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## Identification of Mangrove Associated Plants in the North Beach of Malifut (North Halmahera Regency)



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### ABSTRACT

The free exploration was carried out to identify types of mangrove and mangrove associated plants (epiphytes) as well parts of mangrove attached to the epiphytes. A descriptive qualitative method was employed in this study. The results suggest nine types of mangrove epiphytes, namely *Myrmecodia pandans*, *Pyrrrosia piloselloides*, *Pyrrrosia nummularifolia*, *Pyrrrosia angustata*, *Pyrrrosia lanceolata*, *Dendrobium crumenatum*, *Polypodium sinosum*, *Microsorium punctatum*, and *Ficus benjamin*. Individuals of the nine species associated with *Bruguiera gymnorrhiza* were more abundant in zone 2 and zone 3, while there was none of the species found on zone 1.



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## I. INTRODUCTION

A forest is an association or a collection of trees with a certain density. The collection of the trees will cover a certain area to create a microclimate which is convenient for the plants living under the canopy. Forest vegetation communities can be identified through plant associations. A plant association is mainly characterized by the presence of various types of plants in a particular place Tolangara [8]. It has an important implication in ecology because the majority of ecological processes are based on positive or negative associations between two species or among many species Arief [1]. Every individual in a plant association shares similar physiognomy, ecological structure, and floristic composition.

Tolangara [8] defines plant association as a vegetation unit that consists of a number of individuals of the same species. An association is primarily composed of character species and differentiating species. Djufri [2] explains that plants that grow naturally in a certain place will form a community that lives in harmony. The living-together harmony or the association is mutually beneficial. Therefore, each of the individuals is able to fulfill their needs.

A mangrove forest can serve as an example of a stable community in which individuals live and grow harmoniously Tolangara [10]. There are various types of plants' interactions established in this solid and steady community, either between mangrove or between mangrove and its associated plants (epiphytes) that are attached to its stem and branches. The association between a mangrove tree and its epiphytes may or may not be present at the same time, depending on the ecological conditions. In addition to increasing species diversity, plant associations can also enrich germplasm and create a microclimate in the community Tolangara [9]. Therefore, considering the importance of the association between mangrove and its epiphytes in ecology, this study was conducted.

## II. MATERIALS AND METHODS

The free exploration method was carried out in the North Beach of Malifut, North Halmahera from October 8 to October 31, 2018. Research samples were collected from an area of 240 m<sup>2</sup>. These samples consisted of host plants and their associates (epiphytes) which were attached to the body of the hosts. The next process involved identification of the types of the host plants, the types of their associates, and the zones (parts of the host's body) on which the epiphytes grow.

### III. RESULTS AND DISCUSSION

#### A. Results

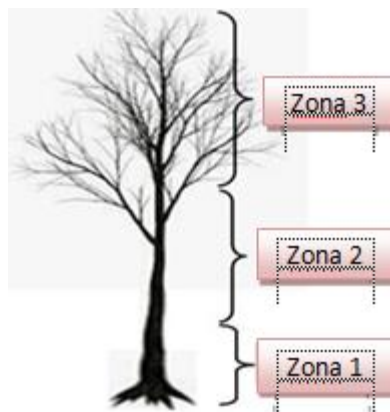
The results of the study revealed nine species of mangrove-associated plants. The Indonesian names of the individuals, the names of the host plants, and the zones where the epiphytic plants grow are presented in Table 1.

