Ethnobotanical study of *Kumpai Babulu (Paspalidium punctatum)* to community of watermelon farmers in Palangka Raya

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**Abstract.** The purpose of this study is to contribute to the development of knowledge-based on local wisdom by describing the origins and techniques of using *Kumpai Babulu* grass (*Paspalidium punctatum*), botanical description and its importance to the community of watermelon farmers in Bangaris, Palangka Raya. This study uses descriptive qualitative methods with three stages; preliminary study, ethnobotanical survey and data collection. Data collection was carried out through 4 research instruments which consist of observation, interviews, documentation and literature study. The data obtained were analyzed descriptively with validity techniques using data triangulation. The results showed that the community of watermelon farmers in Bangaris-Palangka Raya, Central Kalimantan have cultivated *Kumpai Babulu* (*Paspalidium punctatum*) as an organic mulch in watermelon farming, a technique used as a legacy from generation to generation from their hometown, Negara, Hulu Sungai Selatan, South Kalimantan. They have utilized two techniques in processing *Kumpai Babulu* mulch, by spraying herbicides and rolling techniques until the grass dries and is ready to be used as mulch. Watermelon farmers’ community in Bangaris were also utilizing these species as animal feed and organic fertilizer. This shows that *Kumpai Babulu* (*Paspalidium punctatum*) has an important role, especially for the economy of the community.

1. Introduction

Watermelon is one of the commodities in Palangka Raya. According to Sunarlim, Zam & Purwanto (2012); Syofia & Pohan (2015); Wati & Zulfikar (2015) watermelon was first cultivated in Kalahari desert of Africa, from where it spread across the globe of tropical and sub-tropical regions in Asia, Europe, and America. According to Syofia & Pohan (2015), soil that absorbs water too quickly is not an ideal condition for watermelon, because this causes plants to need more intensive watering. Besides, dense and wet soil that absorb and store water easily is not suitable for the cultivation of watermelon plants. The watermelon root system will be rotten and dead. Watermelon plants also need to adapt to soil pH to maximize their growth. The ideal pH for watermelon growth is from 6.5 to 7.2. Chemically, peat soils in Kalimantan are generally acidic (pH 3.0-4.5). Shallow peat has a higher pH (pH 4.0-5.1) than deep peat (pH 3.1-3.9) Policy (2008).

Previous study on the effect of mulch in watermelon farming which has been conducted by, Santosa and Sudalimi (2014) shows the differences in watermelon length, weight, circumference, fresh weight of stover, and dry weight of stover with black silver plastic as the best result of mulch.
treatment which then produces a plant length of 353.9 cm, and a fruit weight of 5.47 kg. The research result of Shukla, et. al. (2014) compared the types of mulch on watermelon farming and the results show that the use of suitable mulch will help in intensifying maximum watermelon agricultural production. This is because mulch is able to regulate and condition the soil. In line with that, the results of Parmar, Polara, & Viradiya research (2013) shows the influence of the type of mulch used on watermelon agricultural products in Junagadh, Gujarat. While the results of evaluation research conducted by Miller, et. al. (2014) show that the productivity of watermelon agricultural products is influenced by the temperature and level of humidity. In other places, Wang, Xie, Malhi, Vera & Zhang's (2014) research on the effect of mulch in the farming system shows that mulch has an influence on the results of watermelon farming in China because the presence of mulch will stabilize air humidity and soil temperature. These studies indicate that the use of mulch plays an important role in watermelon farming. However, these studies were developed not from community traditions, but the development of information in modern agriculture using synthetic mulch. This research has a difference with previous studies, which is more ethnobotanically studied by describing and elevating the value of local wisdom of community traditions in watermelon farming using natural mulch, namely Kumpai Babulu (Paspalidium punctatum) which is inherited from the community habits without scientific method and only proved through trial and error to get the best formula that they consider the most effective. Samal, Mili, & Dollo's research (2019) shows the importance of ethnobotany studies and documenting traditional agrosystem management traditions.

Watermelon farming community in Palangka Raya, Central Kalimantan, has a unique traditional knowledge by cultivating Kumpai Babulu as the mulch for watermelon planting. This type of mulch processed from hairy swamp grass which in the local language of the community was named Kumpai Babulu (Paspalidium punctatum). The use of Kumpai Babulu (Paspalidium punctatum) is intended to overcome the problem of incompatible soil conditions for watermelon cultivation in Palangka Raya which is full of peatland. This knowledge is the heritage of ethnic Banjar ancestors from Nagara, Hulu Sungai, South Kalimantan.

