



Diversity of Efit Orchids in the Rich Delta Area Sekatak Village, Sekatak District North Kalimantan

Tati Hariyati¹, Rita Diana² and Mardhiana³

¹Faculty of Agriculture, University Kaltara

²Faculty of Forestry, Mulawarman University

³Faculty of Agriculture, University of Borneo

Abstract

Orchids are plants that have high enough potential. Sekatak Village is The rich Delta region, which still has a high level of flora and fauna endemism, has become one of the centers of biodiversity. One of the types of flora found in the Kayan Delta area is an orchid. Orchid is one of the biological potentials that has a high commercial value of around 7-10%. However, information regarding the existence of orchids, especially in some areas, is still limited. Therefore, this study aims to determine the diversity of orchid species in Sekatak village, Delta Kayan area, and Sekatak district. This research uses an exploratory method along the Example River I and the Teladan 2 River. Through the river route by riding a speed boat, then climbing the hills and adapted to field conditions. There are 8 types of *Orchidaceae*, *Aspleniaceae* and There are 1 *Nephrolepidaceae*, *Apocynaceae* there are 3 types of dan There is 1 type of *Polypodiaceae*, while at the location of S. Teladan II there are 10 species consisting of *Ganodermataceae*, *Rubiaceae*, *Annonaceae*, *Hypoxidaceae* each with 1 species, *Leguminosae* with 2 species, and *Asparagaceae* with 3 species, with diversity species included in the medium category. The conclusion of this research is that there are 14 types of orchids including 11 epiphytic orchids, based on the average index of the level of diversity of orchid species included in the medium category.

Keywords: *Orchid, biological resources, .Sekatak Village, orth Kalimantan*

Introduction

Kalimantan is one of the provinces in the northern part of Indonesia which has a very high diversity of biological resources so that it has the potential to be developed and preserved. With this potential, Kalimantan is better known for its unique natural conditions, based on its geographical location such as altitude, topography, geology, soil type, climate, and temperature. However, in some areas there are forests that are no longer original, this is natural degradation caused by changes in the area, and one of the biodiversity that still exists and is recorded is the types of orchids (*Orchidaceae*) namely "Orchids of Borneo" (Chan, *et al.*, 1994).

There are 2000 species of orchid species that grow wild in the forests of Kalimantan, however, illegal exploitation of forests in Kaliman-

tan has recently damaged the forest, resulting in the extinction of orchids that live in nature (Siregar, *et al.*, 2005), the types of orchids that still grow in the forests of Kalimantan are epiphytic and terrestrial as well as lithophytic (Soeryowinoto, 1988). Kalimantan has a fairly high number of orchids, namely 1,411 species, from various types of natural habitats / places to grow that exist in nature, both coastal areas and growing in mountainous areas, with topography ranging from 0 - 3000 m above sea level. Information from the exploration that has been carried out by previous researchers about the orchid flora in East Kalimantan has not been widely carried out; this is because of the difficulty of the road traversed so that it takes quite a long time. One of the orchid areas in Kalimantan, called the Heart of Borneo (HoB), is a

*Corresponding Author:

Tati Hariyati;

DOI: <http://dx.doi.org/10.21746/aps.2022.11.8.1>

forest conservation area in Kalimantan covering three countries Indonesia, Malaysia and Brunei Darussalam, *et al.*, 2000; Wood and Cribb, 1994; Wulffraat, 2012).

Orchid plants will gradually become extinct in nature along with the amount of habitat destruction and continuous exploitation, so that the ecosystem in them will also affect their growth power (Wulanesia, 2017). With the lack of sources of data and information related to conservation, it is difficult for managers to be able to provide. However, conservation efforts that have been carried out so far have often experienced difficulties because data and information are not sufficient as a basis for management, including conservation areas (Setyawati, 2010). The more widespread forest destruction will result in these species being threatened with extinction (Hamid, 2013). In addition, the increase in population in the Bukit Lawang area has resulted in an increasing need for land.

