

## **RAFFLESIA MEIJERII IN TELE PROTECTED FOREST OF NORTH SUMATERA**

**BENTENG H. SIHOMBING<sup>1</sup> and ANTON SINERY<sup>2</sup>**

<sup>1</sup>Department of Forestry, Faculty of Agriculture, University of Simalungun, Jl. West Sisingamangaraja, Indonesia. Email: bentengsihombing@gmail.com

<sup>2</sup>Universitas Negeri Papua.

### **Abstract**

The researches aimed to Analising species vegetation and important value indeks of all species in inventory plot area as habitat *Rafflesia meijerii* and analysing the physics site area and relationship community of life between *Rafflesia meijerii* and *Tetrastigma* sp was done in reserve forest area on West Pakpak District of North Sumatera. Data collection was received by inventory of 15 plots area of 20 m x 20 m (0.60 ha). Based on inventory data collection was obtained information about vegetation and the relationship of *Rafflesia meijerii* and *Tetrastigma* sp. Based on the result of analysis data was concluded that there are 8 species vegetation in inventory plots area and the important value indeks of all species were sugar wood kayu (*Cinnamomum ummiverum*, IP = 170.34 %), hapas-hapas (*Exbucklandia populena* IP = 163.120 %), medang (*Endospermum malaccensis* IP = 6.6735 %), laban (*Vitex negundo* IP = 27.474%), simartolu (*Schima wallicii* IP = 64.205 %), tusam (*Pinus merkussii* IP = 9.321%), anturmangan (*Casuarina sumtrana* IP = 8.331%), and hotting (*Lithocarpus cycloporus* IP = 15.192). Based on data analysis that it can be concluded that it obtained one life form as a community plant between species of *Rafflesia meijerii* and *Tetrastigma* Sp much discovered in under cover of tusam (*Pinus merkussii*) species and this case can be hipotized influencing of mikoriza at roots and setup the growth of tubers.

**Keywords:** *Rafflesia meijerii*, Londut protected forest

### **INTRODUCTION**

Forest ecosystem is a community of life among living things with environment of interdependencing. Forest is a natural site of floras and faunas in the world. Forest ecosystem very expensively of floras and faunas life. The dinamic of forest environment defandanced to all of atcs to be degadradaded forest. But, in simply the living of floras and faunas change of human destruction as land occupations of agriculture, mining, industry, illegal logging, shifting cultivation and forest fire. The damaged to floras and fauna where extinction of species.

In many reported of ecology research, the forest fire almost mainly caused of forest destruction. So, the forest destructing cause loosing the biodiversity. This condition also experienced by floristic flower species of *Rafflesia meijerii*. The *Rafflesia meijerii* was fixed as a extictingly floristic species by IUCN red listed. The *Rafflesia meijerii* growth in a specifict site and can not live in all condition. The *Rafflesia meijerii* growing as a parasitism of career plant. The species of *Rafflesia meijerii* is rarely found in forest land if the site not worthy to life of *Rafflesia meijerii*. The life circle of *Rafflesia meijerii* is to long of 4 years. Up to now, there were discovered 30 species of Refflessia and of all the world, Indonesia has 14 species of *Rafflesia* (Sugiarti, Rohana, 2010).

Saved biodiversity action in tropical forest area was generally failed because hit of national interest as mine exploitation who destructing land and destroyed plants natural habitat. Natural resoueches as mine in South east asia as Indonesia was eliminated many species of biodiversity. In line that biodiversity conservation activities, the *Rafflesia meijerii* as small plant lived on forest floor many experience of distraction of exploitation mine. Conservators hopes the government trully implemented the conservation wisdom of biodiversity that poured in the international environment protocols.

### **Research Aim**

1. Analysing forest species vegetations and the important value of all species in Londut Ptotected Forest as habitat *Rafflesia meijerii*.
2. Analising psycal site area and relationship community of life between *Rafflesia meijerii* and *Tetrastigma* sp.

### **METHOD**

#### **Location And Time**

The research located in Tele protected forest of North Sumatera Province with altitude at 1.300m – 1.900 m at mean sea level. The researched time was done in April – May of 2020.

