

Ethnobotany of suweg (*Amorphophallus paeoniifolius*): Folk classification, habitat, and traditional conservation in Cisoka Village, Majalengka District, Cimanuk Watershed Region, Indonesia

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Abstract. Mutaqin AZ, Kurniadie D, Iskandar J, Nurzaman M, Partasasmita R. 2020. Ethnobotany of suweg (*Amorphophallus paeoniifolius*): Folk classification, habitat, and traditional conservation in Cisoka Village, Majalengka District, Cimanuk Watershed Region, Indonesia. *Biodiversitas* 21: 546-555. *Amorphophallus paeoniifolius* (Dennst.) Nicolson or suweg is commonly called in Sunadese of West Java as *suweg* that is a species of tuber growing in many regions of the world, including in the Cimanuk Watershed, West Java Province, Indonesia. *A. paeoniifolius* usually grows in rural areas of West Java in some agroecosystem types, including the homegarden, garden, and mixed garden system. This plant species, in contrast to other tuber species, such as taro, has not been intensively cultivated by rural community in West Java. Even though *A. paeoniifolius* has not been intensively cultivated, this plant species in the future have the potential to be used for various purposes for human being. Because *A. paeoniifolius*, one of plant tubers, has a high resistance to unpredictable environmental changes, such as climate change, pest disruption, and easy to maintain. This study aimed to elucidate the traditional ecological knowledge (TEK) of rural people of Cisoka Village, Cikijing Sub-district, Majalengka District of Cimanuk Watershed, West Java on folk classification, habitat, and traditional conservation of *A. paeoniifolius*. The method used in this study was qualitative. Field data collection was undertaken by observation and semi-structured interviews or deep interviews with competent informants. The results of study showed that the rural population of Cisoka Village, Majalengka District, has recognized two kinds of *Amorphophallus*. Firstly, *Amorphophallus* is a commonly consumed that is called *suweg* which has scientific name as *Amorphophallus paeoniifolius* (Dennst.) Nicolson. Secondly, *Amorphophallus* is recognized as not commonly consumed which is called 'iles-iles' (*Amorphophallus variabilis* Blume). Both species can be traditionally classified based on morphology (tubers, leaf blade and petioles, and flowers), habitat, utilization, cultivation, and suitability of growing places. Specifically, *A. paeoniifolius*, grows in various conditions, growing at non-cultivated lands, such as forests and cultivated land, such as homegarden, garden, mixed-garden, and rice fields, or pond edges, but predominantly grows in homegardens and gardens. Some of these lands are *hieum* or shaded areas and *negrak* or open areas. *A. paeoniifolius* starts to grow and develop at the beginning of the rainy season until approaching the dry season, which is characterized by yellowing and falling of petiole. Conservation of *A. paeoniifolius* has been based on tradition is carried out by the rural community through storage/ preparation of seeds, which does not destroy *A. paeoniifolius* that grows in several types of agroecosystems, and is managed semi-intensively in several types of agroecosystems such as homegardens and gardens.

Keywords: Cimanuk watershed, Cisoka village, ethnobotany, *suweg*

INTRODUCTION

Plants are one of the resources that are closely related to human life. Plants are managed by humans, including to be used in order to meet their needs (Iskandar 2017). The use of plants in question includes food, health, and industry (Walujo 2011). Management of natural resources, including plants by rural communities, generally involves aspects of integrated socio-economic and ecosystem systems, which are based on belief systems (*cosmos*) and knowledge systems (*corvus*) (Toledo 2002; Iskandar 2018).

One species of plant that is often used by humans is *Amorphophallus paeoniifolius* (Dennst.) Nicolson (elephant foot yam) or in its local language is *suweg*. *A. paeoniifolius* or other plants that are often used, generally exist in the built ecosystem, such as in the villages around the watershed which are widely managed by the

community, especially in the type of homegarden and garden agroecosystem. A watershed is a land area that is an integral part of a river and its tributaries, which functions to accommodate, store and flow water that comes from rainfall to lakes or to the sea naturally, the boundary on land is the topographic separator and the boundary at sea until with water areas that are still affected by land activities (Government Regulation of the Republic of Indonesia Number 37 of 2012). One of the watersheds that are important for the use of resources, including plants, by the community is the Cimanuk watershed. This watershed covers several districts in West Java, namely Garut, Bandung, Sumedang, Majalengka, and Indramayu. The Cimanuk watershed is one of the national strategy areas, because in this watershed region there are several vital state objects, including the Jatigede Reservoir in Sumedang

District and the West Java Kertajati International Airport in Majalengka District.

More specifically related to the place to grow *A. paeoniifolius*, Mandal et al. (2016) state that the plant is a plant that is widely spread and cultivated by people in India, Indonesia, and other Asian countries. Yuzammi et al. (2017) states that this plant is widespread in the territory of Indonesia. In addition, Santosa et al. (2017) mention that *A. paeoniifolius* grows in Sumatra, Java, Bali, and Lombok, which are genetically divided into three sub-groups. Specifically, in West Java, *A. paeoniifolius* grows spreading in several areas of Kuningan District (Santosa et al. 2010).

Each species of plant has certain characteristics that are different from other species. Expression of specificity of which can be seen from the morphological characteristics. In addition, there is diversity or variation in individuals in one plant species. For example, Sulistiyo et al. (2015) state that there are genetic variations in *porang* (*Amorphophallus muelleri* B), plants that are related to *A. paeoniifolius*, which can be caused by factors of adaptation to the environment in which they grow.

