TREE ARCHITECTURE MODEL IN THE FOREST AREA OF LAMPAGEU VILLAGE UJUNG PANCU ACEH BESAR DISTRICT

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ABSTRACT

The architectural model of a tree or tree building relates to the pattern of stem growth, branching and formation of thermine shoots. This architectural model affects water absorption through crown outflow and stem flow. The Ujung Pancu forest area of Aceh Besar Regency is the place where research was conducted on "Tree Architecture Models in the Lampageu Village Forest Area Ujung Pancu Aceh Besar Regency" in June 2023. This study aims to determine the models of tree architecture in the Ujung Pancu forest area on the amount of crown outflow and stem flow. Thus, each additional rainfall will increase the crown outflow on each tree architecture model. This data was obtained using the Transect (*Line Transect*) method and direct observation in the field (field survey), with a transect line made along 10x100 meters dividing the forest area with a transect size of 10 m to the right and to the left and a road length of 100 m. The results showed that the Ujung Pancu rainforest area of Aceh Besar Regency has a variety of plants. There are 7 tree architecture models from 15 species in the Ujung Pancu forest area, Aceh Besar Regency, namely, rauh, leuwenberg, scarrone, corner, koriba, massart, troll, with the dominant architectural models namely scarrone and rauh. The rauh and scarrone model has the characteristics of rhythmic growth (simultaneously), with branches that are orthotropic (growing towards the direction or), the first stem can grow indefinitely, vase-shaped canopy, where the lower canopy is narrow and the higher it will widen will affect surface flow, infiltration, interception and erosion.

Keywords : Ujung Pancu, Tree Architecture Model

A. INTRODUCTION

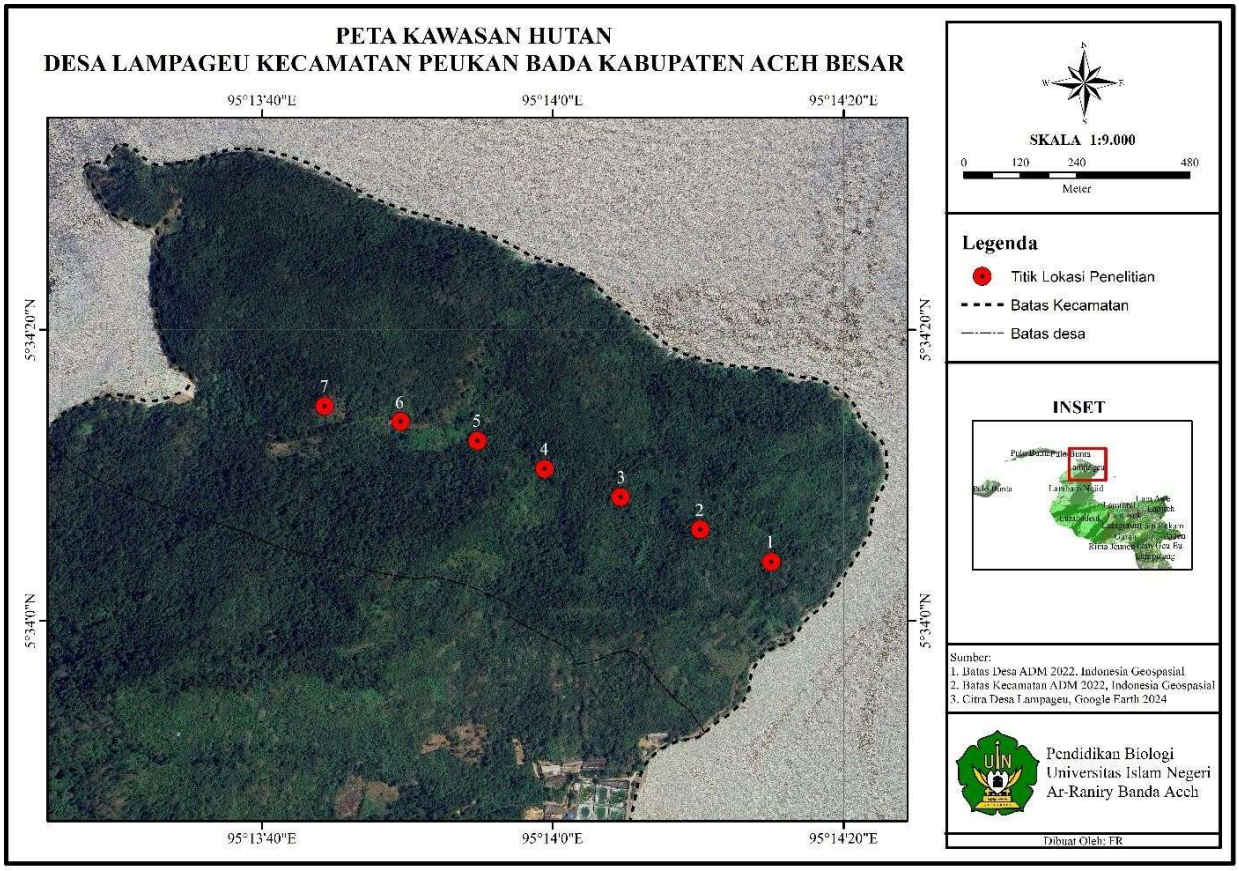
Indonesia is famous for its diverse types of plants, ranging from plants that flower or have seeds and woody trees that are spread in various Indonesian forests. About 4,000 types of trees are woody plants that have a main trunk that is clear from the title (Naemah, 2014). Ujung Pancu is one of the forests and tourist locations in Indonesia which has a variety of tree species in it. Apart from being a tourist location, this place is also often used as a research location by researchers, one of which is research on tree architectural models. The tree architectural model is one of the morphological characteristics of plants that is important for identifying each tree.

