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IDENTIFICATION OF THE TYPE OF FERNS IN THE FOREST AREA OF NOONGAN VILLAGE

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Abstract

Ferns (*Pteridophyta*) are spore-forming cormophytes that can live in a variety of habitats both as epiphytes, terrestrial and aquatic. In the forest area of Noongan Village, many potentials play an important role in developing forest ecosystems. One such potential is ferns. The results of the study were eight types of ferns in the forest area of Noongan village which were divided into two plots of 50x50 meters at different heights, namely plot I at an altitude of 610 masl with a total of 380 ferns with the percentage: Paku Garuda (*Pteridium aquilinium*) 0.20 %, Elephant fern (*Angiopetris avecta* Hoofm) 0.01%, Red rane fern (*Selaginella australis*) 0.01%, Paku Kikir (Stenosomia Sp.) 0.14%, Ferret fern (*Nephrolepis biserrata* Schott.) 0, 21%, cecerenean fern (*Nephrolepis falcata*) 0.16%, suplir fern (*Adiantum*.) 0.12%, andam fern (*Dicranopetris linearis*) 0.12%. And plot II at an altitude of 869 meters above sea level with a total of 179 ferns with a percentage of: Garuda fern (*Pteridium aquilinium*) 0.21%, elephant fern (*Angiopetris avecta* Hoofm) 0.01%, miserly fern (*Stenosomia* Sp.) 0, 17%, Paku harupat (*Nephrolepis biserrate* Schott.) 0.21%, Paku cecerenean (*Nephrolepis falcata*) 0.15%, Suplir (*Adiantum*.) 0.10%, Paku andam (*Dicranopetris linearis*) 0.12%. In the plot I, the types and number of ferns were higher than the types and numbers of ferns in plot II. No red fern (*Selaginella australis*) was found in plot II. And the plant species Paku Harupat (*Nephrolepis biserrata* Schott). The red fern has the highest number, and the red fern (*Selaginella australis*.) has the least amount. The difference in altitude greatly affects the surrounding environment. So that these differences greatly affect the number of types and numbers of ferns.

Keywords: Ferns, Altitude, Type, *Nephrolepis biserrata* Schott*, Selaginella australis.*

INTRODUCTION

Ferns are well-known plants since they produce oxygen and food energy and meet other living requirements. Ferns are among them, a type of plant that is common in Indonesia. There are around 10,000 different varieties of fern plants on the planet's surface Ferns are spore-forming cormophytes that can live in several environments, including epiphytes, terrestrial and aquatic habitats. Ferns are separated into two parts: vegetative organs (roots, stems, rhizomes, and leaves) and leaves. Spores, sporangium, antheridium, and archegonium are the generative organs. Ferns are typically found in humid

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environments, such as tropical rain forests Windari (2015). Ferns are also plants (*Pteridophyta*) with characteristics like Cormophyta plants with spores and can live in various habitats. Agrawal (2017). Ferns are found all across the world, from the tropics to near the north and south poles, depending on their habitat. Primary forest, secondary forest, open nature, lowlands to highlands, humid, moist, shady surroundings, plantations, and roadside nails are all possible. Ferns cannot survive in dry environmental conditions. Ferns (*Pteridophyta*) are the simplest group of vascular plants and are included in the spore-forming Cormophyta that already have vessel ties. Pteridophyta can live epiphytically, hygrophytes, hydrophytes, and other plant residues (Wahyuningsih, 2019). The existence of ferns has received less attention and needs to be addressed compared to other plant groups. This is because people consider these plants to have less value for life, even though ferns (Pteridophyta) have a fairly high economic value and potential, including medicinal plants, ornamental vegetable plants, and other plants that have yet to be studied (Afrani 2020).

