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Exploration of Orchid Varieties in Raja Ampat Island, West Papua Province

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ABSTRACT— The study was carried out in West Waigeo Nature Reserve, Kaptacool, and Wailen Subdistricts, West Salawati District, Raja Ampat Regency. The method used is descriptive with a random representative exploratory technique. The findings show that there are 21 varieties of orchids in three different research sites. In West Waigeo Nature Reserve, we found five genera with 12 types of orchids. The total number of individuals was 756, consisting of 152 *Bullbophyllum fritillariiflorum*, 140 *Bulbophyllum sp*, 131 *Vanda hinsil Lindl*, 114 *Bulbophyllum biflorum Teijsm & Bin*, 108 *Bulbophyllum adelpidium*, 23 *Grammatophyllum sciptum*, 17 *Dendrobium lasinthera*, 16 *Dendrobium sp*, 15 *Dendrobium anttenatum*, *13 Bulbopyllum mirum*, and 2 *Dendrobium glumacum*. In Kapatcool subdistrict forest, we found seven types of orchids consisting of 1 terrestrial and six epiphyte orchids. Their biggest population was *Spathoglottis plicata* with a total number of 98, followed by *Vanda hinsii* with the number of 48, *Grammatophyllum scriptum* with the number of 15, *Dendrobium smile* with a number of 14, *Dendrobium antenantum* with the number of 9, *Grammatophyllum speciosum* with the number of 5, and *Bulbophyllum macranthum* with the number of 3. While in the forest of Wailen subdistrict, we found 7 varieties of orchids from three different families, namely Dendrobium, Bulbhophylum, and Eria. The biggest population is *Dendrobium anttenatum* with a total number of 76, followed by 40 *D. lawesii*, 12 *D. aloifolium*, 7 *Eria pannea*, 4 *D. mutablie*, *3 Bulbophylum. Macranthum*, and 2 *B. vaginatum*, and the total number of orchids in the site was 144.

KEYWORDS: Exploration, Orchids, Islands, Raja Ampat

1. INTRODUCTION

The rich diversity of orchids in Indonesia contributes to the development of knowledge. Thus, it should be learned and preserved [2]. The vegetation of natural orchids is one of the forest components that can live in various forest formations including seaside and high mountainous areas. Legal and illegal forest exploitation leads to damage to the forest and threats the existence of orchid (species) living epiphytes on the trees. One of them is exploitation which degrades the forests. It includes using and taking the forest product (both wood and non-wood), which gets increasing, leading to the degradation of the areas. Epiphyte orchid is a plant living associatively with another plant as the house. It sticks on the trunk and branch of the plant. Ecologically, each type of orchid has different habitat and its own host tree. Epiphyte orchid needs a host to grow, and it needs proper light, temperature, and air circulation [15]. According to [1], the orchid is a preserved plant by Government Regulation No.7 of 1999 about plant and animal preservation. Indonesia has approximately 6,000 species of orchid, or around 23% of the total 26,000 orchids in the world [11].

Orchid is a flowering plant with a big number of varieties. It has 700 – 800 genera and 25.000 - 35.000 species.

Indonesia is known as the country that has the biggest number of Orchid varieties in the world. It is estimated to have 4,000 types. The biggest orchid varieties are found in Papua. There are around 2,000 types living there [8]. The statement is supported by [18], that the types of orchids exisiting in Papua are 2,000, in Jawa are 731, in Maluku are 820, in Sulawesi are 548, and in Sumatera are 1,118. Orchid can be used as decorative plants thus, it has high economic value and is highly demanded by societies in Indonesia and worldwide [23]. However, the population of orchids has reduced [12]. According to [19], Indonesia is noted as the main exporter of natural and hybrid orchids. Besides that, the threat to orchids generally comes from human activities like changing and breaking the orchid habitat into areas of agriculture, residence, farm, mining, and road facilities inside the forest.

Raja Ampat has some nature reserves including West Waigao [9] and some small islands like Misol (Kapatcool) and Central Salawati. The forest area is one of the habitats of endemic plants and animals like an orchid. As a nature reserve forest, it puts priority based on the species richness, endemism, habitat varieties, and their unique values, especially orchids. It is supported by the study of [13] that the number of orchids in Kofiau Nature Reserve is 4 consisting of 3 epiphyte and 1 terrestrial orchid with a total number of 256. The availability of nature preserves and some islands in Raja Ampat, West Papua, is very important for the society, especially the ones who live around the area. In general, the communities were in the middle class, and they highly depended on the forest for foraging food, medicine, firewood, building material, and various ornamental plants to sell, especially orchid,s as it has high value. Considering the limitation of information and urgencies about orchids as a biodiversity that is potential to be developed as a superior commodity, it is important to study the orchid diversity to depict its potential and varieties to support the sustainability of the orchid in the region and further management. Thus, to introduce the repertoire of richness and uniqueness of the orchid species in West Papua, especially in Raja Ampat, there should be an exploration of varieties of orchids there.

