

**Inventory of Epiphytic Ferns in Tanta Village,  
Tabalong District, South Kalimantan****Hayatun Nisa<sup>1\*</sup>, Mahrudin, Nurul Hidayati Utami**<sup>1</sup>Pendidikan Biologi, Universitas Lambung Mangkurat, Banjarmasin, Indonesia\*Email: [hhayatun18@gmail.com](mailto:hhayatun18@gmail.com)

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**Abstract**

The diversity of ferns species is very high, one type of fern that is often found in the forests of Kalimantan is the epiphytic fern. Epiphytic ferns are ferns that attach to host trees which are often found in forests with high humidity. From an ecological perspective, epiphytic ferns in Tanta Village have an important role in the environment, especially river border areas, for example as a place for small animals to live and as producers in the food chain. In terms of its benefits for humans in Tanta Village, people use it as an ornamental plant, medicine, handicraft or food. This research aims to inventory epiphytic ferns in Tanta Village, Tabalong Regency, South Kalimantan. Data collection was obtained using total techniques. The results of the research found that there were 7 types of epiphytic ferns, namely: *Davallia denticulata*, *Asplenium nidus* L., *Nephrolepis biserrata*, *Drynaria sparsisora*, *Pyrrosia lanceolata*, *Drymoglossum piloselloides*, and *Microsorium punctatum*. From this research it can be concluded that the seven types of epiphytic ferns can be found in the riverbank area of Tanta Village because this area is suitable for supporting the life of epiphytic ferns.

**Keywords:** epiphytic ferns; inventory; river banks; Tabalong**INTRODUCTION**

Plant diversity is spread across various habitats from highlands to lowlands in forests, mountains and waters. One of the potential plant diversity in Indonesia is lower plants. One example of lower plants are ferns (Astuti *et al.*, 2018; Sengka *et al.*, 2022; Setiawan, 2022). Indonesia is a country located in a tropical area with diverse natural resources, one group of plants with high diversity is ferns. Ferns are lower plants that can be found almost everywhere every region in Indonesia. As a lower plant, ferns grouped into one division whose types can be clearly distinguished into three main parts, namely roots, stems, and leaves (although the leaves are still very simple). It is estimated that there are 10,000 types of ferns in the world, in Indonesia there are around 2,197 types or around 22% of the ferns growing (Tnunay & Hanas, 2020; Hidayah *et al.*, 2021; Karim *et al.*, 2022).

The diversity of fern species is very high, both those that live on land and those that live epiphytically. One of the ferns that is often found in the forests of Kalimantan is the epiphytic fern. Epiphytic ferns live attached to host trees which are often found in forests with high humidity. Epiphytic ferns are a small group of plants that play an important role in characterizing tropical forest

types. The size of epiphytic plants varies, from small (micro epiphytes) to large (macro epiphytes). These ferns utilize life in trees to obtain nutrients and water from the sediment around the surface of their host trees and to obtain certain environmental conditions. Epiphytic ferns are different from parasitic plants because epiphytic plants have roots that are able to absorb water and dissolved nutrients and are able to produce their food itself (Lindasari, *et al.*, 2015; Prastyo *et al.*, 2015; Listiyanti *et al.*, 2022).

Tabalong District has a great variety of plant diversity like orchid, citrus, and even threatened one in Kinarum Protected Forest (Kinarum PF) (Dodo & Hidayat, 2020; Puspitaningtyas, 2020; Masriana *et al.*, 2023). Tabalong is one of the districts in South Kalimantan. Tabalong has amazing natural potential. These potentials include Riam Kinarum, Mambanin Waterfall, Liang Tapah Cave, Batu Pujung Beach, and many more. In this area identified 10 types of forest plants, 15 types of MPTS plants and 14 types of medicinal plants. The names of the forest plants are Alaban (*Vitex pinnata* L), sungkai (*Peronema canescens*), gatah/rubber (*Hevea brasiliensi*), pitanak, barambang, oput/bintawa, sugarcane orchid (*Grammatophyllum speciosum*), orchid moon (*Phalaenopsis amabilis*), horsetail (*Equisetum hyemale*) and ferns deer (*Platynerium bifurcatum*). Meanwhile, the results of identification of types of medicinal plants found around the village Kinarum has around 16 types of plants that function or are used community as medicine, especially by the Deyah Dayak tribe.

