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St. Fatmah Hiola <fatmah.hiola@unm.ac.id> 2 Januari 2019 17.31
Kepada: IConGETech <icongetech@gmail.com>

Dear Commitee,

Here I attached the manucsript for International Conference on Green Engineering & Technology (IConGETech 2019).

St. Fatmah Hiola

Jurusan Biologi
Fakultas Matematika dan Ilmu Pengetahuan Alam
Universitas Negeri Makassar

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Official Acceptance and Invited Letter

IConGETech <icongetech@gmail.com> 13 Januari 2019 08.15
Kepada: St. Fatmah Hiola <fatmah.hiola@unm.ac.id>

Dear Author(s)

Thank you for your submission to IConGETech 2019. We are pleased to inform you that your paper;
Paper ID: IConGETech-001
Title: Characteristics of Wild Orchids in Mallawa Resort at Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia
Author(s): Siti Fatmah Hiola, Gufran Darma Dirawan, Muhammad Wiharto, Syamsiah
Due to review of IConGETech 2019 Committees, your paper was accepted as **oral presentation.**
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We are pleased to invite you to attend the International Conference on Green Engineering & Technology 2019 (IConGETech 2019). The event will be well attended, and your participation will enhance the aims of the meeting, by helping to create a proper forum for discussion among engineers, professionals and other experts working in areas related to the conference.

We hope that your authorities will grant you the necessary visas and documents allowing you to attend this event and we look forward to welcoming you to Thailand.

Sincerely Yours,

MOHD MUSTAFA AL BAKRI ABDULLAH
IConGETech 2019Committee
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Reviewer Comment

IConGETech <icongetech@gmail.com> 1 Februari 2019 08.15
Kepada: St. Fatmah Hiola <fatmah.hiola@unm.ac.id>

Dear Author,

Here attach the result of review of your manuscript. Please send back the revision up to 27 February 2019.

Sincerely Yours,

MOHD MUSTAFA AL BAKRI ABDULLAH
IConGETech 2019Committee
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St. Fatmah Hiola <fatmah.hiola@unm.ac.id>

Re: Reviewer Comment

St. Fatmah Hiola <fatmah.hiola@unm.ac.id> 2 Februari 2019 11.38
Kepada: IConGETech <icongetech@gmail.com>

Thank you very much

St. Fatmah Hiola <fatmah.hiola@unm.ac.id>

Revision Manuscript Fatmah Hiola

St. Fatmah Hiola <fatmah.hiola@unm.ac.id> 10 Februari 2019 17.31
Kepada: IConGETech <icongetech@gmail.com>

Dear Editor,

Here we attach the result of revision of the manuscript. We hope it can more suitable with the format. Thank you very much.

Sincerely Yours,

Authors

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Characteristics of Wild Orchids in Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

Siti Fatmah Hiola[1], Gufran Darma Dirawan[2], Muhammad Wiharto[1], Syamsiah[1]
[1]Biology Department, Universitas Negeri Makassar, South Sulawesi, Indonesia
[2]Environmental Education Studies, Postgraduate Program, Universitas Negeri Makassar, South Sulawesi, Indonesia

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Abstrak. This study aims to determine the characteristics of natural orchids in the area of Resort Mallawa, Bantimurung Bulusaraung National Park. This type of research is descriptive with the roaming method (exploration), which is tracking the study area which is known to have a fairly high distribution of natural orchids. Exploration of natural orchids is carried out at 85 distribution points, with altitude of 432 meters above sea level to 849 m above sea level. The results showed that there were 40 types of orchids, 33 species identified, and 7 species not identified. Based on the growth properties of natural orchids found were dominated by 35 species of epiphytic orchids, while for the type of growth were dominated by 24 species of sympodial orchids. The most found locations of natural orchids are in Mallenreng Hamlet I. The most common species is Trichoglottis geminata. Based on the height of the place, the species that grows at the highest position is Coelogyne sp., While in the lowest position is Dendrobium sp. 1. Based on the visual intensity of light, orchids were found in shelter as many as 5 species, half sheltered as many as 21 species, while in the open as many as 4 species. There are 5 orchid species that can grow in shelter and half shelter, 3 species that grow in half sheltered and open places, and 2 species that can grow in three places.