Sekatak Village is one of the villages in the Delta Kayan area, Sekatak District, Bulungan Regency, North Kalimantan, including the Model River area. The forest area is still very natural where only local people live know the location, while the outside community (not local residents) mostly do not know it. The local community still recognizes natural or traditional medicine and still follows local wisdom; they get these medicines from forest areas that grow wild. Thus the plants that grow in nature have good potential for us to preserve, therefore there is a need for conservation for the protection of natural resources such as the existing biodiversity which has high potential, both ornamental plants and medicinal plants which are usually used by local residents to be used as medicinal plants. natural medicine in treating disease and traditional medicine.

Efforts to preserve it is necessary to collect data on orchid plants, especially North Kalimantan, which has not been widely carried out, until now the existence of orchids in the forest is still largely untouched, so that information regarding the diversity of orchids is still minimal and very limited. The purpose of this study was to determine the types of orchids in

the Kayan delta area, especially the Sekatak village, Bulungan Regency. The usefulness of this research is expected to provide information related to the distribution of orchid species and where they grow in the Kayan Delta area of Sekatak Village, so that conservation actions can be taken to be able to maintain the preservation of orchids. so that information related to the diversity of orchids is still minimal and very limited. The purpose of this study was to determine the types of orchids in the Kayan delta area, especially the Sekatak village, Bulungan Regency. The usefulness of this research is expected to provide information related to the distribution of orchid species and where they grow in the Kayan Delta area of Sekatak Village, so that conservation actions can be taken to be able to maintain the preservation of orchids. so that information related to the diversity of orchids is still minimal and very limited. The purpose of this study was to determine the types of orchids in the Kayan delta area, especially the Sekatak village, Bulungan Regency. The usefulness of this research is expected to provide information related to the distribution of orchid species and where they grow in the Kayan Delta area of Sekatak Village, so that conservation actions can be taken to be able to maintain the preservation of orchids.

Research Methods

The research was conducted from October 2019 to June 2020; the location is in Sekatak village, namely Teladan River I and Teladan River II Peat Swamp Forest, North Kalimantan. The equipment used in the study was a meter, raffia rope, boots, stationery, ribbon, camera, luxmeter, GPS (Global Positioning System), thermohygrometer and thermometer. and compass. The material used is peat swamp forest vegetation. The research method uses descriptive quantitative and qualitative descriptive methods. The research was carried out using the exploratory method, namely exploring the area that had been determined, then observing by observing and recording the types of orchids that grew in the area.

Exploration of the diversity of orchid species is carried out by tracing the route that has been

determined using a speed boat passing through several villages in the Sekatak District area, the model river to be traversed must know when the tides and recedes. This is done to facilitate the journey to the location to be

passed. The journey to reach that location is very difficult, the river that is passed has a large stones, visible when the water recedes so that it cannot be passed, the boat or speed must be pulled on foot.

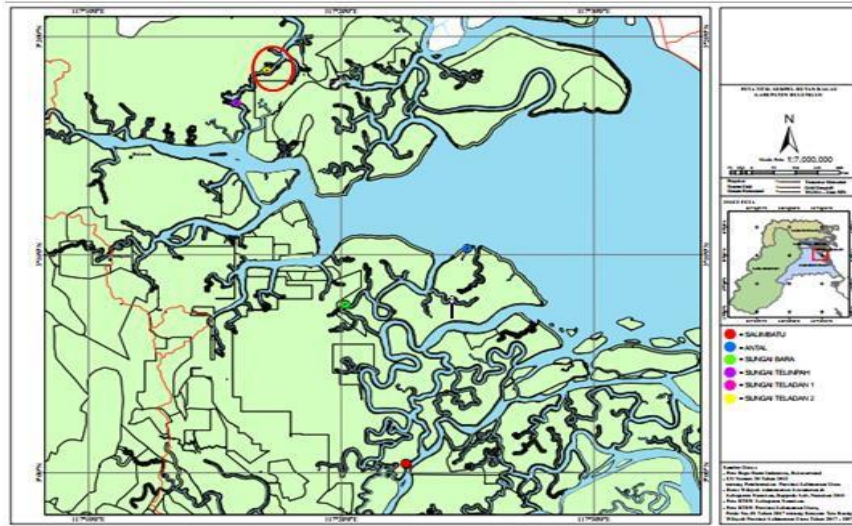


Figure 2: Research Location Map

The model river 1 has a plateau, so it must be reached on foot by climbing because it is a slope. In contrast to the example of river 2 which has a mangrove forest area. At high tide, you have to climb a tree to collect the orchid data.

