

Ethnobotanical Study on Plants Used by Local People in Dusun Beleq, Gumantar Village, North Lombok Regency

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Abstract. The traditional use of plants by people in Indonesia has been done since centuries ago. However, there are still many regions that do not already have proper documentation on this matter. This ethnobotany research aimed to analyze the forms of plant utilization and local wisdom in plant management by the indigenous people of Dusun Beleq, Gumantar Village, Kayangan District, North Lombok Regency. This research is a descriptive exploratory survey. Data collection was done by means of observation, interviews, documentation and literature study. Selection of informants was using purposive and snowball sampling methods. Qualitative and quantitative data were analyzed descriptively based on observations, interviews and ICS (Index of Cultural Significance) calculations. There were 10 kinds of plant utilization involving 86 species from 36 families. The plants were used as food, medicine, ritual plants, firewood, fodder plants, construction materials, handicrafts, aromatic plants, dyes and natural pesticides. Most of the plant species was used as food (41 species) with rice (*Oryza sativa*) as a plant with the highest ICS value among all plants in all categories (74 species). Local wisdom in term of natural resources utilization was reflected in community efforts in forest preservation, plants conservation, plants cultivation and harvesting. The novelty of this study is the revelation of local knowledge in plants utilization possessed by people in traditional village. This results of this study are expected to support the preservation of biological and cultural resources.

Key words: Ethnobotany; Indigenous Village; Local Wisdom

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INTRODUCTION

Local people are communities that inhabit an area in a long period of time and interact very closely with their environment. According to Zakiah et al. (2019), rural communities are still very dependent on natural resources. They are able to process it to meet the needs of daily life, for example for food, medicine and so on, based on knowledge from their ancestors. The form of communities interaction with plants can be seen from how they use and manage plant resources in their daily lives. People interactions that were formed from generation to generation has delivered a unique traditional knowledge owned by each region (Irsyad et al., 2013). People generally transfer their knowledge through oral traditions. This raises concerns about the extinction of traditional knowledge in plant utilization (Widya et al., 2015). Documentation of the local knowledge of the community in utilizing plant resources will greatly help to preserve the biodiversity and local plant domestication (Kandari et al., 2012, cited in Setiawan & Qiptiyah, 2014).

Sasak tribe is the original tribe in Lombok Island, West Nusa Tenggara (Ananta et al., 2015). The Sasaks live scattered in various regions on the island of Lombok, both in cities and in rural areas. Dusun Beleq, one of the hamlets in Gumantar Village, North

Lombok Regency is a traditional hamlet that still holds fast to the customs and traditions of the Sasak's ancestors. The traditional use of plants to meet the daily necessities of life by the indigenous people has been carried on for generations along with local wisdom that they have. Local wisdom is a kind of knowledge obtained by human from the results of their interactions with nature and the environment, including how they manage and use natural resources wisely for sustainability (Suhartini, 2009). Local wisdom contains socio-cultural norms and values that contribute to regulate how to build a balance between environmental carrying capacity, lifestyle, and human needs (Cahyanto et al., 2012).

Plant diversity in Indonesia is spread throughout the archipelago, with various tribes that have been utilizing plants in many daily activities by their own experiences and perceptions (Aziz et al., 2018). Local knowledge about the management and use of natural resources is an asset that needs to be preserved and developed especially in Indonesia as the country with abundant natural and cultural wealth. Failure to explore and document the local knowledge of the community can have an impact not only on the loss of important information related to the utilization of natural resources, but also on the loss of biodiversity of the natural resources used by local people. For this reason, it is necessary to conduct a multidisciplinary

study that is able to explore and analyze the management and use of biological resources by local communities. The ideas generated from such a kind of study can be raised for future conservation efforts

This study aimed to document and analyze the form of plant utilization and local wisdom in managing natural resources carried out by the communities in Dusun Beleq, Gumantar Village, North Lombok Regency. The results of this study are expected to play a role as a complementary information related to the utilization and management of plants by local communities in the territory of Indonesia, and also in the wider region in general.