In addition to diversity, there are also similarities in common characteristics between species so as to create a kinship that can be collected in a classification. Scientific classification generally refers to the nomenclature of established principles. In addition to scientific classifications, there are also classifications based on population knowledge (folk classification) which generally use mother tongue (Iskandar 2018). More generally, this classification according to the community is a knowledge called local knowledge or traditional knowledge or folk knowledge (Ellen and Harris 2000; Iskandar 2018). Local knowledge is very distinctive, gained from various practical experiences locally and is strongly related to the local environment (Cotton 1996; Iskandar et al. 2018a). In general, local knowledge systems are obtained from the synthesis of information obtained from at least four sources, namely (i) the experience accumulated by an individual or community of residents during history throughout his lifetime and can be passed on from one generation to the next generation by a community cultural group, (ii) various experiences of community individuals are shared socially by members of the same generation or the same group in the community, (iii) experiences are shared by various households or domestic groups in a family, and (iv) certain experiences of each individual, obtained through repetition of annual cycles (natural and productive), and enriched with variations in understanding and various unpredictable conditions associated with it (Toledo 2002; Iskandar 2018).

Humans with their environment have a reciprocal relationship. Humans are one entity with their environment. Humans get a variety of imagination and stories about their environment, including the plants that are often used. With this integralist or ecocentrism concept, humans always pay attention to the balance with the environment, maintain, and even respect available resources based on the knowledge gained during interacting with their environment. A concrete example is the behavior or respect

of Sundanese people for rice. Besides utilizing Sundanese people, they also have confidence in the esoteric or spiritual value possessed by rice. Thus, Sundanese people have a piece of in-depth knowledge and maintain rice as a very important personification that is integrated to be done through culture or customs (Iskandar 2017; Iskandar and Iskandar 2011; Hidayat et al. 2020). More specifically, Asih and Kurniawan (2019) mentioned that *A. paeoniifolius* tuber in Bali were used in traditional ceremonies, namely the *Upacara Dewasa*, *Rsi*, *Manusia*, *Pitra*, and *Bhuta Yadnya*. This means that the community will preserve the plant, as long as the traditional ceremony or cultural product is still ongoing or carried out.

Based on observations and some literature studies as described above, it is necessary to study ethnobotany *A. paeoniifolius*, especially in Cisoka Village, Cikijing Sub-district, Majalengka District, which belongs to the Cimanuk Watershed knowledge of the population about folk classification, habitat, and conservation of Sundanese people in Cisoka Village, Cikijing Sub-district, Majalengka District.

MATERIALS AND METHODS

Study area

This research was conducted in January-May 2019 in Cisoka Village, Cikijing Sub-district, Majalengka District, West Java Province, which is part of the Cimanuk Watershed (Figure 1). Cisoka is a self-contained village consisting of 3 hamlets, 10 neighborhood residents, and 21 neighborhood units (Government of Cisoka Village 2016). Cisoka Village has an altitude of 611 meters above sea level, an area of 4.15 km², distance to the Sub-district and district centers are 3 km and 40 km respectively, and a population of 1,982 people with a density of 478/ km² in 2018 (Statistic of Majalengka District 2019). Cisoka Village topography consists of plains, hills, and river flows (Government of Cisoka Village 2016). Specifically related to land, Cisoka Village has 194.18 Ha of paddy land, 21.12 Ha of homegarden, 19.5 Ha of moor, 4.9 Ha of pond, 58.07 Ha of community forest, 19 Ha of grazing land, and other 7,43 Ha (Agricultural Counseling Center of Cikijing Sub-district, Majalengka District 2019). The homegarden is usually planted with various species of annual and annual plants, such as ginger (*Zingiber officinale* Rosc.), and banana (*Musa paradisiaca* L.). The garden usually also found a pond, to maintain species of fish such as carp (*Osporonemus goramy*) and tilapia (*Oreochromis niloticus*). The garden is usually planted with plants such as guava (*Psidium Guajava* L), cloves (*Syzygium aromaticum* (L.) Merr & Perry), coffee (*Coffea arabica* L.), and albasiah (*Paraserianthes falcataria* (L.) Nielsen). Rice fields are planted with rice and secondary cropping patterns or vegetables. In addition to rice planted commodity crops, also during the dry season are often planted plants such as shallots (*Allium cepa* var. *aggregatum* L.), water spinach (*Ipomoea reptana* Poir.), long beans (*Vigna sinensis* (L.) Savi ex Hassk.), hot peppers (*Capsicum frutescens* L.), cayenne peppers (*Capsicum annum* L.), cucumbers

(*Cucumis sativus* L.), and tomatoes (*Solanum lycopersicum* L.). Forests in Cisoka Village are generally community forests with a number of plants including *Hibiscus macrophyllus* Roxb. Ex. Hornem, *Ficus benjamina* L., *Ficus elastica* Roxb. Ex. Hornem, and bamboo (Government of Cisoka Village 2016; Statistic of Majalengka District 2019; Agricultural Counseling Center of Cikijing Sub-district, Majalengka District 2019).

