

Rattan Species Inventory in *Rawa Singkil* Region of Conservation Forest Management Unit Area

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Abstract

Rawa Singkil region of Conservation Forest Management Area (KPHK) is a sanctuary for fauna teeming with an abundance of plant species. The species diversity is predominantly constituted of rattan and other non-timber forest products. This investigation seeks to compile a list of the various species of rattan found in the Rawa Singkil KPHK region. Therefore, this study was carried out in the Rawa Singkil region of KPHK were located in the Aceh Singkil Regency of Aceh Province, Indonesia. Spanning an area of 82,374 ha, this territory comprises nearly fifty percent peat ecosystem. A survey is utilized as the research strategy, with data acquisition conducted via sampling techniques. Moreover, the acquired data were subjected to descriptive analysis on the basis of morphological attributes, encompassing the following morphological characteristics: 1) the stem (including characteristics such as height, diameter, color, internode length, and thorn shape); 2) the leaf, including its length, ocrea, leaf count, leaf color, and leaf surface; 3) Cane/knee (color and outline of the knee); 4) Spine; (spine color, length of longest spines, position of spines, and length of shortest spines). Eight species of rattan were discovered in this region, i.e Calamus melanoloma Mart., Calamus ornatus Blume., Calamus rhomboideus Blume., Daemonorops mattanensis Becc., Daemonorops melanochaetes, Korthalsia echinometra Becc., Korthalsia hispida Becc., and Plectocomia elongata Mart

Keywords: Aceh Singkil, Conservation, Diversity, Inventory, Rattan



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INTRODUCTION

Rawa Singkil Conservation Forest Management Unit Area (KPHK) is located in Subulussalam City, Aceh Singkil Regency, and South Aceh Regency. KPHK was established by the Rawa Singkil Wildlife Reserve, a conservation area unit, in accordance with Minister of Forestry Decree Number SK.980/Menhut-II/2013 dated December 27, 2013. The total carbon content of Rawa Singkil, both above and below the surface, amounted to 175.18 million tons of carbon. This is equivalent to 642.91 million tons of CO₂ being absorbed by the atmosphere, which has a valuation of \$6.43 trillion. Utilized non-timber forest products in this region consist of rattan, fish, and honey (KLHK, 2016)

Rattan is classified as a member of the *Araceae* (*Palmae*) family, which comprises a mere eight hundred families of flowering plants worldwide (Hidayat et al., 2017). Indonesia is home to an estimated 332 species of rattan, of which 294 are classified under the genus *Calamus*, 86 under the genus *Daemonorop*, 25 under the genus *Korthalsia*, 7 under the genus *Ceratolobus*, 4 under the genus *Plectocomia*, 4 under the genus *Plectocomiopsis*, and 2 under the genus *Myrialepsis*. Particularly prevalent in tropical forests are the provinces of Sulawesi, East Kalimantan, West Kalimantan, Central Kalimantan, East Kalimantan, Java, and Nusa Tenggara (Kusmana & Hikmat, 2015).

Among the preferable products, rattan stands in contrast to rubber and palm oil. The stems and the red resin present in the fruit are important components of rattan that have the potential to enhance the economic well-being of producers (Asra et al., 2020). Rattan plants possess considerable potential for practical application, particularly in ecological contexts, as they can serve as bioindicators to uphold environmental equilibrium and provide habitat for diverse organisms. Consequently, the general public must have a comprehensive understanding of rattan plants (Umar et al., 2015).

Rattan is an archetypal tropical ascending plant species that develops in the presence of a host tree. In contrast to plants belonging to other tribes, rattan possesses a number of distinctive characteristics, such as stems that can attain a length of 100 meters or more despite having a relatively small diameter. The rattan shafts are then encircled with pointed, yet robust and malleable, spiny fronds. Rattan stems possess considerable economic worth due to their frequent utilization as ornamental objects, including chairs and shells (Saputra et al., 2019). Rattan finds extensive application in the production of ropes, vegetables, and weaving (Sarikun et al., 2019). Rattan, a member of the *Areceaceae* family, is among the eight hundred flowering plant families worldwide; therefore, it is imperative to enhance its preservation, utilization, and conservation practices (Hidayat et al., 2017).

METHOD

Research Location

This research was carried out in the Rawa Singkil region of Conservation Forest Management Unit Area (KPHK), Aceh Singkil Regency, Nanggroe Aceh Darussalam Province, Indonesia, with an area of 82,374 ha, where almost 50% of this area is a peat ecosystem (Figure 1).