2. Material and Methods

Research Time and Sites: The study was carried out in the nature preserve forests of West Waigao, Misol island (Kapatcool), and Wailen Subdistrict, Salawati Tengah, for around four months (July-October 2021).

Research Materials and Instruments: Instruments used in this study included a map, Global Position Sytrunk (GPS), compass, hagameter, Clinometer, digital camera, and orchid identification book to identify an unknown object; we matched it with the data available in the orchid identification book [4].

Research Method: The study implemented a descriptive method with an exploration technique, namely representative random exploration. Types of orchids found were inventoried and identified.

Research Procedure: The research was carried out through field observation / exploration. The samples were determined by objectively considering areas where orchids grew:

Initial preparation: The research was prepared by doing coordination with the village apparatus and local communities collaborating with BKSDA and relevant institutions to do an initial survey in the West Waigao Natural Preserve, Misol island (Kapatcool), and Wailen Subdistrict, Salawati district, to support the research process.

1) Research Technique

The study was carried out using field exploration techniques based on the map of research sites: West Waigao Nature Preserve, Misol Island (Kapatcool), and Wailen Subdistrict, Salawati Tengah District, to get macro data.

The study used six paths to observe varieties of orchids, put in three different locations, including the edge of the forest, the middle of the forest, and sloping areas.

a. Data were collected by exploring each observation path.

b. The host trees of orchids were identified, and the heights and diameters were measured using a clinometer.

c. The condition of the habitat was observed visually to see the header cover and the site where the host grew.

d. Quantitative and qualitative data were recorded in a data sheet / tally sheet.

2) Data Collection

Data collected in this study consisted of primary and secondary data. Primary data include:

a. Varieties of orchids include all types of orchids growing in the research paths.

b. Distribution refers to the distribution of orchids in the research paths.

c. Host trees include types of trees, diameters of trees, the height of trees, and positions of orchids on the host trees.

d. Orchid characteristics describing the morphological features, including:

a) Trunk: Stature (habitus), growth type (monopodial/sympodial), trunk shape, trunk height (cm), color, segmented and pseudo tuber shape, measurements were made on reachable orchids.

b) Leaves: Leaf shape, leaf size (length and width), leaf surface color, leaf edge shape, leaf tip, leaf base, leaf layout, and leaf surface texture, measurements were made on reachable orchids.

c) Flowers: Flower size (cm), type of inflorescence, flower color (petals, corolla, and labellum), the shape of flower arrangement, location of flower discharge, flower stalk (size and color), and flower aroma; measurements were made on orchids that can be reached.

d) Roots: Root surface (hairy/smooth), root shape, root color.

e) Habitat: Place of growth, host tree species, location of the orchid on the host tree (trunk, branches, twigs), tree diameter (cm), tree height, skin texture, and height of the orchid on the host tree from the ground (m).

Data Analysis: Data from observation were analyzed based on parameters and were described quantitatively and qualitatively, then presented in tables and figures (charts, graphs, and photos).

3. Results

a) Abundance of Orchid Varieties in Nature Preserves of Waigao Barat, Kapatcool and Wailen Subdistrict, Central Salawati District, Raja Ampat Regency

Based on the exploration and identification of orchid varieties in Nature Preserves of Waigao Barat, Kapatcool, and Wailen Subdistrict, Central Salawati District, Raja Ampat Regency, we found 26 epiphytes and one terrestrial orchid. Thus, the total number of varieties was 27. They are presented in the following table:

Table 1. Genus and Types of Orchids in Nature Preserves of Waigao Barat, Kapatcool and Wailen Subdistrict, Central Salawati District, Raja Ampat Regency

Sites	Clans /Genus	Orchid Categories	Numbers of Orchids
CA. Waigeo Barat	Dendrobium	Epiphyte	5
	Bolbophylum	Epiphyte	5
	Vanda	Epiphyte	1
	Grammatophylum	Epiphyte	1
Total			12
Kapatcool	Spathoglotis	Terestrial/tanah	1

islands	Vanda	Epiphyte	1
	Dendrobium	Epiphyte	2
	Bulbophylum	Epiphyte	1
	Grammatophylum	Epiphyte	2
Total			7
Central	Dendrobium	Epiphyte	4
Salawati	Bulbophylum	Epiphyte	2
	Eria	Epiphyte	1
Total			7
Total			26