**Table 1 Mangrove and Mangrove-Associated Plants Found in the Research Site**

| Indonesian Names of the Epiphytic Plants | Scientific Names of the Epiphytic Plants | Host Plants                 | Zones to attach |
|--|--|-----------------------------|-----------------|
| <i>Sarang semut</i>                      | <i>Myrmecodia pandans</i>                | <i>Brugueira gymnarhiza</i> | 2               |
| <i>Paku sisik naga</i>                   | <i>Pyrrosia piloselloides</i>            | <i>Brugueira gymnarhiza</i> | 2 and 3         |
| <i>Daun picisan</i>                      | <i>Pyrrosia Nummularifola</i>            | <i>Brugueira gymnarhiza</i> | 2 and 3         |
| <i>Pakis staghorn</i>                    | <i>Pyrrosia angustata</i>                | <i>Brugueira gymnarhiza</i> | 2               |
| <i>Sisik naga picisan</i>                | <i>Pyrrosia lanceolata</i>               | <i>Brugueira gymnarhiza</i> | 2               |
| <i>Anggrek merpati</i>                   | <i>Dendrobium crumenatum</i>             | <i>Brugueira gymnarhiza</i> | 2               |
| <i>Paku tanduk rusa</i>                  | <i>Polypodium sinosum</i>                | <i>Brugueira gymnarhiza</i> | 3               |
| <i>Paku purba</i>                        | <i>Microsorium punctatum</i>             | <i>Brugueira gymnarhiza</i> | 3               |
| <i>Beringin</i>                          | <i>Ficus benjamin L</i>                  | <i>Brugueira gymnarhiza</i> | 2 and 3         |

Source: Research Data 2018

The table shows three parts (zones) of the host plants that were attached to the associated plants. The three zones consisted of zone 1 (lower part), zone 2 (middle part), and zone 3 (upper part), as illustrated in Figure 1.



**Figure 1. Attached Zones**

## B. DISCUSSION

Plant association is a community found in the same and repeated condition in various research locations. An association is characterized by the presence of plants' similar floristic composition, uniform physiognomy and distribution in a typical habitat Lindasari Y, et,al., [3]. A species association produces a spatial relationship between the individuals. Therefore, if an associated individual is found in the observation area, then it is more likely to discover its partner in the adjacent area.

A group of plants which corresponds to a similar association has the same needs for particular abiotic factors (Wiharto M, *et al.*, [11]. Every plant association establishes a unique relationship with various abiotic factors, so there are no identical associations. The types and the characters of the associations formed between mangrove trees and their epiphytes in this study are explained as follows.

### 1. Types of Mangrove Associated Plants

There are nine types of mangrove associated plants found in this study. The characteristics of the plants are described as follows:

#### a. Sarang semut or ant nest plant (*Myrmecodia pendans*)

Ant nest plant is an epiphytic plant that contains phytochemical. Ant nests have a uniqueness that lies in their interaction with ants. Ants build halls and form colonies inside the plant bulbs. This type of symbiosis makes ants choose this plant as a comfortable place for nesting.

#### b. Paku sisik naga or dragon's scales (*Pyrrosia piloselloides*)

*Pyrrosia piloselloides* is an epiphytic creeping fern whose development is fast though it is housed in a host tree. These vines grow by attaching to host plants, but making their own food on the stem of the host trees. The Chinese medicine world calls this plant *bao lian*, which is efficacious as an anti-inflammatory, pain relief, and blood cleanser. This plant can also be used to stop bleeding, strengthen the lungs, and treat a cough.

**c. Daun Picisan or creeping button fern (*Pyrrrosia nummularifolia*)**

*Pyrrrosia nummularifolia* is an epiphytic fern that has round leaves. The leaves are arranged in pairs on the stalks that propagate. This plant is drought resistant and has a typical photosynthetic system which is possessed by epiphytic plants.

**d. *Pyrrrosia angustata***

*Pyrrrosia angustata* has a long propagating root. The thickness of the root is around 1.5 mm. It is hard and covered by scattered scales. One *Pyrrrosia angustata* leaf consists of 30 strands with a width of 3 cm which form a whole line on the edge of the leaf.

**e. *Pyrrrosia lanceolata***

*Pyrrrosia lanceolata* is distributed in Africa, from Southeast Asia to the Pacific and throughout the Melanesian region. Malaysians use this plant for a headache remedy. The leaves are pounded together with black cumin and onion. The concoction is then rubbed on the patient's forehead.