#### **Matter and Tools**

In this research used matter of forest area under cover of identification of *Rafflesia meijerii*. The tools used are mapp location, identification book, wood block, tally sheet, compass, marker, clinometer, hagameter, GPS receiver, thermometer and digital camera.

#### **Object and Research Data**

##### **1.Research Object**

The object of reasearch are *Rafflesia Meijerii* and *Tetrastigma* sp on under cover of forest protected in Toba Pulp Lestari Limited area of Tele sector. The number of inventory plots area about 15 plots of 20 m x 20 m (0.60 ha).

##### **2.Research Data**

The data of research are primery data and sechondary data. The primery data are composition vegetation, career of *Rafflesia meijerii*, and knop of *Tetrastigma* sp. The sechondary data are rainfall, climate tipe, and general condition of research location.

#### **Collecting Data Method**

The colecting data method was done of sampling with purposive sampling method. The sampling plots inventory was done to see the *Tetrastigma* sp and *Raflessia meijerii*. The several data measured were tofografy, vegetation, rainfall, temperature and realtive humidity.

## Analisis Data Method

The primary data of forest inventory result interpreted and analysed of several vegetation analysis formulas were:

1. Frequency (Fr) is number of point distribution vegetation in inventory plots.
2. Relative Frequency (RFr) is the ratio frequency one species to totally frequency values of all species x 100.
3. Density (De) is the number of individual a species in inventory plot area.
4. Relative Density (RDe) is the ratio density of one species to totally density values of all species x 100.
5. Dominancy (Do) is number of basal area one species in inventory plot area.
6. Relative Dominancy (RDo) is the ratio dominancy of one species to totally dominancy values of all species x 100.
7. Important Value Indeks (IVI) is the total relative value of frequency, density and dominancy of one species (Mueller-Dombois and Ellenberg, 1974) as IVI (Important Value Indeks) = RFr + RDe + RDo

## RESULT AND DISCUSSION

### 1. The General Condition of Research Location

Geographically the location of the research on 2°15' 00'' N - 2° 50' 00''N dan 98° 20' 00'' E - 98° 50' 00''E. The research are topography of flat to steep with soil type are troohemists, dystropepts, hydrandepts dan dystrandeps, dengan jenis batuan berupa tapanuli, sihapas, alluvium muda dan toba. Based on Schmidt Fergusson climate classification, the research location climate is A type (TPL, 2008). Based on the result of 7 climate centre reported that the monthly rainfall of location is 177 mm/ month with 11 rainfall days, the temperature about 17°C - 29°C, the relative humidity about 85 % and classified as tropical climate. The maximum rainfalls in November of averaged about 440 mm/ month with 15 rainfall days. The minimum rainfalls in June – August about 31- 56 mm/ month with 5-7 rainfall days (Art and Culture Bureau of Samosir District, 2009).

### 2. The Method of Vegetation Analysis

#### a. Relative Frequency of Species

The result of species vegetation inventory obtained that there are 8 species were kayu manis species (*Cinnamomum ummiverum*), hapas-hapas (*Exbucklandia populena*), medang (*Endospermum malaccensis*), laban (*Vitex negundo*), simartolu (*Schima wallicii*), tusam (*Pinus merkussii*), anturmangan (*Casuarina sumtrana*), and hotting (*Lithocarpus cycloporus*). The distribution frequency and relative frequency value of all species as shown in Tabel 1 below.

**Tabel 1: Distribution of Frequency and Relative Frequency Values of all species**

Vegetation Name	Frequency	Relative Frequency (%)
1. Kayu manis (Cinnamomum ummiverum)	3	4,918
2. Laban (Vitex negundo)	12	19,672
3. Medang (Endospermum malaccensis)	15	24,590
4. Hapas-Hapas (Exbucklandia populnea)	15	25,490
5. Simartolu (Schima wallicii)	2	3,279
6. Hotting (Lithocarpus cycloporus)	6	9,836
7. Tusam (Pinus merkussii)	4	6,557
8. Anturmangan (Casuarina sumatrana)	4	6,557
<b>Totally</b>	<b>61</b>	<b>100,000</b>

Source: Primery Data.