METHODS

This ethnobotanical study was conducted using field observation, interviews and documentation methods. Research area was at Dusun Beleq, a traditional hamlet located at Gumantar Village, North Lombok Regency, West Nusa Tenggara. Purposive sampling was directed to local people lived in Dusun Beleq that had information and knowledge related to the plant utilization in their daily life. Informants were also selected using snowball-sampling methods. Semi-structured or open-ended interviews were conducted until saturated data was obtained. Documentation were done by taking photographs or preserving voucher specimens (Silva et al., 2014; Puri et al., 2015).

Qualitative data obtained was all data related to plant utilization, kinds of species, plant parts that are used, preparation, and also ethnobotanical aspects such as botany, ecology, social-cultural, anthropology and history. Quantitative data was obtained by calculating the Index of Cultural Significance (ICS) introduced by Turner in 1988 (Purwanto et al., 2011) to analyze the importance and cultural significance of each plant used in Dusun Beleq society.

Formula:

$$ICS = \sum_{i=1}^n (q * i * e)$$

ICS = Index of Cultural Significance

q = quality

i = intensity

e = exclusivity

All data were analyzed descriptively and holistically to document the related knowledge of local people in Dusun Beleq on the utilization and management of plant resources in their daily life.

RESULTS AND DISCUSSION

Sixteen selected informants had participated in data collecting. The number of female informants was greater because they play more role in utilizing plants as food, coloring and craft materials. Informants ages ranged from 24 - 60 years, and all informants were generally still use various plants intensively in daily lives. The main livelihood of the inhabitants of the hamlet is farming or gardening on the land inherited from their ancestors that has been used for generations.

Plant utilization by local people in Dusun Beleq

Based on the research, there were 86 plants species categorized in 36 families used in people's daily life (Table 1).

Table 1. Kinds of plants utilisation in Dusun Beleq

No	Utilisation	Number of species
1.	Food	41
2.	Medicine	20
3.	Rituals	16
4.	Firewood	13
5.	Cattle fodder	10
6.	Construction	6
7.	Handycraft	4
8.	Aromatic plants	6
9.	Coloring plants	3
10.	Pesticides	4
Total		86

As shown in Table 1, most of the plant species were used for food, medicine and rituals. This fact indicated the local knowledge in recognizing the potency of plants in those three categories, and also their intensity in using them in daily lives.

Plant utilization as food

There were 41 species of 23 families recorded as food plants in Dusun Beleq (Table 2). Fabaceae was the most representative family with 5 species (*Lablab purpureus*, *Psophocarpus tetragonolabus*, *Arachis hypogea*, *Cajanus cajan* and *Vigna sinensis*) that were found to be the most commonly used plants. Fabaceae species have a high utilization by people due to their frequent use as daily vegetables and their abundance in surrounding environment in the hamlet (Figure1). People have already cultivated them in their home yards, gardens or fields to meet their daily food needs and nutritional reason.

Table 2. Plants species utilized as food in Dusun Beleq, Kayangan District, North Lombok