In the table 1, we can see in West Waigeo Nature Reserve, there were 5 genus of epiphyte orchids including 5 types of the Dendrobium, 2 types of bulbophylum, 1 type of Vanda, 1 type of Grammatophylum. In Kapatcol island, we found 1 genus of terrestrial orchid and four genus of epiphyte orchids consisting of 2 Dendrobium and 2 Grammathophyllum, and 1 vanda and 1 Bulbophylum. While in Central Salawati, there were 3 genera of epiphyte orchids, consisting of 4 Dendrobium, 2 bulbophylum, and 1 eria. Two genera with the biggest populations were Dendrobium (13 types) and Bulbophylum (8 types), it indicates that *Dendrobium* and *Bulbophyllum* can adapt more easily to the habitat. Besides that, it has light fruit shaped like a capsule containing thousands to millions of fine seeds. Once the fruit ripens, the skill will break, and the seeds will spread and be brought by wind to wide areas. It is in line with [7] that orchids as many seeds, and the size is very small and fine, like powder thus, they are easy to spread by wind. According to Sujalu (2008), dendrobium and bulbophyllum orchids can live under a roof or in open space.

While the clans of Vanda, Spathoglotis, and Grammatophyllum prefer open space and are more appropriate with a forest as their habitat due to its physical environmental condition and the availability of nutrients. The number and percentages of orchids in Nature preserves of West Waigao, Kapatcool, and Central Salawati, Raja Ampat Regency are as bellows:

Table 2. Number and Varieties of Orchids in West Waigeo Nature Reserve

No	Varieties of Orchids	Number of Individuals (ni)	Percentages (%)
1	*Dendrobium anttenatum*	15	1.98
2	*Bulbophyllum biflorum teijsm & bin*	114	15.08
3	*Bulbophyllum adelpidium*	108	14.29
4	*Vanda hinsii Lindl*	131	17.33
5	*Bulbophyllum fritillariiflorum*	152	20.11
6	*Grammatophyllum sciptum*	23	3.04
7	*Dendrobium sp*	16	2.12
8	*Dendrobium salacense (BI) Lindl*	13	1.72
9	*Bolbophyllum mirum*	18	2.38
10	*Dendrobium lasinthera*	17	2.25
11	*Bulbophyllum sp*	140	18.52
12	*Dendrobium glumacum*	9	1.19
	Total Number	756	100

The biggest number of orchid varieties were Bullbophylum and Dendrobium, while the fewest ones were Vanda and Grammatophylum located in West Waigeo Nature Reserve. Bulbophyllum and dendrobium were

massively found because they can adapt, and their body characteristics are appropriate to the habitat, both under the roof or without a roof. In line with [21] stated that dendrobium and bulbophyllum are two types of orchids which do not direct sunlight and they only need approximately 50-60% to grow better. While *Dendrobium glumaecum* does not really like sunlight. The orchid generally live in a place without direct sunlight.

On the other hand, we only found one type of *Vanda hinsil Lindl* and *Grammatophyllum sciptum* because they can only grow on trees with big diameter,s while in the research sites, only a few trees with big diameters. Also, the habitat had fewer roofs. These orchids seem not proper with the physical condition of the environment, and the nutrients are inadequate. It confirms [6], [3] that sunlight is essential for orchids because it is the source of energy for photosynthesis to produce energy for their life. Each type of orchid needs sunlight with different intensities. Too much or too less sunlight can inhibit their growth.

Some types of orchids found in West Waigeo Nature Reserve that had been included in the conservation list by the Convention on International Trade in Endangered Species of Wild Fauna and Flora are *Dendrobium lasinthera* (Appendix II). It is in line with Government Regulation No 7 of 1999 about plant and animal preservation that also states orchid as endangered species and conserved.

Based on data, the terrestrial orchid, *Spathoglottis plicata*, had the biggest number, followed by *Vanda hinsii* because both types like to live in a dry place without a roof, and the research site was open space and sloppy so that the sunlight was abundant. According to Latif (1960) in [13], *Spathoglottis plicata* grow in warm areas, together with reeds, a type of weeds that can reduce the fertility of the soil. It is in line with [14], that orchid like open space, live together with reeds, and can widely spread (cosmopolite). It is also supported by [6] that sunlight is very important for orchids because it is the resource of energy for photosynthesis. Photosynthesis produces energy for the orchids' lives. Each type of orchid needs different intensities of sunlight. Too much or too less energy can negatively affect their growth. The numbers of *Grammatophyllum scriptum*, *Dendrobium smile*, *D. antenantum*, *Grammatophyllum speciosum*, and *Bulbophyllum macranthum* were limited because they generally live on trees with rough and cracky textures. It is supported by [16] that epiphyte orchids generally live on trunks with uneven, rough, and rather cracky surfaces. It is highly likely that such texture increases dirt to stick and add up, making it humid. Species diversity is also influenced by the distribution of individuals within each species, but if the distribution of individuals is uneven, species diversity is considered low. The level of biodiversity shows the level of stability of a forest community. The higher the level of diversity, the higher the level of stability of a community.