The role of Kumpai Babulu (Paspalidium punctatum) in the tradition of watermelon farming of this community can be assessed through ethnobotany studies. Ethno-botany is an important study as a major effort undertaken to be a systematical document which focuses on the use and relationship between the use of plants in the tradition of one community (Kayani, et al., 2015; Seethapathy, et al., 2018). The results of Walujo's research (2011) concluded that the basic principles of ecology in ethnobotany research has become an important part in the context of disclosure of plant biodiversity for human survival and humanity, especially for national development. Types of plants, both wild and cultivated, are sources of all biological resources, where humans get all the necessities of life, both for food, health, and industrial products. Therefore ethnobotany research is carried out in connection with conservation (sustainable use) which is part of the principle of ultimate life since it is able to produce economic benefits for national development.

The description underlies the need for an ethnobotanical study on Kumpai Babulu (Paspalidium punctatum) for the cultivation of a watermelon farming community in Palangka Raya. The purpose of this study is to describe the origins and techniques of using Kumpai Babulu in watermelon farming in Bangaris, Palangka Raya. This research is expected to contribute to the development of knowledge-based on local wisdom.

2. Research Methods

This type of research is descriptive qualitative of ethnobotany which concerns on Kumpai Babulu (Paspalidium punctatum) by collecting qualitative data about botanical description and origin of Kumpai Babulu (Paspalidium punctatum), techniques of using Kumpai Babulu (Paspalidium punctatum) and the importance of Kumpai Babulu (Paspalidium punctatum) in watermelon farming as the object of the study. The location of this research is in Palangka Raya, Central Kalimantan, Indonesia. Then the study was held through three (3) stages consist of preliminary studies, ethnobotany surveys, and data collection. Data collection was carried out through 3 research
instruments consist of observation, interviews, and documentation. The data obtained were analyzed descriptively with validity techniques using the triangulation of the data. The data obtained were analyzed descriptively and integrated with the literature.

3. Research Results and Discussion

3.1. The origin of Kumpai Babulu (Paspalidium punctatum)

*Kumpai Babulu* (Paspalidium punctatum) has originated in South Kalimantan brought by the migrant farmers of Banjar ethnic group from Negara Regency into the Bangaris Farming community in Palangka Raya, Central Kalimantan. According to Hadi (2015), the typical Banjar ethnic group is a hard-worker. They were eager to migrate to have a better life. Negara regency is a watermelon farming area with the majority of the population works as watermelon farmers. *Kumpai Babulu* (Paspalidium punctatum) is deliberately cultivated in watermelon farming, so the population is abundant. This technique has been developed in their homeland and then carried out according to as a heritage throughout generations yet no one knows the first cultivator of *Kumpai Babulu* (Paspalidium punctatum) in watermelon farming system. The cultivation might have been started since the Dutch colonial era. Watermelon farming in bangaris has a period of once a year to adjust soil conditions and seasons. The character of the soil is clay and will be submerged in water during the rainy season. Thus watermelon planting will stop during the rainy season, and cultivation time of *Kumpai Babulu* (Paspalidium punctatum) as the mulch is started.

Ungirlawu, Awang, Maryudi and Suryanto (2016) and Kobail (2011) stated that people in the community tend to have adaptive initiatives inherited through generations in managing the environment. The main components of adaptive management of natural resources consist of community, environmental and cultural system which is unified and inseparable from one another. Society is inseparable from the environment in which it lives, there is a relationship of cultural systems forming a community typology based on classifications of environmental characteristics. The causal relationship (in causal terms) between culture and environmental resources are always associated with human cultural civilization through the process of interaction in the sustainable use of the environment (Naveh, 2007; Musacchio, 2009; Nurhadi, Setiawan, and Baitiuni, 2012; Fatem, Peday, and Yowei, 2014). In the past, the forest environment has important functions for the surrounding community and is used as a place to interact to meet basic needs. This theory was first revealed by Steward in 1955 in his book Theory of Culture Change which stated that the process of society adapting to culture is influenced by basic adjustments made by humans in using their environment.

3.2. The Technique of cultivating Kumpai Babulu (Paspalidium punctatum) as a mulch

*Kumpai Babulu* (Paspalidium punctatum) in the Bangaris community has been cultivated as mulch in watermelon farming. There are two kinds of techniques in cultivating *Kumpai Babulu* (Paspalidium punctatum) as a mulch.

3.2.1. Herbicides Technique

The technique of using herbicides in cultivating *Kumpai Babulu* (Paspalidium punctatum) is by letting them grow on the ground and then spraying them with herbicides. After *Kumpai Babulu* (Paspalidium punctatum) wilts and dries, then holes are made between the layers of the *Kumpai Babulu* (Paspalidium punctatum) as the place to plant watermelon seeds. This technique has advantages, which is more practical and efficient yet the growth of watermelon is less than optimal and has a longer harvest period.

