

Original article

Exploration of Terrestrial Fern (Pteridophyta) in Mt. Rore Kautimbu Area Lore Lindu National Park

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Abstract

The study entitled "Exploration of Terrestrial Ferns in Mountain of Rore Katimbu, Lore Lindu National Park" has been carried out from March to September 2019. This study was aimed to describe the species of terrestrial ferns in Mountain of Rore Kautimbu, Lore Lindu National Park. The method was used botanical exploration methods. The results showed that there were 19 species consisted of 13 families of terrestrial ferns. Mostly, ferns were distributed in the tropics and subtropics area. Species that only distributed naturally in Sulawesi dan Maluku was *Alsophila celebica* (Blume) Mett.

INTRODUCTION

Indonesia is one of the countries with the highest plant biodiversity in the world, One of them is the fern. ferns are the cormophyta with spores that can live in various habitats such as epiphyte, terrestrial and aquatic (Ekoyani, 2007).

Ferns are an important component in tropical forests that are able to adapt in various environments. These plants are dominate in the forest, especially in humid, protected or shaded conditions, but several species are found in the open areas (Sastrapradja *et al.*, 1979). The total number of identified ferns in the world were estimated about 12,000 species (Chin, 1997), while the ferns in Indonesia were estimated about less than 1,300 species (LBN-LIPI, 1980).

Terrestrial ferns were found living in forest, both in the lowlands and highlands. There were also various kind of habitats such as rocky soil, humid, dry areas, open areas and sheltered areas (Kinho, 2009). Ferns were dominant in the highlands compared to the lowlands. This was caused by high humidity, the amount of water flow, the presence of mist and the amount of rainfall (Sastrapradja *et al.*, 1979).

Mount Rore Kautimbu is a mountain that located in the Lore Lindu National Park, Poso, Central Sulawesi, with the altitude 2400 meters above sea level (MASL), a high level of humidity that suitable for Pteridophyta, which was one of the plants that is still lacking information. This study was conducted because there is still a lack of botanical studies on ferns in Rore Kautimbu, Lore Lindu National Park.

MATERIAL AND METHODS

Specimen collection was done by using exploring method (Rugayah *et al.*, 2004). Exploring starts from mountain valley about (1,600 MASL) to the top of Rore Kautimbu mountain (2,400 MASL) by following the hiking trail in April 2019. The fern samples were on terrestrial habitus, also a fertile plants (with spores), and the samples were documented. Then samples were labeled with a collection number. Habitus information, coordinate points and sampling time were written in the log book and the map of mount Rore Katimbu can be seen in figure 1.

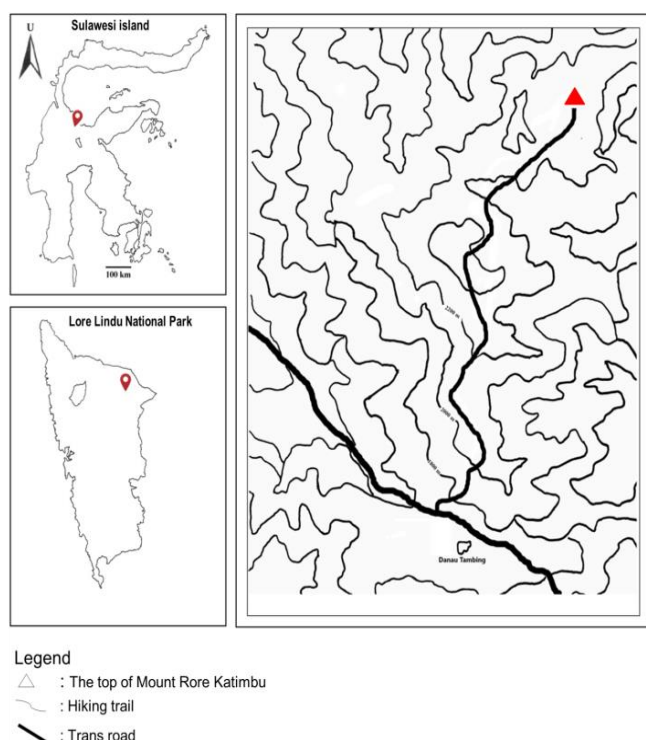


Fig 1. Map of the Mount Rore Katimbu in Lore Lindu National Park.