Each tree has its own unique characteristics in the growth process which are passed down genetically to its offspring. Because of their consistent characteristics, the architectural model for each tree type is used as additional data to differentiate between various tree types. The concept of this architectural model has been developing since the 1970s and is a combination of architectural science, plant morphology and plant taxonomy. This concept aims to facilitate and complement the distinguishing characteristics of each particular tree type (Siborne, 2019).

Tree architecture or tree building models are related to stem growth patterns, branching and formation of shoot terminals (Sasmita, 2021). The forest architectural model shows the real situation of the position of trees in the forest, so that it can be seen directly whether there are vertical and horizontal storm stars (Hidayat, 2018). It is important to carry out research on architectural models in order to obtain a database of the diversity of architectural models of plants that grow in forest areas Ujung Pancu This research aims to determine tree architectural models in forest areas Ujung Pancu and a linear relationship to the amount of canopy rainfall. Thus, each additional rainfall will increase the canopy rainfall in each tree architecture model

B. RESEARCH METHODS

This research was conducted in a forest area Ujung Pancu, Aceh Besar in June 2023. The samples taken as data in this research were all plants that are classified as trees. It can be seen in the following map



The tools used in research on tree architectural models in the Tip Pancu forest area can be seen in the following table

No.	Tools and Materials	Function
1.	Meter	to measure area
2.	Rapiah Rope	To determine the area of the plot
3.	Camera	To take image samples
4.	Stationery	to record data
5.	Machete	for taking samples

6.	Plastic Bags	To collect sampling results from the field
7.	Alcohol 70%	for making herbarium and preserving samples
8.	. Label paper and Data Sheet	For the data collection process
9.	Peg the sample plot	to determine the area of the plot
10.	Identification Book	To identify samples

Data collection in the field was carried out using the method line transect direct observation in the field (field survey). A transect line was made 10x100 meters long dividing the forest area with a transect size of 10 m to the right and left and a road length of 100 m. Observations were made on all trees found in the designated area. Mark all the trees in the sample plot, then record the name of the type of each plant using regional and scientific language, family, and architectural model of the plant. The data is then processed based on the results of observations (images) and a plant species model is determined which refers to a literature review of various literature, including identification books, journals, papers, and information from other sources related to the researcher's theme..