**f. Anggrek merpati or pigeon orchid (*Dendrobium crumenatum* Swartz)**

Pigeon orchids possess long branches and dense stems. The rhizomes are 1-2 meters in length. These orchids also have pseudo-tuber shaped stems (32-68 cm) which are arranged together in a small base. The centre is shaped like a tube and its tip shrinks. The leaves are found at the end of the stem. The length of each leaf is 4-6 cm and the width of each leaf is 1.5-3 cm. The flowers bunch is white and fragrant.

**g. *Polypodium sinosum***

*Polypodium sinosum* has a fibrous root that can propagate. Its stem first grows as a rhizome but will go upright as it gets older. The compound leaf and the stalks are downy. Its 30-cm-leaf is divided into 20-50 leaflets.

**h. *Microsorium punctatum***

*Microsorium punctatum* has single and elongated leaves. The leaves have flat or lobed edges, tapered bases, symmetrical pointed edges, and reticulate venation. Its monolet-shaped spores are protected by a perisphere or a thick cell wall.

**i. Beringin or weeping fig (*Ficus benjamin* L.)**

Beringin (Indonesian name) or weeping figs a plant with a tap root which is often known as a garden or ornamental plant. Weeping fig is native to Asia and Australia. This mystical trees not only used as an ornamental plant but also has the properties to prevent various types of diseases such as high fever, rheumatism, dysentery and etc.

**2. Associations Based on the Types of the Host Plants**

Mangrove ecosystems are unique resources that are highly influential. However, they are very vulnerable because the ecosystems serve either direct or indirect ecological and economic functions for humans and other organisms Pratana dkk,[6]. The consistency of mangrove presence will affect the spread of epiphytic plants in the region because epiphytic plants can only live in cool environmental conditions with high humidity and shade.

Mangroves that were found as host plants in this study generally have the same physical characteristics, such as having thick, rough and cracked outer skin, relatively good canopy conditions (umbrella-shaped architecture with normal branching and not too thick), even though some of them also show defects physical conditions due to injury (e.g. broken or cracked or bent stalks). Similarly, Sujalu. A.P et al., [7] argue that host trees for epiphytic plants often have a special physical appearance. Most host plants have flat or tilted branches with a large stem diameter which function as a habitat for the associated plants.

The stem diameter of a host plant affects the number of epiphytic plants that attach to it regardless of its species, clan, and tribe. A host plant with a relatively large and crowned diameter is more attractive to its potential associates. In addition, notched and perforated tree bark is also very beneficial for the epiphytic plants because such physical skin condition allows the accumulation of topsoil or hummus and ensures the availability of water and nutrients for the associated plants (Sujalu. A.Pet al.,[7]. Similarly, the results of this study showed that *Bruguiera gymnorrhiza* had more potentials as a host plant because the tree has grooved and filamentous stems and thick skin. The *Bruguiera gymnorrhiza* thick and hard skin will let the associated plants to flourish, while slippery skin can cause some difficulties for the plants to attach and grow on it Nasution et al.,[5].

### 3. Associations Based on the Tree Canopy (Zones)

Association based on the tree canopy is a form of association that spreads on all parts of the corresponding host plant, especially on the trees, shrubs or lianas (woody plants) which grow above the ground or attached to the main stem of the tree. There are different types of canopy shapes. The shape of a tree canopy is commonly determined by the tree adaptation skills or how the tree individual survives in its habitat Tolangara [10]. According to Sujalu A.P., et al.,[7], places that are inhabited by many types of plant individuals are more likely to create a higher diversity of species. This habitat condition encourages the trees to develop a more stable and dynamic canopy compared to other habitats that accommodate epiphytic plants with branch-free stems.