Keywords: Natural orchids, Resort Mallawa, Bantimurung Bulusaraung National Park

INTRODUCTION

The diversity of Indonesian orchids that are spread in various regions of the archipelago is a potential that has not been fully explored. The study of natural orchids is very necessary to increase knowledge about the potential of flora in Indonesia.

Experts say that in the world there are an estimated 50,000 species of natural orchids collected in 1,200 genera (Parnata, 2005). Orchids are classified as members of the Orchidaceae family. According to Jatmika (2013), in Indonesia there are around 5,000 orchid species which are spread in almost all parts of Indonesia. The islands in Indonesia which have known the number of species of orchids, among others in Java as many as 731 species, Sumatra as many as 1118 species, Borneo as many as 2000

species, Sulawesi and Maluku as many as 820 species, with 548 species of which are in Sulawesi (Sulistiarini, 2008).

One of the conservation areas in South Sulawesi that is often found in the presence of natural orchids is in the Bantimurung Bulusaraung National Park area (Babul National Park). Area in TN. Babul has 8 resorts including, Resort Mallawa, Pattunuang-Karaenta, Bantimurung, Camba, Balocci, Minasate'ne, Tondong Tallasa and Butterfly Park. Based on the results of interviews from the National Park Office. Babul, stated that Resort Mallawa has a better diversity of natural orchids than other resorts including the area in TN. Babul. Therefore it is necessary to hold a data collection or record the diversity of orchid species, so that it can be used as a database for the development of natural orchids in Bantimurung Bulusaraung National Park (BTNBB, 2012).

RESEARCH METHOD

This type of research is descriptive research with exploratory methods, where observations of objects to be studied are carried out by tracing the study area, to collect images of objects (photo documentation), then identify each natural orchid found through orchid characterization.

This research was carried out in the Bantimurung Bulusaraung National Park area in the Resort Mallawa forest area. Implementation of field research for 3 months (March-June 2018).

The tools used in this study were digital cameras (optical zoom 63x, 20.1MP), magnifying glass, Garmin GPS, binoculars, maps, literature / orchid identification reference books and writing instruments. The material used is orchid specimens.

Before conducting research, first determine the natural orchid exploration route based on information from local people and field officers.

Data retrieval is done by exploring and observing directly in the research area. This exploration area consists of 4 locations, namely: Dusun Ballanglohe Village Barugae; Bentenge Hamlet, Bentenge Village, Mallenreng I Hamlet and Mallenreng II Hamlet Samaenre Village.

Measurement of coordinates and altitude is determined when finding natural orchids, then making documentation by taking pictures of orchids using a digital camera.

Characterize each specimen with type identification, determine the nature and type of growth, and visual needs of light.

The identification stage of orchid species is based on direct observation and matching documentation images with literature. Identification is carried out based on plant organs including roots, stems, leaves, flowers and fruit (if any).

The literature / book regarding the reference consists of Flora (Van Steenis, 2005), Orchid Species (Ramsay, 2014), Orchid of Sulawesi (Handoyo & Prasetya, 2012), Native Orchid of Indonesia (Handoyo & Prasetya, 2006), Koleksi Anggrek Kebun Raya Bogor (Puspitaningtyas & Mursidawati, 1999), Orchids of Java (Comber, 2001), An Alphabetical List of Indonesian Orchid Cultivated in Bogor Botanic Garden (Supardi et al., 1999), and Tropical Orchids of Southeast Asia (Banks, 1999). Besides that, it also uses several website sources, such as http://plants.usda.gov; http://flnativeorchids.comwww.flora.dempstercountry.org; www.theplantlist.org/;

RESULTS AND DISCUSSION

Based on the results of the research, it is known that the types of wild orchids at Resort Mallawa, Bantimurung Bulusaraung National Park Region have quite diverse types. The types of wild orchids found in the area are presented in Table 1 below.

Table 1. The types of natural orchids found at Resort Mallawa in Bantimurung Bulusaraung National Park.