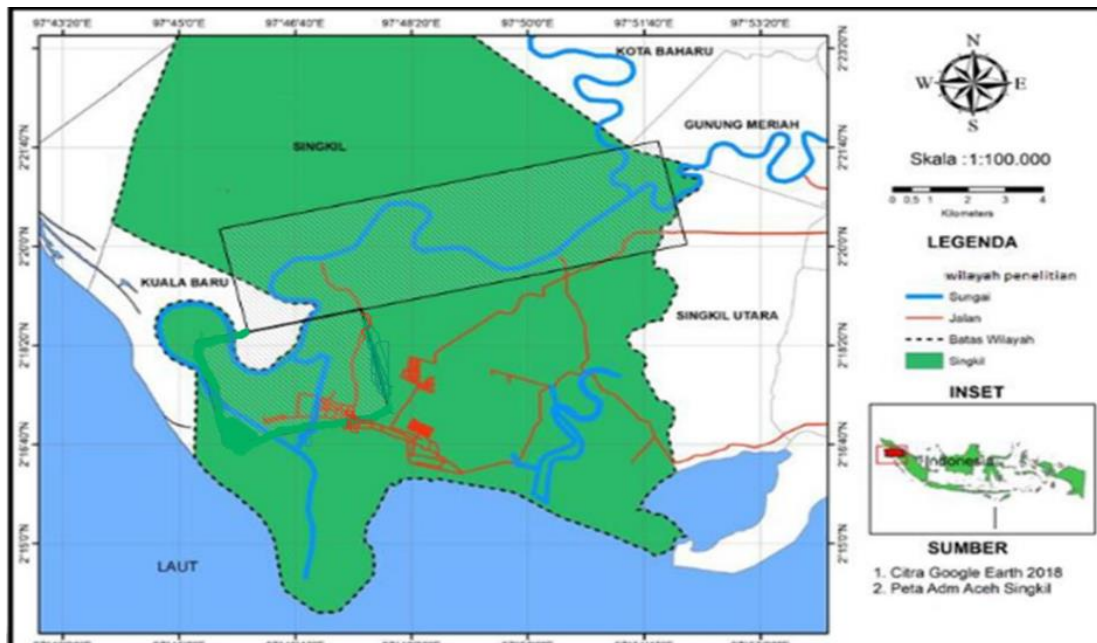


Figure 1. Research Location (Source: KLHK, 2016)

Instruments and materials

The materials used in this study were all types of rattan found in the measuring plots. The tools used were GPS, measuring tape, tally sheet, machete, paint, rope/mine, determination key/rattan species identification book, camera, stationery and other supporting tools.

Data Collection

The investigation was conducted utilizing a positive sampling technique that accounted for the habitat. Specifically, exploration was conducted along the observation route, which had a 10-meter path width to the left and right, or as modified to suit field conditions (Rahawarin, 2004).

Significant attributes of the discovered rattan varieties were documented, captured in photographs, and gathered. The morphological observation parameters utilized in this study are derived from (Syam et al., 2016) with modifications to (Rustiarni, 2002). These parameters include growth care, stem morphology, leaf midrib, leaves, inflorescence type, morphology of male and female flowers, as well as fruit and seed morphology. The specimen is positioned between newspaper folds, secured with plastic string, set in a plastic container measuring 60 x 40 cm, and saturated with 70% alcohol until moist.

Physical parameters were evaluated at the site of the observation, encompassing altitude in relation to soil temperature and air humidity, soil temperature and soil humidity, air humidity and humidity in relation to soil temperature and soil temperature, soil humidity and pH in conjunction with soil temperature, light intensity in relation to ordinate points, and GPS (Global Positioning System) data, among others.

Data Analysis

This study's data analysis necessitated descriptive analysis, more specifically, through the description or depiction of data acquired directly from the field, including but not limited to the leaf's shape, color, rattan stem's shape, leaf strand count, and other physical attributes. The analysis assessed the uniqueness of the acquired data through the identification of intuitive categories of rattan, accompanied by unambiguous explanation sentences (Dransfield, 1979, 1984, 1990, 1992, 1997; Dransfield et al., 2008; Dransfield & N, 1996) International nomenclature resources, including www.theplantlist.org, <http://www.plantsoftheworldonline.org>, and www.ipni.org, were utilized to validate plant names.