Procedures

The research was qualitative in nature using the ethnobotany approach (Albuquerque et al. 2014; Iskandar 2018). Field data collection was carried out by observation and through semi-structural interviews or deep interviews. Observation was carried out by observing various land uses commonly found in *A. paeoniifolius*, such as homegardens, gardens, ponds, forests, and rice fields. In addition, the researchers observed various activities of the population, such as planting, harvesting, and processing *A. paeoniifolius* tubers. Semi-structured interviews were conducted to find out community knowledge about various aspects of *A. paeoniifolius*, especially related to folk classification, habitat, and conservation. Specifically, semistructured interviews were conducted with informants selected purposively who were considered to be competent by taking into account their diversity, with the snowball technique (Martin 1995; Cotton 1996; Cunningham 2001;

Iskandar 2018). The informants in this study were several elderly male and female farmers; public figure; village head and staff; hamlet head; the owner of the land where *A. paeoniifolius* grows; breeder; and pond owners who usually use *A. paeoniifolius*.

Data analysis

Data were analyzed through an emic and ethical approach by cross-checking, summarizing, and synthesizing for later narrative descriptive analysis (Newing et al. 2011; Iskandar and Iskandar 2015; Iskandar 2018). Cross-checking is done to check the validity of data from various informants' information, based on observations and reports. The cross-checking data will then be summarized and synthesized. Then, data from various sources are narrated in a descriptive analysis sequentially.

RESULTS AND DISCUSSION

Based on interviews with community informants from Cisoka Village, it was shown that the community in the village had traditional ecological knowledge about *suweg* (*Amorphophallus paeoniifolius* (Dennst.) Nicolson) such as folk classification, habitat, and conservation which were explained or elaborated on the subtitles below:

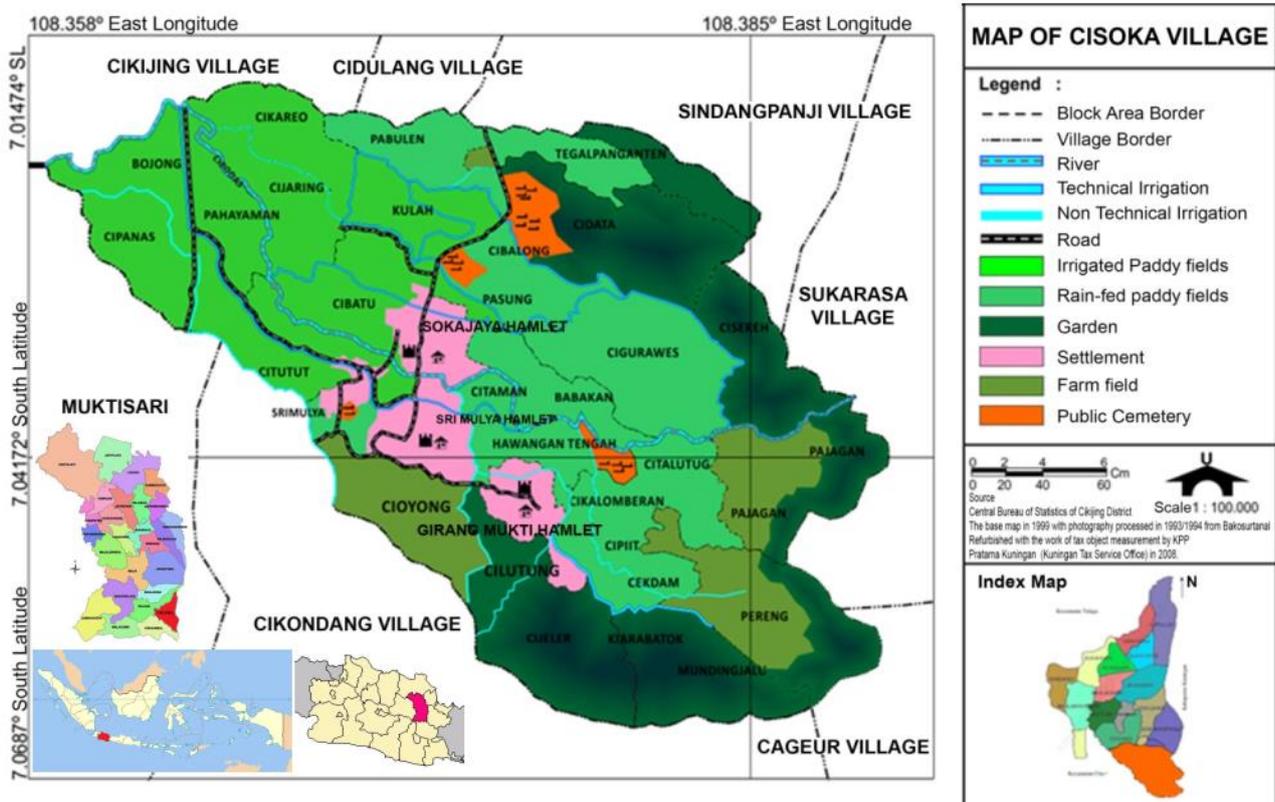


Figure 1. Location of research in the Village of Cisoka, Sub-district of Cikijing, District of Majalengka, West Java, Indonesia (Mutaqin et al. 2018)

Folk classification *Amorphophallus*

According to the rural people of Cisoka Village, *Amorphophallus* is known for 2 species, namely, first, it is a species of *Amorphophallus* that is not commonly consumed, commonly called *ileus* with the scientific name *iles-iles* (*Amorphophallus variabilis* Blume). Another type, commonly called *suweg*, with the scientific name *suweg* (*Amorphophallus paeoniifolius* (Dennst.) Nicolson).

Based on the knowledge of the people of Cisoka Village, the two species of *Amorphophallus* can be classified (folk classification) based on morphology, such as tubers, petioles, and flowers; utilization; hábitat; and cultivation (Table 1 and Figure 1).

