae plant parts used as fish feed are usually leaf and stem. The stem given to the fish is first cut into pieces, then spread to the fish pond. The feeding of fish, especially gourami (*Osphronemus goramy*) with leaves and stems of *talas* is done once or twice a week. In addition to being fish feed, Araceae plant also stems function in reducing the growth of microorganisms that harm the fish, as shown by Sapitri (2012) that the leaves of Araceae such as *Amorphophallus paeoniifolius* can act as a disinfectant in pond water. Thus, the leaves can reduce the micro-organisms that are the source of fish diseases in fish ponds.

It has been known there are species of Araceae which have been used by local community in Cisoka Village mainly as traditional medicines. For example, the sap of leaf stalks of Bogor *talas* (*Colocasia esculenta), iles-iles* (*Amorphophallus muelleri*), *suweg* (*Amorphophallus paeoniifolius)*, and Padang *talas* (*Xanthosoma sagittifolium*) are locally used for curing wounds. In addition to the sap, the tubers of *suweg* (*Amorphophallus paeoniifolius*), Padang *talas* (*Xanthosoma sagittifolium)*, Bogor *talas* (*Colocasia esculenta),* and *taleus beureum* (*Caladium bicolor*) can also be used as wound medicine (Figure 6). Besides, the tuber of Bogor and Padang can be used as ulcer medicine (*obat maag*). Nasution (2015) mentions that the tuber of Japan *talas* (*Colocasia esculenta* (L) Schott *var. antiquorum*), of Araceae family, can accelerate wound healing. This is because of the role of ethanol contained in this tuber of the plant. In addition, the petiole of *talas* contains active substances, namely saponins, flavonoids, tannins, alkaloids, steroids, and terpenoids that contribute to the healing of wounded skin (Wijaya et al. 2014). Hassan (2014) mentions that *talas* (*Colocasia esculenta* (L) Schoot) is one of the plants that have specific physiological functions for health. The tuber of *suweg* contains alkaloids, polyphenols, saponins, tannins and flavonoids that have antioxidant activity and can be used as medicine (cf. Benhammou et al. 2013), cancerous diseases, anti-inflammatory, anti-poison, bleeding and healing wounds (Firman et al. 2016). Meanwhile, Usman et al. (2013) mention that the sap of the petiole of *sente* is useful to heal snakebite and wound.

Utilization for ecological purposes

It is known that there are species of Araceae that have ecological and aesthetic functions, namely *Spathiphyllum wallisii* (Figure 7). According to the Cisoka community, they plant *Spathiphyllum wallisii* because this plant has the function to withstand water droplets or rain splashes. Thus, many Cisoka people plant *Spathiphyllum wallisii* next to their houses, knowing the benefits of this plant in the rainy season. In addition, the public knows that the plant has a rapid growth and easily spread, so the planting is quite easy. According to Surya and Astuti (2017), Araceae plants are used for cover crops. In addition, Rusman (1999) mentions that cover crops serve to protect soil from damage caused by erosion and can improve the physical, chemical, and biological properties of the soil. Meanwhile, Yasi et al. (2006) mention that plant cover can increase fertility. Mangkoedihardjo and Samudro (2010) mention that one of the functions of the plant is to minimize runoff on the soil surface which can cause erosion.

A B C

Figure 5. *Talas* leaves (A, B) and *suweg* (C) are traditionally used as fish feed in the fish pond

A B C

Figure 6. *Xanthosoma sagittifolium* (A), *Caladium bicolor* (B), *Colocasia esculenta* (C) are predominantly used as a wound medicine

Figure 7. *Spathiphyllum wallisii* Regel has an important role in the ecological systems

The cultivation of the plants

Members of the Araceae family used by the local community in Cisoka Village are wild or cultivated plants which are taken from various land uses such as homegarden, garden, rice field, and forest. In general, the cultivation of these plants, especially in the home gardens, gardens, and rice fields, are undertaken in several stages, namely land preparation, planting, caring, and harvesting.

Land preparation

The people of Cisoka generally prepare the land at the beginning of the rainy season in September and October. However, if *talas* cultivation is done in intercropping system, no special tillage is done. The preparation of *talas* cultivation land in the *talas* garden is done with the following stages: Firstly, the soil is cleared of weeds; Secondly, the cleared soil is plowed using hoes. Thirdly, bunds of soil are made while the soil is cleansed from the roots of weed plants. Finally, holes with a distance of 50 cm from one another are dug. Appah (2012) mentions that soil tillage with plowing can increase the porosity and moisture content of soil. Meanwhile, Triyono (2007) mentions that the addition organic straw mulch in soil can increase potassium levels, suppress the rate of erosion, and increase crop productivity.