Epiphytic ferns are plants that have beneficial value for everyday human life. It has the same point with animal (Pertwi & Lathifah, 2019; Ratih *et al.*, 2021; Triacha *et al.*, 2021; Fatonah *et al.*, 2023; Mufida *et al.*, 2023; Putri *et al.*, 2023). The benefits of epiphytic ferns include use as ornamental plants, medicines, handicrafts and food. The existence of ferns plays an important role in the community and structure of tropical rain forests as well as in the nutrient cycle of forest ecosystems. Epiphytic ferns also have an important role in the rainforest ecosystem as a habitat for several animals. Apart from that, there are still many types of epiphytic ferns that have potential as ornamental plants but are rarely cultivated (Surur, 2019; Surur, 2020; Tnunay, 2020). Epiphytic ferns are often found in Kalimantan forests, one of which is in Tanta Village, Tabalong Regency, South Kalimantan. However, publications regarding riverside ferns, especially epiphytic ferns, are still rarely found, especially in the Tanta River area. Therefore, based on the description above, this research aims to inventory epiphytic ferns in Tanta Village, Tabalong Regency, South Kalimantan.

## METHOD

This research was carried out from January 2023 – June 2023 which included a preparation period (research location survey, data collection, data analysis, and preparation). This research was carried out on the riverbanks of Tanta Village, Tabalong Regency, this is because the riverbanks of Tanta Village are secondary forests with lots of trees and some have become oil palm, rubber and oil palm plantations so there are many epiphytic ferns. Epiphytic plants will be found in many places around springs such as river banks (Ristawan, 2021; Roziaty, 2016; Surfiana, 2019). This research uses the total roaming method by exploring from upstream to downstream of the river. The Tanta Village River bank has an area of 1.20 km with a bank width of  $\pm 10$  meters, divided into 3 parts, namely upstream, middle and downstream. Researchers followed the research route and recorded and documented all epiphytic spikes found both on the left and right (Utami & Putra, 2020; Mahesa *et al.*, 2023; Safitri *et al.*, 2023). The research area can be seen in Figure 1.



(Map scale 1:25,000)

**Figure 1.** Research Location

The tools and materials used in this research are, Camera to document observation results, Stationery to record data, Clock to determine research time, Location map to determine the position or place of research. millimeter blocks are used as measuring tools and bases for placing found samples so they can be easily documented, Plastic samples for storing plant samples so they can be identified, Reference books related to ferns. The parameters used in this research are, Thermometer to measure air temperature in °C units, Anemometer to measure wind speed in m/s units, Luxmeter to measure light intensity in K.Lux units, Soil tester to measure soil pH and soil moisture, and Hygrometer to measure air humidity. The stages in conducting this research are, determining the observation area, namely the area along the river bank in the Tanta Village area, Tabalong subdistrict, which is  $\pm 1,200$  meters long with a bank width of  $\pm 10$  meters, then determining the observation area using the exploration method from upstream to downstream, the sampling area can be seen in figure 2.



Keterangan:

- - - : Batas Wilayah
- : Jarak Panjang Sungai
- : Batas Tepian
- : Batas Pembagian Daerah

(Map scale 1:25,000)

**Figure 2.** Sampling Location

Species study observations of the morphology of the types of epiphytic ferns found include: roots, stems, leaves and sorus, each type of epiphytic fern found is documented, then measuring environmental parameters which include: air temperature, air humidity, soil moisture, soil pH, speed wind and light intensity, plants obtained in the field were identified and analyzed using literature studies. Identification of the types of epiphytic ferns found using the literature.

## RESULT AND DISCUSSION

Based on research results that have been identified in species data, there are 7 species of epiphytic ferns found on the riverbanks of Tanta Village, Tabalong Regency, including: Paku kaki tupai, Paku sarang burung/lukut, Paku Pedang, Paku simbar layangan, Paku sisik naga, Paku dduitan/picisan, dan Paku Kadaka. The observation results can be seen in table 1.

**Table 1.** An epiphytic fern species found in Tanta Village

Species Code	Vernacular Name	Number of Individuals
Species 1	Paku Kaki Tupai	27
Species 2	Paku Sarang Burung/ Lukut	44
Species 3	Paku Pedang/ Kelakai	22
Species 4	Paku Simbar Layangan	38
Species 5	Paku Sisik Naga	29
Species 6	Paku Dduitan/ Picisan	22
Species 7	Paku Kadaka	4

Based on table 1, 186 individual epiphytic ferns from 7 species were found, the most frequently found being the bird's nest fern species and the least frequently found being the kadaka fern species. The morphology of epiphytic ferns found is as follows:

1. *Davallia denticulata* (Paku kaki tupai).