As additional information, the community knows that some of the other features of *iles-iles* are itchy tubers, the color of tuber flesh is white, and the size of a handful. Meanwhile, *suweg*'s tubers have blackish-brown outer shell characteristics; reddish-white or yellowish-white tuber flesh; chewy or soft when cooked; there is a rather sweet taste; rooted and sprout; gummy or slimy colored clear or light yellow or slightly reddish and sticky; spherical round shape, middle grooved; odorless; and weighs as big as a pan or about 10 kg. In addition, the community also knew that in the *suweg* tubers there were a large number of tubers, round in shape, and a length of up to about 20 cm.

Associated with differences in leaf morphology, the community informed that *ileus* has a greenish-purple stalk

and not rough. Meanwhile, *suweg* has green leaf stalks with white spots, round in shape, surface, rather rough, gummy or slimy, which are clear and itchy; height can reach around 1-2 meters or in the local language *sa tangtung* (as high as the human body); 3 (three) branches that together with the leaf blade look like an umbrella shape or *rampidak* (in local language); and leaflets that are green, but when it is old it turns yellow, marked by the withering of leaves (leaf blade and petiole); hairless, smooth

Associated with differences in flower organs, people know that *ileus* smells of carcasses. Likewise, *suweg* has a flower that smells of carcasses. In addition, *suweg* have red or dark red or pink or brownish-red or blackish red or purple flowers; oval rounded like a banana heart; and not gummy.

Regarding habitat differences, the community knows that *ileus* grows in forests that are generally *tiis* (in local language) or cold. The weather or temperature is due to *hieum* (in the local language) or shaded by higher plants. While *suweg* can grow in areas that are cold, temperate, or hot in the sense that it can grow in the *hieum* and *negrak* areas (in the local language) or open.

Regarding utilization, the community informed us that *ileus* was generally not used because of itching. Meanwhile, *suweg* is used for several purposes such as food and feed. Organs that are used as food are tubers. Organs used as food are strands and petioles.

Table 1. Difference between *suweg* and *iles-iles* according to the community of Cisoka Village, Cimanuk Watershed Region, Indonesia

Description of difference	<i>Suweg</i> (<i>Amorphophallus paeoniifolius</i>)	<i>Iles-iles</i> (<i>Amorphophallus variabilis</i>)
Morphology		
- Tuber	Large tuber	Small tuber
- Leaf-blade and petiole	Big and tall	Small and short
- Flower)	Rounded bud	Long-form, growing up
Habitat	Generally shaded or open areas	Generally, in shaded areas
Utilization	Be utilized	Not utilized
Cultivation	Cultivated, but not intensive	Not cultivated
Suitability of place grow	Diverse	Somewhat limited

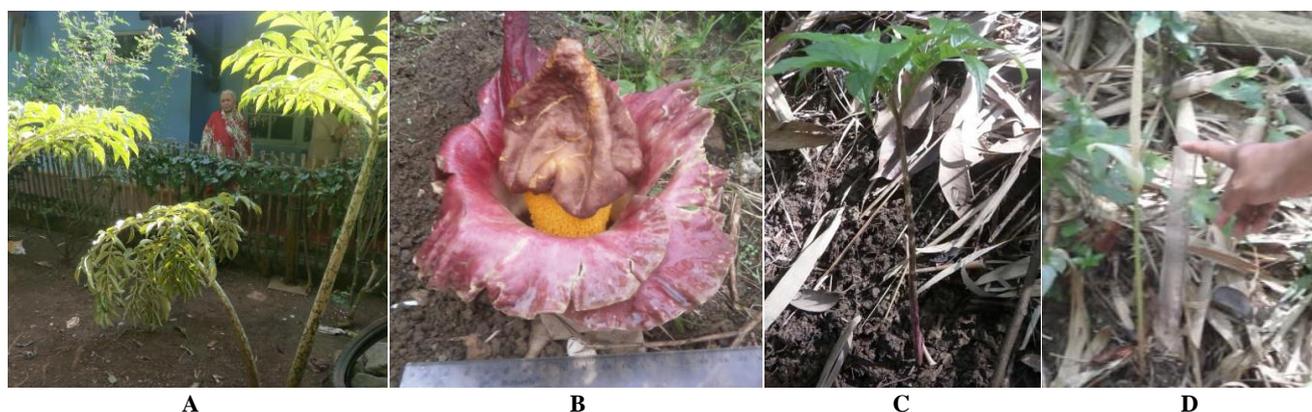


Figure 2. Differences between *suweg* (A and B) and *iles-iles* (C and D) from Cisoka Village, Cimanuk Watershed Region, Indonesia

Table 2. Some variants of *suweg* based on petiole, tuber flesh color, and taste according to the people of Cisoka Village, Cimanuk Watershed Region, Indonesia

Variant category	<i>Suweg 1</i> (<i>Amorphophallus paeoniifolius</i>)	<i>Suweg 2</i> (<i>Amorphophallus paeoniifolius</i>)
Petiole	Thin	Not thin
Color of tuber meat	Reddish white	Yellowish white
The taste of tuber meat	Taste good	Don't taste good

Table 3. Some variants of *suweg* by place of growth according to the community of Cisoka Village, Cimanuk Watershed Region, Indonesia

Category of place to grow	<i>Suweg 1</i> (<i>Amorphophallus paeoniifolius</i>)	<i>Suweg 2</i> (<i>Amorphophallus paeoniifolius</i>)	<i>Suweg 3</i> (<i>Amorphophallus paeoniifolius</i>)
Light intensity	Shade area	Open area	Somewhat open area
Soil texture	Silt soil	Clay soil	Sandy soil
Soil color	Reddish soil	Blackish soil	Brownish soil

Regarding cultivation, the community knows that *ileus* is a wild plant that is not cultivated at all. Slightly different from *suweg*, although not intensive, is still planted or allowed to grow on land that is normally managed by the community such as homegardens and gardens.