RESULTS AND DISCUSSION

The results of field observations and identification with the aim of using a research method based on rattan habitat, in the Rawa Singkil KPHK Area, 8 species of rattan were found which were classified into 4 categories, it can be seen in the following table 1.

Table 1. Species of rattan found by KPHK Rawa Singkil

No	Local Name	Latin name	Genus
1	<i>Ketang sasah</i>	<i>Calamus melanoloma</i> Mart.	<i>Calamus</i>
2	<i>Ketang khuang</i>	<i>Calamus ornatus</i> Blume.	<i>Calamus</i>
3	<i>Ketang onpen</i>	<i>Calamus rhomboideus</i> Blume.	<i>Calamus</i>
4	<i>Awe cut</i>	<i>Daemonorops mattanensis</i> Becc.	<i>Daemonorops</i>
5	<i>Ketang getah</i>	<i>Daemonorops melanochaetes</i> Blume.	<i>Daemonorops</i>
6	<i>Ketang Dahan</i>	<i>Korthalsia echinometra</i> Becc.	<i>Korthalsia</i>
7	<i>Ketang udang</i>	<i>Korthalsia hispida</i> Becc.	<i>Korthalsia</i>
8	<i>Ketang badak</i>	<i>Plectocomia elongata</i> Mart.	<i>Plectocomia</i>

The Morphological Characteristics Species of Rattan

Calamus melanoloma Mart.

Rattan is a group-developing, 12-meter-tall plant. Stem diameter: 2 cm when leaves are present; 1 cm when leaves are absent; 47 cm between segments. The spiny leaves are pale green with white patches, while the spiny leaves and midrib are arranged have a balanced and smooth vein and are rarely brown. A two-meter-long climbing implement with a shape that lacks. The leaves is comparable in appearance to an tapered tip; it measures 105 cm in length and has a 2-centimeter stem. The leaves exhibit a crisscross pattern and possess a smooth upper and lower surface. Their length ranges from 22 to 38 centimeters, while their width varies from 1.8 to 5 centimeters. The quantity of leaves is as follows: 12 strands on the right side and 12 strands on the left side, both in green (Figure 2).

Habitat: Swamps, hill slopes to mountains at an altitude of 4 -1200 m above sea level.

Distribution: West Java, Sumatra (Kalima & Jasni, 2015)



Figure 2. *Calamus melanoloma* Mart. A. Stem with leaf sheaths B. Leaflets and cyrus

The results of the identification process at the Rawa Singkil KPHK found many rattans that were classified as *Calamuis meilotama* Mart. Because it has distinctive characteristics, namely spiny, climbing and scaly. This is in accordance with [Mondal & Chowdhury \(2018\)](#) who said that tropical areas are a favorable habitat for 18 species of rattan, of which 14 species are *Calamuis sp.* ([Peter & Henderson, 2014](#))

***Calamus ornatus* Blume.**

Rattan grows in groups, climbing up to 20 meters high. Stem diameter with leaves: 4.5 cm; without leaves: 3 cm; distance between segments: 48 cm. The leaves of the leaves are greenish in color; the leaves are large and have a triangular shape at the base of the green leaves; and the leaves of the leaves are black in color, have a balanced and smooth shape, and are balanced. The climbing instrument is up to 15 m long and has a distinctive green color. The length of the the leaves is 211 cm, and the length of the stalk leaves is 80 cm. The young leaves are criss-crossed, the top and bottom surfaces are smooth, the length of the young leaves is 31–63 cm, and the width of the young leaves is 4–7 cm. The number of leaves on the right side is 27 strands, and the left side is 27 strands in green color. Fruit length up to 75 cm, fruit brown.

Habitat: Swamps, lowlands, hillsides to mountains at an altitude of 7 -1150 m above sea level.

Distribution: Java, Sumatra, Kalimantan, the Malay Peninsula, southern Thailand, the Philippines and Sulawesi ([Kalima & Jasni, 2015](#)).



