

Morphological Differentiation between Nibung (*Oncosperma tigillarum* (Jack) Ridl), A Mascot Flora of Riau Province, and Its Closed Related Species, Bayas (*Oncosperma horridum* (Griff) Scheffer)

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Abstract

Nibung and Bayas plants are members of the Arecaceae family, which is characterized by monocots, solitary or clumped stems, pinnate compound leaves, and flower frames. The province of Riau contains Nibung (*O. tigillarum*). Nibung (*Oncosperma tigillarum*) and Bayas (*Oncosperma horridum*) are members of the same family, but their morphology and habitat are distinct. This study seeks to determine the morphological distinctions between Nibung and Bayas plants found in the province of Riau, as well as their distribution. This investigation utilized field samples collected from two locations: Rantau Bertuah Village and Tanjung Medang Village. Additional analysis of morphological characters, notably diagnostic characters, and distribution data obtained from the GBIF website using secondary data. The results revealed morphological distinctions between *O. tigillarum* and *O. horridum*, particularly in terms of habitat, leaf arrangement, stem texture, and thorn texture. In contrast to the leaves of *O. horridum*, *O. tigillarum* leaves are arranged (facing) in the opposite direction. The stem of *O. tigillarum* is silky, whereas that of *O. horridum* is fibrous and textured. The thorns of *O. tigillarum* have a smooth and thin texture, whereas those of *O. horridum* are rough and dense. In addition, Nibung and Bayas plants have strikingly different distributions. *O. tigillarum* grows in marshy zones along the coast, whereas *O. horridum* grows on mountain slopes and plateaus.

Keywords: Arecaceae; morphological description; *Oncosperma tigillarum*; *Oncosperma horridum*

1. Introduction

Plants play an important role in human life and the surrounding environment. One important aspect of plants is their morphology, or physical structure. Through the morphological characterization of plants, we can understand more deeply the nature and characteristics of certain plants. In general, the characteristics of the Arecaceae family are monocotyledonous, single-stemmed or clumped, in the form of trees or climbing, fibrous roots, segmented stems, and do not have a true Cambium, pinnate compound leaves, petioles with leaf midribs that wrap around the stem, flowers arranged in a flower frame (mayang), and flowers usually with 3 sepals, 3 petals, 6 stamens, and 3 carpels [1] [7]. Two types of members of the Arecaceae family that have similar morphological characters are Nibung plants (*Oncosperma tigillarum*) and Bayas (*Oncosperma horridum*).

Nibung plants belong to the Arecaceae family, which usually grows wild in clumps like bamboo [1]. Plant Nibung (*O. tigillarum*), which is the flora of Riau province, is a kind of palm plant that grows in Southeast Asia, including almost all regions of Indonesia. Based on the decree of the Minister of Home Affairs No. 48 of 1989, dated September 1, 1989, on guidelines for determining the identity of regional flora and fauna Nibung (*O. tigillarum*) is determined to be the identity of Flora originating from Riau province. One Nibung tree usually has 5–30 saplings, Nibung plant (genus *Oncosperma*) is one of the species in the group of palm plants (Palmae), some of whose members are endemic plants in China [12].

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This plant is distributed in Sumatra, Java, Kalimantan, Malaysia, Cambodia, and Thailand. Nibung Habitat grows along the coast in the zone of swamps and pluvial forests at an altitude of 0-400 MDPL [11].

Bayas (*Oncosperma horridum*) (Griff.) Scheff, known as the Mountain Nibong Palm, is a tall, clustered palm tree, usually 6 to 12 mature trunks for each bunch and a very thick crown. It belongs to the Arecaceae family and is widely distributed in Southeast Asia, where it can be found in Thailand, Malaysia, Borneo, the Philippines, Sulawesi, and Sumatra. It grows in lowland rainforests up to mountain slopes at an altitude of 300–1000 m, towering above the trees in a tropical forest [8]. The morphology of this Bayas plant has a gray stem covered by black pointed thorns facing downwards, reaching 10 cm in length, and characterized by a brown ring corresponding to the base of the fallen leaves. A large crown is formed by pinnate, slightly curved leaves, even longer than 3 m. The leaves have a spiny stalk 1 cm long, ending in a green-gray sheath that completely encloses the stem [8].

