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Inventory of Bryophyta Species in Pingaran Ulu Village, Banjar District, South Kalimantan

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Abstract: Moss is one of the plant biodiversity that does not have phloem and xylem transport vessels, which can live on various substrates. The many types of lichens found in Pingaran Ulu Village are supported by good environmental conditions and some areas of rubber plantations. Observations that have been made by researchers, there has been no research related to the types of moss plants in the place. The purpose of this research is to describe the types of moss plants (Bryophyta) found in Pingaran Ulu Village, Banjar Regency so that it can be used as a basis for further research. This research uses the type of field research. The sampling technique used purposive sampling with the exploratory survey method. Research data were analysed descriptively and exploratively. Based on the results of the study, 11 species of moss plants were found, namely *Andreaea rupestris* Hedw., *Brachythecium rutabulum*, *Brachymenium indicum*, *Brachythecium selebrosum*, *Dicranum scoparium* Hedw., *Fissidens dubbius*, *Chiloscyphus pallescens*, *Hyophila apiculata* Fleisch., *Octoblepharum albidum*, *Philonotis hastata*, and *Riccia huebeneriana*.

Keywords: Species, Moss, Pingaran Ulu.

Introduction

Indonesia is a tropical country that has a high level of biodiversity. According to Fajriah (2018) in Indonesia, there are various plants with various shapes and sizes that attract attention. The differences are seen in external features such as morphology and internal structures such as anatomy. So regarding the diversity of plants with various sizes from the smallest to the largest, it is implicitly contained in the word of Allah SWT. in Surah Al Hijr verse 19 in the verse translated by Harjono, Hanafi, & Hisyam (2010) it explains that the plants that have been created by Him have a variety of unique shapes and sizes, with distinctive characteristics. This diversity makes it easier to group plants into various categories. As a group of moss plants that are smaller in size compared to other plants and do not yet have a formed transportation system.

Moss plants are one of the groups of plants from biodiversity that have not been widely studied because at first glance they do not seem to attract attention and are often considered to be the cause of the environment looking dirty and slippery. The statement above is supported by Rianti, Aulia, Nursamsyah, Yusuf, & Kurniati (2019) which shows that in Indonesia, moss is still minimally researched and is often considered an indicator of dirtiness because moss often grows around the house such as on damp and wet walls and floors. Another opinion was expressed by Bawaihaty, Istomo, & Hilwan (2014) that moss plants have various benefits, one of which is as an indicator of pollution. In addition, as stated by Anggraini (2022) moss can also be used as ground cover for bonsai or plantations.

Kasiani et.al., (2019) stated that moss plants can be found growing on various substrates such as rotting wood, fallen leaves, tree trunks, rocks, and damp leaves. The diversity of habitats where moss grows shows the extraordinary adaptation of a simple but important group of plants in the ecosystem. Moss growth is influenced by two

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environmental factors, namely biotic factors and abiotic factors. Biotic factors that affect moss are competition between the moss itself in getting food or a place to live. According to Mulyani et.al. (2015) the growth of moss plants is greatly influenced by abiotic factors such as humidity, temperature, light intensity, oxygen levels, and the condition of the substrate where they grow. Each moss species has a different level of tolerance to the environment, which then affects the adaptation, distribution patterns, and composition of the moss plant species found.

Moss plants have interesting external morphology. Moss stems consist of epidermal rhizoids formed from several layers of skin cells, as well as a cortex that plays an important role in transporting water and salt. Moss does not have transport vessels like those of higher plants. Moss leaves, although simple, have their own uniqueness. Leaves consist of a single layer of cells with small, narrow, and long sizes. Inside the leaves, chloroplasts are arranged in a net pattern that allows the process of photosynthesis to take place. The shape of moss leaves also varies greatly, some are oval, lanceolate, and the tips of the leaves can have interesting differences. In addition, the edges of moss leaves can also be flat, serrated, or grooved, adding to the uniqueness of the external morphology of the plant.

After conducting initial observations, in Pingaran Ulu Village, Banjar Regency, South Kalimantan, there are various types of moss plants that live in various habitats such as soil, sandy soil, rocks, and even on rotten tree trunks and tree roots. The factors that influence the amount of moss are supporting abiotic factors. These abiotic factors include rainfall and humidity. According to BMKG (2022), Banjar Regency has a relatively moderate rainfall forecast and high air humidity levels with an air temperature range of 20-36.2 ° C and air humidity of around 48% -100%.