Planting

Different planting techniques have been applied to each species of the Araceae family. In general, the Cisoka community plants Araceae plants using the following steps. First, the holes are made, measuring 20 x 20 x 20 am. Second, each *talas* seedling is placed (*ditancebunun*) in the hole. Third, fertilizer is sown on each hole that has been planted with *talas* seedling. Fourth, the hole that has been planted with *talas* seedling and sprinkled with fertilizer, filled with soil until the surface is the same as ground level

(Figure 8). Arifin (2012) mentions that the hole is made according to the size of the seedlings. Similarly, according to Makruf and Iswadi (2015) the hole for *talas* planting is approximately 30 x 30 x 30 cm or 40 x 40 x 40 cm, and 3-4 kg of manure is given for each hole. In intercropping system with cassava, the planting distance is 60 x 70 x 260cm; 60 cm is the distance among rows, 70 cm the distance between plants within the same row, and 260 cm the distance between rows of cassava. Djukri (2006) mentions that some *talas* clones (Araceae family members) planted in intercropping system are those tolerant to low light intensity so as not to affect the productivity of the plants. Some *talas* cultivation activities are shown in Figure 8.

Caring

In general, after planting, the young *talas* plants should be taken care of to protect them from pests and weeds (Figure 9). Therefore, the caring of young *talas* should be done, such as fertilizing, weeding, and spraying pests with pesticides. According to the Cisoka community, organic or inorganic fertilizers should be given to young *talas* plants to improve the quality of growth. In addition, the Cisoka community also believes that *talas* tubers fertilized with manure such as goat feces will produce large, fast-growing bulbs with excellent quality. Priyadi et al. (2014) state that the provision of organic fertilizer in the form of compost or animal dung is highly recommended, especially if the soil is compacted and hard, because this type of fertilizer can improve the physical properties of the soil. Fertilization is also useful to reduce the effects of competition in obtaining nutrients in the soil, so the soil nutrient content increases (Sudomo 2014). The nutrient needs of each plant vary, in terms of the type and amount required to complete the life cycle (Munawar 2011).

The caring of young *talas* should be done by fertilizing, weeding, and spraying of pests with pesticides. Other unexpected *talas* varieties were removed to reduce competition (Figure 9). Individual *talas* plants that grow in the same place will cause competition so it will not be profitable in producing good quality tubers (Ardhana 2012).