Both types of plants belong to the same family and are used in Riau, but there are some differences in the morphological character and habitat of both plants. This article will discuss the morphological differences between the two plants. This study aims to identify differences in the morphological characterization of Nibung and Bayas plants and determine the distribution of these two plants in the world.

2. Material and methods

2.1. Material

The materials used are from their own collections, obtained directly in the field. Tools and materials used for morphological characterization in the form of herbarium kits include, among others, plastic bags, plant scissors, cutters, gloves, hanging labels, newsprint, and 70% alcohol.

2.2. Methods

This study uses the survey method of direct observation in the field. The collection of plant material follows Dransfield [2]. Observation of morphological characters refers to Dransfield (1986), namely: habitat, stem, thorns, leaves, inflorescence, peduncle, branching, rickets, flowers, and fruit. and the manufacture of herbarium specimens was carried out by the method of Jain and Rao (1977) [6]. in your herbarium at Andalas University. This research was carried out from September to December 2022. The locations of the research were in two locations in Riau province, Rantau Bertuah Village, Siak Regency, and Tanjung Medang Village, Bengkalis Regency. Additional data is available to determine the distribution of both types of plants through the website GBIF (Global Biodiversity Information Facility).

3. Results and discussion

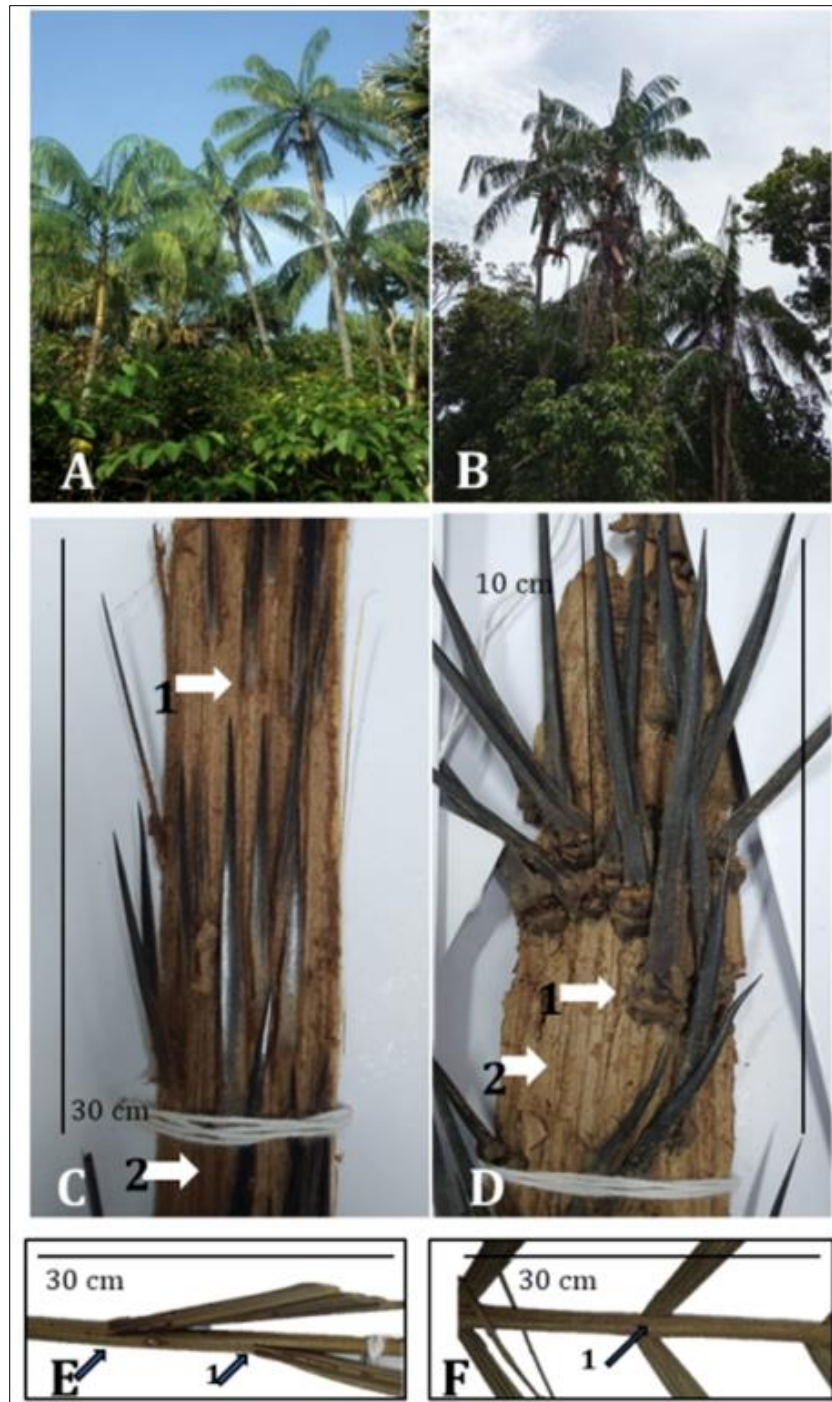
3.1. Morphological Character

Nibung Plant Habitat grows in lowlands along the coastal zone, with an altitude of 0-400 MASL. It grows wild and clumps about 5–10 saplings. The height of the tree reaches 20–30 m. The bark is covered with black thorns, the stem is 15–50 cm in diameter, and the surface of the stem is *O. tigillarum* is