Local Name	Species Name	Family	Part used
Ambon lolo	<i>Manihot esculenta</i> Crantz.	Euphorbiaceae	Tuber
Lomak	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Tuber
Ambon tandan	<i>Ipomoea batatas</i> Lamh.	Convolvulaceae	Tuber
Uwi	<i>Dioscorea alata</i> L.	Dioscoraceae	Tuber
Irong	<i>Dioscorea hispida</i> Dennst.	Dioscoraceae	Tuber
Ganjar	<i>Alocasia macrorrhizos</i> (L.)	Araceae	Tuber
Sabrang	<i>Plectranthus rotundifolius</i> (Poir.)	Lamiaceae	Tuber
Kembilik	<i>Dioscorea esculenta</i> L.	Dioscoraceae	Tuber
Tirek/lombos	<i>Amorphophallus muelleri</i> Blume.	Araceae	Tuber
Kacang Tanah	<i>Arachis hypogaea</i> L.	Fabaceae	Seed
Pare/pade	<i>Oryza sativa</i> L.	Poaceae	Seed
Botor	<i>Psophocarpus tetragonolobus</i> L.	Fabaceae	Fruit
Lebi	<i>Cajanus cajan</i> L	Fabaceae	Seed
Jewawet/jawa	<i>Setaria italica</i> (L.) P. Beauv.	Poaceae	Seed
Wijen	<i>Sesamum indicum</i> L.	Pedaliaceae	Seed
Kopi	<i>Coffea</i> sp.	Rubiaceae	Seed
Lekong	<i>Aleurites moluccana</i> (L.) Willd	Euphorbiaceae	Seed
Sebia	<i>Capsicum frutescens</i> L.	Solanaceae	Fruit
Jagung	<i>Zea mays</i> L.	Solanaceae	Fruit
Komak	<i>Lablab purpureus</i> (L.) Sweet	Fabaceae	Fruit
Tangon	<i>Vigna sinensis</i> L.	Fabaceae	Fruit
Terong	<i>Solanum melongena</i> L.	Solanaceae	Fruit
Sukun	<i>Artocarpus altilis</i> Fosberg.	Moraceae	Fruit
Nyuh/kombok	<i>Cocos nucifera</i> L.	Arecaceae	Fruit
Apukat	<i>Persea americana</i> Mill.	Lauraceae	Fruit
Perenggi	<i>Cucurbita moschata</i> Duchesne.	Cucurbitaceae	Fruit
Jepang	<i>Sechium edule</i> (Jacq.) Swartz	Cucurbitaceae	Fruit
Teruwuk	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae	Fruit
Nangke	<i>Artocarpus heterophyllus</i> Lamk.	Moraceae	Fruit
Ketela/pepaya	<i>Carica papaya</i> L.	Caricaceae	Fruit
Gedang/pisang	<i>Musa paradisiaca</i> L.	Musaceae	Fruit
Kakao	<i>Theobroma cacao</i> L.	Malvaceae	Fruit
Duren	<i>Durio zibethinus</i> Rumph.	Malvaceae	Fruit
Pao	<i>Mangifera indica</i> L.	Anacardiaceae	Fruit
Cengkeh	<i>Syzygium aromaticum</i> L.	Myrtaceae	Fruit
Remungkek	<i>Moringa pterygosperma</i> Lam.	Moringaceae	Leaf
Lembain	<i>Amaranthus hybridus</i> L.	Amaranthaceae	Leaf
Tampak bela	<i>Euphorbia pulcherrima</i> Willd.	Euphorbiaceae	Leaf
Ombal	<i>Piper umbellatum</i> L.	Piperaceae	Leaf
Paku	<i>Diplazium esculentum</i> L.	Athyriaceae	Leaf
Rotan	<i>Calamus manan</i> L.	Acoraceae	Stem

**Figure 1.** Fabaceae as food plants: (a) *Lablab purpureus*, (b) *Psophocarpus tetragonolobus*, (c) *Vigna sinensis*.

The other families widely cultivated by the community were Araceae and Poaceae. They are commonly used as additional food besides rice. The Araceae family includes *Colocasia esculenta* and *Alocasia macrorrhizos* processed by steaming or burning, while the Poaceae family includes *Oryza*

sativa, *Zea mays* and *Setaria italica* which is processed by boiling and steaming. Most of the food plants are herbs, allegedly because this kind of habitus is easy to obtain in the environment and their growth is faster than other habitus. Food-plants were also recorded as spices or seasoning (*Capsicum frutescens*, *Syzygium aromaticum*), beverage (*Cocos nucifera*, *Coffea* sp.), and also as additional food (*Manihot esculenta* and *Dioscorea alata*). Most of the plant species is used as food plant since food varies greatly in function and benefits for people's

daily life. According to Apriliani et al. (2014), information of plant utilization as food is a data about local knowledge in managing the surrounding plants to meet daily food requirements including staple food, side dishes, snacks, and matters related to ritual activities.