Based on research, this epiphytic fern has a brown fibrous root system. Root fibers are located throughout the rhizome. Generally, the rhizome stems are upright and spread round. The petiole of the epiphytic fern is round with a brownish green color. Ental is pinatus-tripinatid type. Alternate leaf layout. The leaves are dark green on the upper surface and light green on the lower surface. The leaf surface is smooth with a paper-like texture. The arrangement of the veins is pinnate with triangular-ovate leaflets, serrated/serrated edges, pointed base, and tapered tip. The sorus is spread along the edges of the leaflets shaped like sacs. *Davallia denticulata* grows mostly in the lowlands and can grow in open areas. Apart from being an epiphyte, this fern can also grow terrestrially (Lindasari *et al.*, 2015; Meliza *et al.*, 2019; Hidayah *et al.*, 2021).



**Figure 3.** *Davallia denticulata* Morphology  
(Source: Nisa, 2023)

2. *Asplenium nidus* L. (Paku sarang burung/lukut).

Based on research, this epiphytic fern has a densely arranged fibrous root system that is dark brown in color. The stem is a short black rhizome, covered with fine hairs. Very short stalks, approximately 0.5 - 1 cm, black. The leaves include single leaves, light green to shiny dark green. The surface of the leaves is smooth, the texture resembles paper. The leaves are lanceolate in shape with tapered bases and tips with wavy edges. There are brownish black leaf veins. The leaves are arranged like a rosette. The sorus is located under the surface of the leaf, brown in color and arranged lengthwise from the middle of the leaf vein towards the edge. *Asplenium nidus* is a plant that lives on other trees and grows widely in Indonesia. This part of the leaf is the part that is usually used as a mixture of herbal medicines, such as in the treatment of stomach ulcers (Brahmana *et al.*, 2022; Listiyanti *et al.*, 2022; Sartinah *et al.*, 2023).



**Figure 4.** *Asplenium nidus* L. Morphology  
(Source: Nisa, 2023)

3. *Nephrolepis biserrata* (Paku Pedang).

Based on research, this epiphytic fern has a fibrous root system that is firmly attached to the host, brown in color. The stem is round, upright, strong, dark brown, covered with fine hairs scattered along the stem. The brown stalk is round. Pinatus type ental. The leaves are dark green with a hairy surface. The leaf shape is lanceolate to elongated, the base of the leaf is blunt, the tip of the leaf is pointed, the edge of the leaf is serrated. The compound leaf type is pinnately bony. Alternate leaf layout. The sorus is located on the lower surface along the edge of the leaflets, light brown in color, round in shape, evenly arranged. This group of ferns generally grow as epiphytic or semi-epiphytic ferns which are often found growing on palm trunks and can also grow on several

other large and shady trees. These ferns can also be found around river banks and can also be found in cliff crevices (Aini *et al.*, 2022; Kambombu & Ina, 2023; Razoki *et al.*, 2023).



**Figure 5.** *Nephrolepis biserrata* Morphology  
(Source: Nisa, 2023)

4. *Drynaria sparsisora* (Paku simbar layangan).

Based on research, this epiphytic fern has roots in the form of a taproot, cylindrical in shape, blackish brown in color. Climbing or creeping stems, narrow like rhizomes, dark brown scaly surface. Leaf stalks are brown, round. The ental form is pinnatifid. The top of the leaf is dark green, while the bottom is light green. The supporting leaves or sterile leaves are short and wide in the middle and thin. The edges of the fertile leaves are split, the tip is pointed, and the base is tapered. The leaves are pinnate. The sporangium is small, orange in color, located between the fertile leaf veins and scattered irregularly. This fern is often found on rocks, in open areas and along river banks and can also be found in tall trees, living as an epiphyte. *Drynaria sparsisora* Moore leaves contain flavonoids and steroids which function as anti-inflammatory, anticancer, antimicrobial, antifungal and antiviral. Meanwhile, the rhizomes contain terpenoid compounds which function as antioxidants, anticancer, antimicrobial and neuroprotective (Purnawati *et al.*, 2014; Karim *et al.*, 2022; Majid *et al.*, 2022).