smooth-textured, and the length of the spines reaches 10 cm. The thorns on the nibung are thin and smooth on the surface and have pinnate, slightly curved leaves, more than 3 m long. There are thorns on the back of the O-ring, the back of the O-ring. *tigillarum* opposite (parallel), the leaf midrib is light brown and covered with thorns. Flowering in June-August, the flowers are yellow. Monoecious (monoecious), that is, males and females. The flowers are arranged in groups of 3 (2 male flowers and 1 female flower) in the same inflorescence, called spadix, infrafoliar (emerging from under the leaves), and develop inside a woody sheath or spathe. During flowering, the spathe splits lengthwise to expose the spadix. Each handle consists of a main axis with a length of up to 80 cm. Flowers that have bloomed easily fall when exposed to the wind. On one flower stalk (spadix), there are several branching rachis and rachilla, fruiting in November-December. The fruit of *O. tigillarum* is spherical, 0.5–1 cm in size, and about 12 mm in diameter. Young fruits are green and purple-black when ripe.

The habitat of Bayas plants grows on mountain slopes and hills with an altitude of up to 1000 MASL. The height of the tree reaches 20–30 m, the diameter of the tree is 20–25 cm, the bark is brown to gray, and the surface of the trunk is *O. horridum* has a slightly rough texture, and the stem is covered with black thorns. Thumbs up to *O. horridum*, whose slightly thick, slightly leathery thorn length reaches 1–12 cm. It has slightly curved pinnate leaves, the length of which is even more than 3 m. There are thorns on the back of the leaves, O-leaf layout. *horridum* alternate (crossed). The leaf midrib is light brown and covered with thorns. Based on the results of observations in the field, no part of the flowers or fruits was found, due to the inflorescence period that had passed while in the field. Large yellow inflorescences reach