Plant utilization as medicine

There were 20 species of 13 families used as medicinal plants (Table 3).

Table 3. Plants species used as medicine in Dusun Beleq, Kayangan District, North Lombok

Local Name	Species Name	Family	Disease	Part used
Ganjar	<i>Alocasia macrorrhizos</i> L.	Araceae	Rheumatic, stomachache	Leaf midrib
Sampirangan	<i>Pachyrhizus erosus</i> L.	Fabaceae	Ulcer	Tuber
Jarak rajak	<i>Jatropha curcas</i> L.	Euphorbiaceae	Fever, stomachache, toothache	Leaf, sap
Bantenan	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Fever	Leaf
Lekok	<i>Piper betle</i> L.	Piperaceae	Breathless, itchy	Leaf
Rerampa	<i>Chromolaena odorata</i> L.	Asteraceae	Wound	Young leaf
Pace	<i>Morinda citrifolia</i> L.	Rubiaceae	Intestinal worm, thyphoid	Fruit
Bebangkan/suren	<i>Toona sureni</i>	Meliaceae	Breathless/asthma	Bark
Babandotan	<i>Ageratum conyzoides</i> L.	Asteraceae	Inflammation, wound, boil	Young leaf
Jambu batu	<i>Psidium guajava</i> L.	Myrtaceae	Stomachache	Leaf, fruit
Cengkeh	<i>Syzygium aromaticum</i> L.	Myrtaceae	Stomachache, headache	fruit
Ketela	<i>Carica papaya</i> L.	Caricaceae	Fever	Leaf
Alpukat	<i>Persea Americana</i> Mill.	Lauraceae	Ulcer	Leaf
Kunyit	<i>Curcuma domestica</i> L.	Zingiberaceae	Postpartum pain	Rhizome
Laos	<i>Alpinia galanga</i> (L.) Willd	Zingiberaceae	Postpartum wound, fungal skin disease	Leaf and rhizome
Kemiri/lelong	<i>Aleurites moluccana</i> (L.) Willd	Euphorbiaceae	Post-natal disease in babies, skincare	Seed
Sekuh	<i>Kaempferia galanga</i> L.	Zingiberaceae	Fever	Rhizome
Dangkongan	<i>Lantana camara</i> L.	Verbenaceae	Wound	Leaf
Rumput teki	<i>Cyperus rotundus</i> L.	Poaceae	Menstruation pain	Tuber
Klincung/kedondong hutan	<i>Spondias pinnata</i> (L.F.) Kurz.	Anacardiaceae	Deodorizer, shampoo	Fruit

Zingiberaceae contributes three species, i.e. *Curcuma domestica*, *Alpinia galanga* (Figure2) and *Kaempferia galanga*. People used the combination of

multiple medicinal plants or single plant species to treat minor illnesses such as stomachache, fever, and headache.



Figure 2. Plant as medicine: (a) *Curcuma domestica*, (b) *Alpinia galanga*

Indonesia is a country that is very rich in potential medicinal plants that have been used for generations with a variety of local wisdom (Rahayu & Andini,

2019). The advantages of using medicinal plants that felt by the community were the ease of obtaining raw materials, ease of cultivation, cheap, and the pro-

cessing that can be done at home. The diversity in the medicinal plants utilization by local people is a biological and cultural wealth that needs to be maintained and developed. According to Ibrahim et al. (2019), studies on the discovery of new medicines made from plants need to be done to balance the pace of the development of bacteria that are resistant to antibiotics. Various local knowledge on medicinal plants are a kind of documentation on community knowledge that could support the conservation of natural resources (Mutaqin et al., 2016).