No.	Latin name	Indonesian name	Nature of Growth	Growing Type
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	Anggrek peru	Epiphytic	monopodial
2	*Aerides inflexa* Teijsm. & Binm.	Anggrek lilin	Epiphytic	monopodial
3	*Aporum uncatum* (Lindl.) Brieger	-	Epiphytic	Sympodial
4	*Arundina* sp.	*Anggrek bambu*	Litofit	Sympodial
5	*Bulbophyllum* sp.	-	Epiphytic	Sympodial
6	*Calanthe triplicata* (Rumph.) Ames	Ahan abal Anggrek popocongan Bunga tida lapis Lemba utan	Terrestik	monopodial
7	*Cleistoma* sp.	-	Epiphytic	monopodial
8	*Coelogyne* sp.	Anggrek hitam	Epiphytic	Sympodial
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	*Anggrek lidah ular* *Anggrek pandan* *Anggrek perahu*	Epiphytic	Sympodial
10	*Cymbidium* sp.1	-	Epiphytic	Sympodial
11	*Cymbidium* sp.2	-	Epiphytic	Sympodial
12	*Dendrobiumphalaenopsis* Fitzg.	Anggrek larat	Epiphytic	Sympodial
13	*Dendrobium* sp.1	-	Epiphytic	Sympodial
14	*Dendrobium* sp.2	*Anggrek merpati*	Epiphytic	Sympodial
15	*Dendrobium* sp.3	-	Epiphytic	Sympodial
16	*Dendrobium* sp.4	-	Epiphytic	Sympodial
17	*Flickingeria* sp.	-	Epiphytic	Sympodial
18	*Gastrochillus* sp.	-	Epiphytic	monopodial
19	*Hebenaria radiata* (Thunb.) Spreng.	Anggrek bangau putih	Terrestik	monopodial
20	*Lipariscondybulbon* Rchb. f.	-	Epiphytic	Sympodial
21	*Lipariselegans* Lindl.	-	Epiphytic	Sympodial
22	*Liparis* sp.	Anggrek kutilang	Epiphytic	Sympodial
23	*Luisia* sp.	-	Epiphytic	monopodial
24	*Oberonia costeriana* J.J. Sm.	-	Epiphytic	monopodial
25	*Phaius* sp.	-	Epiphytic	Sympodial
26	*Phalaenopsis amabilis* (L.) Blume	*Anggrek bulan*	Epiphytic	monopodial
27	*Phalaenopsis* sp.1	-	Epiphytic	monopodial
28	*Phalaenopsis* sp.2	-	Epiphytic	monopodial
29	*Phalaenopsis* sp.3	-	Epiphytic	monopodial
30	*Phreatia* sp.	Anggrek upil	Epiphytic	Sympodial
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	Anggrek madu *Anggrek kobra*	Epiphytic	Sympodial

No.	Latin name	Indonesian name	Nature of Growth	Growing Type
32	*Trichoglottis* sp.	-	Epiphytic	Sympodial
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	Anggrek vanda merah	Litofit	monopodial
34	Spesies 1	-	Epiphytic	Sympodial
35	Spesies 2	-	Epiphytic	monopodial
36	Spesies 3	-	Epiphytic	Sympodial
37	Spesies 4	-	Epiphytic	Sympodial
38	Spesies 5	-	Epiphytic	Sympodial
39	Spesies 6	-	Epiphytic	monopodial
40	Spesies 7	-	Epiphytic	monopodial

Tabel 2. Types of Natural Orchid Based on Visual Light Intensity at Resort Mallawa at Bantimurung Bulusaraung National Park Area.

No.	Orchids Name	Visual Light Intensity		
		Shelter	Half Shelter	Open
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	√	-	-
2	*Aerides inflexa* Teijsm. & Binm.	√	√	-
3	*Aporum uncatum* (Lindl.) Brieger,	-	√	√
4	*Arundina* sp.	√	√	√
5	*Bulbophyllum* sp.	-	-	√
6	*Calanthe triplicata*(Rumph.) Ames	-	√	√
7	*Cleistoma* sp.	-	√	-
8	*Coelogyne* sp.	√	√	√
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	√	√	-
10	*Cymbidium*sp.1	√	-	-
11	*Cymbidium*sp.2	-	√	-
12	*Dendrobiumphalaenopsis* Fitzg.	-	√	-
13	*Dendrobium* sp.1	-	√	-
14	*Dendrobium* sp.2	-	√	-
15	*Dendrobium* sp.3	-	√	-
16	*Dendrobium* sp.4	-	√	-
17	*Flickingeria* sp.	-	√	√
18	*Gastrochillus* sp.	-	√	-
19	*Hebenaria radiata* (Thunb.) Spreng.	-	-	√
20	*Lipariscondybulbon* Rchb. f.	√	√	-
21	*Lipariselegans* Lindl.	-	√	-
22	*Liparis* sp.	-	√	-
23	*Luisia* sp.	-	√	-
24	*Oberonia costeriana* J.J. Sm.	-	-	√
25	*Phaius* sp.	-	√	-
26	*Phalaenopsis amabilis* (L.) Blume	-	√	-
27	*Phalaenopsis* sp.1	-	√	-
28	*Phalaenopsis* sp.2	-	√	-