According to Andries (2022), ferns can be used as animal feed, dyes, medicines, and biofertilizers. Ferns can also form soil, prevent erosion, and help to weather. (Majid, 2022). Ferns have a very important role in the environment, including maintaining soil moisture, preventing soil erosion, acting as pioneers in the succession process of forest ecosystems, and having high economic value, especially as ornamental plants. Indonesia is a country that contributes to global biodiversity and has a high level of floral specificity. Gymnosperms, angiosperms, and plants with spores from mosses and ferns are included in this plant diversity. Ferns are divided into four groups: Psilophyta (ancient nails, horsetail nails, and bare nails), Lycophyta (wire nails, vines), and Equisetophyta (Pradipta, 2020). Ferns, according to Sianturi (2020), can be divided into numerous classes: Some ancient ferns have become extinct in the family, *Psilophytinae (Ancient Ferns)*. This group of ancient ferns has bare nails (no leaves) and small undifferentiated leaves (microphylls). Some do not have roots but a carrier network; they are homosporous, and the sporangium is located at the stem terminal. *The class Lycopodiinae,* which is not yet extinct, has 900 species covering four genera: Isoetes, Phyloglosum, Lycopodium, and Selaginella. *Wire nails* are plants that grow in moist conditions and belong to the Lycopodinae family (creeping nails or wire nails). *Equisetinae (Horsetail Ferns) live in damp areas and have branched, knuckled, and jointed stems. Class Filicinae* is a plant group that spreads more than 90% of its diversity; this plant is in the tropics; this plant resembles a tree with pinnate leaves; it has no cambium; and it belongs to the herbaceous plants with a flat rhizome. The study aimed to identify the different varieties of ferns present in the woodland area of Noongan Village, Minahasa Regency.

RESEARCH METHOD

Place and Time of Research

This research was conducted in the forest area of Noongan Village, West Langowan District, Minahasa Regency. This research was conducted from November-December 2021.

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Materials and Tools Used

The tools in this study used several media such as *a Roll meter, Geographic Position System (GPS), Altimeter, soil taster, hygrometer, anonemeter, Steck scissors, Photo camera, ATM, Knife/Machete.* The materials used in this study were*: raffia rope, plastic bag, fern field manual.*

Research Procedure

The stages of activities carried out in this study are: Prepare all tools and materials to be used in the field, Conduct a survey at the research location, Perform data sampling, Determine blocks or plots by taking an area of 50x50 meters in the highlands and lowlands to take a comparison of the number of ferns, Observe the body of the nails in the plot, Count the number of fern species in each plot, Then take pictures of the types of plants that are in blocks or plots. The data retrieval mechanism is that any data collected is immediately recorded in the observation table.

Research Method

The method used in this research is descriptive method, using survey and documentation techniques.
As for the Observational Variables, it uses two types, namely:

1. The main variable, namely the main variable observed, is the type of ferns present.
2. Supporting variables, namely supporting variants, namely the altitude of the place, and the surrounding environment.

Data Analysis Technique

The data obtained in the study were analyzed using the following percentages:

Ferns = (Species of Ferns)/(Total number of fern species) X 100%

Abiotic elements were measured once in each plot, and the average was calculated. The measurements begin with plot one and progress to plot 2. When observing, the abiotic parameters measured are soil pH, soil moisture, air humidity, air temperature, light intensity, and wind speed.

RESULT AND DISCUSSION

The study results in the Noongan village forest area was divided into two plots of 50x50 meters at different heights where eight types of ferns were found, which can be seen in the following table.

Table 1. Observation of fern species

No	Name of ferns		Number of ferns	
	Local Name	Scientific Name	Plot I	Plot II
1.	Garuda Ferns	*Pteridium aquilinium.*	76	38
2.	Elephant Ferns	*Angiopetris avecta Hoofm.*	5	2
3.	Red Rane Ferns	*Selaginella australis.*	4	0
4.	Stingless Fern	*Stenosomia Sp.*	56	32
5.	Harupat Ferns	*Nephrolepis biserrata Schott.*	83	39
6.	Cecerenean Ferns	*Nephrolepis falcata.*	63	27
7.	Suplir Ferns	*Adiantum.*	46	18
8.	Andam Ferns	*Dicranopetris linearis.*	47	23
Total Plot I and Plot II			380	179

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From the table above, it is known that there are 8 types of ferns in 2 plots, namely Garuda Fern *(Pteridium aquilinium),* Elephant Fern *(Angiopetris avecta Hoofm.),* Red Rane Fern *(Selaginella australis.),* Stingless Fern *(Stenosomia Sp.),* Harupat Fern *(Nephrolepis biserrata Schott.),* Cecerenean Fern *(Nephrolepis falcata.)* Suplir Fern *(Adiantum.),* Andam Fern *(Dicranopetris linearis.).* Data were analyzed using a percentage based on the number of ferns found in each plot.