Table 3. The Number and Types of Orchids in Kapatcool Subdistrict, Raja Ampat Regency

No	*Jenis Anggrek*	Individuals	Percentages
1	*Spathoglottis plicata*	98	51.04
2	*Vanda hinsii*	48	25
3	*Grammatophyllum scriptum*	15	7.81
4	*Dendrobium smile*	14	7.30
5	*Dendrobium antennatum*	9	4.69
6	*Grammatophyllum speciosum*	5	2.60
7	*Bulbophyllum macranthum*	3	1.56
	Total	192	100

Table 4. number and Types of Orchids in Wailen Sub District, Central Salawati District, Raja Ampat

Regency

No	Types of Orchids	Number of Individuals	Percentages
1	*Dendrobium anttenatum*	76	52.78
2	*Dendrobium lawesii*	40	27.78
3	*Dendobium mutabile*	4	2,78
4	*Dendrobium aloifolium*	12	8.33
5	*Eria pannea*	7	4.86
6	*Bulbhophylum vaginatum*	2	1.39
7	*Bulbhophylum macranthum*	3	2.08
	Total	144	100

Based on the table 4, *Dendrobium anttenatum* and *D. lawesii,* and *D. aloifolium* spread evenly in the research sites, on mangrove trees, at a height of 1-14 meters above the ground. According to [10], an epiphyte orchid living on a tree has a thick and humid surface. Orchid sticks on trunk cracks or broken branches which had been moldy, and full of nutrients. While *D.mutabile, Eria pannea, Bulbophylum macranthum, and B. vaginatum* lived 1-10 meters above the ground. Those orchids did not spread evenly in all zones due to the surrounding environment. It is supported by [20] that environmental factor highly determines the spread and growth of an organism and each type can only live on particular abiotic condition around particular tolerance that suits the organism. Therefore, according to [5], it is necessary to strengthen and control the function of protected areas to ensure the preservation and balance of nature, especially orchids that can grow well only in an environment that meets the growing requirements. Also, [17] mentioned that the growth of orchids is influenced by climate, including the capacity of sunlight (length of the day or amount of light), the humidity of the air, and temperature.

b) Morphology and Varieties of Orchids in Raja Ampat Islands

Related to the morphology and types of orchids in the research sites, we found 21 types of orchids spread on Raja Ampat islands, including West Waigeo Nature Reserve, Kapatcool and Wailen Sub-district, Central Salawati District. Bellows are identifications and types of orchids.

Figure 1. Anggrek kelinci *(Dendrobium anttenatum*

D. anttenatum: A small epiphyte orchid. **Trunk**: enlarged in the middle. Round shape, length= 8 cm, and 4 cm and width= 1.8 cm, rough surface. **Leaves**: round and long round shapes with a length of 12 cm and width of 3 cm, lanceolate in shape, alternating green, length ±8cm and width = 1,2cm, smooth surface, flat edge, thick, pointed tip, and has a petiole. **Flowers**: 8-12 cm long, and there are 3-10 flowers in each bunch. The color of the petals and crown is white; the lips are hairy, and the inner side is purple. **Sepal**: lanceolate in shape, and the color is yellow with purple stripes**. Petals:** the shape is like a vertical ribbon, and the colors are green-brown. The lips are white with purple stripes and have three lenses, 2.4 cm long and 0.2 cm wide. Side petals: 1.3 cm long and 0.8 cm wide. Crown: 1.3 cm long and 0.7 cm wide. **Lip**: Rolling up into a triangular shape with a length of 1.7 cm, **Root:** the color is brownish white, curling the tree. Anggrek kelinci (*D. anttenatum*) in site I, grew on the seaside with enough sunlight and a height of 12 cm. **Habitat:** This orchid likes a shady place in wet forests at an altitude of 600-1000 m above sea level.