Research Methods

The sampling technique used Purposive Sampling with the exploration method (exploratory survey). There are 4 location points with a distance of 100 km from each point drawn in a straight line. The exploration method (exploratory survey) used to explore the path made to represent the samples found in Pingaran Ulu Village, Banjar Regency, South Kalimantan. As for data collection by observation and documentation.

The results of observations carried out in the field are in the form of field notes on moss morphology containing name, color, shape, habitat and so on. Then data related to moss morphology is identified for each moss species based on a literature review with several sources of assistance such as books by Lukitasari (2018), Hasnunidah (2018), Sohuno (2015), and Tjitrosoepomo (2016). Several official applications and websites that can be accessed such as Plant Net, Google Lens and iNaturalist.org. In addition, measurements of environmental parameters that affect moss growth such as temperature, humidity, pH, and light intensity are also carried out.

Furthermore, the field data is made in a descriptive form such as the morphology of the moss obtained starting from the capsule, seta, leaves, stems, and roots, where the body is. In addition, a classification of the moss species obtained is carried out along with comparing it with the matched source from the reference. After the data obtained is appropriate, a validity test is carried out regarding the moss species obtained to one of the lecturers of Tadris Biology UIN Antasari who is also the lecturer of the Lower Plant Botany course.

Research Result

Based on the research results, 11 species from 10 moss families were found in Pingaran Ulu Village, Banjar Regency, South Kalimantan, namely Andreaeaceae with 1 species, Brachytheciaceae family with 2 species, Bryaceae family with 1 species, Bartramiaceae family with 1 species, Dicranaceae family with 1 species, Fissidentaceae family with 1 species, Lophocoleaceae family with 1 species, Octoblepharaceae family with 1 species, Pottiaceae family with 1 species, and Ricciaceae family with 1 species. In the Brachytheciaceae family there are 2 species, while the other families

each only have 1 species. Species included in the Brachytheciaceae family are Brachythecium rutabulum and Brachythecium celebrosum. Species from the Andreaeaceae family are Andreaea rupestris Hedw. Species from the Bryaceae family are Brachymenium indicum. Species of the Bartramiaceae family, namely, Philonotis hastata. Species of the Dicranaceae family, namely, Dicranum scoparium Hedw. Species of the Fissidentaceae family, namely, Fissidens dubbius. Species of the Lophocoleaceae family, namely, Chiloscyphus pallescens. Species of the Octoblepharaceae family, namely, Octoblepharum albidum. Species of the Pottiaceae family, namely, Hyophila apiculata Fleisch. Species of the Ricciaceae family, namely, Riccia huebeneriana.

In addition, researchers collected data in the field by measuring the physical environment. This is because the environment affects the amount of moss in the research area. Supporting physical environmental factors such as humidity, temperature, and light intensity. According to Yohendri, Rafdinal, & Zakiah (2021) who stated that a temperature of 10-30°C is a favorable condition for the growth of various types of moss. In addition, soil pH ranging from 4.3-8.3 also affects moss growth, and appropriate humidity ranges from 70-98%. Furthermore, Putri (2012) added that an optimal light intensity of 10,000 LUX is needed to assist photosynthesis in moss plants.

The characteristics of moss, the classification of moss species found in Pingaran Ulu Village, Banjar Regency and physical environmental factors can be seen in the following table:

Table 1. Characteristics of Moss Types in Pingaran Ulu Village, Banjar Regency.

No.	Characteristic features	Plant Name					
		***Andreaea rupestris*Hedw.**	***Brachyth-ecium rutabulum***	***Brachymenium indicum***	***Philonotis hastata***	***Brachythecus celebrus***	***Dicranum scoparium*Hedw.**
1.	Habitat	Rocky ground	Land	Rotten tree trunk	Moist soil	Land	Land
2.	Moss Class	Leaf moss	Leaf moss	Leaf moss	Leaf moss	Leaf moss	Leaf moss
3.	Root System	Rhizoids	Rhizoids	Rhizoids	Rhizoids	Rhizoids	Rhizoids
4.	Growth Direction	Perpendicular	Creeping	Perpendicular	Perpendicular	Creeping	Leaning
5.	Stem Shape	Round	Slim	Round	Round	Slim	Round
6.	Leaf Shape	Line lancet	Lancet	Lancet	Lancet	Lancet	Spear
7.	Leaf Edge	Flat	Flat	Flat	Flat	Flat	Flat
8.	Leaf Tip	Pinching	Tapered	Tapered	Tapered	Pointed	Pointed
9.	Leaf Base	Blunt	Tapered	Blunt	Tapered	Tapered	Pointed
10.	Leaf Surface	Slippery	Slippery	Rough	Slippery	Slippery	Slippery
11.	Leaf Color	Green with a reddish tinge	Glossy Green	Green	Light green	Greenish yellow	Green
12.	Seta	There isn't any	There is	There isn't any	There isn't any	There is	There isn't any
13.	Sporophyte	There isn't any	There is	There isn't any	There isn't any	There is	There isn't any