C. RESULTS AND DISCUSSION

The results of research carried out in the Ujung Pancu forest area found 15 species of plants from two stations with 10 families and 7 types of tree architectural models, the seven models namely rauh, leuwenberg, scarrone, corner, koriba, massart, troll. The dominant family is the Anarcadiaceae family, with the dominant architectural model being rauh. The data from this research can be seen in the following table.

No	Local Name	Scientific Name	Family	Branching Models	Total

1.	Kelapa	*Cocos nucifera L*	Palmae	Corner	3
				Total	**3**
2.	Tupelo/Nisa	*Nyssa aquatica L*	Cornaceae	Koriba	2
				Total	**2**
3.	Zaitun Manis	*Osmanthus fragrans lour*	Oleaceae	Leuwenberg	3
4.	Kamboja	*Plumeria alba L*	Apocynaceae		1
				Total	**4**
5.	Pohon Kapuk	*Ceiba pentandra*	Malvaceae	Massart	2
				Total	**2**
6.	Gerok Ayam/Popohan	*Buchanania arborecens*	Anarcadiaceae		4
7.	Tanaman Karet	*Havea brasiliensis*	Euphorbiaceae		2
8.	Kemala Merah	*Mallotus philipenis*	Euphorbiaceae	Rauh	1
9.	Bunga Kupu-Kupu	*Bauhinia ellitri pulle*	Fabacea		6
10.	Kayu Cedro	*Cedrela odorata*	Meliaceae		1
11.	Pohon Mahoni	*Sweitenia mahagoni*	Meliacea		1
				Total	**15**
12.	Mangga	*Mangifera indica*	Anarcadiaceae		6
13.	Ikhtisar	*Styrax japonicus siebold*	Styraceae	Scarrone	1

14.	Kedondong Hutan	*Spondias piñata*	Anarcadiaceae		13
				Total	**20**
15.	Asam Jawa	*Tamarindus indica*	Fabacea	Troll	1
				Total	**1**

Description of the Architectural Model of Trees Found in the Ujung Pancu Forest Area

Tree architecture is an abstraction of genetics by a plant from the beginning of its growth. Tree architecture has a different meaning from growth patterns, habitus and canopy shapes. Architecture is the form of the final product of an apical meristem growth behavior pattern (Ekowat, 2017). The names of these types of tree architectural models are taken from botanical names, for example Leewenberg (Dutch Botanization) and so on (Sitanggang, 2019). Model Tree architecture can be seen from the canopy formed in each species, this is in accordance with the statement (Arief, 2001) that the difference between dense and sparse stands can only be clear when using the canopy opening criterion. Canopy size can also be used to determine competition between trees (Sasmita, 2021). Description of the Plant Architectural Model as follows::

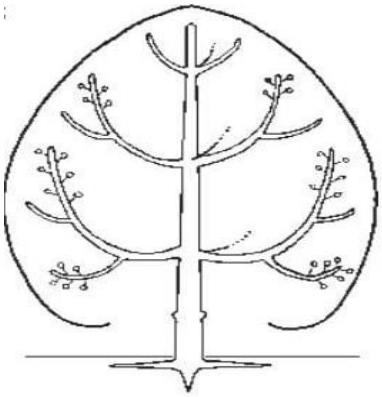
1. Rauh

   The characteristic of the Rauh Architectural Model Description is that its branches are composed of orthotropic monopodial stems that grow rhythmically. Rhythmic (synchronous) growth, resulting in the branches appearing to be arranged in a bouquet. Branches are also orthotropic (grow upwards), and the main stem can grow indefinitely (Hasanudin, 2013). The canopy on this model is in the shape of a vase, where the bottom canopy is narrow and the higher it gets, the wider it gets. This type of model will affect surface flow, infiltration, interception and erosion (utami, 2011)

   If a forest area has little litter, the potential for surface runoff is quite large and infiltration (absorption of water in the soil) is small, but if there is enough litter, the potential for

infiltration is quite large in a certain time. Interception (the ability of trees to hold rainwater and then evaporate it again) in this model has great potential. This model too

It can be used by wild animals as a place to nest and defend itself which is quite comfortable because the canopy is wide and the branches tend to be close together (Hadinoto, 2018). The types of tree plants that have this type of architectural model are: Gerok Ayam/Popohan *(Buchanania arborecens),* Karet plant *(Havea brasiliensis),* Kemala Rerah *(Mallotus philippines),* Bunga Kupu-kupu *(Bauhinia ellitri pulle),* Kayu Cedro *(Cedrela odorata),* Tree Mahoni *(Sweitenia mahagoni)*. Can be seen in picture 1..