 **Figure 2. *Dendrobium salacense* (BI) Lindl**	***D. salacense* (BI) Lindl. Habitus**: herb, the overall height of 21 cm. pseudobulb: flat, similar to the petiole, 0.2 cm length, smooth surface and consisting of 1 leaf. **Leaves:** short and round, dark green, 20 cm in length, 10 cm in width, smooth surface, even edge, thin, rounded tip and has 1 cm petiole**. Flowering:** growing from the side of the pseudobulb, compound, inflorescence stalk 20 cm long. **Flowers** yellowish white and 0.5 cm wide. **Sepal:** triangular, rounded ends, 0.3 cm long. **Mahkota:** elongated shape, 0.1 cm long. **Lip:** 0,6 cm long. **Habitat:** epiphyte, grow in open space with adequate sunlight.
 **Figure 3. Anggrek stuberi *(Dendrobium lasinthera)***	***D. lasianthera*** is an epiphyte plant that grows in damp areas and requires a lot of light. In the wild, it is commonly found living around watersheds, swamps, and forests in the lowlands of Papua. *Dendrobium lasianthera* has a big size, and could reach 1 m. it has beautiful flowers. In one tank, there are usually 10 – 30 flowers growing. The colors vary greatly, like red, white, blue, and yellow, with beautiful gradations. Each of these orchid varieties has different color gradations. **Habit**: herbaceous, overall height 18 cm. **Trunk:** rounded shape, has branches, sized 13 cm long and 0.7 cm wide, locinous surface, flat edge, thick, pointed tip, and has petiole. **Flowers:** large, yellow with white patches on the sepal and petal. **Sepal:** length of 17 cm and width of 0,8 cm. **Petals:** length of 5 cm and width of 0,3 cm. **Lip:** length of 7 cm and width of 0,5 cm. leaves: green, length of 5 cm and width of 0,7 cm.
 **Figure 4. Anggrek Kelapa *(Dendrobium glumacum)***	***D. glumacum.* Habit:** herbaceous, overall height 13 cm. **Trunk:** long, Lanceolate, thick, and rough. Length of 7.4 cm, **Leaves:** Stiff, colored light to dark green, 12 cm long, and 0.7 cm wide, smooth surface, flat edge, thick, long rounded tip with the petiole. **Flowers**: yellowish white, **Petals**: brownish yellow, 0.9 cm long and 0.1 cm wide, **Root:** brownish black, 12 cm long and 2 cm wide

 **Figure 5.** ***Dendrobium aloifolium***	***D. aloifolium*** small-size epiphyte orchids. **Root**: fibrous, whitish brown in color. **Leaves**: Alternate, needle/subulate shape, sharp/acute tip, flat leaf edge, ±7 cm long and ±2 cm wide. **Trunk**: sympodial elongated round, can reach ± 30 cm, surface covered by leaf sheaths and segmented, growing in circles on tree trunks. Flowers and fruits were not found during field observations. Habitat, where it grows attached to the host tree as an epiphyte.
 **Figure 6.** ***Dendrobium lawesii*/belimbing**	***D. lawesii*/Belimbing,** Medium-sized orchids, trunks can reach ± 40 cm, leaves about 2.5 x1 cm. The flower has a short stalk, which is found on the leafless part of the trunk. Flowers ± 4 cm long, bell-shaped, brightly colored with variations in colors such as red, orange, yellow, and pink that appear in clusters. We met yellow flowers in the field.
 **Figure 7.** ***Dendrobium mutabile***	***D. mutabile.*** Small-sized orchids. Trunks can be more than 150 cm long, found many, blackish, sometimes forming dense clumps. Leaves arranged in 2cm spacing, lanceolate, 5-9 cm, usually reddish underside. According to [4], flowers grow on the trunk close to the tip, the inflorescence stalk is short, but the flower stalk is quite long, and can consist of 12 florets, sized 2.75 cm. White or pink in color, at the base of the lip, there is a yellow spot. When in the field, flowers were not found because they had turned into fruit.