No.	Characteristic features	Plant Name				
		Fissidens dubbius	***Chiloscyphus pallescens***	***Octoblep-harum albidum***	***Hyophila apiculata*Fleisch.**	***Riccia huebeneriana***
1.	Habitat	Land	Root of the tree	Rotten tree trunk	Rotten tree trunk	Sandy soil
2.	Moss Class	Leaf moss	Liverwort	Leaf moss	Leaf moss	Liverwort

3.	Root System	Rhizoids	Rhizoids	Rhizoids	Rhizoids	Rhizoids
4.	Growth Direction	Perpendicular	Lie down	Spread diagonally	Perpendicular	Lie down
5.	Stem Shape	Round	Flat	Round	Round	There isn't any
6.	Leaf Shape	Lancet	Round	Line	Lancet	Flat lobe-shaped sheet
7.	Leaf Edge	Flat	Flat	Flat	Flat	Flat
8.	Leaf Tip	Pointed	Rounded	Tapered	Tapered	Blunt
9.	Leaf Base	Tapered	Blunt	Tapered	Tapered	Blunt
10.	Leaf Surface	Rough	Slippery	Slippery	Slippery	Slippery
11.	Leaf Color	Light green	Green	Pale green	Green	Green
12.	Seta	There isn't any	There isn't any	There isn't any	There is	There isn't any
13.	Sporophyte	There isn't any	There isn't any	There isn't any	There is	There isn't any

Table 2. Physical Factors of the Moss Environment in Pingaran Ulu Village, Banjar Regency.

No.	Environmental Parameters	Unit	Research Point				Range
			I	II	III	IV	
1.	Air temperature	°C	31.5-32.6	30.1-30.7	30.6-31.9	31.2-31.9	30.6-32.6
2.	Air Humidity	%	68.1-69.2	69.1-70.6	40.1-42.1	40.4-43.2	40.1-70.6
3.	Soil Moisture	%	7	8	7<7	7	8-7
4.	Soil pH		7	7	7	7	7
5.	Light Intensity	LUX	1430-1540	443-544	504-507	444-543	443-1540

Table 3. Classification of Moss Species in Pingaran Ulu Village, Banjar Regency.

Division	Class	Order	Family	Genus	Species
	Andreaeopsida	Andreaeales	Andreaeaceae	Andrea	*Andreaea rupestris*Hedw.
		Hypnales	Brachythecaceae	Brachythecium	*Brachythecium rutabulum*
					Brachythecium celebrosum
Bryophyta	Bryopsida	Bryales	Bryaceae	Brachymenium	*Brachymenium indicum*
			Bartramiaceae	Philonotic	*Philonotis hastata*
		Dicranales	Dicranaceae	Dicranum	*Dicranum scoparium*Hedw.
		Fissidentales	Fissidentaceae	Fissidens	*Fissidens dubbius*
Marchantiophyta	Jungermanniopsida	Jungermanniales	Lophocoleaceae	Chiloscyphus	*Chiloscyphus pallescens*
		Dicranales	Octoblep-haraceae	Octoblephar-um	*Octoblepharum albidum*
Bryophyta	Bryopsida	Pottiales	Pottiaceae	Hyophila	*Hyophila apiculata*Fleisch.
	Marchant-iopsida	Marchantia-les	Ricciaceae	Richie	*Riccia huebeneriana*

Based on the data presentation in table 1, most of the moss found in the field lives on soil and rotten tree trunks. The most commonly found moss is leaf moss. The root system is in the form of rhizoids with some sporophytes at the end of the seta. In addition, the moss found has a color that is mostly dominated by green such as light green, shiny green, greenish yellow, and reddish green.