Plant utilization as firewood

Local people in Dusun Beleq used 13 species of 10 families as firewood, i.e. *Mangifera indica* L., *Planchonella nitida* Blume., *Dalbergia latifolia* Roxb., *Duabanga moluccana* Blume., *Theobroma cacao* L., *Coffea robusta* L., *Aleurites moluccana* (L.) Willd., *Swietenia macrophylla* King., *Pterospermum javanicum* Jungh., *Dracontomelon dao*, *Ficus benjamina* L., *Artocarpus heterophyllus* Lamk., and *Toona sureni*. *Artocarpus heterophyllus* was easily found in people's yard (Figure 3).



Figure 3. Plants as firewood: *Artocarpus heterophyllus*

Most people still used traditional stove in their kitchen so that there were various plants species used as firewood, especially from Anacardiaceae, Moraceae and Meliaceae. The most commonly part used was dried branch or stem. *Coffea robusta*, *Theobroma cacao*, and *Toona sureni* were the most used species because they were easy to obtain and grow abundantly in the forests, fields and people's home yard.

In many traditional Indonesian communities, the use of firewood is still maintained for various reasons. One of them is due to its abundant availability in na-

ture and the better quality (aroma and taste) of dishes compared to those cooked with other fuels. According to Irsyad et al. (2013), the community generally obtained firewood by pruning the plants that are available in the yard with the consideration that these plants are widely available and produce good quality of fire.

Plant utilization as fodder plant

There were 10 species of 7 families that were used as fodder plant, i.e. *Pennisetum purpureum*, *Imperata cylindrica* (L.) Raeusch., *Cyperus rotundus* L., *Musa paradisiaca* L., *Gliricidia sepium*, *Lanea coromandelica*, *Thespesia populnea*, *Artocarpus heterophyllus* Lamk., *Zea mays* L., and *Oryza sativa* L. Some of the species are shown in Figure 4.



Figure 4. Fodder plant: (a) *Gliricidia sepium*, (b) *Musa paradisiaca*

Livestock that were generally raised by the community were goats and cows because these animals were usually used for ritual activities. In general, Dusun Beleq communities used grass (Poaceae) as livestock feed. The most widely used species were *Pennisetum purpureum*, *Imperata cylindrica* and *Oryza sativa*. *Oryza sativa* was used in the form of fine or coarse rice bran obtained from the residue during rice pounding. In addition to abundant availability in nature, suitable fodder plants can support livestock productivity (Saking & Qomariyah, 2017).

Plant utilization as ritual plant

People of Dusun Beleq often perform various traditional rituals, such as marriage, death, and birth rituals as well as traditional Islamic ceremonies and traditional harvest festival. There were 16 species from 13 families used for these traditional activities (Table 4).

Table 4. Plant species used as ritual plant in Dusun Beleq, Kayangan District, North Lombok

Local Name	Species Name	Family	Part used
Pare	<i>Oryza sativa</i> L.	Poaceae	Seed
Kombo	<i>Cocos nucifera</i> L.	Arecaceae	Fruit, shell
Lekok	<i>Piper betle</i> L.	Piperaceae	Leaf
Buaq	<i>Areca catechu</i> L.	Arecaceae	Fruit
Kapas	<i>Gossypium hirsutum</i>	Malvaceae	Flower
Jeruk	<i>Citrus aurantifolia</i> L.	Rutaceae	Leaf, stem
Paku	<i>Diplazium esculentum</i>	Athyriaceae	Leaf
Nangke	<i>Artocarpus heterophyllus</i>	Moraceae	Fruit
Kunyit	<i>Curcuma domestica</i> L.	Zingiberaceae	Rhizome
Jahe	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Rhizome
Kemiri/lelong	<i>Aleurites moluccana</i>	Euphorbiaceae	Seed
Goal	<i>Ziziphus mauritiana</i>	Rhamnaceae	Leaf, stem
Ketela/pepaya	<i>Carica papaya</i> L.	Caricaceae	Fruit
Gedang/pisang	<i>Musa</i> spp.	Musaceae	Leaf
Jarak benah	<i>Ricinus communis</i> L.	Euphorbiaceae	Fruit
Bokah	<i>Lagenaria siceraria</i>	Cucurbitaceae	Fruit