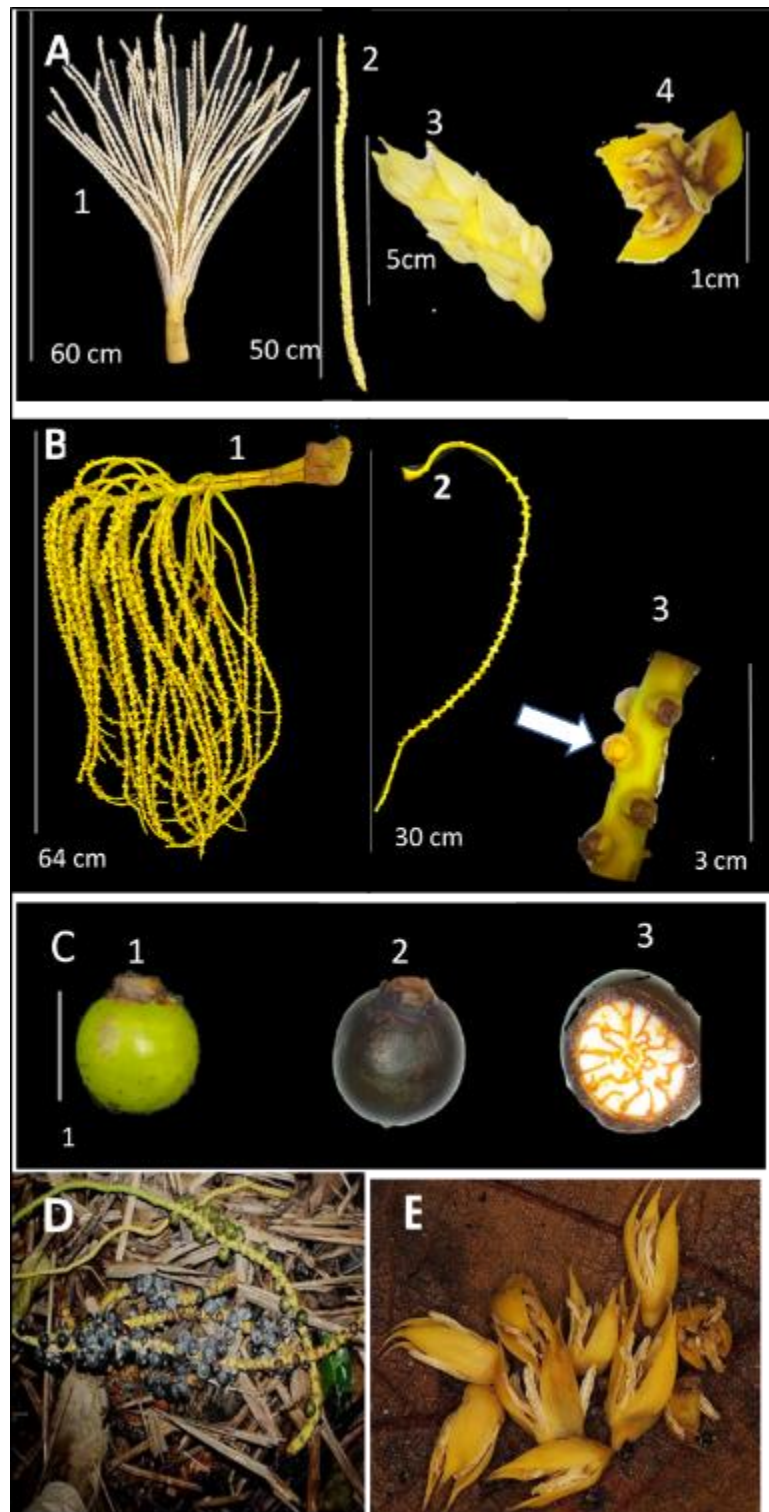
60 cm in length. Initially, covered in a gray spathe, deciduous, when blooming, spirally scattered flowers are arranged in a triad formed by two male and one female flower. Flowering in June-August, fruiting in November-December. The fruit of *O. horridum* is oblong, waxy, at first green, then brown, and finally black when ripe, with a diameter of 1.5–2 cm [8].

The data found in the field are habitat, stems, thorns, petioles, flowers, and fruits from both plants. But for the flowers and fruits of the plant Bayas *Oncosperma horridum*, they are not found in the field due to the flowering and fruiting period that is not in season. The morphology of the two plants can be seen in Figure 1.



A. Habit *Oncosperma tigillarum* ;B. Habit *Oncosperma horridum* batang ;C1. thorns *Oncosperma tigillarum* ;C2. Stem texture *Oncosperma tigillarum* ; D1. thorns *Oncosperma horridum*; D2. Stem texture *Oncosperma horridum*; E1. Petiole of *Oncosperma tigillarum*; F1. Petiole of *Oncosperma horridum*

Figure 1 Plants Organs *Oncosperma tigillarum* (Jack) Ridl dan *Oncosperma horridum* (Griff) Sheffer



A1.Pendule male compound ; A2. Rachis; A3. Rachilla; A4. male flower ; B1.Pendule female compound ; B2. Female Inflorescence grain type; B3. female flower ; C1. Young fruit ; C2. ripe fruit; C3. cross section of fruit. Source : Palmpedia (Scale : A-C : 30 cm)

Figure 2 Plants Organs *Oncosperma tigillarum* (Jack) Ridl dan *Oncosperma horridum* (Griff) Sheffer