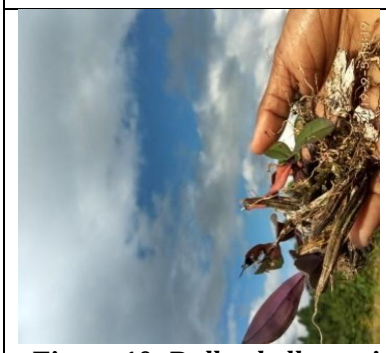
 **Figure 8.** ***Dendrobium smile/*****nanas**	***D. smile/*****nanas. Trunk**: sympodial, round segments elongated, flat, and shallowly grooved, smooth texture, curved, colored green. The segments above the leaves are white. Length 76 cm, diameter 15 mm, segments 28-32, number of trunks 10-15. **Leaves**: ovate, oval, lanceolate (ovatus- oblongus), thin, 12-16 cm long, 4-6 cm wide, flat edge (entire), green color, smooth surface, rounded base, tapered tip (acuminatus), bones parallel to leaf margins, 6-12 in number, alternate layout. **Root**: brownish white. **Flowers**: whitish purple, yellow petals, the number of sepals can reach 30-40 strands of pineapple-like shape. **Habitat**: lives attached to the trunk of a tree as an epiphyte.
 **Figure 9.** ***Dendrobium sp***	***Dendrobium sp*** **Habitus:** total herb 50 cm. **Trunk:** round, length 53 cm and diameter 0.9 cm, surface rough. **Root:** soft and easily broken, the tip is tapered, and smooth like seaweed roots. **Leaves:** lengthwise, green in color, 60 cm long and 3 cm wide, smooth surface, thick edge, pointed tip, and no petiole.
 **Figure 10.** ***Bulbophyllum mirum***	***B. mirum.*** **Habit:** herbaceous, overall height 45 cm. pseudobulb: elongated globose, 12 cm long and 0.3 cm wide, smooth surface, and consists of 1 leaf. **Leaves:** cuff, dark purple, 20 cm long and 9.2 cm wide, smooth surface and thick, pointed tip, has petiole 3 cm long. **Flowers:** long. Flowers: whitish purple dots. **Root:** brownish-white and dense fibrous. **Habitat:** epiphyte grows in open areas with sufficient light intensity at an altitude of 1300-1600 m.
 **Figure 11.** ***Bulbophyllum sp***	***Bulbophyllum sp.*** **Hebit:** herbaceous, overall height 36 cm. pseudobulb: elongated, 7 cm long and 1.2 cm in diameter, smooth surface, and consists of 1 leaf. **Leaves:** lanceolate, green in color, 24 cm long and 6.5 cm wide, smooth surface, flat edge, thin, pointed tip, and has petiole 1.8 cm long. **Trunk:** round, branched, 0.8 cm long and 0.5 cm wide, stem usually made into durian cap, smooth surface, and has petioles. **Sepal:** 9.3 cm long and 0.7 cm wide. **Petals:** round, maroon in color, 0.4 cm long and 0.2 cm wide. Lips: 0.2 cm long and 0.5 cm wide
	***B. biflorum*** is a member of the Orchidaceae family**. Habitat:** herbaceous, overall height 1.2 cm, smooth surface, and consists of 1 leaf. Leaves: lanceolate shape, dark green, 12 cm long and 2.5

Figure 12. *Bulbophyllum biflorum*	cm wide, smooth surface, flat edge, thin, pointed tip, and has petiole 1.3 cm long. **inflorescence:** growing from the side of the pseudobulb, compound, consisting of 2-3 flowers, inflorescence stalk 11 cm long. **Flowers:** yellow and red stripes, especially on the upper petals and corolla, 7.8 cm long and 0.8 cm wide. **Upper sepal:** lanceolate shape, 3 cm long and 0.7 cm wide. **Side sepal**: pointed tip, 7.8 cm long and 0.7 cm wide. **Crown**: 0.8 cm long and 0.6 cm wide. **Lip**: swayed by the wind, triangular shape 0.6 cm long. **Root**: brownish white and stringy. **Habitat**: growing in open areas with sufficient sunlight intensity at an altitude of 1200-1640 m**.**
 **Figure 13. *Bulbophyllum adelpidium***	*B.adelpidium* is a genus of orchids, members of the Orchidaceae tribe. This genus is the largest in the orchid family and also one of the largest genera of flowering plants, with more than 2,000 species of members, but fewer than the Astragalus clan (Leguminosae tribe). **Habitat:** herbaceous, overall height 15 cm. pseudobub: round, 7 cm long, and 0.6 cm in diameter, smooth surface. **Root**: brownish white and stringy**. Leaves:** lanceolate, green, 11cm long and 3.1cm wide, smooth surface, flat edge, thick, pointed tip, and no petiole. Inflorescence: growing from the side of the compound consisting of 5 flowers, 3.5 cm long flowering stalk. **Flowers:** whitish purple spots and 1.5 cm wide. **Sepals**: curved at the base, rounded ends, 0.8 cm long. **petals**: round and lobed, purple, 0.3 cm long and 0.5 cm wide. **Lip**: small, 0.2 cm long. Habitat: grewing in location I, growing in areas exposed to sunlight.
 **Figure 14. *Bulbophyllum fritillariiflorum***	***B.fritillariiflorum*** **Habitat:** herbs, overall height 10 cm. Pseudobulb: round-oval, 1.5 cm long and 0.4 cm in diameter, smooth surface and consists of 1 leaf. **Leaves**: lanceolate, green, 7 cm long and 0.6 cm wide, smooth surface, flat edge, thick, pointed tip and no petiole. **Fruit**: green, 0.3 cm long. **Root**: brownish white and stringy. **Habitat**: epiphyte, found in location II, growing in areas with sufficient sunlight intensity