Plants for traditional activities were mostly from Arecaceae (*Cocos nucifera* and *Areca catechu*), Piperaceae (*Piper betle*), and Poaceae (*Oryza sativa*) family. These families were also used in some rituals in Lombok Island (Sutraningsih et al., 2019). These species are often used because they are mandatory plants that must be present in every traditional ritual. Some species symbolize certain meanings, so their existence is important for the community and this rule has been passed down for generations. Another plants that were usually used in ritual activities are *Ricinus communis* and *Aleurites moluccana* (Figure 5).

**Figure 5.** Plants used in rituals: (a) *Ricinus communis* fruit, (b) *Aleurites moluccana*

Plants for traditional activities were widely planted in fields, yards and gardens, but for certain species which were non-cultivated plants, people look for them in the forest. The existence of plants for rituals is a proof that the local community still upholds the custom inherited from their elders. Customs are values in a society that rule the life of its members, where good norms are social inheritance that need to be maintained and developed (Basyari, 2014).

Plant utilization as natural dyes

There were 3 species from 3 families used as natural dyes. A yellow color was derived from turmeric (*Curcuma domestica*) tubers, while red and dark blue were from *mengkudu* (*Morinda citrifolia*) and *tarum* (*Indigofera tinctoria*) tree bark respectively. These plants were generally used to dye food and yarn used for weaving cloth (Figure 6).

**Figure 6.** Textile materials dyed by plants: *Curcuma domestica* (yellow); *Morinda citrifolia* (red), *Indigofera tinctoria* (blue).

Yarn is used as a raw material for making cloth to carry a baby in the *umbaq kumboq* ritual, a traditional ritual that is performed once in a lifetime when a child was less than five years old. *Umbaq kumboq* is one of the life cycle ceremonies for the Sasak people. According to Sukenti et al. (2017) the life cycle ceremony for the Sasak people in West Nusa Tenggara is an important traditional ceremony because it is a reminder of the passage of an important stage in one's life.

Plant utilization as natural pesticides

There were 4 species from 4 families that used by Dusun Beleq communities as natural pesticides, i.e. *Aegle marmelos*, *Dioscorea hispida*, *Azadirachta indica* and *Cocos nucifera* L. The most commonly

used plants were *Aegle marmelos* (Rutaceae) and *Dioscorea hispida* (Dioscoreaceae) (Figure 7). According to local people, fruit from these two plants can be used as plant-based pesticides because they have a bitter taste that affects insects' appetite. *Dioscorea hispida* and *Azadirachta indica* are also usually used as plant-based pesticides by other local communities in Indonesia (Lubaba, 2014). The communities process plants as pesticides by pounding and mashing, then soaking them with water. Result of the immersion water are sprayed on the plants.

Plants used for pesticides were found in small number of species because plants in Dusun Beleq were rarely attacked by pests. Pest exterminations, especially insects, were done using natural pesticides obtained from people's homeyard and garden. The use of natural pesticides is basically a safe and environmentally friendly effort to overcome pest problems in the environment. This bio-control knowledge is based on local wisdom that deserves further development (Ariyanti et al., 2017; Suhartini et al., 2017).



Figure 7. *Dioscorea hispida* tuber, used for pesticide

Plant utilization as aromatic plants

Aromatic plants found in Dusun Beleq were used as flavor enhancers in cooking, i.e. *Cymbopogon citratus*, *Citrus hystrix* (Rutaceae), *Pandanus amarylifolius* (Pandanaceae), *Kaempferia galanga* (Zingiberaceae), and *Ocimum basilicum* (Lamiaceae). Some of these species are shown in Figure 8).