Regarding the suitability of growing areas, people know that *ileus* has a rather limited spectrum of growth sites, generally in *hieum* (shaded) or *tiis* (cold temperatures). Meanwhile, *suweg* can grow in a variety of place conditions. *Suweg* can grow on a flat topography or *gawir* (land with sloping or slightly sloping elevation). In addition, *suweg* can grow in a variety of soil conditions, both color, texture, or level of fertility. Likewise, *suweg* can grow in varying conditions of temperatures or vegetation environments.

In addition to the diversity of *Amorphophallus* which is classified into two species, although it is not specific and explicitly informs of morphological variations like other plants (taro, cassava, sweet potato, or others), the community informs that there are several variants of *suweg* based on the petiole, tuber flesh color, taste tuber meat, and growing sites as shown in Table 2 and Table 3.

In addition to information, the community informed that there are some differences growth of *suweg* in different conditions or places. *Suweg* that grows in shaded areas or *hieum* (in the local language) have thin petiole or *jangleung* (in the local language). Conversely, *suweg* that grows in open areas or *negrak* (in the local language) has a petiole that is not thin. According to the community, *jangleung* petiole because it is less exposed to sunlight or *panon poe* (in the local language). In addition, tubers that have a good taste or *pulen* (in the local language) are cooked tubers derived from tubers harvested during the dry season. Whereas the tubers which are harvested at the time of growth or the petiole do not yet fall have a bad taste or *cangor* (in local language).

Based on literature review as a comparison with public knowledge about nomenclature, specifically *A. paeoniifolius*, this plant has several local names including *kidaran* in Sabaramaguwa-Sri Lanka Province

(Dharmadasa et al. 2016); *karnai kizhangu* in the Namakkal-Tamilnadu District (Ramanathan et al. 2014); *karnaikilangu* in Kerala-India (Yabesh et al. 2014); and *koniaku* in Japan, *buk khan* in Thailand, and *suvarna gedde* in Canada (Singh and Wadhwa 2014). In general, the diversity of names or knowledge is influenced by ethnicity, gender, and age (Zambrana et al. 2014). Furthermore, specifically, Adnan and Othman (2012) stated that knowledge of plant identification in rural areas is higher than in urban areas.

Public knowledge about the differences in places to grow between *suweg* and *iles-iles* (Table 1), is in line with what was concluded by Siswanto and Karamina (2016) that the parameters of land requirements for the species of members of the genus *Amorphophallus* are not all the same. Yuzammi et al. (2017) also inform that the habitat and distribution of *Amorphophallus* species are varied. Specifically, Nugraha et al. (2018) found a *suweg* in the mountainous region. Meanwhile, Afifah et al. (2014) state that the conditions for growing *iles-iles* plants are under a shade at least 50% with temperatures around 22-30°C.

Amorphophallus diversity in Cisoka Village as mentioned by the community is in line with what was informed by Supriati (2016) that in Indonesia there are generally several species of *Amorphophallus* such as *Amorphophallus oncophyllus* Prain ex Hook. f. (*iles-iles*), *Amorphophallus campanulatus* (Roxb.) Blume (*suweg*), and *Amorphophallus variabilis* Blume (*acung*). Yuzammi et al. (2017) state that in Indonesia there are several species of *Amorphophallus* such as *Amorphophallus paeoniifolius* (Dennst.) Nicolson (*suweg*), *Amorphophallus muelleri* Blume (*porang*), and *Amorphophallus variabilis* Blume. Specifically, related to diversity, Santosa et al. (2018) states that genetic distance between populations increases with increasing geographical distance.

Associated with the variance or diversity based on morphologists as known to the public in line with several scientific sources. Anil et al. (2011) state that morphological characters such as cormel shape, cormel weight per corm, fresh corm weight, corm flesh color, and

petiole surface pattern can be used for the identification of various morphotypes of *Amorphophallus paeoniifolius*. In addition, Santosa et al. (2012) concluded that there are groupings of accessions of *Amorphophallus variabilis* Blume based on morphological groups. Ekowati et al. (2017) also mentioned that phenetic or morphological characters such as leaf blades, petiole, and tubers can be used as a basis for the classification of *Amorphophallus*.

Associated with public knowledge that plants have characteristics based on morphology in line with some of the results of scientific studies. Permatasari et al. (2014) state that plant characteristics can be identified based on morphological, anatomical, and isozyme banding patterns. More specifically, Priyanti et al. (2013) state that plant characteristics can be analyzed based on the morphological character of the petiole.