The identification process was based on the morphological characteristics of terrestrial ferns using the identification key book "Ferns and Fern Allies (Tryon and Tryon, 1982)" and the literature related to this study, as well as using reference specimens stored in Herbarium Celebense (CEB), Tadulako University and using <http://www.theplantlist.org/> to confirm the scientific name.

The morphology of ferns were described according to the observations in the field and laboratory. Measurements and observations were habitus, stem (surface, shape and color), leaves (shape, strands, tip, base, repetition, leaf surface), sorus (color, shape), root shape and overall length of the plants. Descriptions of ferns were obtained using terminology from the dictionary "Botanical Latin" (Stearn, 1988; Harris and Harris, 1994).

RESULT AND DISCUSSIONS

The results showed that there were 19 species consisting of 13 families (Table 1 & Fig 2). The ferns were generally distributed in tropical and subtropical regions, and there was 1 endemic species of Sulawesi, Maluku, Ternate, Ambon, namely *Alsophila celebica* (Blume) Mett.

Description of *Pteridophyta*

Allantodia aspera (Blume) Ching

Family : Athyriaceae

Terrestrial; Fibrous roots, erectile rhizomes, height/length 105 cm. Round petiole, spiny, 33-46 cm, light green. Compound leaves, lanceolate shape, slicky surface, tapered tip, tapered base, serrated edge, pinnate reinforcement, 12.5 x 2.5 cm, dark green. White sporangium, aligned sporangium.

Stenochlaena palustris (Burm.f.) Bedd.

Family : Blechnaceae

Terrestrial; Fibrous roots, tall erectile rhizomes with 119 cm. Round rod, hairy surface, brown. Compound leaves, lanceolate, slicky surface, serrated edges, tapered base, tapered tip, pinnate, dark green, 12.5 x 1.3 cm. Dark brown sporangium, pinned sporangium.

Alsophila celebica (Blume) Mett.

Family : Cyatheaceae

Terrestrial; Fibrous root, woody plants, round stem, black spiny surface. Compound leaves, lanceolate, smooth surface, serrated edges, tapered base, tapered tip, pinnate reinforcement, 10.5 x 2.3 cm, dark green color. Black sporangium, spreads sporangium.

Hypolepis punctata (Thunb.) Mett.

Family : Dennstaedtiaceae

Terrestrial; Tap roots, herbaceous plants, height/length 98 cm. Round stem, slicky surface, dark brown. Leaf length 28 cm, blackish brown. compound leaves, linear, flat surface, incised edge, tapered base, tapered tip, pinnate reinforcement, 2 cm x 3 mm, green color. Green sporangium, spread sporangium.

Dipteris conjugata Reinw.

Family : Dipteridaceae

Terrestrial; erectile rhizomes, round stems, smooth surface, shiny black. Leaves are 10-16 cm, light green. Two-leaf compound leaves, fan-shaped and not rigid, flat surface, flat edge, tapered base, tapered tip, fingers reinforced, 38 x 33 cm, light green color. Sporangium are light brown, spread irregularly sporangium.

Dicranopteris linearis (Burm.f.) Underw.

Family : Gleicheniaceae

Terrestrial; fibrous roots, erectile rhizomes, round stems, hairy surface, dark green, there are internodes 21.5-17 cm. Stalks are 2 cm, brown hair. Compound leaves; linear, smooth surface, flat edge, tapered base, tapered tip, parallel reinforcement, 1.3 cm x 2 mm, dark green color. The color of sporangium is light green, parallel sporangium.

Table 1. Terrestrial ferns in Mount of Rore Kautimbu, Lore Lindu National Park.