 **Figure 15.** ***Bulbophyllum macranthum***	***B. macranthum.*** Epiphyte orchids are small. **Root**: brownish-white around the host tree. **Trunk**: creeps around the tree or branch. The tubers are egg-shaped ± 3 cm, arranged in a slightly flat row with tuber spacing 8-9 cm, sympodial. **Leaves**: round/oval, thick, handle ±2 cm greenish yellow and 15-20 cm long and 5 cm wide. According to [4], **inflorescence**: the flower stalk growing from the stem with a length of ± 3 cm. small flowers, red spots, 5 cm long and 4 cm wide, rather thick, with purplish spots. **Pedicels** sized 3.5 cm, longer than the flower stalks. The flower **lip** is easy to shake, and yellowish. **Flowers and fruit**: It was not found when whe carried out field observation. The habitat where it grows attached to the host tree as an epiphyte
 **Figure 16.** ***Bulbophylum vaginatum***	***B.vaginatum.*** Epiphyte orchids are small. **Root**: rhizomes 12-29 cm long, brownish, 0.7 cm in diameter, rhizomes surrounded by hairs, massively fibrous, greenish-white, and hairless at the tip, rooted in rhizomes and growing creeping on the host tree. **Leaves**: oval, rounded, narrow at the base, upper surface convex, spine indented, thick, the size is more than 12x2.5 cm, ends split and are slightly divided. **Trunk**: pseudobulbs approx. 2x1 cm, sympodial growth type, ribbed when mature, arranged 5 cm apart on rhizomes. According to [4], the inflorescence has a stalk of about 9 cm, composed of 12-15 florets facing all directions, cream or white. Petals 6.5 cm, joined slightly at base, the end part is threadlike and divided, petals protruding, edge part is also hairy, about 2.5 cm long. Lip is like a tongue, 0.2 cm, dark cream or pale yellow. Flowering in January and February. **Flowers and fruit** were not found during the observation. The habitat where it grows sticks on the host tree as an epiphyte.
 **Figure 17.** ***Eria pannea.***	***Eria pannea.*** **Root**: brownish white. **Leaves**: linear (like ribbons/straight) sharp/acute ends, 2-3 strands on each stem, 7-15 cm long, ±0.5 cm wide, smooth leaf surface and flat leaf edges. **Trunk**: indistinct pseudo-bulbs, resembling stems on rhizomes with a distance of 2-5 cm. Leaves will fall when they get old; the growth type is sympodial. According to [4], flowering starts from the base/side of the pseudobulb, bunches of flowers have short stalks ± 2.5 cm in length, a number of flowers 1-3, florets erect, smells like vanilla, flowers 1-2 cm wide, pale green yellow. Lip: dark purple, triangular sepal, and narrower petals. **Flowers and fruit**: were not found during the observation. The habitat where it grows sticks on the host tree as an epiphyte

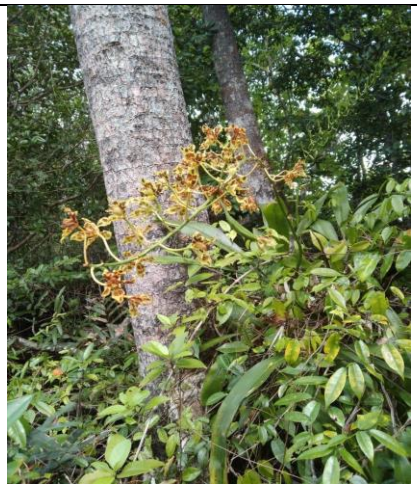


Figure 18. Anggrek Macan *(Grammatophyllum sciptum)*

Grammatophyllum sciptum. The main characteristic of *macan* orchid is that its size is big. **Root**: Fibrous roots, brown, grow straight up, looking for water. Leaves: have rows attached to the stem, slightly drooping, up to 80 cm long and 4 cm wide, sharp tip, and flat leaf edge. **Trunk**: pseudo tubers are rod-shaped, cylindrical, tense or hanging, and the ends turn upward, the length is 1.5 m to more than 7.5 m, the extension of the stem is reached in several years, the diameter of the stem is 7.5 cm, yellowish green, sympodial growth type. **Flowers**: yellow with brown, red, or blackish-red spots; flower stalks / panicles can grow to a height of 2.5-3 m with a diameter of about 1.5-2 cm. Each panicle can have tens, even hundreds of flower buds, with a diameter of about 10 cm. **Flowers** are long-lasting and do not fade easily, some are scented, and some are not. The habitat where it grows is attached to a host tree that has quite a large diameter [4].

Figure 19. *Grammatophyllum speciosum*/tebu.