## 2. Relative Density of Species

Based on result inventory data discovered 231 individus of 8 species kayu manis species (Cinnamomum ummiverum), hapas-hapas (Exbucklandia populnea), medang (Endospermum malaccensis), laban (Vitex negundo), simartolu (Schima wallicii), tusam (Pinus merkussii), anturmangan (Casuarina sumatrana), and hotting (Lithocarpus cycloporus). The distribution density and relative density value of all species as shown in Tabel 2 below.

**Tabel 2: Distribution of Density and Relative Density Values of all species**

Vegetation Name	D	De (%)
Kayu manis (Cinnamomum ummiverum)	4	1,732
Laban (Vitex negundo)	17	7,359
Medang (Endospermum malaccensis)	91	39,394
Hapas-hapas (Exbucklandia populnea)	92	39,827
Simartolu (Schima wallicii)	5	2,165
Hotting (Lithocarpus cycloporus)	12	5,195
Tusam (Pinus merkussii)	6	2,597
Anturmangan (Casuarina sumatrana)	4	1,732
<b>Totally</b>	<b>231</b>	<b>100,000</b>

Source: Primery Data.

## 3. Relative Dominancy of Species

Based on result inventory data discovered 231 individus of 8 species kayu manis species (Cinnamomum ummiverum), hapas-hapas (Exbucklandia populnea), medang (Endospermum malaccensis), laban (Vitex negundo), simartolu (Schima wallicii), tusam (Pinus merkussii),

anturmangan (*Casuarina sumtrana*), and hotting (*Lithocarpus cycloporus*). The distribution dominancy and relative dominancy value of all species as shown in Tabel 3 below.

**Tabel 3: Distribution of Dominancy and Relative Dominancy Values of all species**

Vegetation Nama	D	De (%)
1. Kayu manis ( <i>Cinnamomum ummiverum</i> )	9,0746	0,024
2. Laban ( <i>Vitex negundo</i> )	166,7649	0,442
3. Medang ( <i>Endospermum malaccensis</i> )	83,148	0,221
4. Hapas-hapas ( <i>Exbucklandia populnea</i> )	37208,21	98,703
5. Simartolu ( <i>Schima wallicii</i> )	90,7906	0,241
6. Hotting ( <i>Lithocarpus cycloporus</i> )	60,676	0,161
7. Tusam ( <i>Pinus merkussii</i> )	62,742	0,166
8. Anturmangan ( <i>Casuarina sumatrana</i> )	15,7094	0,0417
<b>Total</b>	<b>37697,12</b>	<b>100,000</b>

Source: Primery Data.

Tetrastigma sp is as career plant for living of *Rafflesia Meijerii*. Based on vegetation analisys obtained the conclusion the Tetrastigma Sp and *Rafflesia Meijerii* living succesed under the tusam tree (*Pinus merkussii*) species. Based on result of inventory obtained 46 root nodules, 30 knop, 62 die individus of *Rafflesia meijerii* and 104 Tetrastigma sp.

#### 4. The Important Value Indek of Species

Based on unity the relative frekuensi (RFr), relative density (RDe) and relative Dominancy (RDo)of Dari tingkat dominansi dan dominansi relatif 8 species of kayu manis species (*Cinnamomum ummiverum*), hapas-hapas (*Exbucklandia populena*), medang (*Endospermum malaccensis*), laban (*Vitex negundo*), simartolu (*Schima wallicii*), tusam (*Pinus merkussii*), anturmangan (*Casuarina sumtrana*), and hotting (*Lithocarpus cycloporus*). The distribution Important Value Indeks (IVI) of all species as shown in Tabel 4 below.