Table 2. Percentage of observation of fern species

Plot I		
Species	Total	Percentage (%)
Paku Garuda *Pteridium aquilinium.*	76	0,20%
Paku Gajah *Angiopetris avecta Hoofm.*	5	0,01%
Paku rane merah *Selaginella australis.*	4	0,01%
Paku Kikir *Stenosomia Sp.*	56	0,14%
Paku Harupat *Nephrolepis biserrata Schott.*	83	0,21 %
Paku Cecerenean *Nephrolepis falcata.*	63	0,16%
Suplir *Adiantum.*	46	0,12%
Paku Andam *Dicranopetris linearis.*	47	0,12%

Table 3. Percentage of observation of fern species

Plot II		
Species	Total	Percentage (%)
Paku Garuda *Pteridium aquilinium.*	38	0,21%
Paku Gajah *Angiopetris avecta Hoofm.*	2	0,01%
Paku Kikir *Stenosomia Sp.*	32	0,17%
Paku Harupat *Nephrolepis biserrata Schott.*	39	0,21%
Paku Cecerenean *Nephrolepis falcata.*	27	0,15%
Suplir *Adiantum.*	18	0,10%
Paku Andam *Dicranopetris linearis.*	23	0,12%

This study used the single plot method on 2 plots. By making a plot of each station measuring 50x50 meters. The first plot is at an altitude of 610 meters above sea level with a total of 380 existing ferns, that type Garuda Fern *(Pteridium aquilinium)* 0.20%, Elephant Fern *(Angiopetris avecta Hoofm)* 0.01% Red rane Fern *(selaginella australis.)* 0.01%, Stringless Fern *(Stenosomia Sp.)* 0.14%, Harupat Fern *(Nephrolepis biserrata Schott)* 0.21%, Cecerenean Fern *(Nephrolepis falcata)* 0.16%, Suplir Fern *(Adiantum)* 0.12%, Andam Fern *(Dicranopetris linearis.)*0.12%. And in plot II which is at an altitude of 869 meters above sea level with a total of 179 existing ferns, that type of Garuda fern *(Pteridium aquilinium.)* 0.21%, Elephant fern *(Angiopetris avecta Hoofm.)* 0.01%, Stringless fern *(Stenosomia Sp.)* 0.17%, Harupat fern *(Nephrolepis biserrata Schott.)* 0.21%, Cecerenean fern *(Nephrolepis falcata)* 0.15%, Suplir fern *(Adiantum.)* 0.10%, Andam fern *(Dicranopetris linearis)* 0.12%.

The types and number of ferns in plot I were greater than the types and number of ferns in plot II. There was no red fern fern (Selaginella australis) found in plot II. And the plant species Harupat fern *(Nephrolepis biserrata schott)* has the highest number, while the Red rane fern *(Selaginella australis.)* has the lowest. The variation in altitude has a significant impact on the surrounding environment. Soil moisture, pH, temperature, wind speed, and light intensity are just a few examples. As a result, these changes have

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a significant impact on the number of fern varieties and numbers.

The sampling procedure was carried out at each stage in the research path using descriptive methods with survey and documentation techniques. Sampling of ferns was carried out at each location. In the observation plot, all types of ferns were observed.

Photographs of each type of fern discovered were taken, and information on the fern was documented. Identification was accomplished by examining the exterior morphology of the samples discovered and then comparing them to some literature (identification books and related journals).

Table 4. Abiotic factor measurements

Plot	Soil Ph	Humidity Land (%)	Humidity (%)	Air Temperature (°C)	Soil Temperature (°C)	Light intensity (KLux)	Wind Speed (m/s)
1	6,4	22,6	71,5	29,3	28,3	≥500	6,7
2	7	33,3	65,8	31,3	33,2	≥500	10

The results of abiotic measurements have diverse values. From the results of abiotic measurements on plot 1, it is known that the average soil pH 6.4, soil moisture 22.6%, air humidity 71.5%, air temperature. 29.3 °C, ground temperature 28.3 °C, luminous intensity ≥500 and wind speed 6.7 m/s. While in plot 2 it is known that the average soil pH7, soil moisture 33.3%, air humidity 65.8%, air temperature. 31.3 °C, ground temperature 33.2 °C, luminous intensity ≥500 and wind speed 10m/s (Table 4). From these results it is known that this abiotic factor supports the growth of ferns in noongan village forest.