***Grammatophyllum speciosum*/tebu.** The main characteristic of this type is its big size. **Root**: fibrous root-shaped, brown, the roots grow straight up to find water. **Leaves**: leaves are in two rows, attached to the sheath on the stem, slightly hanging leaves up to ±80 cm long and ±4 cm wide with sharp ends and flat leaf edges. **Trunk**: pseudo tubers are rod-shaped, cylindrical, erect or hanging, and the ends turn upwards. The length is from 1.5 m to more than 7.5 m, the elongation of the stem is reached in several years, the diameter of the stem ± 7.5 cm, yellowish green with sympodial growth type. **Flowers**: yellow with brown spots, red or blackish red, flower clusters/panicles can grow to a height of 2.5-3 m with a diameter of about 1.5-2 cm. each panicle can have dozens, even hundreds of flower buds with diameter of about 10 cm. Sugarcane orchid flowers are long-lasting and do not wilt easily, some are scented, and some are not. Habitat where it grows attached to the host tree.

Figure 20. *Vanda hinsii Lindl*

Vanda hinsii Lindl. This epiphytic orchid is medium-bodied and crawls on host trees. **Habitat**: herbaceous, overall height 4.5 cm, **Root**: white to greenish, densely fibrous, and hairless at the ends, tips of active roots are greenish white. **Trunk:** elongated round, surface covered by leaf midrib, yellowish green, 13-21 cm long, 0.4-0.7 cm in diameter, has many segments (14-19), has 4-7 clumps, and monopodial**. Leaves:** ribbon-shaped, thick fleshy, folded shape, light green, smooth surface, stumpy ends, truncated bases, flat edges, length 20-27 cm, width 2.3-4.3 cm, parallel bones, alternate layout, has 7-9 stems**. Flowers and fruit** were not found during field observation**s. Habitat**: This epiphyte grows in areas I-II and III, living in areas with much sunlight.

 **Figure 21. *Spathoglottis plicata***	***Spathoglottis plicata.*** Terrestrial orchid. **Leaves**: lanceolate leaves, acuminate/tapered apex, sharp sides, 3-4 sheets of leaves, ±28 cm long and ±6 cm wide, rough texture, parallel veins, folds, leaf surface is green. **Trunk**: monopodial, length of ±3 cm. **Flowers**: Flower stalks appear from the tubers and can reach 50-100 cm in length, and have many flowers. Flowers are purple, light purple, and white. **Sepals** are 3.5-4 cm long and 12-14 mm wide. The number of petals is 5. The habitat is an open space and mountain slopes

4. CONCLUSIONS

Based on the study we carried out about orchids in Raja Ampat island, we concluded that:

1. The total number of all varieties in the research sites: West Waigeo Nature Reserve, Kaptacool Sub-District, Wailen Sub-District, Central Salawati Distrik, Raja Ampat regency is 21.
2. In West Waigeo Nature Reserve, there are 5 genera and 12 varieties of orchids, and the total number is 756, consisting of 152 *Bullbophyllum fritillariiflorum* (20.11%), 140 *Bulbophyllum sp* (18.52%), 131 *Vanda hinsil Lindl (17.33%),* 114 *Bulbophyllum biflorum Teijsm & Bin* (15.08%), 108 *Bulbophyllum adelpidium* (14.29%), *%),* 23 *Grammatophyllum sciptum* (3.04%), 17 *Dendrobium lasinthera (2,25%),* 16 *Dendrobium sp (2,12%), 15 Dendrobium anttenatum* (1,98), 13 *Bulbopyllum mirum* (2.38%) and 2 *Dendrobium glumacum* (1,19%).
3. In Kapatcool sub-district, we found seven varieties of orchids, including 1 terrestrial orchid and 6 epiphyte orchids. The biggest population was *Spathoglottis plicata* with a total number of 98 (51.04%), then *Vanda hinsii* with a total number of 48 (25%), *Grammatophyllum scriptum* with a total number of 15 (7,81%) *Dendrobium smile* with the total number of 14 (7.30%) *Dendrobium antenantum* with the total number of 9 (4.69%) *Grammatophyllum speciosum* with the total number of 5 (2.60%) and *Bulbophyllum macranthum* with the total number of 3 (1,56%).

In Wailen subdistrict forest, we found 7 types of orchids from three different families, including Dendrobium, Bulbhophylum, and Eria. The biggest population was *Dendrobium anttenatum* with a total number of 76 (52.78%), followed by *D. lawesii* with a total number of 40 (27.78%), *D. aloifolium* with a total number of 12 (8.33%), *Eria pannea* with the total number of 7 (4.86%), *D. mutablie* with the total number of 4 (2.78%), *Bulbophylum. macranthum,* with a total number of 3 (2.08%), and *B. vaginatum,* with a total number of 2 (1.39 %), and a total number was 144.

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