In more detail, the morphological characteristics of *ileus* and *suweg* knew to the community are in line with some of the results of scientific studies. The results of searching for several scientific sources related to the characteristics of the *Amorphophallus* variant, specifically *Amorphophallus variabilis* Blume has characteristics of tuber diameter is commonly small, about 10-15 cm, very dark, rough, producing seasonal rhizomatous buds. Petiole 50-75 cm long and up to 120 cm, smooth, sometimes glossy, variegated surface color from pale green, greenish-brown, pure green to pale brown, with randomly whitish-green to dark green irregular spots. Blade or blade 50-75 cm in diameter and up to 125 cm; almost similar to *A. paeoniifolius* lamina, elliptical to lanceolate leaflets, 4-34 cm x 2-12 cm. Peduncle about 50-60 cm, 1-2 cm in diameter. Inflorescence is the longest than *A. muelleri* and *A. paeoniifolius*; spathe narrowly short, up to 20 cm or 1 / 3-1 / 4 spadix length, limb pale green-green with randomly whitish spots outside, creamy white-ivory inside. Spadix is commonly very longer than spathe. When inflorescence is flowering, it's commonly known with a bad smell that appears early in the evening. Only unripening infrastructure found during fieldwork, cylindrical, densely arranged, green; the ripening fruit is orange-red with 1-3 seeded (Jansen et al. 1996; Kurniawan et al. 2011). In addition, Pratama (2011) states that this plant has several characteristics including the green to brownish green petiole, plain patterned to have rounded or oval-shaped patches of white to yellowish, smooth surface, length ranging from 5.2-160 cm, diameter 0.05-2.3 cm; tubers between 7.5-12.7 cm in diameter, white tuber flesh with tuber skins brownish-white, there are several buds; spathe in yellowish-green inflorescence, the lower speckled with various shades, having a length of about 5-22.4 cm, diameter 1.3-4.1 cm; yellowish-white male flowers up to brown, 2.2-6.8 cm long, 1.1-3.1 cm in diameter; and female flowers are yellow on the head of the green bottom, 2-5 cm long, 1.1-2.8 cm in diameter.

Meanwhile, according to several scientific sources, *A. paeoniifolius* has several morphological characteristics related to the organs of leaves, tubers, flowers, and roots. *A. paeoniifolius* has complete leaf (has petioles, vagina, and lamina), compound leaves, leaf reinforcement pinned to the sharing edge, has 6-8 leaflets, and is elliptical with a

tapered tip. Leaf blade of *A. paeoniifolius* is light green to dark green, with a smooth surface. The petiole is light green to dark green and has a white bottle, speckled surface, divided into three secondary stems, 3.3-10 cm in diameter, and 75-100 cm in length (Jintan et al. 2015); petiole dark green, light green, light greenish-yellow, and brownish-green (Permatasari et al. 2014); leaves 100-150 cm in diameter, highly fragmented oval-shaped oblong and winged rachis, petiole such as warty-thorny and grooved folding, dark brown-greenish brown in wild species and slightly wintered-spiny or smooth, pale green- green on the type of cultivation with whitish green dots in both wild and cultivated species (Kurniawan et al. 2011); pale green up to dark green or black-green petiole with small and large-sized patches, stems reaching 2 meters in height, and 20 cm in diameter (Yuzammi et al. 2017); the petiole is usually strongly warty, rarely smooth, always blotched and never striped (Sedayu et al. 2010). Brownish-yellow tubers (Jintan et al. 2015); dark brown, up to 15 kg in weight (Yuzammi 2017); tuber skin is blackish brown, tuber flesh is purplish yellow, and has a petiole diameter of 20-25 cm (Govi et al. 2017). *A. paeoniifolius* flowers are large and give off a scent like a carcass, a sheath measuring 10-30 x 15-50 cm with an upper sheath surrounding the cob, the cob is longer than the sheath, the outer sheath is pale-brown green with pale green-whitish dots, the inner shell of a dark brown shiny-red purplish heart, and has a shorter stem than the petiole and elongates when bearing fruit (Kurniawan et al. 2011); the smell of rotten meat (Kite and Hetttersceid 2017). Root of *A. paeoniifolius* is root spreading (Singh et al. 2010); cylindrical shape, growing horizontally extending to more than 1 m during the rainy season, whereas in the dry season the length is up to less than 30 cm and its thickness is 2-5 mm (Ravi et al. 2009); root length up to about 50-60 cm (Govi et al. 2017).

Associated with public knowledge about differences in places to grow there are causing some differences in characteristics, this is in line with some scientific research results. Heriyansyah et al. (2017) state that there are variants of *suweg* (*A. paeoniifolius*) based on differences in growing locations. Likewise, Sulistiyo et al. (2015) mentioned that there is a variant of *porang* (*Amorphophallus muelleri* Blume), a plant that is related to *suweg*, based on differences in growth location. More specifically, Sahoo et al. (2016) revealed that light intensity influences vegetative growth of plants such as plant height and canopy width. In addition, Wijayanto and Pratiwi (2011) revealed that the shade affects the growth of *porang* (*Amorphophallus onchophyllus*), plants that are related to *suweg*, such as tuber wet weight, tuber diameter, biomass, and plant height.

Related to community knowledge which mentions several different soil textures and colors is as a medium to grow *A. paeoniifolius*, this is in line with the results of other studies related to community knowledge about the classification of land-based on color (Iskandar et al. 2018b). Permatasari et al. (2014) state that *A. paeoniifolius* are found in loose, silty, and sandy silt. Furthermore, Daryanto et al. (2016) inform that soil texture is generally related to production capacity and groundwater. In

addition, soil conditions, especially pH, affect the distribution of *Amorphophallus* (Hafsah et al. 2018).