Classification and Morphology

Based on the morphological characteristics of each type of fern found in the study area, according to Van Steenis and also from the results of observations made in the research area, namely:

1. Garuda Fern (*Pteridium aquilinium.*)

The ground fern thrives in shade but can grow without it. The stems are straight and branching, slightly brown and slightly smooth, and covered with hairs. The leaves can grow 7–10 cm long, and the branches are loaded with leaves; the smaller the leaves, the more cone-shaped and green in color they are. The roots are fibrous and robust, and they develop in clusters. It possesses spores that are buried along the edges of light brown leaves. The shape of the sorus is rectangular.

Picture 1. Garuda Fern (*Pteridium aquilinium.*)

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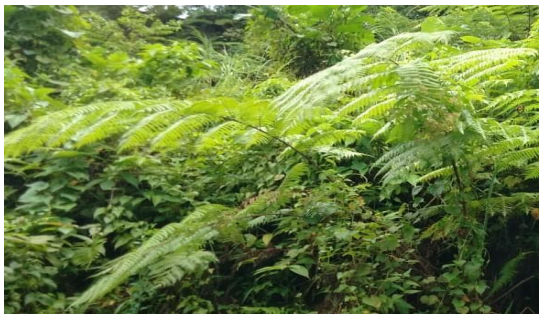
2. Elephant Fern (Angiopetris avecta Hoofm.)

Ferns have a large stature but no stem, unlike pole nails. Has a protruding stem base. It features double-finned fronds and branches, each with a leaf blade, giving this fern rich growth. The talcum has a length of 2-3 m and a width of up to 2 m. green, scaly stalks that are hairy on the bottom. The thin leaves have blunt-toothed edges and fine, coarse-toothed, and tapered edges.



Picture 2. Elephant Ferns (*Angiopetris avecta Hoofm.*)

3. Red Rane Fern (*Selaginella australis.*)

It is a hammered nail. The stems are not epiphytic, lying and partially standing upright, branched like a fork, arranged in four rows facing each other, and 20–35 cm long. The stems are red like hearts. It forms a clump of robust rhizomes and creeping roots. Each stem has two opposing leaves that are quite tiny. Spores can be found beneath the leaves.

Picture 3. Red Rane Fern (*Selaginella australis.*)

4. Stringless Fern (Stenosomia Sp.)

It is an epiphyte that grows around the roots of trees and rocks. It is a fern that lives underground and is an epiphyte. Brown stems grow vertically to a height of 3-6 cm. The green leaves are 5–9 cm long and 1 cm broad. The surface of the leaf is smooth and light green in hue. In rhizomes with roots and clusters, the spores are on the leaf's underside, and the sori are spherical.

Picture 4. Stringless Fern (*Stenosomia Sp.*)

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5. **Harupat Fern (*Nephrolepis biserrata Schott*)**

It is a soil fern that can grow and survive in open areas without shade. Brown upright stems with white scales grow 11–20 cm tall. The leaves alternate down the stem, getting smaller and smaller as they come closer to the end. They are formed like a cone of 1-3 cm long and are light green. The leaf blade is smooth, and the roots are rhizomes that grow into clumps. Spores are found under the leaf blade, which is dark brown and placed along the edge of the leaf. The scoria is in the shape of a line and is uneven.

Picture 5. Harupat Fern (*Nephrolepis biserrata Schott*)

6. **Cecerenean Fern (*Nephrolepis falcata.*)**

It is a soil fern and epiphyte that may grow in open areas with or without shade. The erect stems are black and range from 20 to 37 cm. The leaves alternate on the stem, getting smaller as you approach the tip, and are 1-3 cm long and 0.5-2 cm wide. Dark green in color, with a relatively broad leaf blade, a rhizome root, and a very powerful clump. The black spores are under the leaf blade and along the leaf margins. The sorus has a rounded contour.

Picture 6. Cecerenean Fern (*Nephrolepis falcata.*)

7. Suplir (*Adiantum.*)

A fern grows solely in the shadow and lives in the ground. It has a very little stem that grows to 20-50 cm and is blackish brown, with branches crowded with leaves. The leaves are oval and curled at the ends, measuring 0.5-1 cm in length and 0.5 cm in breadth. Green is the color of the leaves. There are 7-8 stems clumped in one bunch of fibrous roots. The spores are brown-black and form a huge shape. They are placed on the upper border of the leaf.