3.2.2. Rolling Technique

This technique is carried out by planting *Kumpai Babulu* (Paspalidium punctatum) in certain formation then made a line on the bed by using a machete/sickle with a width of about one (1) meter.
After that, rolling over the blades of the *Kumpai Babulu* (*Paspalidium punctatum*) until it dries. After dry the holes are made between the beds where the watermelon seeds and mulch are ready to be used. This technique has a greater effect than herbicides. Besides, the harvest time tends to be faster, up to 3 months.

Both techniques of using *Kumpai Babulu* (*Paspalidium punctatum*) in mulch formation are used, but farmers tend to use rolling techniques. This is due to the consideration of agricultural productivity.

Watermelon farming community in Bangaris, Palangka Raya have the knowledge and skills in cultivating *Kumpai Babulu* (*Paspalidium punctatum*) as the mulch to cover the surface of watermelon agricultural area. Santos and Sudalmi (2014) said that mulch can be defined as any material that is spread to cover part or all of the surface area and affect the micro-environment of the covered soil. The provision of mulch can improve soil temperature and humidity and provide a beneficial effect on plant growth. Mulch is a material used at the soil surface and serves to avoid water loss through evaporation and suppress weed growth. Mulch function is to suppress weed growth, maintain soil aggregates from rainwater, reduce soil surface erosion, prevent water evaporation, and protect the soil from sun exposure. It can also help to improve soil physical properties, especially the structure of the soil by improving soil aggregate stability.

Firmasyah and Mokhtar (2011) said that *Kumpai Babulu* (*Paspalidium punctatum*) is the name given by Bangaris watermelon farming community which refers to hairy swamp grass vegetation. The thickness of mulch litter at the bottom reaches about 30 cm, while the grass stems are up to chest height of adults. Local heritage with the use of natural vegetation of *Kumpai Babulu* (*Paspalidium punctatum*) has several stages as follows: (1) if the dry season is strong, then the lowland inundated by water up to 2 m will recede, then *Kumpai Babulu* will settle to the surface of the peat soil. After measuring a width of 1 fathom (1.25 m), *Kumpai Babulu* will be cut in rows throughout the farm, (2) *Kumpai Babulu* which have been cut in stripes are allowed 2-3 weeks to dry, (3) the dried *Kumpai Babulu* is rolled alternately, that is, one lane is rolled the next lane is left, and so on. The rolled strip of *Kumpai Babulu* will show the peat soil and be used as a place to plant seedlings, (4) the method of rolling requires two people, one slicing the bottom of the clump using a long blade and the other using two hooks to pull and roll the base which has been cut down. After the roll is large enough or after it has been rolled for 10 m, the roll is stopped and moves on to the next batch, (5) after the seedlings have been planted on the ground where the coils are curled, it takes 1 week for the seeds to be strong enough. After that, the rolls of the kumpai are decomposed and spread again in the original lane. To protect young seedlings, the seedlings are covered with a bucket, after the kumpai has finished being spread, the bucket is taken back, (6) watermelons and other vines make use of *Kumpai Babulu* as a place to attach tendrils and a base for the fruit that appears, (7) after the crop is harvested, the farm will be planted again with *Kumpai Babulu*. *Kumpai Babulu* seedlings soaked in water channels 1-3 days to grow new roots. Seedlings that have new roots will grow fast enough if planted in the field, (8) by entering the rainy season, there will be an increase in the flow of water into the Tanjung Pinang lebak peat, and the condition of the embedded clumps is ready to extend to the height of the flood, and (9) the grass will grow tightly and dense again and is ready to be cut and used as a mulch in the dry season in the following year.

The ethnics group in Bangaris peatland originated from Negara Regency South Kalimantan which is dominated by the valley and has adopted their ancestral cultivation systems by cultivating the types of commodities and ways of trying to farm without burning. According to Noor (2010), the use of peat is very diverse because it is constrained by understanding and experience. Each ethnic group has different perceptions and ways of utilizing peatlands as agricultural resources.

The use of kumpai babulu in the Bangaris community that uses agricultural land without burning is one of the local pearls of wisdom of the community in order to preserve the environment. De Oliveira dan Hanzaki (2011) reports on the ability of fishing communities to utilize plants and maintain ecological balance in making fish traps. This shows the importance of using the environment with various techniques without damaging and maintaining environmental balance.
3.3. Description of Kumpai Babulu (Paspalidium punctatum)

Kumpai Babulu (Paspalidium punctatum) is a species of the genus Paspalidium that belongs to the Poaceae family. This family belongs to the order of Poales of the Liliopsida class and is a division of Tracheophyta, and belongs to the kingdom of Plantae. Kumpai Babulu plants (Paspalidium punctatum) have a unique morphology, which is a Perennials plant, stems measuring 50-150 cm in length, look like weeds, grow upward, have root fibers under the ground, leaf reinforcement is parallel with size 12-40 x 0.5-1.2 cm, the base of the round stem, the midrib of the leaf can be up to 16 cm in size and covered with a tuft of hair, and the panicle length is about 25-45 cm.