Rauh Model

Buchanania arborecens

Havea brasiliensis

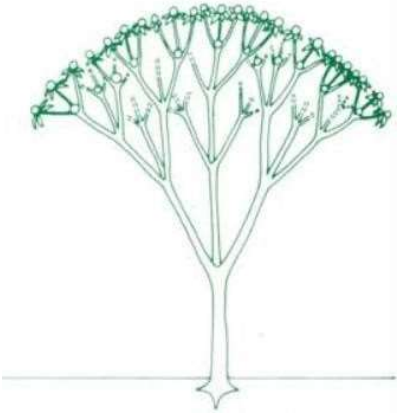
Mallotus philipenis

Cedrela odorata

Sweitenia mahagoni

2. Leeuwenberg

   The characteristic of the Leeuwenberg Architectural Model is that tree branching is composed of sympodial branches where each sympodia unit supports more than one of the same unit at the distal end. Has a branching structure in the direction of growth
   pointing upwards. Leeuwenberg has the position of its branches tending to lean upwards, so most of the rainwater that hits the tree's branches will become trunk flow and only a small part will become crown fall (Naharuddin, 2016). The large area of canopy closure will cause the small amount of water escaping from the canopy to have a fairly high interception potential (Hendarso, 2022). The types of trees with this type of model are: Kamboja (*Plumeria alba L*) and Zaitun Manis (*Osmanthus fragrans lour*). Can be seen in picture 2..



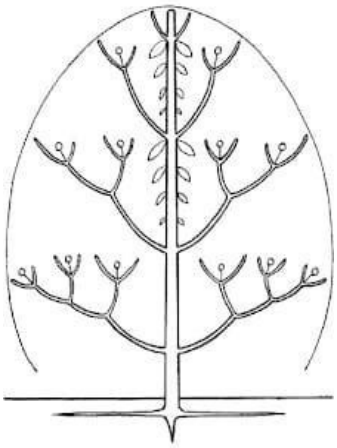
Leeuwenberg Model

Osmanthus fragrans lour

Plumeria alba L

3. Scarrone

   The characteristics of the scarrone architectural model are that the trunk is branched, polyaxial or a tree with several different axes, with vegetative axes that are not equivalent to a homogeneous shape, has monopodial branching with terminal connections, all of them are orthotropic, located in the peri-periphery of the crown, visible sympodial branches such as modular construction, stems with rhythmic growth in height, the canopy in this model is dense and wide (Hendarso, 2022). The types of plants found in this model are: Mangga *(Mangifera indica),* Ikhtisar *(Styrax japonicus siebold),* Kedondong Hutan *(Spondias piñata)*. Can be seen in picture 3.



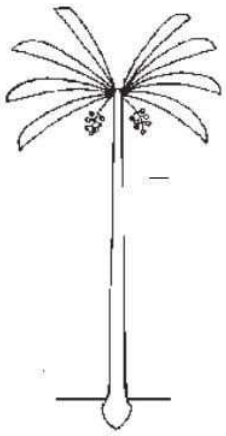
Scarrone Model

Styrax japonicus siebold

Mangifera indica

4. Corner

The corner architectural model has the characteristics of a monopodium stem with lateral connections and no branches. This is because the connections are lateral so the apical meristem can grow continuously (Idayat, 2018). Examples of this model plant are Coconut *(Cocos nucifera L)*. Can be seen in picture 4.