Figure 9. Preservation of *talas* by removing *talas* budding

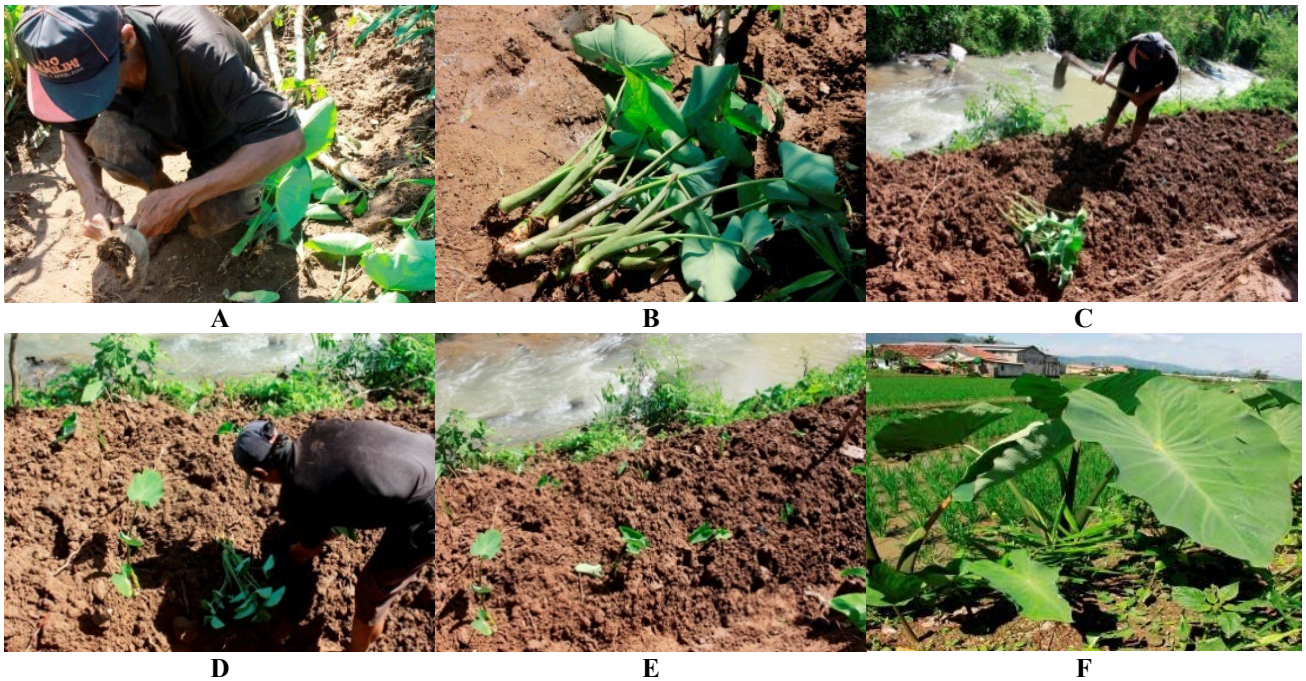

Figure 8. Technique of *talas* planting in the paddy fields: A. *Talas* removal, B. *Talas* seedling ready for planting, C. Preparation of digging holes, D. putting the *talas* seedling in the hole, E. the *talas* seedlings have already been put in each hole, and F. *Talas* plants have grown mixed with other crops in intercropping system

Pest management is part of Araceae plant management activities. There are various ways that people do to control pests, such as by spraying pesticides on *talas* plants that are exposed to pests. However, if the *talas* plant is an additional plant in the intercropping system, the affected plant is not sprayed, because this spraying will affect the quality of staple food crops. Instead, the affected plant is removed or left to death. The main pests that often attack the Araceae plant are insects in the larval or caterpillar phase, such as *Spodoptera litura* and *Hippotion celerio*. Informants mentioned that there are several types of *talas* that are considered resistant to pests, such as Bogor *talas* (*Colocasia esculenta* (L) Schott) (Priyadi et al. 2014).

Harvesting

Harvesting is the last stage in the management of Araceae cultivation in the garden. In general, *talas* crop harvest does not require many special tools. *Talas* tubers buried in the ground can be excavated with hoes or pieces of bamboo that are sharpened at the edges. The process of *talas* tuber harvesting can be divided into 5 stages. Firstly, *talas* harvesting begins by pruning the leaves and leaving the leaves 30 cm long. Secondly, the soil near the *talas* tuber is excavated partially with caution as it may damage the bulbs. Third, the *talas* plant is removed from the excavation pit. Fourth, the bulbs are cut from the petiole and cleansed of the soil. Fifth, in general, the base of the petiole is taken to make vegetable *lompong* (as in Figure 3). The *talas* tubers should be stored in a dry place so as not to rot or grow buds. *Talas* tuber harvest is usually done after the plants are about 6-12 months old. Especially for *talas* harvest in Bogor, some people in Cisoka Village usually harvest *talas* at the age of 8 months (39% of respondents). Respondents mentioned that when the *talas* plant is at the age of 8 months, the tuber is big enough, weighing about 1-2 kg per bulb. Farmers who want to get large bulbs usually harvest the plants at the age of 1 year (22% of respondents), but for people who really need *talas* tubers for consumption, 6-month old *talas* plants (13% of respondents) may be harvested, because at that age, *talas* has a tuber big enough to be consumed. Some farmers in Cisoka harvest *talas* tubers when the plants are at the age of 7 months (26% of respondents), because at this age, *talas* plants produce bulbs that are favored by consumers or traders. Makruf and Iswadi (2015) mention that the *talas* plant is harvested at the age of about 7-9 months, characterized by leaf drying. Prananingrum (2007) mentions that *talas* usually starts flowering at the the age of 6-8 months.

On the basis of this study, it can be inferred that the local people of the Cisoka Village, Majalengka, West Java, have a rich local knowledge of species and landraces, utilizations, and cultivation of the plant of Araceae family inherited from their ancestors. This local knowledge system may be usefully integrated into Western knowledge to use for supporting the sustainable development in Indonesia.

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