Figure 3. *Calamus ornatus* Blume. A. The appearance of *Calamus ornatus* Blume. B. Caulis with leaf, C. inflorescence

The results of the identification process of the characteristics of *Calamus ornatus Blumei*. (Figure 3) in the Rawa Singkil KPHK is in accordance with the identification results of [Rezki et al., 2023](#) who inventoried the species of rattan in Balukang Village, Sojol District, Donggala Regency where *Calamus ornatus* is known as rattan that grows in clumps, the stems are yellowish green with a fine smooth surface. The length of the segments is around 25.3-38.8 cm with an average of 30.4, the diameter is 25-27.5 mm with an average of 29.9 mm, the cylindricity of the stem is 0.93-1.0 cm with an average of average 0.95 cm. The leaves are green and pinnately compound in shape with pointed tips and long, black-spiked midribs. Additional tools in the form of a 201 cm cylinder.

***Calamus rhomboideus* Blume**

Rattan grows in groups, climbing to a height of 18 m. Stem diameter with leaf plates 1 cm, without leaf plates 0.7 cm; distance between segments 20-37 cm. The leaf midrib is green, covered with pink spines with a length of 2 mm arranged sparsely, has developed and smooth knees, the flagellum is 1-2 m long, the ocreas is thin and pink with a length of 1-1.5 cm. Leaves are pinnate with pointed tips, leaf length 43-63 cm, petiole 2-4 cm long. The leaflets are rhomboid-shaped, arranged irregularly, the length of the leaflets is 14-23 cm, the width of the leaflets is 4.7-8.5 cm; The number of leaves on the right side is 6, the left side is 6 green.

Habitat: Swamps, hillsides to mountains at an altitude of 4 -1200 m above sea level.

Distribution: West Java, Sumatera and Kalimantan ([Kalima & Jasni, 2015](#))



Figure 4. *Calamus rhomboideus* Blume. A. Habitus of *Calamus rhomboideus* Blume.
B. Caulis with sheaths and leaves.

The characteristic rattan of the *Calamus rhomboideus* Blume is that it climbs and lives in groups. This rattan is often found in the forests of Sumatra Island. This is in accordance with research by [Kalima & Jasni, \(2015\)](#) which identified *Calamus rhomboideus* Blume climbing up to 12 m high, stem diameter with fronds up to 15-30 mm, diameter without fronds 10 mm. Segment length 30 cm. The leaf midrib is brownish green, has black spines, the spines are 1-2 mm long and are sparsely arranged, the climbing apparatus is a flagellum 1 m long. Knee clear, leaf length up to 64 cm, stalk length 30 cm. The leaflets are rhomboid in shape, the leaf veins on the upper surface of the leaflets are hairy, arranged pinnately irregularly, the size of the leaflets is 16-26 cm x 4-8 cm, there are 10 pairs of leaflets. Fruit 10 mm in diameter with 15 vertical scales. Sterile. This rattan is distributed in West Java, Sumatra and Kalimantan. This species is found on hillsides to mountains at an altitude of 350-1200 m above sea level. It is generally used for woven materials and rigging in house buildings.

***Daemonorops mattanensis* Becc.**

Rattan grows in groups, climbing 6-8 m. Stem diameter with leaf plates 3-5 cm, without leaf plates 1.6-2.2 cm; distance between segments 10-25 cm. The midrib of the leaf is covered with evenly distributed spines, the spines are 1-3 cm long, blackish brown in color, have developed and spiny knees, have no flagellum, no ocreas. Leaves are pinnate with tapered tips, leaf length 201 cm, petiole 11 cm long, cyral length 112 cm. The leaves are arranged regularly, the length of the leaflets is 9-32 cm, the width of the leaflets is 0.4 cm; the number of leaves on the right side is 58, the left side is 58. The bracts are shaped like brown boats, smooth. Compound inflorescences and inflorescence length 45 cm.

Habitat. Lowland forest, swamp 17 m above sea level.

Spead. India, South China, Malaya Archipelago, New Guinea, Malay Peninsula, Kalimantan, Java, Sumatra, Bangka, Belitung ([Dransfield, 1979](#))



Figure 5. *Daemonorops mattanensis* Becc. A. Habitus of *Daemonorops mattanensis* Becc.; B. leaves; C. Inflorescence

The morphology of rattan species producing jernang in Kuta Panang District, Central Aceh Regency according Putri et al., (2020), known as *Daemonorops mattanensis* Becc. This jernang rattan (as local name) has; a). The stem character consists of a stem height of 2 - 4 m that grows straight upwards and has a stature (habitus) that grows climbing and clustering. The stem diameter is 3 - 6 cm and there are 4 - 8 stems per cluster, and have a bunch length of 1 - 3 m. The color of the stem is greenish brown and has an internode length of 10 - 35 cm per stem. b). The character of the leaves consists of a leaf length of 30 cm and there are 60 leaves per stem, and the leaves of this species have a green color. c). The character of the fruit which consists of this species of super jernang-producing rattan has the character of fruit whose appearance (habitus) is clustered, the diameter of the fruit is 2 - 4 cm, has a light brown skin color with convex fruit scales and the number of fruit is 18 - 30 per bunch. d). The character of the thorns, which consists of this species of rattan that produces super jernang, is characterized by the position of the thorns Distribution across the stem and there are also thorns on the leaf stalks. The length of the shortest spines is 1 - 2 cm and the length of the longest spines is 2 - 3 cm and has brownish spines.

