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Morphological Characteristics of Bird's Nest fern (*Asplenium nidus* l.) In the Wisdom Park UGM Area

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Abstract: This research aims to determine the morphological characteristics of the bird's nest fern (*Asplenium nidus* L.) in the Wisdom Park UGM area. The study employs a purposive sampling research method to obtain data and identify the morphological traits of the bird's nest fern (*Asplenium nidus* L.). Morphological character observations were conducted directly in the field. The field research took place in the Wisdom Park UGM area. This study examines five characteristics of (*Asplenium nidus* L.), including habitus, leaves, sorus arrangement, roots, and stems. The leaves of (*Asplenium nidus* L.) are elongated, arranged in a circular pattern on a creeping rhizome, and range in color from light to dark green with a glossy surface. The sorus of (*Asplenium nidus* L.) is yellowish-brown and has a net-like ornamentation. The roots of (*Asplenium nidus* L.) are fibrous, while the stem is dark brown to grayish-black.

Keywords: Asplenium nidus L., Characteristics, Morphological, Purposive Sampling, Wisdom Park UGM.

Introduction

Plant morphology is the science that studies the physical form and structure of plants; the term morphology originates from the Latin word 'morphus' meaning form or shape. This facilitates researchers in classifying plant types, as morphological form is a major indicator for visually identifying plants. Thus, the vast diversity of plants can be identified and classified to simplify the naming of species, families, and even kingdoms (Gembong, 2004). Ferns (Pteridophyta) are distributed throughout the world. According to Tjitrosoepomo et al. (1994), Pteridophyta are widely distributed from humid tropics to beyond the Arctic Circle. A very large number are found in tropical rainforests and they also thrive in temperate regions, in forests, moist grasslands, along roadsides and rivers.

The abundance of ferns is due to the climate supporting their growth. Ferns require sunlight and live in open places, are widely distributed, and can live in groups, solitarily, or as climbers. Some ferns form thickets covering bare ground, in areas with low light intensity and high humidity. Forest ferns generally prefer shade. Ferns protected from heat and strong winds mostly grow smaller and slower compared to ferns in open areas (LIPI, 1980). Ferns play an important role in the community and structure of tropical rainforests and are involved in nutrient cycling. Ferns also have several important roles, namely in humus formation, protecting soil from erosion, maintaining soil moisture, and being pioneer plants in the early stages of forest ecosystem succession. One fern species, the bird's nest fern (*Asplenium nidus* L.), is a type of fern that naturally lives as an epiphyte. Indonesian people know it by various local names, such as: kadaka, badaba (Sundanese), simbar merah (Javanese), lokot (Kalimantan), tatoe hoekoen, tato hukung (Maluku), bunga minta doa (Buginese), paku sarang burung, pakis sarang burung (Indonesian) (Sastrapradja et al., 1979). The habit of the bird's nest fern (*Asplenium nidus* L.) is that of an epiphytic shrub with a short stem. It grows as an epiphyte or can also be found on soil surfaces and rocks in cool, moist, and shaded places (Sastrapradja et al.,

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1979). Classification of Bird's Nest Fern (*Asplenium nidus* L.):

Kingdom : Plantae
Division : Pteridophyta
Class : Polypodiopsida
Order : Polypodiales
Family : Aspleniaceae
Species : *Asplenium nidus* L.
(Nasution, 2018)

The Bird's Nest Fern has circularly arranged leaves forming a basket (bird's nest) shape and has sori attached to the lines of the lateral veins on the underside of the leaf, which are light brown and linear in shape. This plant is utilized by the community as an ornamental plant (Ridianingsih et al., 2017). Mardiya in Fitrah (2014) added that *Asplenium nidus* is a type of fern where various insects, such as ant colonies and others, are often found. Therefore, the researcher wants to conduct this research entitled "Morphological Characteristics of the Bird's Nest Fern (*Asplenium nidus* L.) in the Wisdom Park UGM Area". This research is useful for understanding fern types, especially the bird's nest fern (*Asplenium nidus* L.).

Materials And Methods

This type of research is observational research using a direct purposive sampling method. Observations wereconducted on December 24, 2024, in the Wisdom Park UGM area from 10:00 AM to 12:00 PM Western Indonesian Time. The subject of this research is the morphological characteristics of the bird's nest fern (*Asplenium nidus* L.) using the purposive sampling method, which is a sampling technique used when the researcher already has target individuals with characteristics that match the research (Dana P. Turner, 2020).