So it can be seen that the results of the observations made are in accordance with the opinion of Kasiani et.al., (2019) that moss can be found growing on various substrates such as rotten wood, fallen leaves, tree trunks, rocks, and damp leaves. In addition, it is supported by the opinion of Putri, Prayogo, & Wulandari (2019) that rotten wood trunks are a good environment for moss growth. This is due to the ability of rotten wood to absorb and store water between wood cells, creating high humidity and providing substances needed by moss plants to support their growth. According to Lukitasari (2018), rhizoids in moss are pseudo roots consisting of a layer of cells that resemble threads, playing an important role in strengthening moss and attaching to the substrate where they grow. In addition, rhizoids also function to absorb mineral salts needed by moss. The sporophyte part of moss includes setae or stalks.

In the identification carried out by searching for species names based on morphology obtained from several sources, both from applications, websites and books. The applications used are Plant Net and Google Lens. In addition, researchers use trusted websites according to several sources from previous studies such as iNaturalist.org. The books used by researchers are sources from books by Lukitasari (2018), Hasnunidah (2018), Sohuno (2015), and Tjitrosoepomo (2016).

Regarding the classification of moss in Pingaran Ulu Village, Banjar Regency, the results of the study found by researchers found 11 types of moss. The moss species are included in 10 families and 10 genera. Table 3 shows the results of the species classification obtained that the most abundant species members are from the leaf moss division. Meanwhile, only two species were found in the liverwort division. This is because the leaf moss division can survive in bad conditions, such as in the dry season and can also survive even on moving sandy soil. The results of this study are supported by the opinion of Lukitasari (2018) who stated that leaf moss can grow on bare soil that is gradually experiencing aridity, even on moving sandy textured soil it can grow. In addition, it is also supported by the opinion of Fajriah (2018) who stated that some leaf mosses live in dry places, can even withstand drought for months to years and are not damaged. Leaf moss also has a very wide distribution area with the largest number of species compared to other classes. After conducting morphological observations and identification, the data obtained were then processed in the form of a naming table regarding the types of moss plants (Bryophyta) in Pingaran Ulu Village, Banjar Regency. After obtaining the results of the field data, the results of the data were then made in descriptive form.

Discussion

1. *Andreaea rupestris* Hedw.

Figure 1. *Andreaea rupestris* Hedw. Source: Personal Document, 2022

Andreaea rupestris Hedw. found growing on sandy soil. Andreaea rupestris Hedw. is a species of moss from the Andreaeopsida class which is included in the group of leaf mosses, often referred to as "lantern moss" because of the appearance of broken sporangia. *Andreaea rupestris* Hedw. has a reddish green color, forming small tufts of very tangled plants. The leaves have a lanceolate shape with wide and scattered curves. The leaf tips can be slanted or symmetrical, with lines crossing the entire surface of the leaf. The leaf edges are flat and the tips are tapered. The lowest leaves grow when the stem is still young, are blunt square and spread widely. The stem is round and equipped with rhizoids as an adhesive to attach to the substrate. *Andreaea rupestris* Hedw. has benefits as a provider of oxygen, storing water, as an absorber of pollutants, and the main component of peat soil formation. This is supported by the opinion of Ivhone, Irwandi, and Hartati (2020) *Andreaea rupestris* Hedw. has color variations including

blackish red, black, and greenish brown. The leaves are broadly curved and spreading, short, and lanceolate in shape. The leaf tips are slanted or symmetrical and there are lines throughout the leaf, basal cells, short laminae.

According to Gembong (1989) *Andreaea rupestris* Hedw. is a plant that can be green to blackish, so it is often referred to as "dense grass". The stem is upright and the branches are irregular. Its rhizoids function as cushions to absorb nutrients. The phylloid of this moss resembles leaves. The capsule is a structure that stores moss spores, while the calyptus functions as a protector for the upper part of the capsule. The habitat of this moss is found on the surface of rocks in peat soil areas, and has an important role in the formation of peat soil as one of its main components.

2. *Brachythecium rutabulum*

Figure 2. *Brachythecium rutabulum.* Source: Personal Document, 2022

Brachythecium rutabulum which is found growing on the ground. *Brachythecium rutabulum* is a moss from the group of leafy mosses that has a slender body like a shiny green weave. The stem creeps on the substrate and the branches are irregular. In this moss, the leaves grow spread out crowded along the stem, have a lanceolate shape with flat edges. The tip of the leaf is tapered, while the base is also tapered and the surface of the leaf is smooth. There is a developed sporophyte structure, where the seta is visible at the tip and there is a yellowish brown capsule with a beaked lid. The capsule is irregularly slanted, the shape of the cylindrical capsule grows curved. The sporophyte produces spores for reproduction. This moss has an adhesive tool called rhizoids, which function to attach to the substrate. *Brachythecium rutabulum* has antibacterial and antifungal benefits. Ash from burning *Brachythecium rutabulum* moss mixed with fat and honey is used as an ointment in the Himalayan region, to stop bleeding wounds. wings and burns.