Results and Discussion

The natural forest area in Sekatak village has varied field physiography, namely for example

the river area 1 has mountainous or hilly plains while the model river II is a mangrove forest area. Based on the results of observations that have been made in the field at the location of S. Exemplary I there are 14 types of orchids that grow (Table 1.) and at S. Exemplary II there are 10 types of orchids (Table 2.) the types of orchids found are epifit orchids.

Table 1: List of Orchid Types Location River Model 1 Sekatak Village

No	NAMA ILMIAH	Family	Type Of Orchid
1	<i>Acriopsis liliifolia</i> (J.Koenig) Seidenf.	Orchidaceae	Epifit
2	<i>Dendrobium grande</i> Hook.f.	Orchidaceae	Epifit
3	<i>Pinalia bractescens</i> (Lindl.) Kuntze	Orchidaceae	Epifit
4	<i>Arundina graminifolia</i> (D.Don) Hochr.	Orchidaceae	Epifit
5	<i>Cymbidium bicolor</i> Lindl.	Orchidaceae	Epifit
6	<i>Pinalia multiflora</i> (Blume) Kuntze	Orchidaceae	Epifit
7	<i>Grammatophyllum speciosum</i> Blume	Orchidaceae	Epifit
8	<i>Papilionanthe hookeriana</i> (Rchb.f.) Schltr.	Orchidaceae	Epifit
9	<i>Asplenium nidus</i> L.	Aspleniaceae	Epifit
10	<i>Nephrolepis biserrata</i> (Sw.) Schott	Nephrolepidaceae	Epifit
11	<i>Dischidia nummularia</i> R.Br.	Apocynaceae	Epifit
12	<i>Dischidia major</i> (Vahl) Merr.	Apocynaceae	Epifit
13	<i>Hoya multiflora</i> Blume	Apocynaceae	Epifit
14	<i>Pyrrosia lanceolata</i> (L.) Farw.	Polypodiaceae	Epifit

Table 2: List of Orchid Types Location River Model 2 Sekatak Villages

No	NAMA ILMIAH	Family	Type Of Orchid
1	<i>Ganoderma</i> sp.	Ganodermataceae	Epifit
2	<i>Dalbergia cf.candenatensis</i>	Leguminosae	Epifit
3	<i>Dracaena surculosa</i> Lindl.	Aspagaraceae	Epifit
4	<i>Psychotria</i> sp.1	Rubiaceae	Epifit
5	<i>Derris amoena</i> Benth.	Leguminosae	Epifit
6	<i>Friesodielsia</i> sp.1	Annonaceae	Epifit
7	<i>Molineria</i> sp1.	Hypoxidaceae	Epifit
8	<i>Dalbergia cf.candenatensis</i>	Leguminosae	Epifit
9	<i>Dracaena surculosa</i> Lindl.	Aspagaraceae	Epifit
10	<i>Dracaena elliptica</i> Thunb.dan Dalm.	Aspagaraceae	Epifit

Based on the place where orchids grow, they prefer trees that have rough trunks, and have branches as a place to grow. According to Sujalu's, *et al.*, (2015) that epiphytic orchid plants are mostly found on host trees which have a rather rough bark texture (*intermediate*), a tree that is overgrown with orchids from the Tribe *Elaeocarpaceae*.e. Balaban (*Elaeocarpus* sp.) with a cracked outer skin texture, this is to make it easier for the plant to store water, and feel comfortable (*Elaeocarpus submonoceras*) has a slightly rough (*intermediate*) skin texture and is not flaky. Laran Tree (*Dipterocarpus oblongifolius*) a tree is a host that has a rough and cracked bark texture, branch shape, type of branching, relatively flat or sloping direction of branch growth, and has a large tree diameter and the surface texture of the bark of the tree trunk is cracked and grooved.