29	*Phalaenopsis* sp.3	-	√	-
30	*Phreatia* sp.	√	-	-
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	√	√	-
32	*Trichoglottis*sp.	√	-	-
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	-	-	√
34	Spesies 1	√	√	-
35	Spesies 2	-	√	-
36	Spesies 3	-	√	-
37	Spesies 4	-	-	√
38	Spesies 5	√	-	-
39	Spesies 6	-	√	-
40	Spesies7	-	√	-

Table 1 shows the number of species of natural orchids found in Resort Mallawa as many as 40 types. There are 13 types of natural orchids identified to species level, 20 species identified only to family level, and 7 species that have not been identified, this is because the type of orchid found has not had a generative organ making it difficult to identify. According to Hiola, et al (2017), to distinguish between one type of orchid with another orchid, one of which is seen from the flower.

Based on the nature of growth, there are 3 types of orchid growth properties, namely epiphytes, terrestics, and litophytes. The growth properties are dominated by epiphytes as many as 35 species, while based on the type of growth, the orchids found are mostly sympodial orchids as many as 24 species.

These natural orchids are found in different conditions. There are 12 types of shelter in the shelter, 28 in the half shelter, while 11 in the open place. Of the total types of orchids, there are 5 types of orchids that can grow in shelter and half shelter, 3 species that grow in half-sheltered and open places, and 2 species that can grow in three places (Table 2).

Based on the results of research, there were 40 types of natural orchids at Resort Mallawa. This was almost equivalent to the previous findings by TN. Babul in 2011 found 39 species. Thomas and Schuiteman (2002) in Sulistriani (2008) stated that there were about 548 types of Sulawesi orchids. When compared with the total number of orchid species in Sulawesi, the species found at Resort Mallawa only reached 7.3%.

In Table 1, it shows several types of natural orchids that do not yet have an Indonesian name or area name, this is because not all types of natural orchids have names that are popular or are still very rarely cultivated by the community. Each region has different terms and languages, so that one type of orchid can have more than one regional name.

The results of exploration of natural orchids were found in 85 distribution points. The characteristics and types of orchid growth that dominate are epiphytes and simpodial types. Trichoglottis geminata is the most growing species among the other species, namely as many as 10 points. Based on height, Coelogyne sp. at an altitude of 849 m above sea level which is the highest growth position compared to the other species found in Bentenge Hamlet, while the lowest level is Dendrobium sp.1 with an altitude of 432 m above sea level in Mallenreng I. Hamlet Based on the distribution location, Mallenreng I Hamlet is the location of the most abundant orchid plants, followed by Mallenreng II, Bentenge and Ballanglohe. According to Fibriliani et al. (2013), the type of forest and

the presence of vegetation can be a limiting factor for the distribution of these types of orchids. Each type of orchid has a different distribution level, so that each forest area contains different varieties of orchids. orchids as a place of refuge, taking nutrients, developing and regenerating. Therefore, the structure and diversity of vegetation types of tree stands at the study site will also affect the variety of types of orchids that exist.

Generally, natural orchids are found to grow in half-sheltered conditions. However, there are some that can grow in 2 or 3 types of conditions. Types of Aerides inflexa, Cymbidium finlaysonianum, Liparis condybulbon, Trichoglottis geminata and species 1 are types of orchids that can grow in shaded and half-sheltered conditions. Types of Aporum uncatum, Calanthe triplicata and Flickingeria sp. is a type that can grow in half-sheltered and open conditions. Type of Arundina sp. and Coelogyne sp. is a type that can grow in all three conditions.