Figure 8. Plants used as aromatics: (a) *Pandanus amarylifolius*, (b) *Cymbopogon citratus*, (c) *Cyperus rotundus*

People also used aromatic plants as traditional cosmetics called *boreh* (herbal scrub for smoothing body's skin), such as *Kaempferia galanga* (Zingiberaceae) which is used together with rhizome of *Cyperus rotundus* (Poaceae). The use of aromatic plants is often related to the presence of active compounds including essential oils. Essential oils emit various volatile anorganic compounds, with specific aroma in certain plants (Sumekar & Utami, 2017). Nowadays, the use of traditional cosmetics tends to diminish due to the decrease in knowledge and intensity of the utilization in young generation (Shanthi et al., 2014).

Plants utilization as handicraft materials

There were 4 species from 4 families used by local people as handicraft materials, namely *Gigantochloa apus* (Poaceae), *Lygodium circinatum* (Schizaeaceae), *Sida rhombifolia* (Malvaceae) and *Pandanus tectorius* (Pandanaceae). *Gigantochloa apus* is the most easily found species, and that has been cultivated by people. *Lygodium circinatum*, which was also known as raw material for local craft of Lombok Island, has not been cultivated in Dusun Beleq, so it could only be found in the forests around the village.



Figure 9. Handicrafts made from *Lygodium circinatum* and *Gigantochloa apus*

The handicraft making and weaving were done by the Dusun Beleq community to make equipments used in daily life, such as hampers for going to the fields, baskets (*bakaq*), paddy container (*rombong*), brooms, mats, rice container (*keroak*) and betel containers (*ketak*) (Figure 9). The problem experienced by the community is the knowledge and skills that facing extinction because of the decrease in number of crafters due to aging without the regeneration.

Plant utilization as construction materials

There were 7 species from 4 families used as construction materials by the community. The houses in



Figure 10. Traditional houses in Dusun Beleq: walls were made of *Gigantochloa apus*, roofs made of *Imperata cylindrica*, and pillars made of *Gigantochloa atter*, *Toona sureni*, *Artocarpus heterophyllus* or *Swietenia macrophylla*

Houses in Dusun Beleq are generally old houses that have been passed down from generation to generation, so that housing construction is rarely done because people only do the maintenances and repairs if necessary. There are local customary rules that require married girls to live with their husbands, while married boys live with their parents. Customary rules can sometimes function as a means to get people to do things that indirectly contribute to the preservation of plant resources. However, this will also depends on how the community can preserve their traditions. According to Anggraini et al. (2018), rituals and traditions have a load of information about the use of plants, community knowledge, the importance of plants, and the conservation efforts of the people who use them.

Index of Cultural Significance Index (ICS) value

Five plants with the highest ICS values are *Oryza sativa* (74), *Artocarpus heterophyllus* (55), *Coffea sp.*, *Gigantochloa apus* (48), and *Aleurites moluccana* (47). Plants with the lowest ICS values are *Citrus hystrix*, *Citrus auratifolia*, *Thespesia populnea* and *Azadirachta indica* (6). ICS is value that describe the level of cultural significance of a species for a group of people, where the value also shows the level of intensity of the use of a species, community preferences and the number of categories of utilization owned. *Oryza sativa*, *Artocarpus heterophyllus*,

Dusun Beleq generally have walls made of *Gigantochloa apus* woven, pillars made of *Gigantochloa atter*, *Toona sureni*, *Artocarpus heterophyllus* or *Swietenia macrophylla*, and roofs made of *Imperata cylindrica* (Figure 10). In building a house and taking the raw materials from the forest, people always based on the time or day that had been approved by traditional leaders. According to the community, this was a belief among villagers so that the house construction went well and avoided from distress.