This is in accordance with the opinion of Ivhone, Irwandi, and Hartati (2020) Brachythecium rutabulum is a type of moss that is commonly found with oval-shaped leaves and pointed leaf tips. This moss can grow on various substrates such as rocks, soil, rotten wood, tree trunks, gravel, and walls. Usually, this type of moss is found in shady places. The stem has pleurocarpic growth with dense, green leaves. The sporangium of this moss has a curved cone-like shape at the tip. Young sporangia are light green in color, while old ones are blackish gray. The setae of this moss are dark red when old and bright green when young, and there are fine hairs covering the setae.

3. *Brachymenium indicum*

Figure 3. *Brachymenium indicum.* Source: Personal Document, 2022

Brachymenium indicum which is found growing on rotten tree trunks. *Brachymenium indicum* is a type of leaf moss that has distinctive morphological characteristics. The leaves grow vertically with a short size, are green, lanceolate with a pointed tip, and grow in a rosette pattern. The base of the leaves is blunt, the surface is smooth, and at the end of the thallus there is more leaf growth. This moss has two types of life phases, namely male gametophytes that have antheridia and female gametophytes that have archegonium. When viewed from the top (dorsal), *Brachymenium indicum* grows in a regular arrangement and resembles a star shape. Although very small in size, the stems of this moss are short and hidden

under the leaves so that they are not visible. The leaves are green, arranged alternately, and tightly so that they look like they are piled up. This moss reproduces vegetatively through rhizoids and also through buds (gammae). When the buds are detached or broken, new thallus grow from the rhizoids which become new gametophyte moss. *Brachymenium indicum* has an important role as an environmental indicator and contributes to the tropical rainforest ecosystem as a habitat for various organisms such as insects and trapped rainwater.

Based on the statement that has been mentioned, in line with the views of Putri, Prayogo, & Wulandari (2019) true moss Brachymenium indicum can be found growing in populations on tree trunks. *Brachymenium indicum* has a thallus shape that grows upright with a short size. The leaves are green with a lanceolate shape and a pointed tip. This moss grows in a rosette pattern, where the leaves grow more at the tip of the thallus. Additional information from Febrianti (2015) states that *Brachymenium indicum* has a star-like appearance when viewed from above and is very small in size, with a length ranging from 1-3 mm. The stem is very short and covered by the leaves, so that the stem is not visible. The leaves are light green and arranged tightly, stacked on top of each other. The shape of the leaves is elongated with flat edges and pointed tips. According to Putri, Prayogo and Wulandari (2019) that moss growth tends to be good on rotten tree trunks. This is due to the ability of rotting wood to absorb and store water between the wood cells, providing high humidity and substances needed by moss plants to support their growth.

4. *Brachythecium celebrosum*

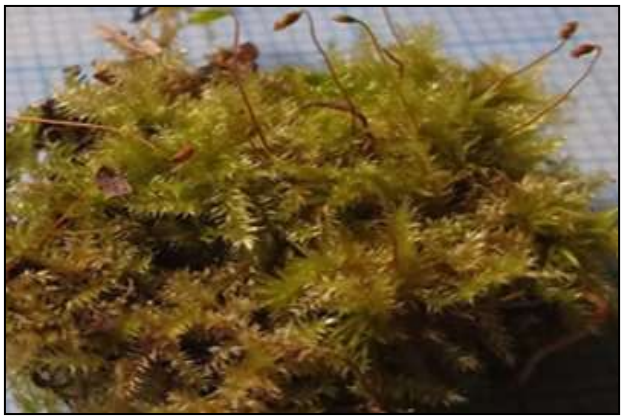

Figure 4. *Brachythecium celebrosum.* (Source: Personal Document, 2022)