3.2. Differences in the morphological character of Nibung and Bayas

Based on the results of observations in the field, several differences were found between the two plants, namely in the growing habitat of the two plants. *O. tigillarum* grows in the lowlands, along the coastal zone, while *O. horridum* grows on mountain slopes and hills, the second difference lies in the stem surface. The smooth surface of the *O. tigillarum* stem is light brown, while the textured and fibrous *O. horridum* is light brown. The next difference lies in the thorns of

the two plants. The spines of *O. tigillarum* are thin and smooth on the surface, whereas the spines of *O. horridum* are thick and rough on the surface. Furthermore, it can be seen on the leaf veins, *O. tigillarum* has an opposite leaf layout, while *O. horridum* has an alternate leaf layout.

It can be seen in Table 1 as follows.

Table 1 Differences In Morphological Character *O. tigillarum* and *O. horridum*

Character	<i>O. tigillarum</i>	<i>O. horridum</i>
Habitat	Lowland, along the coastal zone	Mountain slopes and hills
Stem	Smooth stem surface	Textured and fibrous stem surface
thorns	Thin and slippery	Thick and rough
Leaf	Opposite leaf layout	Alternate leaf layout

3.3. Distribution of Nibung (*O. tigillarum*) and Bayas (*O. horridum*) plants

Data on the distribution of Nibung and Bayas plants in the world were obtained through the GBIF website ((Global Biodiversity Information Facility) [3]. The distribution of the Nibung plant (*O. tigillarum*) in the world *tigillarum* is distributed in the regions of Java, Kalimantan, Malaysia, Cambodia, Vietnam, Berlin, and China. But for the Sumatra region, not all identified plants are yet included in the GBIF map for the distribution of nibung plants. On the map, the distribution of these plants has not yet been identified in the regions of Riau, Jambi, and South Sumatra, but there have been studies related to the utilization of the two plant species found in several studies. [9] Apart from that, similar research was also found in Bali regarding the use of the nibung plant as a traditional ceremony. [10] Data from GBIF also shows that there are several specimens of this plant in several locations, namely the Berolinense Herbarium, Berlin, the New York Botanical Garden Herbarium, GBIF Backbone Taxonomy, the European Nucleotide Archive (ENA) taxonomy, the Meise Botanic Garden Herbarium (BR), the NMNH Extant Specimen Records (USNM, US), the Leipzig catalog of vascular plants, GRIN Taxonomy, and World Plant Specimen from the Herbaria in China to the Brazilian Flora 2020 Projeto Flora do Brasil 2020 [4].

Data on the distribution of Bayas plants (*O. horridum*) are distributed in the regions of Sumatra, Kalimantan, Sulawesi, Malaysia, the Philippines, and Brazil. However, the Sumatra region, namely Riau and Jambi, has not yet been identified on the map. [12] Data from GBIF also shows that there are several specimens of this plant in several locations, namely GRIN Taxonomy, TAXREF, the AAU Herbarium Database, the Vascular Plant Collection at the Botanische Staatssammlung Munchen, the Royal Botanic Garden Edinburg herbarium, the Leipzig catalog of vascular plants, and the Vascular Plant Collection (P) at the Herbarium of the Muséum national d'Histoire Naturelle (MNHN-Paris). [5]

Based on data on the distribution of the two types of plants in the world, their distribution is only around the Asian continent, and there is only one point in the Americas. This plant only grows in a few areas, but from its distribution, it can be seen that this plant grows a lot around Southeast Asia. This is due to the uneven distribution pattern throughout the world and the seasonal factors that differ in each country.

4. Conclusion

Different morphological characteristics that are present in the habitat include leaf arrangement, stem texture, and spine texture in *O. tigillarum* and *O. horridum*. While *O. horridum* grows on the highlands and mountain slopes, *O. tigillarum* grows in the marsh region and along the coast. *O. tigillarum* has a different leaf arrangement than *O. horridum*, which has a different leaf arrangement. *O. horridum* has a rough and thick texture, whereas *O. tigillarum* is smooth and thin. Knowing the physical traits of nibung and bayas plants can help us learn more about biodiversity and how crucial environmental preservation is to the continued existence of people and other living creatures.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest.

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