The types of orchids that grow in the location of the Teladan River 1 are: *Orchidaceae* there are 8 types, *Apocynaceae* there are 3, and type *Aspleniaceae*, *Nephrolepidaceae* and *Polypodiaceae* there is only 1 type. Based on the place where orchids grow, they prefer tree species that have a rather rough bark texture (*intermediate*), in accordance with the character of orchids, especially epifit orchids, which have their natural habitat in nature, can grow and develop by riding on a large tree according to the type of orchid. In open habitat, the highest epiphytic orchid species can grow on trees with rough bark characteristics. According to Oloyede's, *et al.*, (2014) that trees with rough bark surface characteristics and berlekeh are the most common types of epiphytic orchids, when compared to host trees which have smooth bark

surfaces. In addition, orchids can also grow on the bark of trees that soft and hollow (leak-lekah) or rough, this has the function of being able to store water, thus allowing the orchid seeds to get stuck on tree trunks and germinate (Puspitaningtyas, 2007; Atmaja and Pamuji, 2015).

Epiphytic orchids generally grow in tree habitats that have thick surfaces and tend to be moist. This orchid usually grows and develops by sticking to rough tree trunks, cracks in the trunk or broken branches so that over a long period of time it will accumulate so that it becomes moist and filled with humus or litter (Murtiningsih, *et al.*, 2010); 2016; Sadili, 2013). Thus, the habitat of orchid plants also requires sunlight, weather or climate, air temperature, humidity and nutrients. These factors can affect the growth of orchids to be able to grow and develop, which will affect the quality and quantity of flowers they produce (Putra, *et al.*, 2016), therefore, orchids have high light requirements to grow and develop optimally.

Species Diversity

Orchid species diversity based on evenness value (E) and species richness value (R) Orchid plants can be seen in Figure 1.

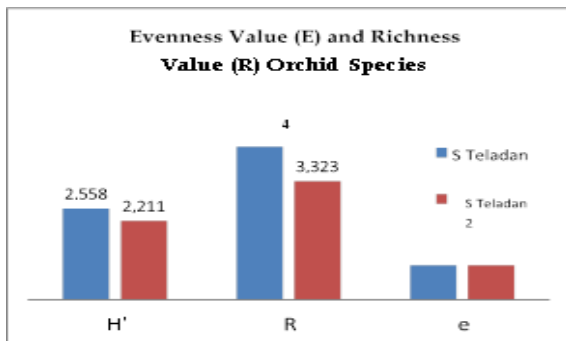


Figure 1: Diversity Index (e), Species Richness (R) and Species Evenness (H')

The results of the recapitulation of species richness and evenness data obtained values from both locations. The results show that the location of the model river 1 has higher diversity than that of the model river 2 and with an evenness of species (E) of 0.969 which is smaller than the species richness (R) of 4.297 and the evenness of species (H') gives an index value of 2.558. The species diversity index according to Seitske, *et al.*, (2001) has a very high meaning that describes the productivity and services that can be provided by an ecosystem to biodiversity, both in terms of diversity, species as well as habitats and ecosystems. The magnitude of the diversity value can be described by the quantitative Shannon-Wieners (H') value. The survey results show that the orchid species diversity

index in the Example River I shows the number 2,558, meaning that the diversity of orchid species in Sekatak Village, Sekatak District is in the medium to high category (2 H' 3), this is because it has a value of more than 2.5. Judging from this value (figure 1), which determines the species diversity index (e) is species richness (R), species diversity is composed of two components, namely the evenness of species (H') in the community and species richness (R). If the results of the recapitulation of the index value are the same or close, it means that the evenness of species and species richness can determine the diversity index is equal or balanced. On the other hand, one component makes a greater contribution, meaning that the diversity of plant species in a community is determined by species richness and species evenness. A community component of species richness may dominate, i.e. the evenness of species that dominates, or both have a balanced contribution power. Plant species diversity can be influenced by several factors such as soil pH,

Light Intensity and Canopy Closure

Plants need sunlight to carry out photosynthesis, the better the plant growth, the better the plant photosynthesis process.