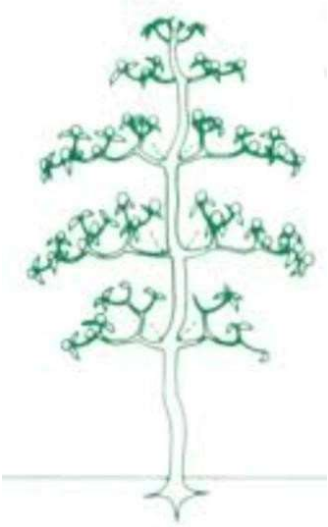
Model Corner

Cocos nucifera L

5. Coriba

It has the characteristics of a sympodium stem model, the terminal bud has stopped growing, because the meristematic tissue at the tip has differentiated into parenchymal tissue. The axillary buds on this plant will develop to form branch coulomners (Ekowati, 2017). Plants

with this architectural model, namely Tupelo/Nisa (*Plumeria alba L*). Can be seen in picture 5..

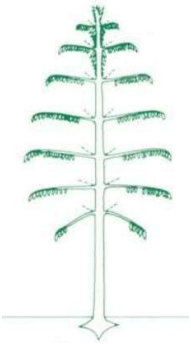


Coriba Model

Plumeria alba L

6. Massart

This architectural model has the characteristics of a branching, polyaxial stem, with unequal, homogeneous or differentiated vegetative axes in the form of an orthotropic axis, all of the branches are acrotonic in forming the stem, not a modular construction with lateral inflorescences, the branching is generally monopodium, the growth of stems and branches is rhythmic and flagiotropic branching, this is not due to apposition, monopodial or sympodial due to substitution (Hendarso, 2022). The type of tree with this model is Tree Kapuk (*Ceiba pentandra*). Can be seen in picture 6..

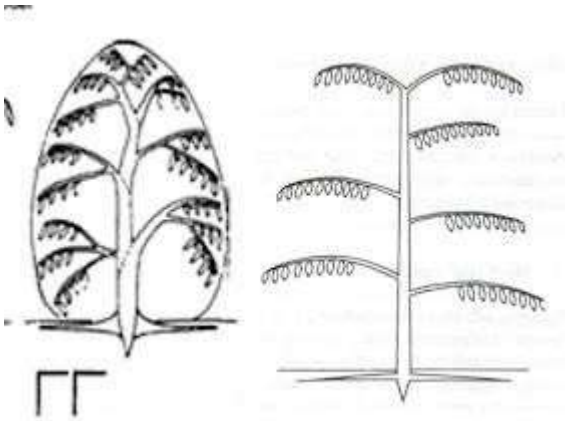


Massart Model

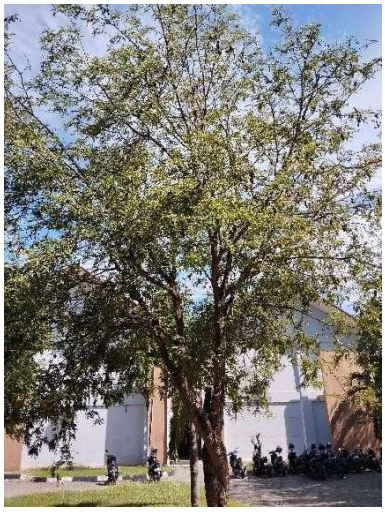
Ceiba pentandra

7. Troll

   The troll model has the characteristic of having a sympodial stem, that is, it is difficult to distinguish between the main stem and the branches because subsequent development of the main stem is less large or less rapid in growth than the growth of the branches. Then, it will flower once it matures. This model allows a lot of rainwater to escape through the canopy and a little through the trunk, due to the large surface flow, infiltration, erosion and interception. If the litter is around the tree yard, it will cause quite a large potential for surface runoff, and small infiltration, but if there is enough litter then the potential for infiltration is quite large within a certain period of time (Naharuddin, 2016. The leaves are more directed towards each other, the first axis is orthotropic (grows towards the top).), the next axis begins to differentiate plagiotropically (grows sideways) gradually. The troll model is found in plants Asam Jawa (*Tamarindus indica*). Can be seen in picture 7.