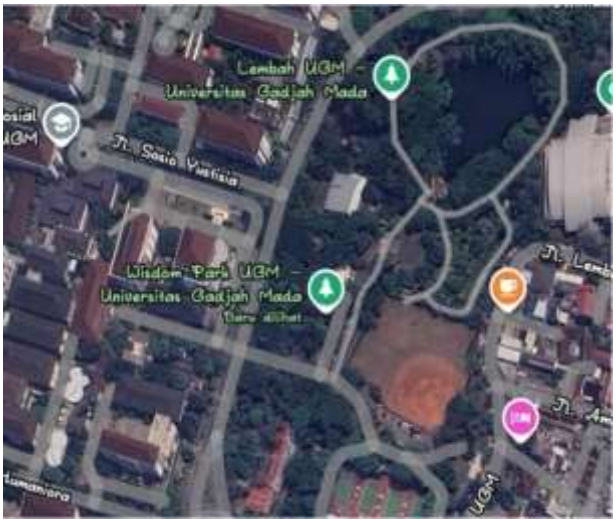


Figure 1. Wisdom Park UGM Area

The observation location is in the Wisdom Park UGM area. The tools used included observation sheets, writing instruments, white manila paper, a measuring tape, a dissecting lens, a mini microscope, and a mobile phone. The material used was the bird's nest fern plant (*Asplenium nidus* L.). Observations were conducted once using the direct observation method. The procedure for the direct observation method involved observing 1 plant for 2 hours from 10:00 AM to 12:00 PM. The direct observation method was carried out by recording and observing the morphology of the leaves, sorus arrangement, roots, and stem.

Results And Discussion

Results

Morphological Characteristics of Bird's Nest Ferns (*Asplenium nidus* L.)

The morphological characters of the Bird's Nest Fern (*Asplenium nidus* L.) were observed, and 4 morphological characters were described: habitus, leaves, sorus arrangement, roots, and stem. The following is a description of the morphological characteristics of the Bird's Nest Fern (*Asplenium nidus* L.):

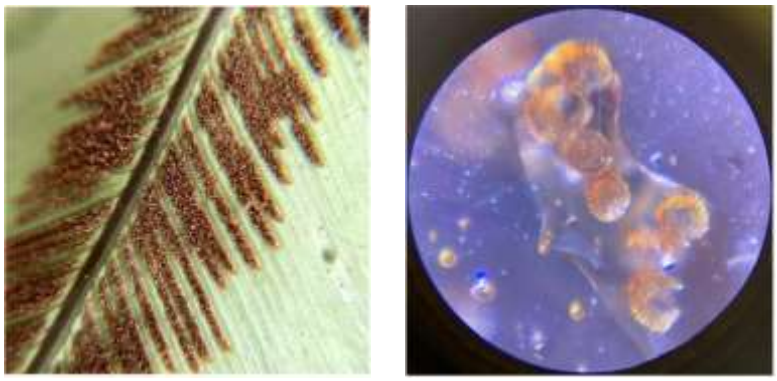
Table 1. Observation results of the morphological characters of the bird's nest fern (*Asplenium nidus* L.)

Character	Description
Root System	Fibrous, brown color
Root Length	Average 8 cm
Stem	Average 5 cm
Surface	Longest stem reaches 100 cm and shortest 21
Stem	cm Green
Length Leaf	Arranged circularly and incomplete leave because it generally only consists of a leaf stalk (which is
Color	very short and fused with the base of the leaf vein) and an elongated leaf blade.
Leaf Arrangement	Simple
Leaf Blade Shape	Wavy
Leaf Margin	Pointe
Leaf Base	d
Leaf Apex	Pointe
Leaf	d
Surface	Smooth, glossy
Leaf	Single, prominent upwards
Midrib/Vein	Pinnate, single
Leaf Venation	Smoothly wavy and thin
Leaf Texture	Longest leaf reaches 128 cm and shortest 49
Leaf Length	cm In one plant, there are an average of 25
Number of Leaves	leaves Brown color, arranged following the
Sorus	leaf veins
Sori	Shaped like lines, brown color, located on the lower leaf surface

Next are the pictures morphological of the Bird's Nest Fern (Asplenium nidus L.) in the form of leaves, sorus arrangement, roots and stems:

(a) (b) (c) (d) (e)

Figure 2. Leaves. (a) Young leaf bud, (b) Ventral part of leaf, (c) Dorsal part of leaf, (d) Leaf tip, and (e) Mature leaf.



(a) (b)

Figure 3. (a) Sorus, (b) Sporangium

Figure 4. Roots of the bird's nest fern

Figure 5. Stem.

DISCUSSION

Habitus

The bird's nest fern (*Asplenium nidus* L.) can reach a height of 7-150 cm. In the bird's nest fern, as it matures, the stem and leaves become sturdier. Furthermore, at the mature stage, the bird's nest fern also becomes more active in the reproduction process, producing sporangia containing spores to continue its life cycle. Overall, as it matures, the bird's nest fern becomes more proficient in spore formation and reproduction. The distinctive nest-forming habitus is a key functional adaptation; a recent study confirms that this rosette structure is highly effective at intercepting and retaining leaf litter, which in turn decomposes to create a unique "canopy soil" that provides the fern with essential nutrients and moisture, supporting its growth and reproductive maturity in the epiphytic environment (Bittner et al., 2023).