No	Family	Scientific Name	Coordinate	Elevation (m. asl.)
1	Athyriaceae	<i>Allantodia aspera</i> (Blume) Ching	S 01°19'16.24", E 120°18'05.42"	1656
2	Blechnaceae	<i>Stenochlaena palustris</i> (Burm.f.) Bedd.	S 01°19'01.94", E 120°18'16.90"	1813
3	Cyatheaceae	<i>Alsophila celebica</i> (Blume) Mett.	S 01°16'56.55", E 120°18'33.62"	2343
4	Dennstaedtiaceae	<i>Hypolepis punctata</i> (Thunb.) Mett.	S 01°19'14.21", E 120°18'05.86"	1705
5	Dipteridaceae	<i>Dipteris conjugata</i> Reinw.	S 01°19'09.42", E 120°18'04.99"	1742
6	Gleicheniaceae	<i>Dicranopteris linearis</i> (Burm.f.) Underw.	S 01°19'16.41", E 120°18'03.57"	1646
7		<i>Sticherus truncates</i> (Willd.) Nakai	S 01°18'30.66", E 120°18'38.30"	2028
8	Lindsaeaceae	<i>Odontosoria chinensis</i> (L.) J. Sm.	S 01°18'20.46", E 120°18'33.21"	2042
9	Lycopodiaceae	<i>Lycopodiella cernua</i> (L.) Pic. Serm.	S 01°18'31.21", E 120°18'37.45"	2019
10		<i>Lycopodium clavatum</i> L.	S 01°18'31.21", E 120°18'37.45"	2028
11		<i>Lycopodium complanatum</i> L.	S 01°18'20.46", E 120°18'33.21"	2030
12	Nephrolepidaceae	<i>Nephrolepis cordifolia</i> (L.) C. Presl	S 01°19'10.74", E 120°18'04.36"	1734
13	Oleandraceae	<i>Oleandra neriiiformis</i> Cav.	S 01°19'09.42", E 120°18'04.99"	1742
14	Polypodiaceae	<i>Belvisia mucronata</i> Copel.	S 01°17'54.64", E 120°18'20.08"	2131
15		<i>Drynaria sparsisora</i> (Desv.) T. Moore	S 01°19'14.21", E 120°18'05.86"	1705
16		<i>Phymatosorus scolopendria</i> (Burm. F.) Pic. Serm.	S 01°17'39.61", E 120°18'23.54"	2148
17		<i>Selliguea feei</i> Bory	S 01°19'14.21", E 120°18'05.86"	1724
18	Selaginellaceae	<i>Selaginella doederleinii</i> Hieron	S 01°18'46.82", E 120°18'29.75"	1930
19	Thelypteridaceae	<i>Pronephrium triphyllum</i> (Sw.) Holttum	S 01°19'08.34", E 120°18'06.47"	1756

Sticherus truncates (Willd.) Nakai

Family : Gleicheniaceae

Terrestrial; Tap roots, upright creeping plants. Round rod, smooth surface, green color. Green stem with 30 cm. Compound leaves, linear shape, flat surface, curved edge, tapered base, tapered tip, parallel reinforcement, 2,2 cm x 2 mm, green color. The color of sporangium is brown.

Odontosoria chinensis (L.) J. Sm.

Family : Lindsaeaceae

Terrestrial; fibrous roots, bush plants with height/length 67 cm. round stem, hairy, light green. Long petiole 28,5 cm, light green. Compound leaves, bilobed shape, flat surface, flat edge, tapered base, bilobed tip 3 lobes, parallel reinforcement, 7,5x1.5 cm, light green color. brown sporangium, sporangium at the top of the leaf.

Lycopodiella cernua (L.) Pic. Serm.

Family : Lycopodiaceae

Terrestrial; Tap roots, Creeper plants. rounded stems, hairy surface, yellowish green color, compound leaves, needle-like shape, tapered tip, flat edge, tapered base, parallel reinforcement, green color. Brown sporangium.

Lycopodium clavatum L.

Family : Lycopodiaceae

Terrestrial; Tap roots, Rhizome plant with branches. Round rod, hairy surface, yellowish green color. yellowish white stalk with 30 cm. Single leaf, lanceolate, tapered end, flat edge, obtused base, non-stemmed stretchy leaf surface or unbranched microfil spirally, parallel reinforcement, light green color. Yellowish green sporangium, cone branches sporangium.