Table 4. Habitat of *suweg* based on vegetation cover and land use according to the people of Cisoka Village, Cimanuk Watershed Region, Indonesia

Habitat category	Habitat type
Non-cultivation land type	Forest
Cultivation land type	Homegarden, garden, rice field edge, pond edge

Table 5. Growth of *suweg* according to the people of Cisoka Village, Cimanuk Watershed Region, Indonesia

Organ	Time of growth
Leaves	Early rainy season or <i>kapat</i> (in local language)/ cold weather until before the dry season
Flower	Early rainy season or <i>kapat</i> (in local language) / cold weather
Tuber	Rainy season

Habitat and growth properties of *Amorphophallus paeoniifolius*

The rural community of Cisoka Village knows that the habitat or place to grow *A. paeoniifolius* can be distinguished by land as can be clearly seen in Table 4. The community also knows that *A. paeoniifolius* has several growth characteristics as can be seen in Table 5.

As additional information, the community knows that the forest is non-cultivated land because it is not or rarely managed to be cultivated for other species of crops. Meanwhile, the homegardens, gardens, rice fields, and ponds are land that is often managed by the community, planted by several species of cultivation plants, either annual or annual crops such as rice, cayenne pepper, tomatoes, onions, bananas, and guava. These lands are very closely related to the fulfillment of daily needs.

Furthermore, the community also knows that forest land is generally *hieum* area (in the local language). Homegardens and ponds are generally *negrak* or rather *negrak* (in local language). Paddy fields are generally *negrak* area. Meanwhile, garden land, in general, is a *hieum* or somewhat *hieum* area. The *hieum* is an area where sunlight does not enter the land because it is covered with tall tree leaves, *poek* (in the local language) or rather dark, air or temperature is *tiis* (in the local language) or cold or rather cold compared to a *negrak* or open area. Meanwhile, the *negrak* area is an area where sunlight can enter land or soil, the weather or the temperature is hot or rather hot compared to the *hieum* or enclosed area.

The community informed that in general, *A. paeoniifolius* grew on lands managed by the community such as homegardens and gardens. But there are also those that grow half-wild on unmanaged lands such as forests. *A. paeoniifolius* that grows in the homegarden, pond edge, and rice field edge, in general, can grow well. Tuber of *A.*

paeoniifolius is big and petiole is not thin. Meanwhile, *A. paeoniifolius* that grow on garden land or grow half-wild in the forest, generally have thin petiole or *jangleung* and tubers are not as large as those that grow in open areas or *negrak*.

Related to the relationship with several other species of plants that exist around *A. paeoniifolius*, the community knows that *A. paeoniifolius* can grow with plant species, both cultivated plants (such as cassava or *Manihot esculenta* Cranz and taro or *Colocasia esculenta* (L.) Schott) or non-cultivated plants (such as *Cyperus rotundus* L., *Eleusine indica* (L.) Gaertn, and *Commelina benghalensis* L.). However, people know that *A. paeoniifolius* lack or do not grow optimally when covered by vines (such as *Piper betle* L.) or reeds (*Imperata cylindrica* (L.) P. Beauv).

Associated with the growth and development of organs, the community knows that the leaf buds come from tubers, child tubers, or skin peeled tubers. Buds grow taller and differentiate or bloom or *ligar* (in the local language) into leaf blades and petioles. The period of growth of buds to adulthood will end with a marked yellowing of leaf blades and petioles, then withered or fallen. During the dry season, the leaf blades and petioles do not grow. Flowers bloom around 6-30 days. After the blooming period is over, the flower will rot, smell the corpse, then the seed that becomes or raises the flower in the following season will grow into leaf buds. Meanwhile, the tubers during the dry season do not increase in size and bring out the leaf buds.

Knowledge of the community about *A. paeoniifolius*'s habitat is in line with several scientific sources. Yuzammi et al. (2017) state that *A. paeoniifolius* has a wide distribution such as growing on secondary forests, forest edges, teak forests, and village groves. Hidayat (2019) also mentioned that *A. paeoniifolius* grows in the teak plantation forest. Likewise, Restiyadi (2012) states that most of tubers including *A. paeoniifolius* can grow on various types of land, both fertile or infertile land. Meanwhile, Permatasari et al. (2014) states that *A. paeoniifolius* are found in areas with open or shaded environments.

Specifically related to public knowledge that shoots or flowers will appear in the *kapat* season, this can be rationalized with the results of several scientific studies. Hidayat et al. (2013) state that this season is marked by the presence of winds from the west that cause rain. Thus, this phenomenon is influenced by water availability. Ravi et al. (2011) state that the growth of plants in between can be influenced by the availability of water and nutrients. Ravi et al. (2015) state that water deficits affect growth and productivity of *Amorphophallus*. Mabhaudhi et al. (2013) state that plant height, number of leaves, and leaf area index are affected by the water content in the growing media. Meanwhile, as informed by the public that *A. paeoniifolius* does not experience growth during the dry season, this is in line with scientific information that generally *Amorphophallus* experiences a period of dormancy starting at the beginning of the dry season. *A. paeoniifolius* will experience an earlier period of dormancy with limited irrigation (Santosa et al. 2004; Santosa et al. 2014). In contrast, *Amorphophallus* that grows with enough

water does not have a period of dormancy (Zhang et al. 2010; Santosa et al. 2014).