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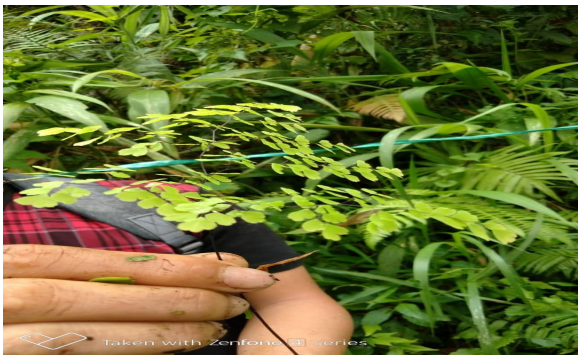

Picture 7. Suplir (*Adiantum.*)

8. Andam Fern (*Dicranopetri linearis.*)

Ferns that live underground have to grow in a shaded area or not. The erect stems, which can be 20–37 cm tall, are black with brown scales. The stem's leaves are arranged alternately and gradually narrower toward the end, resembling a cone between 1-3 cm long and 0.5 cm wide. The leaves have rhizomes (roots), are robust, tough, light green in color, and grow in clusters. Spores are found beneath the leaf blade, along the edge of the leaf, and are light brown with a line-shaped sorus.

Picture 8. Andam Fern (*Dicranopetri linearis.*)

CONCLUSION

In the forest area of Noongan village, by taking samples from 2 different plots, there were eight species of ferns consisting of the Garuda Fern *(Pteridium aquilinium),* Elephant Fern *(Angiopetris avecta Hoofm.),* Red Rane Fern *(Selaginella australis.),* Stringless Fern *(Angiopetris avecta Hoofm.) Stenosomia Sp.),* Harupat Fern *(Nephrolepis biserrata Schott.),* Cecerenean Fern *(Nephrolepis falcata.)* Suplir*, (Adiantum),* Andam Fern *(Nephrolepis exaltata.).* Harupat Fern *(Nephrolepis biserrata schott.).* It is the most numerous and dominant type of fern from the sample data taken in 2 different plots in the Noongan village forest area. Differences in altitude and environment greatly affect the number and types of ferns.

REFERENCE

Afrani, R. (2020). Identifikasi Tumbuhan Paku (Pteridophyta) di Kelurahan Kapuas Kiri Hilir. *Jurnal Keguruan dan Ilmu Pendidikan*, *4(2),* 57.

Agrawal, T. (2017). General Aspects of Pteridophyta. *International Journal of Current Research and Academic Review*, *5(3)*, 81

Andries, A, E, A. (2022). Inventarisasi Tumbuhan Paku di Ruang Terbuka Hijau Kampus Universitas Sam Ratulangi Manado, Sulawesi Utara. *Jurnal Bios Logos, 12(2),* 141

Arini, D. I. D., & Kinho, J. (2012). Keragaman Jenis Tumbuhan Paku (Pteridophyta) di Cagar Alam Gunung

indonesian.biodivers.j.
Vol. 4, No. 1, April 2023
ISSN : 2722-2659

Ambang Sulawesi Utara. *Info BPK Manado, 2(1),* 17-40.
Majid, A., & Aulia, A. (2022). Keragaman Tumbuhan Paku (Pteridophyta) di Taman Biodiversitas Hutan Hujan Tropis Mandiangin. *Jurnal Al-Azhar Indonesia Seri Sains dan Teknologi, 7(2),* 103.
Pradipta, A., Rara, S., & Seri, S. A. (2020). Inventarisasi Jenis Tumbuhan Paku (Pteridophyta) di Desa Padang Pelasan Kabupaten Seluma. *Jurnal Biosilampari: Jurnal Biologi. 3(1), 12.*
Sianturi, A, S, R. (2020). *Eksplorasi Tumbuhan Paku Pteridophyta di Wilayah Ketinggian yang Berbeda*. Semarang: Universitas Negeri Semarang
Van Steenis C. G. G. J. (1978). *Flora*. PT Pradnya Paramita. Jakarta/
Wahyuningsih., & Merti, T. (2019). Inventarisasi Tumbuhan Paku (*Pteridophyta*) di Perkebunan PT Bina Sains Cemerlang Kabupaten Musi Rawas. *Jurnal Biosilampari: Jurnal Biologi*, *2(1),* 29.
Windari, N. N. (2015). Inventarisasi Dan Identifikasi Tumbuhan Paku Di Kawasan Cafe and Rest Area Gumitir Kabupaten Jember Sebagai Bahan Penyusun Karya Ilmiah Populer.