Lycopodium complanatum L.

Family : Lycopodiaceae

Terrestrial; Tap roots, creeper plants, round stem, spiny surface, light green color. Compound leaves, small needle-like shape, tapered tip, flat edge, tapered base, smooth surface, parallel reinforcement, green color. Black sporangium.

Nephrolepis cordifolia (L.) C. Presl

Family : Nephrolepidaceae

Terrestrial; fibrous roots, erectile rhizomes, height/length 89 cm. Petiole 18 cm, dark brown. Single leaf, lanceolate shape, flat surface, serrated edge, split base, tapered tip, pinnate reinforcement, 2,5 cmx5 mm, dark green color. dark green sporangium, parallel sporangium.



Fig 2. Diversity of terrestrial ferns in Mount of Rore Kautimbu, Lore Lindu National Park.

Oleandra pilosa Hook

Syn. *Oleandra neriiformis* Cav.

Family : Oleandraceae

Terrestrial; creeper plants, round rod, hairy surface, dark brown color. brown stem with 5 cm. Compound leaves, lanceolate, tapered tip, serrated edge, tapered base, slicky surface, pinnate reinforcement, 21x2,5 cm, green color. Sporangium is brown and aligned.

Belvisia mucronata Copel.

Family : Polypodiaceae

Terrestrial; Fibrous roots, upright, height/length 54 cm. Stalk are green with 2-3 cm. Single leaf, lanceolate, tapered tip, flat edge, tapered base, smooth surface, parallel reinforcement, 34x3,2 cm green. light brown sporangium.

Drynaria sparsisora (Desv.) T. Moore

Family : Polypodiaceae

Terrestrial; Fibrous roots, rhizome, height/length 49 cm, round stem, smooth surface, black color, long stalk with 2 cm, light green color. Single leaf, pinnate, tapered tip, incised edge, tapered base, nodular surface, pinnate reinforcement, 72x35 cm, dark green color. sporangium.

Phymatosorus scolopendria (Burm. F.) Pic. Serm.

Family : Polypodiaceae

Terrestrial; Fibrous roots, erectile rhizomes, height/length 42 cm, round stems, nodular surface, light brown color. Stalk 21 cm, dark green color. Compound leaves, lanceolate, tapered tip, flat edge, curved base, flat surface, pinnate reinforcement, 14,5 x 2 cm, dark green color. sporangium is brown and parallel.

Selliguea feei Bory

Family : Polypodiaceae

Terrestrial; Fibrous roots, creeper plants, round stem, hairy surface, black color. Stalk length 18 cm, light green color. Single leaf, elongated shape, tapered tip, raised edge, tapered base, slicky surface, pinnate reinforcement, 21x8.3 cm, dark green color. sporangium is brown and pinnate.

Selaginella doederleinii Hieron

Family : Selaginellaceae

Terrestrial; Fibrous roots, terna, height/length 15-35 cm. round stem, spiny surface, green color. Stalk length 2,5 -5.5 cm, green color. Compound leaves, ellipse, tapered edges,

serrated edges, flat base, slicky surface, pinnate reinforcement, 9,5 cmx6 mm, green color. brown sporangium.

Pronephrium triphyllum (Sw.) Holttum

Family : Thelypteridaceae

Terrestrial; Fibrous roots, erectile rhizome, height/length 65 cm. long stems 9-13 cm, hairy surface, dark green color. Compound leaves, elongated, tapered tip, waved edge, tapered base, flat surface, pinnate reinforcement, 15x6 cm, dark green color. brown sporangium pinnate.

CONCLUSION

The results concluded that there were 19 species of terrestrial ferns consisting of 12 families in Mount of Rore Kautimbu. There was an endemic species of Sulawesi and Maluku, *Alsophila celebica* (Blume) Mett. Further exploration of habitat for other ferns such as epiphytes and aquatics to complete the data at Mount Rore Kautimbu, Lore Lindu National Park.

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