Brachythecium celebrosum which is found growing on the ground. *Brachythecium celebrosum* is a moss from the group of leaf mosses that has monoecious morphological characteristics, leaves look like woven and shiny yellow-green. Stems stack and branch irregularly. All leaves are very numerous in dry and wet conditions, leaves are lanceolate, narrow and small lanceolate leaf branches. Single leaf bone, closes or more than the length of the leaf. Stem leaves and branch leaves have almost the same shape, but stem leaves are slightly larger, gradually and evenly narrow from base to tip which is more or less pointed curved at the bottom along the entire edge but slightly serrated at the tip, the base of the leaf is tapered, the leaf surface is smooth, the leaf edges are flat, and the lower leaf edges. The leaves are arranged in layers with narrow longitudinal folds in the middle. These folds are most striking when the leaves dry, but remain even when the leaves are wet. Has an adhesive in the form of rhizoids to adhere to the substrate. Brachythecium celebrosum has benefits as a provider of oxygen and water storage as an absorber.

This is in line with the statement of Khatun and Hadiuzzman (2005) *Brachythecium celebrosum* has striking morphological characteristics. This plant is monoecious and has shiny yellow-green leaves like a mat. The stems creep and branch irregularly. Both stem leaves and branch leaves have a narrow and small lanceolate shape. There is one costa that covers or is longer than the leaf itself. Stem leaves and branch leaves have similar shapes, but stem leaves tend to be slightly larger and taper gradually from base to tip. The underside of the

leaf is curved, while the entire edge tends to be serrated at the tip and slightly wavy at the bottom edge. The leaves grow in layers with narrow longitudinal folds in the middle. These folds are very striking when the leaves dry, but remain visible even when the leaves are wet.

5. *Chiloscyphus pallescens*

Figure 5. *Chiloscyphus pallescens.* Source: Personal Document, 2022

*Chiloscyphus pallescens*which is found growing creeping on tree root substrates. Chiloscyphus pallescens is a leafy liverwort that has distinctive characteristics, such as leaves that are not divided, almost parallel arrangement, and lower leaves that are connected to other leaves. The shape of the leaves is round with flat edges, rounded tips, and blunt bases. This moss grows with flat stems that lie down. The surface of the leaves is smooth due to the cuticle, while the rhizoids are located at the ventral base of the leaves. At the tip or branch there is a short gametophyte, while the sporophyte is rarely seen. The leaves are small and green in color. Chiloscyphus pallescens also contains special oils known as oil bodies, which contain secondary metabolite compounds. In addition, this moss has a distinctive aroma that gives the impression of aromatic components such as phenol.

*Chiloscyphus pallescens*belongs to the Lophcoleaceae family, as described by Gradstein and Costa (2011). This moss has a small to medium size and can be green, brown, or reddish brown in color. The phylloid has two lobes or is not divided and is arranged almost parallel. The surface of the phylloid is smooth due to the presence of a cuticle. The rhizoids are located at the base of the ventral phylloid. At the tip or branch there is a short gametophyte, while the sporophyte has a thick seta. The presence of gemma in this moss is rare.

6. *Dicranum scoparium* Hedw.

Figure 6. *Dicranum scoparium* Hedw. Source: Personal Document, 2022

Dicranum scoparium Hedw. which is found growing on the ground. *Dicranum scoparium* Hedw. is a moss from the group of leaf mosses that has a soft bright green morphological characteristic. This moss is called wind moss or fork moss, forming dense grass. The direction of growth of the stem is inclined not to branch or single but overlap in a round shape. The leaves have a tuft shape with a sheath that extends to the tip and there are protrusions along the back of the leaf. This type of leaf is spear-shaped with a long and slender tip. The color of the leaves is green, and most of the leaves are folded to one side with a wavy surface. The tip of the leaf is sharp and the base is tapered, and has a smooth leaf surface. At the time of conducting this moss research in the gametophyte phase there were no sporophytes growing. This type has a curved capsule resembling a jar. The capsule is supported by a stem that is mostly upright and has a long size. The operculum of the capsule looks longer than the capsule itself. In addition, this type is also equipped with rhizoids that play a role in water absorption. *Dicranum scoparium* Hedw. has benefits as an excellent accent for tetrarium. Other benefits of this moss include providing oxygen, storing water, and absorbing pollutants.

Dicranum scoparium Hedw. is a type of moss that belongs to the group of leaf mosses, as explained by Muammar, Retnoningsih, and Anggraito (2020). This moss has tassel-shaped leaves with leaf

sheaths that extend to the tips and have protrusions along the back of the leaves. This type of leaf has a long and slender spear shape, with a dominant green color. Most of the leaves are folded to one side and have a wavy texture. The habitat of this moss can be found on various substrates, such as rocks, soil, wood, and grasslands. This information is in line with data cited by the British Biological Society which notes that moss is generally found in various habitats, including rocks, litter, soil, and wood.