The interview results show that Kumpai Babulu (Paspalidium punctatum) plant is cultivated in the Bangaris area, Palangka Raya by a farmer community. This plant is deliberately cultivated so that if someone else takes the plant in large quantities and without permission, a fine will be imposed. Kumpai Babulu (Paspalidium punctatum) thrives in watery or valley areas. Colonists way of life, breed with shoots and seeds. This vegetation tends to be dominant when occupying the area of its growth, because of its growth and propagation by budding and propagating rapidly, so that it will form an expanse covering the soil surface. This causes the growth of other vegetation to be stunted, even eliminated even though Kumpai Babulu (Paspalidium punctatum) does not contain allelopathic substances. By growing this way, it causes the vegetation of Kumpai Babulu (Paspalidium punctatum) to be homogeneous if it occupies a certain area.

Kumpai Babulu (Paspalidium punctatum) can also maintain soil pH in stable conditions, thus maintaining soil fertility. Land planted with Kumpai Babulu (Paspalidium punctatum) has an average pH of 5.8 - 6. Kumpai Babulu (Paspalidium punctatum) can be planted in aqueous ground, the planting technique is sufficiently cut in the stem section and then directly plugged into the ground, then Kumpai Babulu (Paspalidium punctatum) can be planted on a watery ground, the planting technique is sufficiently cut in the stem section and then directly plugged into the ground, then the Kumpai Babulu (Paspalidium punctatum) punctatum will flourish by itself. Kumpai Babulu can grow in sandy soil if nutrition is fulfilled.

Alwi, Nazem and Cahyana (2012) stated that Kumpai Babulu (Paspalidium punctatum) is a type of grass weed that thrives in watery soils. Kumpai Babulu (Paspalidium punctatum) is a species of the genus Paspalidium that belongs to the Poaceae family. This family belongs to the order of Poales of the Liliopsida class and is a division of Tracheophyta, and belongs to the kingdom of Plantae. Kumpai Babulu (Paspalidium punctatum) have a unique morphology, which is a Perennials plant, stems measuring 50-150 cm in length, look like weeds, grow upward, have root fibers under the ground, leaf reinforcement is parallel with size 12-40 x 0.5-1.2 cm, the base of the round stem, the midrib of the leaf can be up to 16 cm in size and covered with a tuft of hair, and the panicle length is about 25-45 cm.

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3.4. Role of Babulu (Paspalidium punctatum) family in the Bangaris community

There are several types of similar plants such as the babulu (Paspalidium punctatum) but differ in species name and morphology, including gyps, oil goblets, male goblets, and mamayangan. But what is used and utilized maximally by the local community is the Kumpai Babulu (Paspalidium punctatum). The Kumpai Babulu (Paspalidium punctatum) has an important role in the Bangaris...
community of Palangka Raya City. Besides being used as mulch in watermelon farming, babulu (Paspalidium punctatum) kumpai is also used in other fields, namely used as organic fertilizer through fermentation and animal feed. The community considers that the Kumpai Babulu (Paspalidium punctatum) is the best food for their livestock because it has many advantages. Soft grass texture and contains a lot of water making it ideal for animal feed, especially cattle. Kumpai Babulu (Paspalidium punctatum) provides a beneficial economic value, because the planting technique is easy, practical, does not need a lot of costs, and is easy to grow. The community began to develop a cattle business because they read the opportunities for quality livestock food ingredients that were easily obtained. In addition, the community produced organic fertilizer from the main ingredient of manure.

Kumpai Babulu (Paspalidium punctatum) is a wild plant that has many benefits and is utilized by the people of Bangaris Palangkaraya. Wild plants are often used by the community and become part of the community in carrying out living activities. Ladio, A. H., & Lozada, M. (2009) conducting studies on wild plants used by the community like food, medicine, tinctorial, animal feed and fuel. This proves that wild plants around the community have many benefits in carrying out living activities.

4. Conclusion
The conclusion of this research is that the watermelon farming community in Bangarais, Palangka Raya, Central Kalimantan cultivates Kumpai Babulu (Paspalidium punctatum) as mulch in watermelon farming. This cultivation technique has been used from generation to generation from their homeland, Negara regency, Hulu Sungai Selatan, South Kalimantan. They use two techniques in cultivating the mulch of Kumpai Babulu (Paspalidium punctatum), by spraying herbicide and rolling technique, watermelon farming community in Bangarais also cultivates Kumpai Babulu (Paspalidium punctatum) as an organic fertilizer and animal feed. This shows that Kumpai Babulu (Paspalidium punctatum) has a significant role especially for the sake of the community economy.

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