**Tabel 4: Distribution of Important Values Indeks of all species.**

Vegetation Nama	RFr	RDe	RDo	IVI
1. Kayu manis ( <i>Cinnamomum ummiverum</i> )	4,918	1,731	0,024	6,673
2. Laban ( <i>Vitex negundo</i> )	19,672	7,359	0,442	27,474
3. Medang ( <i>Endospermum malaccensis</i> )	24,590	39,393	0,220	64,205
4. Hapas-hapas ( <i>Exbucklandia populnea</i> )	24,590	39,826	98,703	163,120
5. Simartolu ( <i>Schima wallicii</i> )	3,278	2,164	0,241	5,684
6. Hotting ( <i>Lithocarpus cycloporus</i> )	9,836	5,194	0,161	15,192
7. Tusam ( <i>Pinus merkussii</i> )	6,557	2,597	0,166	9,321
8. Anturmangan ( <i>Casuarina sumatrana</i> )	6,557	1,731	0,042	8,331
<b>Total</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>300.000</b>

Source: Primery Data.

The biodiversity of species vegetation formed mutually association and parasitism association one with another in an ecosystem depended to career of Tetrastigma sp as shelter of Rafflesia Meijerii. The biodiversity also influenced growth and existance of Rafflesia Meijerii in habitat site. Based on field observation, there is one interesting fact that Rafflesia Meijerii good growth under the tree of tusam (*Pinus merkussii*) caused the number of Rafflesia Meijerii was found here more than the other trees species.

### 5. Psycal Site Area Condition of Rafflesia Meijerii

Condition site area of Rafflesia Meijerii in research location is goodly of big trees and wild life of fauna. Based on Hanna, F (2012) reported the psycal condition in this location as shown in Tabel 5 below.

**Tabel 5: Distribution of Important Values Indeks of all species**

Altitude (m mse)	Temperature (° C)	Humidity (%)	Soil Temperature (° C)	Soil pH	Deep (cm)
1.712	18.07	87.53	15.86	5	10
1.714	18.27	87.00	15.93	4	19
1.716	18.26	87.00	15.90	5	13
1.717	18.28	87.43	15.98	5	18
1.733	18.27	87.10	15.86	5	15

Source: Hanna, F (2012)

Generally, the research located on high land with altitude about 1.712 – 1.733 m msl (mean sea level). The site area of Rafflesia Meijerii in this research different with condition site area of Rafflesia arnoldi in West Sumatera of Syahbuddin and Chairul (2009) reported. The site area of Rafflesia arnoldii in West Sumatera located on altitude about 500 – 1.000 m msl and Rafflesia haseltii of Suringar in Jambi at altitude about 270 – 360 m msl (Zuhud dkk, 1999). The difference altitude of 3 site area caused differencing vegetation biodiversity of measure or number species influenced the microclimate of habitat species of Rafflesia sp. Based on observating and measuring by Hanna, F (2012) shown that the minimum air temperature on 07.00 am is 16 °C and the maximum air temperature on 13.00 am is 20 °C. But the averaged air temperature on 16.00 pm is 18 °C. This facts in line with opinion of Widhiastuti (2006) that air temperature will be increasing in line with sun radiation intensity.

Soil is a growing media for plants where soil is important factor of environment and interrelated with plants above. Soil factor covered soil temperature, soil pH, and litterfall thickness. The averaged of temperature in this location are the minimum air temperature is 15.4 °C at morning and the maximum air temperature 15.9 °C at noon (Hanna F, 2012). The soil pH at research location about 4-5 (acid soil classified) and this condition similiar with soil pH of Rafflesia hasseltii in Jambi (Zuhud, 1999) with soil pH about 3,6 – 5. Litterfall thickness in reserach location about 10 cm - 20 cm. The maximum literfall thickness is 20 cm and the minimum is 7 cm. But at site area of Rafflesia hasseltii in Jambi about 2 cm - 5 cm. The differenced of litterfall thickness on site area of Rafflesia sp influencing air temperature on on site. In site area of Rafflesia Meijerii has been low air temperature. But in site area of Rafflesia hasseltii has been higher air temperature. The air temperature influenced the decomposition of litterfall. The