**Figure 6.** *Drynaria sparsisora* Morphology  
(Source: Nisa, 2023)

5. *Pyrrhosia lanceolata* (Paku sisik naga)

Based on research, this epiphytic fern has roots resembling fibers, dark brown in color, and has dark brown root hairs. The stem is round, spreading, the stem is branched with the direction of growth leaning to the side, the surface of the stem is scaly. Very short, invisible green stalk, round

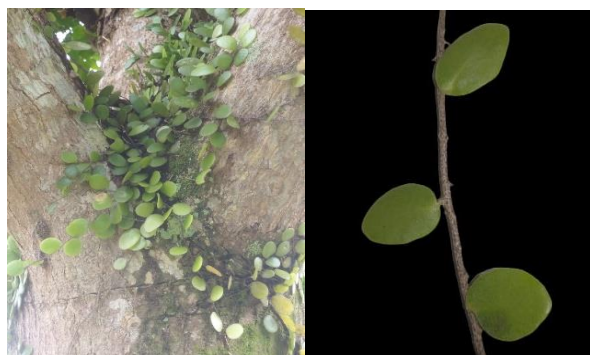
in shape. Single leaf type, sitting alternate leaves, flat leaf edges, pinnate leaf veins, sterile leaves lanceolate, upper and lower surfaces of leaves have trichomes, tip and base of leaves tapered. The fertile leaves are lanceolate, the tip of the sterile leaf is blunt, the base of the fertile leaf is tapered, the upper and lower surfaces of the fertile leaf have trichomes. The sorus is located at the tip of the leaf to  $\frac{3}{4}$  of the base of the leaf, the sorus is densely distributed under the leaf, is round in shape, dark brown in color, does not have an indusium (Wulandari *et al.*, 2016; Hartini, 2020; Sartinah *et al.*, 2023).



**Figure 7.** *Pyrrosia lanceolata* Morphology  
(Source: Nisa, 2023)

6. *Drymoglossum piloselloides* (Paku duduitan/picisan).

Based on research, this epiphytic fern has thin rhizome roots, with a diameter of around 1 mm which are firmly attached to the branches or limbs of the host tree. The stem is a slender rhizome that is round and brown in color. The leaf type is a single type. Sterile leaves are smaller than fertile leaves. Sterile leaves are round or almost round and do not have stipes. Fertile leaves have short stalks, oblong fertile leaves with rounded leaf tips and pointed leaf bases. Fertile and sterile leaves both have a smooth leaf surface and a fleshy leaf texture. Orange colored sori are found along each edge of the fertile leaves in the shape of a line. *Drymoglossum piloselloides* can be used as a medicinal plant because it contains flavonoids, tannins, steroids or triterpenoids, essential oils and glycosides which have anti-cancer potential. *Drymoglossum piloselloides* leaf extraction is able to dissolve bioactive elements including leukemia cells in the human body (Adlini *et al.*, 2021; Fauziah *et al.*, 2022; Sartinah *et al.*, 2023).



**Figure 8.** *Drymoglossum piloselloides* Morphology  
(Source: Nisa, 2023)

7. *Microsorium punctatum* (Paku kadaka).

Based on research, this epiphytic fern has roots that resemble fibrous roots. These roots are blackish brown in color. The stem resembles a small rhizome, short, covered with dark brown scales, the scales are elongated, similar to a triangle. The stem is round and black, resembling the spikes of a swallow's nest. The single leaf is lanceolate in shape, the color is green, the petiole is not clear, the veins are clear, the tip is pointed, the base of the leaf is winged, and the leaf spines are lobed. It is located in a cluster. *Microsorium punctatum* has health benefits such as a laxative, diuretic and wound healer. In the field of gardening, cultivars of this plant with branching leaves are usually used to decorate rooms or gardens (Ulum & Setyati, 2015; Sofiyanti & Harahap, 2019; Ruma *et al.*, 2022)



**Figure 9.** *Microsorium punctatum* Morphology  
(Source: Nisa, 2023)

Environmental conditions are one of the factors that greatly influence the presence of epiphytic ferns in a habitat. These environmental conditions can be determined by measuring environmental parameters. Based on the results of observations and measurements that have been carried out on the riverbank area in Tanta Village, Tabalong Regency, it can be seen in the following table 2.