According to the results of this study, mangrove associated plants were predominantly found to be attached to the host plants on zones 2 and 3. Zones 2 and 3 are located in the upper parts of the main stem so that they can store water and nutrients better than zone 1. These zones also constitute the largest and the flattest parts of the branch. Therefore, in these zones, the decomposition of various types of litter and dust can occur and rainwater or morning dew which is needed by the epiphytes can be restrained Marsus et al.,[4]. On the other hand, zone 1 is barely occupied by the associated plants considering its position at the base of the plant stem. In this zone, sunlight is very limited because the penetration is hampered by the tree branches and surrounding vegetation.

### IV. CONCLUSIONS

There were at least nine epiphytic plant species found in the mangrove forest of the North Beach of Malifut. They include *Myrmecodia pandans*, *Pyrrosia piloselloides*, *Pyrrosia nummularifolia*, *Pyrrosia angustata*, *Pyrrosia lanceolata*, *Dendrobium crumenatum*, *Polypodium sinosum*, *Microsorium punctatum*, and *Ficus Benjamin L.* These plants predominantly associated with one host plant, namely *Bruguiera gymnorrhiza*. The epiphytes were mostly found in zone 2 and zone 3 of the host plant which are located in the upper parts of the stem. There was no epiphytic individual found attached in zone 1 because the location of the zone does not support the adequacy of the sunlight and nutrients.



## REFERENCES

- [1] Arief A. *Hutan Mangrove Fungsi dan Manfaatnya*. Kansius, Yogyakarta. 2003.
- [2] Djufri. *Penentuan Pola Distribusi, Asosiasi, dan Interaksi Spesies Tumbuhan Khususnya Padang Rumput di Taman Nasional Baluran Jawa Timur*. Bogor, Biodiversitas 3 (1) 181- 188. 2002.
- [3] Lindasari W. F. *Jenis-jenis Paku Epifit di Hutan Desa Beginjan Kecamatan Tayan Hilir Kabupaten Sanggau*. Pontianak, Protobiont 4(3); 65-73. 2015.
- [4] Marsus, Mukti C., Setiawan, Kholidah S. Viviati A. *Studi Keanekaragaman Anggrek Epifit*. Surakarta, Biodiversitas 2 (2); 150-155. 2001.
- [5] Nasution T, &Junaedi D.I. *Keanekaragaman dan Komposisi Tumbuhan Epifit Berpembuluh Pada Paku Tiang (Cyathea spp.) di Kebun Raya Cibodas Jawa Barat*. West Java, Indonesia, Published in the Proceeding of National Seminar "Biodiversitas" 3(3); 453-460. 2017.
- [6] Pratana Bayu A., Alhamd L., Rahajoe. J.R. *Asosiasi dan Karakterisasi Tegakan Pada Hutan Rawa Gambut Di Hampangan Kalimantan Tengah*. 2012.
- [7] Sujalu A.P., Pulihasih A.K., *Keanekaragaman Epifit Berkayu Pada Hutan Bekas Tebangan Di Hutan Penelitian Malinau-Cifor*. Samarinda, Jurnal Penelitian dan konservasi Alam 8 (3); 211-216. 2010.
- [8] Tolangara, A.R., &A.D. Corebima. *Species Composition and Utilization Patterns of Mangrove in the District of Jailolo West Halmahera Province of North Mollucas*. Indonesia. Environmental Science and Indian Journal. Volume 9 Issue 10. ISSN 0974-7451. pp359-364. 2014.
- [9] Tolangara, A.R., Hasan T., &A.D. Corebima. *Comparing Several Mangrove Seedlings*. Donnish Journals. Volume 2 (1). ISSN 2014-1162.pp.008-011. February 2015. 2015
- [10]Tolangara, A.R.,&A.D. Corebima. *Kerapatan Mangrove dan Konservasinya di Bacan Kabupaten Halmahera Selatan* . Volume 6 (02):22-24, October 2017. 2017
- [11]Wiharto M., Kusman C., Prasetyo L.B., &Partomiharjo T. *Asosiasi Vegetasi Gunung Salak Bogor Jawa Barat*. Bogor, West Java, Forum Pascasarjana, 31(3) ; 163-171. 2008.