***Daemonorops melanochaetes* Blume**

Rattan grows in groups, climbing 6 m. Stem diameter with leaf plates 3 cm, without leaf plates 1.9 cm; distance between segments 23 cm. The leaf midrib is black, densely spiny, has no flagellum, has a blackish brown ochrea, the knees are developed and spiny; indumentum is jet black. Leaves are pinnate with pointed tips, leaf length 203 cm, petiole length 36 cm, leaf width 56 cm; cirrus length 197 cm. The leaflets are arranged regularly, the length of the leaflets is 31 cm, the width of the leaflets is 1.6 cm; the number of leaves on the right side is 42, the left side is 42. The bracts are shaped like green boats, with black spines. Fruit length 16 cm, fruit diameter 0.8-1 cm. The fruit is round, and the scales are brownish yellow.

Habitat. Lowland forest, swamp 17 m above sea level.

Distribution. India, South China, Malaya Archipelago, New Guinea, Malay Peninsula, Kalimantan, Java, Sumatra, Bangka, Belitung (Andayani et al., 2018)



Figure 6. *Daemonorops melanochaetes* Blume. A. Habitus of *Daemonorops melanochaetes* Blume. B. Fruit

Daemonorops melanochaetes Blume is generally classified as a rattan that grows in the highlands, namely around 462-870 m above sea level with a light intensity ranging from 18% - 65% and a temperature of 280C - 320C. This is in accordance with a survey conducted by Arifin, (2019) in forests in South Kalimantan where the gatah rattan (*Daemonorops melanochaetes*) lives at an altitude of 462 m above sea level. Meanwhile, wax rattan (*Calamus javensis*) and garden rattan (*Calamus caesus*) are respectively 462 – 870 m above sea level and 462 – 812 m above sea level. This shows that altitude greatly influences the distribution of rattan.

***Korthalsia echinometra* Becc.**

Rattan grows in groups, climbing up to 8 m. Stem diameter with leaf sheaths 1.2 cm, without leaf sheaths 0.8 cm; distance between segments 65 cm. Leaf midrib brown, single spiny triangular shape, spines about 4 cm long, brown, knees not developed, ocreas bulging and long spiny. The climbing tool is in the form of a ladder up to 1.5 m long. Leaf length 96 cm, petiole length 31.5 cm. The leaflets are ribbon-shaped, arranged in pairs, the upper and lower surfaces are smooth, the length of the leaflets is 22-34 cm, the width of the leaflets is 2-2.5 cm; The number of leaves on the right side is 22, the left side is 22 green.

Habitat: Lowland forest, swamp 17 meters above sea level.

Distribution: Brunei, Borneo, the Malay Peninsula, and Sumatra (Dransfield, 1979).