**Table 2.** Environmental parameters

No.	Parameters	Score
1.	Light intensity	350 – 2.106 lux
2.	Wind velocity	0,20 -1,7 m/s
3.	Humidity	75 – 80%
4.	Height of place	32 mdpl
5.	Air temperature	28 -30 °C

Based on the environmental parameter data presented in Table 2, the light intensity in the riverbank area of Tanta Village ranges from 350 – 2,106 lux. This can be seen from the forests on the riverbanks of Tanta Village which are secondary forests, some of which are quite open so the light intensity varies. The high and low light intensity is influenced by the absence of canopy and cloud cover. Good intensity for epiphytic ferns reaches the range of 372 – 9470 lux for riverside secondary forest areas (Andiana, 2021; Katili, 2014; Jber). Ferns will grow well in shaded conditions, in high light conditions, ferns usually become tougher, thicker, produce more sori, and are more tolerant of the environment. Therefore, the range of 350 – 2,106 lux is considered still suitable for the life of epiphytic ferns (Wahyuningsih *et al.*, 2019; Yunita *et al.*, 2022; Mahesa *et al.*, 2023). Epiphytic ferns are plants that reproduce vegetatively through spores. One factor that supports the spread of spores is the influence of wind speed. Based on wind speed measurements ranging from 0.1 – 1.7 (m/s), this is thought to be a supporting factor for the growth of epiphytic ferns in riverbank areas. Wind speed has a big influence on



the distribution of fern spores. This is because when the spores leave the spore box (sporangium), they will be carried by the wind to a surface suitable for their development. The higher the wind speed, the farther the spores will spread. Apart from wind speed, water also influences the spread of fern spores because fertilization is stimulated by the presence of water or humid conditions. Water is needed by spermatozoids to swim to the archegonium to fertilize the egg cell which will later produce a zygote. The good wind speed for fern growth ranges from 0.15 – 3.5 m/s so that the riverbank area in Tanta Village is considered still suitable for the life of epiphytic ferns (Imaniar *et al.*, 2017; Prasani *et al.*, 2021; Sengka *et al.*, 2022).

Based on measurements, the air humidity on the riverbanks in Tanta Village ranges from 75 – 80%. This is natural because epiphytes like moist habitats for their growth. Good air humidity for the growth of epiphytic ferns is around 64%-83% (Ristawan *et al.*, 2021; Roziaty *et al.*, 2016; Yunita *et al.*, 2022). The many types of plants found in the area prove that the area is still very natural and is still categorized as balanced. The ecosystem in the area is still relatively good. The lowest percentage of humidity levels that ferns can tolerate in their growth is 30%. High humidity is also influenced by rivers, namely the evaporation of water by rivers ( Ristawan *et al.*, 2021; Listiyanti *et al.*, 2022; Mahesa *et al.*, 2023). Therefore, epiphytic ferns receive sufficient and maintained moisture so that they can be abundant on river banks. Based on measurements, the height of this place on the river bank in Tanta Village is 32 meters above sea level. At this height you can find epiphytic ferns. The altitude factor of an area can influence the presence of epiphytic ferns and their species diversity (Purnawati *et al.*, 2014; Surfiana *et al.*, 2018; Hidayah *et al.*, 2021). The altitude factor will also influence other factors such as temperature and humidity. As altitude increases, the air temperature will decrease, decreasing air temperature can increase air humidity. The distribution of ferns is very wide, starting from an altitude of 0-3200 meters above sea level (Astuti *et al.*, 2018; Lestari *et al.*, 2019; Hartini, 2020). So, at an altitude of 32 meters above sea level, many epiphytic ferns are found. Based on measurements, the air temperature on the riverbanks of Tanta Village ranges between 28-30°C. This temperature is considered the optimum temperature for epiphytic ferns. The optimum temperature for nail growth is around 25-35%. The high and low temperature of an environment will affect the humidity value of the surrounding air. Each type of plant, including ferns, has minimum, maximum and optimum conditions for existing environmental factors (Imaniar *et al.*, 2017; Tnunay & Hanas, 2020; Fauziah *et al.*, 2022). The condition of the riverbank area in Tanta Village is still good for the growth of epiphytic ferns.

## CONCLUSION

Based on the results of research on the diversity of epiphytic fern species on the riverbanks of Tanta Village, Tabalong Regency, it was concluded that: There were 7 types of epiphytic fern biodiversity on the riverbanks of Tanta Village, Tabalong Regency, including: *Davallia denticulate*, *Asplenium nidus L.*, *Nephrolepis biserrate*, *Drynaria sparsisora*, *Pyrrosia lanceolata*, *Drymoglossum piloselloides*, *Microsorium punctatum*. These seven types of epiphytic ferns can be found in the riverbank area of Tanta Village because this area is relatively humid and suitable for supporting the life of epiphytic ferns. In general, all types of epiphytic ferns like humid habitats and have water sources that support their life. This research is useful for national researchers, especially because it can be used as an initial reference for similar research.

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