variation of species vegetation and environment in one and another location and plant need of environment especially different location one time to another time. This is can be seen from the different of plants species of altitude and season (Sitompul dan Guritno, 1995). And than, the differen altitude at mean sea level can be menimbulkan climate and season total at location especially air temperature, air humidity, and rainfall. In generally, the observation of *Rafflesia Meijerii*, whereas observation done, all of *Rafflesia Meijerii* flower is downed, drying and decomposed. *Rafflesia Meijerii* flower bloom in short time about 3 days only. The *Rafflesia Meijerii* deatched flower is black. Deatheing of *Rafflesia Meijerii* evidently not only by age of *Rafflesia Meijerii* maximized, but in reality the caused of deathing knob by human and wildlife around habitat of *Rafflesia Meijerii* as forest pigs. But, pigs also helping in seed pollination of *Rafflesia Meijerii*. In line the Zuhuh etc reported (1999), the wildlife hipotized as caused seed pollination of *Rafflesia Haseltii* is forest pigs (*Sus sp*), rusa (*Cervus unicolor*), tupai (*Tupaia sp*) and ant (*Camponotus sp*). Zuhud et al. (1993) in his research reported that *Rafflesia patma* can be death before the knob is bloom caused hightly air humidity and the end roted, root deatched and the career of root diameter leaset, darying or water deficiency and low seed quality. The knob dimeter of *Rafflesia Meijerii* generally about 0,6 cm-10,2 cm. This condition nearly same to condition of knob *Rafflesia hasseltii* (Zuhud dkk, 1998) whereas the minimum diameter is 0,5cm and the maximum is 18 cm.



**Figure 1: Living Phase of *Rafflesia meijerii***

**Description:** *Rafflesia meijerii* growth started of roots nodule parasiting of *Tetrastigma sp*. The roots nodule developed becomes a knob as will be flower of *Rafflesia meijerii*. After the knob is perfectly ovedned and becomes flower of *Rafflesia meijerii* and in 3-7 days the *Rafflesia meijerii* flower would be death and decomposing.

## Career Condition

Career plants species of *Rafflesia meijerii* is *Tetrastigma* sp. The *Tetrastigma* sp have woods poroused characteristic big and many. It can be shown for stem of *Tetrastigma* sp produced much water. Stem faced of *Tetrastigma* sp is unflated or kasar and the wood is relatif lunak. The same condition there is in *Tetrastigma* sp pada *Rafflesia fatma* Blume condition as reported by Suwartini etc (2007). The *Tetrastigma* sp was parasited by *Rafflesia fatma* Blume have wood culture with many pores and big, higher concentrated of roots and stem and deep stem, and relative soft wood, unflated stem, grooved, easly broken and cracked. Based on the observation result before in to the field that *Tetrastigma* sp growing of *Rafflesia Meijerii* located at root of diameter from 0,6 cm to 2 cm. By the way in line the Suwartini dkk reported (2007) the root diameter measurement of *Tetrastigma* sp at *Refflesia Patma* Blume about 1,5 cm to 3,4 cm. *Rafflesia meijerii* included flower reserved of Government regulations of no106 2018th about flora and fauna species protected. Conservation act has done of *Batang Gagis* Nation Park to save life continuity in habitat by demplot development of *Rafflesia meijerii*, *tertrasigma* inventory as career an education campaign of media research object and tourism to be all people undestood to protec the pride rare puspa. *Rafflesia meijerii* have no prosessi and in discus cover but in *Batang Gagis* Nation Park area discovered *Rafflesia meijerii* have procesy in cover it discus, so this findings cause to be studied more interesting (Natural Resources Baureu Republic of Indonesia, 2019).

The condition of *Rafflesia Meijerii* and *Refflesia Patma* Blume were growth, in root of *Refflesia Patma* Blume can growth on career stem hang on forest floor. Based on observation in field research obtained the averaged of individu number covered in this area about 6-7 times, than the number of *Tetrastigma* sp than the *Refflesia Patma* Blume discovered in *Leuweung Sancang* Natural Reserve decreasing about 24-25 individu each plot to be 6-7 individu each plot (Priatna, 1998). Destroying scale and extincling of *Tetrastigma* sp dcaused oh human and wildlife in forest floor. Destruction of *Tetrastigma* sp damaged in supply to presensing the *Rafflesia meijerii*. *Tetrastigma* sp is intolerant plant (needed direct sun light) for life so that the *Tetrastigma* sp must be creeped the tree of around. Based on observation in research location, the *Tetrastigma* sp generally creeping tree around to peak of tree for obtain the sun light.