Coffea sp., *Gigantochloa apus*, and *Aleurites moluccana* are very culturally important species for the local people. Those plants show high results in intensity of use and community preferences as well as involved in various categories of daily use. This result is coupled with the ease of finding these species around the neighborhood where people live, either because they are cultivated plants or easily found in the surrounding forests. The high value of ICS also indicates that the species is used in several types of utilization, because the value of ICS is the total amount of all types of utilization owned by a species. The more categories of utilization, the ICS value has the potential to be higher than other species (Purwanto et al., 2011).

Local wisdom in Dusun Beleq

Local knowledge in an area is passed down from generation to generation between family and community members, which generally occurs verbally through communication and interaction in daily life (Sepsamli et al., 2019). Local knowledge is also related to local genius, the ability of the community to filter the knowledge that they receive, to be accepted or rejected from people's daily life (Rahman, 2011). Local genius also plays an important role in the formation of local wisdom in society. In Dusun Beleq, some of local wisdom related to natural resources are the utilization and maintenance of natural resources

and the environment including efforts to preserve and protect forests, cultivation of beneficial plant species and strategies for planting and harvesting plants. Basically, this comes from the experience and observations of the local community over a long period of time so that eventually it is accepted as knowledge that can be passed down to the next generation. This knowledge can come from the internal or external environment of the community. People of the community will then sort and decide which knowledge will be maintained and applied in their lives.

Regarding to forests maintainance, Dusun Beleq communities have traditional rules in restricting people from entering traditional forests, the old forests that are very dense and quiet. *Hutan adat* or traditional forests should not be entered by anyone because local people have a belief that the entire area of traditional forest is a sacred place that can only be entered when there are certain traditional rituals. This rule has a good impact on the forest ecosystem because it can indirectly maintain the existence of the ecosystem so that it is not much disturbed by human intervention. Basically, the forbidden area in some traditional forest is a form of local wisdom to reduce external interference and disturbance to the area so that it can be maintained properly.

In relation to the cultivation of useful plant species, the communities carry out such cultivation activities in the environment around their gardens, fields and yard. According to Syafitri et al. (2014), this is a kind of dependency and close relations between the communities and their environment. The types of plants that are cultivated including plants for medicine, ritual and food such as vegetables, fruits and some carbohydrate source plants. With this effort, at least the communities have tried to fulfill their daily needs, as well as to maintain the availability of these cultivated plants in order to remain well-preserved and sustainable. This is also a kind of community efforts to maintain food security in the region. It can be used to anticipate problems from outside the hamlet that can disrupt the availability of food for the community and as a kind of anticipation in facing natural disasters. This cultivation effort is also supported by the application of strategies and planting patterns at certain times, for example *Oryza sativa* is planted during the rainy season, *Zea mays* during the dry season and the other plants at certain times. The community always make certain that the barn always contained with rice and food crops. Savings of rice or grain are only taken from the granary when the available rice supply almost runs out or when there are certain ceremonies or emergencies. This is in line with what was stated by Dirhamsyah et al. (2016), that food security is a reflection of the availability of sufficient, nutritious and evenly distributed food that

is able to be accessed by someone to get optimal quality of life. The positive impact of this traditional wisdom is that in addition to the availability of food that is always maintained, it also affects the sustainability of local rice varieties, which is a community effort to maintain food security and preservation of plant resources in the region.

In general, the results of this study contributed information in term of local community knowledge that needs to be preserved and further developed to support the environmental and cultural preservation. Environmental sustainability and local wisdom that are well maintained in a community will deliver positive impacts on the survival of all the resources involved in it, and also for science development.

CONCLUSION

There were 10 categories of plant utilization involving 86 species from 36 families carried out by the Dusun Beleq communities in their daily life. The categories of plant utilization were plants used as food, medicine, ritual plants, firewood, fodder plants, construction materials, craft materials, aromatic plants, dyes and natural pesticides. People's local wisdom is reflected in various ways of the utilization and management of plants as natural resources.

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