Table 3: Microclimate Measurement Data at two locations in Sekatak Desa Village

Location	Microclimate				
	pH Soil	Temperature (°C)	Intensity light (lux)	Humidity Udara (%)	Title (%)
S.Teladan1	5,9	33,8	1125,3	76,3	42,2
S.Teladan2	5,7	31,7	285,7	85,2	20,7

The amount of light intensity generated from the two locations is at S.Teladan I. The level of light intensity is 1125.3% higher than in S.Teladan II which is only 285.7%. This is possible when the measurements in the field have different times, so that the light intensity in the morning has increased until noon, while in the afternoon the light intensity has decreased.

According to Handoko, (1995) the reception of solar radiation on the earth's surface varies greatly based on place and time, this is due to the latitude and the state of the atmosphere, especially clouds, on a micro-scale the slope level can determine the received radiation rays. Tree

canopy can also affect the intensity of light received; the greater the percentage of tree canopy, the intensity of light received is also large. In S. Teladan I the tree canopy is 42.2%, the percentage value of the canopy cover is classified as tight, due to more than 40% header closing. Low light intensity due to shade that is too dense for species that require light (intolerant) will cause etiolation. Meanwhile, excessive light intensity will cause disruption to growth and even death for tolerant plants (Herdiana. *et al.*, 2008).

Temperature and humidity Noorhadi, (2003) humidity and air temperature are components

of the microclimate that affect plant growth and are associated with optimal environmental conditions for plants. The growth of a plant increases when the temperature increases and the humidity decreases, and vice versa. Table 3. Temperature and humidity have an average high temperature and low humidity of 33.8°C and 76.3%. Factors that affect temperature and humidity are altitude and canopy closure. Based on the location of the survey results conducted, the location of S. Teladan I has the altitude is lower and S.Teladan II has a higher altitude, causing the temperature at that location to be low and humidity high. The temperature on the earth's surface decreases with increasing latitude, but a decrease in temperature will affect the altitude, the higher the location, the lower the temperature and the higher the humidity.

In plant growth, the size of the crown is a component that is closely related, where the taller the tree is proportional to the size of the canopy (Raharjo. et al., 2008). The size of the canopy can determine the competition between trees in getting nutrients and light will affect the shape and area of the canopy. Large trees, wide canopy produced and more roots, it is suspected that the tree is able to get light, nutrients and water. Photosynthesis can affect growth and roots. The photosynthesis process will produce carbohydrates and roots are able to absorb water and nutrients from the soil to meet the needs of growth and canopy (Wijayanto and Araujo, 2011).

Conclusion

The diversity of epiphytic orchid species at the location of the exemplary river I there are 14 types of epiphytic orchids, and at the location of the river of exemplary II there are 10 types of orchids, all of these orchid species have their habitat growing on the host tree. The average species diversity index produced is in the medium category.

Acknowledgments

Thanks to Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) for providing funds to implementing this research

Bibliography

1. Atmaja, M.B. and Pamuji, A.C. "Types of Morphology and Anatomy of Host Bark Epiphytic Orchids in Plot 5 Plawangan Hills, Mount Merapi National Park." *National Seminar on the 159th Anniversary of the Cibodas Botanical Gardens, Indonesia* (2015).
2. Chan, C.L., A. Lamb., Shin, P.S. and. Wood, J.J. "Orchids of Borneo." *Sabah: The Sabah Society Kota Kinabalu and Royal Botanic Gardens Kew* 1 (1994)
3. Handoko. "Basic Climatology." *Bogor: Pustaka Jaya* (1995).
4. Krisnawati, H., Djoko, W. and Rinaldi, I. "The Dynamics of Species Composition Stand Structure and Above Ground Biomass of Undisturbed Forest in East Kalimantan." *Jurnal Biologi Indonesia* 8.1 (2012): 9-22.
5. MacKinnon, K., Gusti, H, Arthur, M. and Hakimah, H. "Ecology of Borneo." *Prenhalindo. Jakarta* (2000).
6. Murtianingsih, I. Ningsih, S. and Muslim. "Characteristics of the Di Orchid Host Tree Lore Lindu National Park Area (Case Study in Mataue Village, Kulawi District, Sigi Regency)." *Warta Rimba* 4.2 (2016): 32-39.
7. Nadia, B. and Fitriani. "Species Diversity and Habitat of Orchid (Orchidaceae) in the Hills Lawang." *Journal of Biologica Samudra* 1.2 (2019): 22-27.
8. Nina. D. Y. "Diversity of Efit Orchids in the Natural Forest Area of Petarikan Village District of Kota Waringin Barat, Central Kalimantan." *Bulletin of the Indonesian Botanical Gardens* 10.2 (2007).
9. Noorhadi, S. "A study of the application of water and mulch on the microclimate of chili plants in Indonesia entisol soil." *A soil and environmental sciences* 4.1 (2003): 41-49.
10. Oloyede, F.A., Anthony, I. O. and Ayodeji, S. O. "Composition and Distribution of Vascular Epiphytes in Different Areas in Obafemi Awolowo, Nigeria." *Notulae Scientia Biologicae* 6.3 (2014): 316-320.
11. Omon, R.M. and B. Adman. "Effect of spacing and maintenance techniques on growth of kenuar (*Shorea johorensis* Foxw.) in the Wanariset belukat bush forest, Samboja, East Kalimantan." *J Dipterocarp Research* 1.1