Related to public knowledge that *A. paeoniifolius* can grow with any species of plant, this can be analogous to the results of other studies that *Rafflesia meijerii*, plants that are related to *A. paeoniifolius*, can grow and develop on various types of land cover by several species of plants (Simamora et al. (2017). Permatasari et al. (2014) state that plants that grow around *A. paeoniifolius* have shrubs or trees. More specifically, Jata et al. (2018) concluded that *A. paeoniifolius* can be planted with other plants with intercropping systems. Chandra (2014) also mentions that *A. paeoniifolius* is good intercropping plants.

Public opinion which states that *A. paeoniifolius* cannot grow optimally if covered by vines or reeds, in line with the results of scientific research. Kuamr et al. (2019) mentioned that weed disturbance results in slow growth and lower leaf area, which might influence the assimilation production needed for tuber development.

Traditional conservation of *Amorphophallus paeoniifolius*

Based on the opinion of the informants of Cisoka Village residents there are several characteristics of the community that can play an important role in the conservation of *A. paeoniifolius* in rural ecosystems, such as storage/ preparation of seeds, not destroying *A. paeoniifolius* that grows in the *type* of agroecosystem, and managed in semi-intensive in several types of agroecosystems.

Regarding the storage or preparation of seeds, the community is aware that the storage or safeguarding of seeds is done by letting the tubers of *A. paeoniifolius* are not used during the harvest season concerned buried in the ground. Bulbs that are not harvested are even reversed their position so that the next season will grow bigger. Seed protection is also carried out by the community by deliberately spreading skin peeled tuber that has been used on lands managed by the community such as homegardens or gardens. The community also sometimes removes puppies of *suweg* or *petetan* (in local language) from one land to another desired land.

The community informs that the growing *A. paeoniifolius* is not destroyed by allowing or not disturbing or not harvesting the tubers of *A. paeoniifolius* if it is not needed, both those that grow around the cultivation plant or grow solitary/ clustered without any cultivation plants around it. This is different from disturbing plants or weed plants, such as some species of grass, herbs, or shrubs, which are unwanted to grow around the staple crop cultivation, people usually eliminate these disturbing plants by pulling or weeding.

Regarding management or cultivation, the community knows that *A. paeoniifolius* is not cultivated intensively which is done in the homegardens, gardens, ponds edge, or rice fields, but generally in the homegardens or gardens. Cultivation of *A. paeoniifolius* is very simple which includes planting or spreading seeds, fertilizing, and caring. Planting seeds is done by burying seeds that come from skin peeled tubers, tubers child, or tubers in a hole that

matches the size of the seed. Fertilization is done by providing manure, either directly on plant *A. paeoniifolius* or indirectly through plants that are around *A. paeoniifolius*. Fertilizing *A. paeoniifolius* by using chemical fertilizers is never or rarely done. But *A. paeoniifolius* get nutrition from fertilizer given to the surrounding plants. *A. paeoniifolius* is rarely treated specifically or routinely through the control of pests or diseases such as other cultivating plants in the vicinity. However, if grass or other nuisance plants grow around *A. paeoniifolius*, then the community is often *ngored* (in the local language) or weeded. Control of pests or diseases of crops that exist around *A. paeoniifolius*, also indirectly can control pests or diseases that might attack *A. paeoniifolius*.

The patterns or behavior of the people towards *A. paeoniifolius*, based on their knowledge, as mentioned above are in line with the rules of conservation based on several scientific sources. In general, Iskandar (2017) mentions that social, economic, and cultural aspects of society are important in conservation efforts. For example, there are various taboos in Sundanese society such as *buyut*, *cadu*, *taboo*, and *pamali* to prevent various human actions that are not in accordance with the environment (Iskandar 2018). Another thing, Hamilton (2013) states that public knowledge about plants is very valuable in conservation. Whitney et al. (2016) state that indigenous peoples' local knowledge and experience are effective or important in biodiversity conservation. Amusa et al. (2010) revealed that the management and utilization of resources by the community provided strong incentives for conservation. Whitney et al. (2018) state that an important place for agrobiodiversity conservation is the homegarden. In addition, Yuzammi et al. (2014) revealed that land conversion or plant commodity conversion in land use can damage the habitat of *Amorphophallus discophorus*, plants that are related to *A. paeoniifolius*, which live on the land concerned. Specifically, Yuzammi (2018) informed that *Amorphophallus*, including *A. paeoniifolius*, was ex situ conservation through cultivation.

Based on the results of this study it can be concluded that the rural people of Cisoka classifies (folk classification) *Amorphophallus* into 2 groups or species. The first species is a species of *Amorphophallus* that is not commonly consumed, commonly called *ileus* with the scientific name *iles-iles* (*Amorphophallus variabilis* Blume). The second species is called *suweg*, with the scientific name '*suweg*' (*Amorphopallus paeoniifolius* (Dennst.) Nicolson). *Suweg* and *iles-iles* can be classified by the community based on morphology (tubers, leaf blades and petioles, as well as flowers), habitat, utilization, cultivation, and suitability of growing places. Specifically, *suweg*, grows in a variety of conditions, growing on non-cultivated lands such as forests and cultivated land such as homegardens, gardens, rice fields, or pond edges, but generally grows in homegardens and gardens. Some of these lands are *hieum* or shaded areas and *negrak* or open areas. *Suweg* starts to grow and develop at the beginning of the rainy season until approaching the dry season, which is characterized by yellowing and falling of petiole. Conservation based on tradition is carried out by the rural

community through storage/ preparation of seeds, does not destroy the *suweg* that grows in some types of agroecosystems, and is managed semi-intensively in some types of agroecosystems, including homegardens and gardens.

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