Leaves

Morphologically, the bird's nest fern consists of elongated leaves or fronds arranged circularly on a creeping rhizome with brownish-black hair-like roots. The leaves or fronds of the bird's nest fern have a papery texture, are light green in color, and the spores are densely arranged in a pinnate pattern. Its habit is that of an epiphytic shrub with a short stem. The leaves are arranged circularly around the stem, forming a shape resembling a bird's nest. The bird's nest fern has simple leaves; light to dark green and glossy; oblong to obovate in shape; length can reach 150 cm and width 30 cm; leaf margin is entire; leaf apex is acute; young leaves emerge from the center of the stem. Spore cases are arranged in dense, linear, pinnate lines on the lower surface of the leaf, brown in color. It grows as an epiphyte or can also be found on soil surfaces and rocks in cool, moist, and shaded places. The bird's nest fern (*Asplenium nidus* L.) found was characterized by leaf blades arranged to form a rosette and resembling a nest. The leaf tip is pointed or rounded with an entire leaf margin and has a wavy or glossy leaf surface texture. The same was also stated by Nurcahyati (2016) that the bird's nest fern (*Asplenium nidus* L.) has green leaves with a circular rosette arrangement. The underside of the leaf is paler than the upper side. The leaf venation is pinnate with a prominent midrib on the upper side.

Sorus Arrangement

This bird's nest fern has elliptical (elipticus) spores that are yellowish-brown and have a net-like ornamentation (retiformis foveatus). Pranita et al. (2017) also added that the bird's nest fern (*Asplenium nidus* L.) is characterized by almost all sori being linearly arranged and the spores being elliptical in shape. Recent studies corroborate that the linear sori, positioned on the acroscopic side of the veins, are a stable and defining characteristic of the *Asplenium nidus* complex, aiding in its identification amidst similar species (Wei & Zhang, 2020). Furthermore, advanced imaging techniques have detailed the spore ornamentation as a prominent, perforated wing (alate-perforate), providing critical data for pteridological taxonomy (Loriga et al., 2021).

Roots

This bird's nest fern has fibrous roots, a short rhizome stem whose surface is covered by hairs. The bird's nest fern (*Asplenium nidus* L.) has morphological characteristics in the form of fibrous roots with an erect rhizome, dichotomously branched, located along the lower part of the rhizome. The bird's nest fern has sharp, staggered roots, and the area around it is covered with rose-colored leaves. In the area behind it, there is a cluster of sharp and staggered roots (Karlita, 2020). Research on epiphytic ferns highlights that the dense, non-photosynthetic root masses of species like A. nidus are crucial for nutrient acquisition. These roots efficiently host symbiotic mycorrhizal fungi, which significantly enhance phosphorus uptake in the nutrient-poor canopy environment (Chang et al., 2021). The overall root system architecture is adapted for optimal anchorage and water retention, forming a "root basket" that traps organic debris (Kawai & Koga, 2023).

Stem

The stem (rhizome) of the bird's nest fern (*Asplenium nidus* L.) is dark brownish-black or dark gray in color. This stem is typically short, grows horizontally, and is often covered by a layer of bark or fine scales giving it a somewhat rough texture. The rhizome's scaly covering consists of clathrate, lanceolate scales, which are a key diagnostic feature. Molecular phylogenetic studies often use the morphology and cell patterns of these scales to resolve species relationships within the genus Asplenium (Xu et al., 2019). The compact, erect rhizome is essential for the structural integrity of the nest-like rosette, strategically positioning the leaves to efficiently intercept and channel rainfall and litterfall to the root system (Chen et al., 2022). This stem color contrasts with the bright green leaves, giving a more natural and hidden impression beneath the broad and lush leaves.

Conclusions

The morphological characteristics of the bird's nest fern plant (*Asplenium nidus* L.) can be

observed from 5 characters: habitus, leaves, sorus arrangement, roots, and stem. The leaves of the bird's nest fern (*Asplenium nidus* L.) are elongated, arranged circularly on a creeping rhizome, and are light green in color. The sorus of the bird's nest fern (*Asplenium nidus* L.) is elliptical (elipticus) in shape, yellowish-brown in color, and has net-like ornaments (retiformis foveatus). The roots of the bird's nest fern (*Asplenium nidus* L.) are fibrous and brownish in color. The stem of the bird's nest fern (*Asplenium nidus* L.) is rhizomatous and dark brownish-black or dark gray in color. The bird's nest fern (*Asplenium nidus* L.) can reach a height of 7-150 cm and its stem becomes sturdier as it matures.

Conflict Of Interest: The authors declare that there are no conflicts of interest concerning the publication of this article.

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