Model Troll



Tamarindus indica

Description of the Morphology of Several Trees in the Ujung Pancu

1. Plants Rubber *(Havea Brasiliensis)*

   Rubber plants are plants that originate from the Amazon forest, Brazil and countries in the United States. This plant entered Indonesia in 1864 during the Dutch colonial period. Previously, this plant was only used as a collection plant, but as time progressed, this plant became a commercial garden plant (Prakoso, 2018). The morphological characteristics of the

rubber plant are that it has a tap root that can support the stem of the plant which grows tall and large. The stem can grow up to 15-25 m, upright, strong, with high upward branches and with dense leaves that can last up to 100 years. Each leaf has three leaflets. Rubber plant leaves will turn yellow or red during the dry season (Sofiani, 2018)..

2. Gerok ayam/popohan *(Buchanania arborecens)*

   Gerok ayam/popoham spread naturally in the Indo-China area. This type of plant has the characteristics of a trunk with a diameter of 120 cm with a height of up to 40 m, cylindrical shape, upright, free of branches reaching 20 m, with smooth bark, pale gray to white or reddish brown. The leaves are elongated oval in shape, single, arranged in a spiral clustered at the ends of the twigs to form a dense crown. The base of the leaf stalk swells. This plant is very important for coastal vegetation and swamp forests to mangroves, and this plant is not resistant to fire. The leaves of this plant can be used as a headache medicine (Tukirin, 2020)..

3. Kemala Merah *(Mallotus philipenis)*

   (Mallotus philipenis) spread across tropical and subtropical regions with an altitude of 1,000 m. This tree is a monoecious plant with a height of up to 25 m and a trunk diameter of up to 50 cm. The leaves are alternate and simple with a pointed or round shape with glands at the base. This tree is resistant to cold (freezing) or dry (hot) environmental temperatures (Gangwar, 2014)..

4. Cedro wood *(Cedrela ordata)*

   This plant can be found in primary and secondary forests in lowland forests. (*Cedrela ordata*) has the characteristics of a single-house plant with a height of up to 40-60 m, an upright, cylindrical, unbranched stem with a diameter of up to 120-300 cm, without supports. The surface of the bark is rough and cracked, reddish brown in color, the twigs are smooth until the lenticels are visible. Has alternate, pinnate leaves with 6-12 pairs of leaflets, round-lanceolate in shape. Unisexual flowers, capsule-shaped fruit, reddish brown. This plant is not resistant to standing water or flooding, has perfect drainage which produces good soil aeration needed by the root system. This plant does not require nutrients soil, but prefer light and fertile soil, slightly acidic soil but resistant to heavy soil (Orwa, 2009).

5. Mahogani Tree *(Sweitenia mahagoni)*

   Mahogany is a plant that can be found in tropical areas, West Indies. This plant can grow wild (Yuniarti, 2008). This plant is a type of tropical tree endemic to Central America and South

America which has a wide natural distribution, stretching from Mexico to Bolivia and Central Brazil. This mahogany species is also planted in Southeast Asia and the Pacific, namely India, Indonesia, the Philippines and Sri Lanka (Krisnawati, 2015). The height of this plant can reach 40 m with a diameter of up to more than 100 cm. It has a tap root, round stem, many branches, and is woody and has sap. The leaves are green in color with leaves reaching 10-30 cm in length, compound pinnately even, barley leaves are oval-shaped, the tip and base are pointed and the veins of the leaves are pinnate. Compound flowers are arranged in bouquets that emerge from the leaf axils (Ahmad, 2019).

D. CONCLUSION

Based on the research results, there are 7 architectural models of trees from 15 species in the Ujung Pancu forest area, Aceh Besar Regency, namely, rauh, leuwenberg, scarrone, corner, coriba, massart, troll, with the dominant architectural models namely Scarrone and rauh. The rauh and scarrone models have the characteristics of rhythmic (simultaneous) growth, with branches that are orthotropic (grow towards the top), the first stem can grow indefinitely, the canopy is vase-shaped, where the lower canopy is narrow and the further up it goes, the wider it gets. influences surface flow, infiltration, interception and erosion. In the rauh model there are 6 species and in the scarrone model there are two species, of all the species that dominates is the species Kedondong Hutan *(Spondias piñata)* and the dominant family is Anarcadiaceae.

E. THANK YOU

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