7. *Fissidens dubbius*

Figure 7. *Fissidens dubbius.* Source: Personal Document, 2022

Fissidens dubbius which is found growing on the ground. This moss is included in the group of leaf mosses, with a regular appearance like a comb when viewed from above or the dorsal part. Its size is very small, with a short stem and hidden by its leaves. The leaves of this moss have a light green color and a dense leaf arrangement, stacked on top of each other, and have leaf veins that are visible from the base to the tip of the leaf. The shape of the leaves is pointed, with flat edges, pointed tips, tapering bases, and rough surfaces. This moss has rhizoids as adhesives that are brownish in color and slightly branched. When the observation was made, only the gametophyte phase was visible without the sporophyte phase. In addition, Fissidens dubbius also has benefits as an antibacterial agent that can help treat swollen throats caused by bacteria and provide assistance in breathing.

This is in accordance with what was conveyed by Raihan, Nurasiah, and Zahara (2018) *Fissidens dubbius* has a body in the form of a leaf thallus with wide leaf veins or grooves from the base to the tip. The cell structure is multicellular, with one holfast that is the base for the bases of the stems. This moss has pseudo roots and its leaves contain chlorophyll so that it is able to photosynthesize autonomously.

According to Ivhone, Irwandi, and Hartati (2020) *Fissidens dubbius* is a type of moss that can be found in various places such as rocks, gutter walls, and soil. This moss has a regular appearance like a comb when viewed from above, with a very small size and short stems hidden among its leaves. The leaves of this moss are dark green, with an elongated shape, flat edges, and pointed tips.

8. *Hyophila apiculata*Fleisch.

Figure 8. *Hyophila apiculata* Fleisch. Source: Personal Document, 2022

Hyophila apiculata Fleisch. is a type of leaf moss found growing on rotting tree trunks. This moss has a leaf arrangement that looks like neat scales when viewed from above or the dorsal side. The stem is very short and covered by its leaves, so it is not clearly visible. The leaves of this moss are green and arranged tightly, stacked on top of each other. The shape of the leaves is lanceolate, with flat leaf edges, pointed and curved leaf tips, and a leaf base that is also pointed. The surface of the leaves is smooth. During the study, sporophytes were found to have grown, with setae and capsules at the tip, still protected by the calyptra. This moss has rhizoids as an adhesive to attach to the substrate.

Hyophila apiculata Fleisch. has light green leaves, with a dense and overlapping leaf arrangement. The leaves are lanceolate with flat edges, pointed and curved leaf tips. This is in line with Febrianti's statement (2015) stating that this moss is very small

in size. The stem is very short and hidden among the leaves, so it is not directly visible. Raihan, Nurasiah, and Zahara (2018) also added that Hyophila apiculata Fleisch. grows with an arrangement that looks like neat scales when viewed from above or the dorsal side.

According to Putri, Prayogo, and Wulandari (2019), it was found that moss growth is very good on rotten wood. Rotten wood has the ability to absorb and store water between its cells, thus providing high humidity and nutrients needed by moss plants to grow well. In addition, *Hyophila apiculata* Fleisch. also has an important role as a habitat for other organisms, especially populations of invertebrates such as ants.

9. *Octoblepharum albidum*

Figure 9. *Octoblepharum albidum.* Source: Personal Document, 2022

Octoblepharma albidum found growing on rotten tree trunks like a carpet. *Octoblepharum albidum* is a moss from the leaf moss group that has morphological characteristics of pale green tending to whitish, the stem is covered by leaves so that it is not visible when viewed from above. The arrangement of the leaves is obliquely spread, stiff with a line leaf shape. The edges of the leaves are flat with pointed leaf tips, pointed leaf bases, smooth leaf surfaces, and the leaves do not change when dry. Has an adhesive tool in the form of rhizoids to adhere to the substrate. When observed, only the gametophyte phase was found while the sporophyte phase was not yet visible. *Octoblepharum albidum* has the characteristic of a sporophyte that does not grow upright. *Octoblepharum albidum* has the benefit of being able to maintain the humidity of the substrate it grows on, as an oxygen producer, and is able to efficiently absorb phenol from oil drilling waste.