## CONCLUSION

There are 8 species vegetation in inventory plots area and the important value indeks of all species were sugar wood kayu manis (*Cinnamomum ummiverum*, IP = 170.34%), *hapas-hapas* (*Exbucklandia populena* = 163.120%), *medang* (*Endospermum malaccensis* = 6.6735), *laban* (*Vitex negundo* = 27.474%), *simartolu* (*Schima wallicii* = 64.205%), *tusam* (*Pinus merkussii* = 9.321%), *anturmangan* (*Casuarina sumtrana* = 8.331%), and *hotting* (*Lithocarpus cycloporus* = 15.192). Based on data analisys that it can be concluded that it obtained one life form as a community plant between spesies of *Rafflesia meijerii* and *Tetrastigma* Sp much discovered in under cover of *tusam* (*Pinus merkussii*) species and this case can be hipotized influencing of mikoriza at roots and setup the growth of tubers.

## Reference



- 1) Art and Culture Bureau of Samosir District, 2009. Promotion Development of Toba Lake in Samosir rgency, North Sumatera.
- 2) Ewusi, J. Y. 1990. The Tropical Ecology. Membicarakan Alam Tropika Afrika, Asia, Pasifik, dan Dunia. ITB. Bandung.
- 3) Government regulations of no106 2018th About Flora And Fauna Species Protected.
- 4) Hanna F, 2012. Observation of Raflessia meijerii in Samosir, North Sumatera. Environment and Forestry Beureu of Toba Samosir Regency (Not Publication).
- 5) <http://repository.usu.ac.id/bitstream/handle/123456789/31603/Chapter%20II.pdf;jsessionid=F73B08A0581B2FF282840DAD74784DFA?sequence=3> (accessed, Saturday, 04 april 2020).
- 6) Irwanto, 2007. Vegetation Analisis of Marsegu Island Forest Reserve Management, West Seram District, Province of Maluku. Tesis Gajah Mada University. Yokyakarta.
- 7) Ludwiq, J.A., and J. F. Reynolds. 1988. Staistical Ecology a Primer on Methods and Computing. John Wiley and Sons. New york
- 8) Natural Resources Baureu Republic of Indonesia, 2019. The observation of Raflessia meijerii in Batang Gagis Nation Park. General Directorate of Natural Resources.
- 9) Marsono, DJ. 1977. Vegetation Description. Vegetation and Tropical Vegetation Types. Yayasan Pembina Fakultas Kehutanan. UGM. Yokyakarta.
- 10) Mueller-Dombois and Ellenberg, 1974. Aim and Method of vegetation Ecology. International Edition. John Wiley and Sons Chichester. New York.
- 11) National Regulation no.116, 2018. Regulation of Flora and Fauna Protected Rare of Eology Status.
- 12) Prihatna, 1998. The Plant Pathogen Interaction. Microbiology Indonesia.
- 13) Sugiarti, Rohana, 2010. Monitoring and Evaluation of Biodiversity in Biodiversity Park .
- 14) Syahbuddin and Chairul, 2009. Introduction to Plant Ecology. Bandung Iinstitute of Tecnology. Bandung.
- 15) Toba Pulp Lestari. Ltd. 2008. Corporate Profile of Toba Pulp Lestari Limited.
- 16) Zuhud dkk, 1998. Potency of Tropical Forest of Indonesia as a Buffering the Natural Madicine Matter.
- 17) Priatna, 1998.
- 18) Resources Baureu Republic of Indonesia, 2019.
- 19) Sitompul dan Guritno, 1995.
- 20) Syahbuddin and Chairul (2009).
- 21) Widhiastuti (2006).
- 22) Suwartini etc (2007).
- 23) Resources Baureu Republic of Indonesia, 2019.