- (2007): 47-54
12. Puspitaningtyas, D.M. "Inventory of Orchids and Their Hosts in Meru National Park Betiri-East Java." *Biodiversity* 8.3 (2007): 210-214.
 13. Putra, R.Z., Mercuriani, I. S. and Samiarti, E. "The Effect of Light and Temperature on Shoot Growth and Protein Profile of *Phalaenopsis Amabilis* Orchid Plant Transgenic Ubipro Paft Gene Carrier." *Bio-experiments* 2.2 (2016).
 14. Raharjo, J.T. and Sadono, R. "Models of Tajuk Teak (*Tectona grandis*) from Various Families in 9 Years of Hereditary Test." *J Forestry Science* 2.2 (2008): 89-95
 15. Sadili, A. "Species of Orchid (Orchidaceae) in Tau Lumbis, Nunukan, Kalimantan Province East: As an Indicator of the Condition of Forest Areas." *Indonesian Journal of Biology* 9.1 (2013.): 63-71
 16. Seitske, K., J, Wanggai. and Husodo, B.B." Diversity of epiphytic orchids in the Reserve Area North Biak realm." *Beccariana Bulletin* 3.(2001): 6-109
 17. Siregar, C, Listiawati, A. and Purwaningsih. "West Kalimantan Species Orchid." *West Kalimantan Tourism Research and Development Institute (LP3-KB) Pontianak* 1 (2005).
 18. Soeryowinoto, M. "Getting to Know Indonesian Natural Orchids." *Self-Help Disseminator, Jakarta* (1988).
 19. Sujalu, A.P., Sigit, H., Chandradewana, B. and Sumaryono, S. "Identification of epiphytic host trees in logged forest in the lowlands of the Malinau watershed (DAS)." *Journal of Dipterocarp Ecosystem Research* 1.1 (2015): 1-6.
 20. Wijayanto, N. and Araujo, J.D. "Pertumbuhan Tanaman Pokok Cendana (*Santalum album* Linn.) pada Sistem Agroforestri di Desa Sanirin, Kecamatan Balibo, Kabupaten Bobonaro, Timor Leste." *Jurnal Silvikultur Tropika* 3.01 (2011): 119-123.
 21. Wood, J.J. and Phillip, J. C. "A Checklist of The Orchids of Borneo." *Royal Botanic Gardens. KEW. United Kingdom* (1994).
 22. Wulffraat, S. "The Environmental Status of the Heart of Borneo the Heart of Borneo Declaration." *WWF's HoB Initiative. Malaysia* (2012): 1-116.

Source of support: Nil;

Conflict of interest: The authors declare no conflict of interests.

Cite this article as:

Hariyati, T., Rita, D. and Mardhiana. "Diversity of Epiphytic Orchids in the Rich Delta Area Sekata Village, Sekatak District North Kalimantan." *Annals of Plant Sciences*.11.08 (2022): pp. 5274-5280.

DOI: <http://dx.doi.org/10.21746/aps.2022.11.8.1>