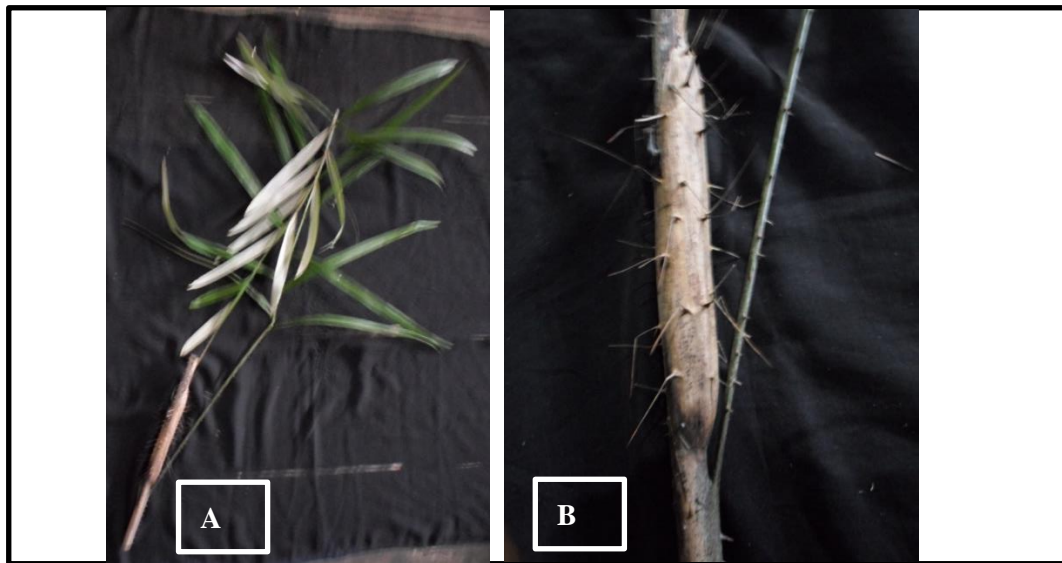


Figure 7. *Korthalsia echinometra* Becc. A. Caulis and Leaves of *Korthalsia echinometra* Becc. B. Okrea

Korthalsia echinometra Becc. is known as prawn rattan, it is very easy to recognize because it has a very clear okrea. The characteristics found are in accordance with research by [Jasni et al., \(2012\)](#) who said that this species of rattan grows in clumps and climbs. The leaf midrib is shiny green, on the stalk there is a swollen okrea or like a large protrusion measuring 9-11 cm long and 5-6 cm wide. This okrea is covered with black spines 1.5-5 cm long. No knees. The length of the leaf midrib is 150-350 cm, including the cyrus with a length of 70-75 cm. Leaves are lanceolate. Number of leaves 10-36 pairs.

***Korthalsia hispida* Becc.**

Rattan grows within groups, climbing 15-20 m. Stem diameter with leaf plates 1 cm, without leaf plates 0.6 cm; distance between segments 15-18 cm. The midrib of the solitary spiny leaf is black, the spines are 2-2.5 cm long, have undeveloped knees, have no flagellum, have an okrea of 18-26 cm and extend upwards and are not attached to the stem, blackish brown in color. Green leaves, pinnate with pointed tips, leaf length 50 cm, petiole 14.2 cm long; cyrus length 63 cm, barbs like 3-6 hooks, red. The leaflets are arranged alternately, the length of the leaflets is 7-17cm, the width of the leaflets is 1.8-8.5 cm; the number of leaves on the right side is 9 leaves, the left side is 9 leaves, the top and bottom surfaces are smooth.

Habitat. Lowland forest, swamp 17 m above sea level.

Distribution. Borneo, the Malay Peninsula, and Sumatra ([Dransfield, 1979](#))

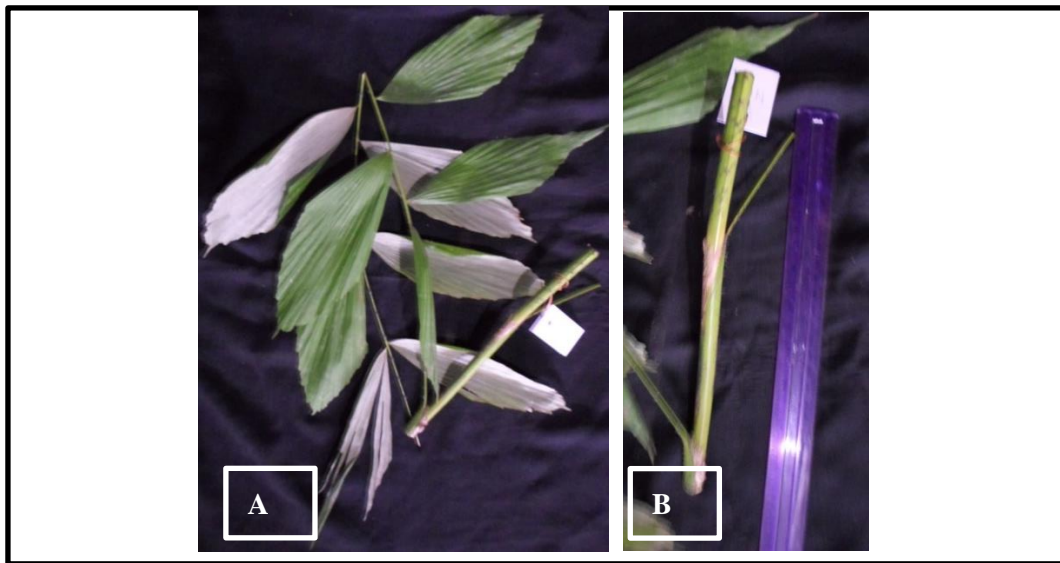


Figure 8. *Korthalsia hispida* Becc. A. Stems and leaves of *Korthalsia hispida* Becc. B. Okrea