Octoblepharum albidum, according to Febrianti (2015) is a type of leaf moss that grows attached to trees. This moss has a slender shape and a light green to pale green color. The stem is covered by its leaves so that it is not visible when viewed from above. The leaves are evenly distributed and have a line shape. The edges of the leaves are flat with pointed tips. The length of the leaves ranges from 2 to 4 mm.

The opinion of Putri, Prayogo, and Wulandari (2019) indicates that rotten wood is a good environment for moss growth. This is due to the ability of rotten wood to absorb and store water between wood cells, creating high humidity and providing substances needed by moss plants to support their growth.

10. *Philonotis hastata*

Figure 10. *Philonotis hastata.* Source: Personal Document, 2022

*Philonotis hastata*w hich is found growing on moist soil. *Philonotis hastata* is a moss from the group of leaf mosses that has morphological characteristics of a small body forming a pad or dense lawn consisting of thin leaves, growing upright, and pale green in color. The leaves will roll up to block evaporation when dry, lanceolate shape, pointed leaf tips, pointed leaf bases, smooth leaf surfaces, and leaves have flat edges. The arrangement of the leaves is very tight spiral. Has an adhesive tool in the form of rhizoids to adhere to the substrate. Small brownish rhizoids (pseudo roots) are tangled and have little branching. When observed, only the gametophyte phase was found while the sporophyte phase was not yet visible.

Philonotis hastata has benefits as a medicine to reduce the pain of bruises or burns. Another benefit of this moss is that it can be used as a decoration in aquascapes to add a natural impression, its soft pale green pads can look quite good on the surface of the water.

According to Raihan, Nurasiah, and Zahara (2018) *Philonotis hastata* has a slender morphology and upright stems. The leaves will roll up to stem evaporation when dry, the leaves are lanceolate, the leaf tips are pointed, the leaves have flat edges. The arrangement of the leaves is very densely spiral, has small and smooth rhizoids. The above was added again by Febrianti (2015) this slender moss has a pale yellowish green color, upright stems. When viewed from above this moss looks like a sponge and is thick as if it contains a lot of water when wet. The leaves will roll up to stem evaporation when dry, the shape of the leaves is lanceolate, the leaf tips are pointed, the leaves have flat edges. The arrangement of the leaves is very densely spiral, has small and smooth rhizoids.

11. *Riccia huebeneriana*

Figure 11. *Riccia huebeneriana.* Source: Personal Document, 2022

Riccia huebeneriana found growing on soil that has a composition of sand and rocks. This type of liverwort has a green thallus with a flat sheet shape that branches dichotomously and has flat edges. On the dorsal part, there is a groove that divides the thallus into two parts. The gametophyte thallus of Riccia huebeneriana has a rosette structure that resembles a rose arrangement. Lobes are branches of the thallus that are formed, with a thicker middle part and increasingly flat towards the edges. The thicker part is called a rib (midrib). The tip of the thallus has a notch that functions as a growth point. The dorsal surface of the thallus consists of air spaces or aerolae that form a trapezoid pattern. On the ventral plane, there are many rhizoids which are extensions of the lower epidermis cells. Its growth lies down with rounded leaf tips and blunt bases. There are two types of rhizoids, namely imperfectly septate rhizoids and smooth-walled rhizoids. In addition, this moss also has flat scale growth and is formed from many cells. Riccia huebeneriana has important benefits as an oxygen provider and as a water absorber to reduce pollution.

This is in accordance with what was conveyed by Gradstein (2011) *Riccia huebeneriana* is included in the Ricciaceae family, has the characteristics of a small thallus with some porous and some not, and has grooves. The ventral part of the thallus is divided into one or two rows. Inside the thallus there are antheridia and archegonia, and there are sporophytes. The moss capsule is round without legs and setae, and does not have elatera. The body of the Riccia huebeneriana moss consists of a dorsal ventral thallus that is green, small, and flat. This thallus branches dichotomously and forms a rosette arrangement (similar to the arrangement of roses) as a whole.

Conclusion

Based on the results of the study, it can be concluded that 11 species of moss were found in Pingaran Ulu Village, Banjar Regency. Moss species with 10 families and 10 genera are *Andreaea rupestris* Hedw., *Brachythecium rutabulum, Brachythecium celebrosum, Brachymenium indicum, Chiloscyphus pallescens, Dicranum scoparium* Hedw., *Fissidens dubbius, Hyophila apiculata* Fleisch., *Philonotis hastata, Riccia huebeneriana*, and *Octoblepharum albidum*.

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