Maarif (2020) said that morphological characters have variations in shape, arrangement and size. In *Korthalsia* spp. in Sumatra the key characters are the species of okrea and its leaflets. Witono (2005) discovered *Korthalsia hispida* Becc. has clumping characteristics, stem height up to 10 m, branches in the canopy. Stem diameter up to 3 cm (without midrib up to 1.5 cm); segment length up to 15 cm, midrib bright green, with brown spots, sometimes black spines up to 2.5 cm long. The tuberous membrane develops, up to 25x5 cm in size, split in two with a pointed tip, both sides curled, black spines up to 2.5 cm long, there are many ants on the tuberous membrane and are usually very busy. Leaf length up to 280 cm, stalk up to 45 cm, cyrus up to 100 cm. 8 leaf blades on each side of the leaf vein. The upper surface is light green, the lower surface is whitish green like sterile chalk. Its distribution is in Borneo, Sumatra and Malaya. On Mount Lumut there are mixed *Dipterocarpaceae* forests at an altitude of 950 m above sea level, especially on the ridges of the hills. If disturbed, especially the tube membrane, the ants will come out so making a herbarum collection is sometimes difficult.

***Plectocomia elongata* Mart.**

Rattan grows single, climbing up to 14 m. Stem diameter with leaf sheaths 4.5 cm, without leaf sheaths 2.5 cm; the distance between segments is 19.5 cm. The midrib of a single, irregular spiny leaf is light brown in color, has an undeveloped knee, has no flagellum, has a thin, easily crushed ochrea, cream colored, pinnate green leaves with a pointed tip, leaf length 110 cm, petiole length 5 cm, leaf width 62 cm. cm, cyrus length 92 cm, 3-6 red coral spines. The leaves are arranged regularly, the length of the leaflets is 15-31 cm, the width of the leaflets is 1.2-3.7 cm; the number of leaves on the right side is 26, the left side is 26, the edge has white spines, the upper surface has thin white spines, the lower surface is smooth.

Habitat. Lowland forest, swamp 17 m above sea level.

Distribution. Sabah, Sarawak, Malay Peninsula, Palawan, Sumatra, Java, Bangka, Belitung (Andayani et al., 2018)



Figure 8. *Plectocomia elongata* Mart. A. Stature of *Plectocomia elongata* Mart.; B. The trunk and knees of *Plectocomia elongata* Mart.; C. Leaves of *Plectocomia elongata* Mart.

Plectocomia elongata is a species that is rarely found and is endemic and grows singly but also in clumps. In the Rawa Singkil KPHK area, the species were found growing singly. Witono et al., (2003) said that *Plectocomia* is one of the rattan genera which has a unique character because it is hapasantic. Some *Plectocomia* varieties grow in clumps and some grow singly, this is thought to be caused by genetic factors that need further research. At the Bogor Botanical Gardens, the *P. elongata* collection comes from Java and grows in clumps. Malik (2023) said that bubuai rattan (*Plectocomia elongata*) is a rattan that is very rarely found. One of the uses of rattan is that the stems can be processed into raw material for furniture such as tables and chairs.

CONCLUSION

1. There are found 8 species of rattan in the Rawa Singkil KPHK area, namely *Calamus melanoloma* Mart., *Calamus ornatus* Blume., *Calamus rhombodeus* Blume., *Daemonorops mattanensis* Becc., *Daemonorops melanochaetes*, *Korthalsia echinometra* Becc., *Korthalsia hispida* Becc., and *Plectocomia elongata* Mart.
2. Each species has the same and different morphological characters. The morphological characters are the same, namely the stature that grows and climbs and in clumps, the color of the leaves is green, the fruit is arranged in clusters, the position of the spines is upright and has spines on the leaf stalks, while the morphological characters are different, namely the stature, the color of the leaf midrib, the shape of the spines, the arrangement of the spines, the color of the spines, the shape of the leaves and leaf surfaces.

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