According to Dressler (1982) in (Puspitaningtyas & Mursidawati, 1999) states that one of the differences in the way of life of epiphytic and terrestrial plants is in their light needs, so species of orchids that like bright light will grow as epiphytic plants, while those who like shade will grow on the forest floor. According to Wiharto et.al. (2018), tree vegetation that is not too tight causes the intensity of sunlight to reach the surface of the ground. Furthermore Hiola, et al. (2015) stated that physiologically the light energy has a large influence on orchids, either directly or indirectly. Direct influence is in the process of photosynthesis, while the indirect effect is on its growth, germination and flowering.

CONCLUSION

Based on the results obtained, it can be concluded as follows.

1. The number of natural orchids found at Resort Mallawa is 40 types. 13 species-level identified types, 20 family-level identified types, and 7 species not identified.
2. The nature of orchid growth is dominated by epiphytes as many as 36 species.
3. The type of orchid growth is mostly sympodial as many as 24 types.
4. Found 5 types of natural orchids in shelter, 21 types in half sheltered places, 4 types in open places, 5 types in shelter and half shelter, 3 types in half shelter and open, and 2 types in all three places.

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02600 Arau, Perlis.

14th January 2019

Official Acceptance and Invited Letter

Dear Author(s)

Thank you for your submission to IConGETech 2019. We are pleased to inform you that your paper;

Paper ID: IConGETech-001

Title: Characteristics of Wild Orchids in Mallawa Resort at Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

Author(s): Siti Fatmah Hiola, Gufran Darma Dirawan, Muhammad Wiharto, Syamsiah

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We hope that your authorities will grant you the necessary visas and documents allowing you to attend this event and we look forward to welcoming you to Thailand.

Sincerely Yours,

MOHD MUSTAFA AL BAKRI ABDULLAH
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Website: https://icongetech.weebly.com/

Characteristics of Wild Orchids in Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

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[1]Biology Department, Universitas Negeri Makassar, South Sulawesi, Indonesia
[2]Environmental Education Studies, Postgraduate Program, Universitas Negeri Makassar, South Sulawesi, Indonesia

E-mail : *fatmah.hiola@unm.ac.id*

Abstrak. This study aims to determine the characteristics of natural orchids in the area of Resort Mallawa, Bantimurung Bulusaraung National Park. This type of research is descriptive with the roaming method (exploration), which is tracking the study area which is known to have a fairly high distribution of natural orchids. Exploration of natural orchids is carried out at 85 distribution points, with altitude of 432 meters above sea level to 849 m above sea level. The results showed that there were 40 types of orchids, 33 species identified, and 7 species not identified. Based on the growth properties of natural orchids found were dominated by 35 species of epiphytic orchids, while for the type of growth were dominated by 24 species of sympodial orchids. The most found locations of natural orchids are in Mallenreng Hamlet I. The most common species is Trichoglottis geminata. Based on the height of the place, the species that grows at the highest position is Coelogyne sp., While in the lowest position is Dendrobium sp. 1. Based on the visual intensity of light, orchids were found in shelter as many as 5 species, half sheltered as many as 21 species, while in the open as many as 4 species. There are 5 orchid species that can grow in shelter and half shelter, 3 species that grow in half sheltered and open places, and 2 species that can grow in three places.

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INTRODUCTION

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Comment [1]: What's the implication of this study?

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species, Sulawesi and Maluku as many as 820 species, with 548 species of which are in Sulawesi (Sulistiarini, 2008).

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RESEARCH METHOD

This type of research is descriptive research with exploratory methods, where observations of objects to be studied are carried out by tracing the study area, to collect images of objects (photo documentation), then identify each natural orchid found through orchid characterization.

This research was carried out in the Bantimurung Bulusaraung National Park area in the Resort Mallawa forest area. Implementation of field research for 3 months (March-June 2018).

The tools used in this study were digital cameras (optical zoom 63x, 20.1MP), magnifying glass, Garmin GPS, binoculars, maps, literature / orchid identification reference books and writing instruments. The material used is orchid specimens.

Before conducting research, first determine the natural orchid exploration route based on information from local people and field officers.

Data retrieval is done by exploring and observing directly in the research area. This exploration area consists of 4 locations, namely: Dusun Ballanglohe Village Barugae; Bentenge Hamlet, Bentenge Village, Mallenreng I Hamlet and Mallenreng II Hamlet Samaenre Village.

Measurement of coordinates and altitude is determined when finding natural orchids, then making documentation by taking pictures of orchids using a digital camera.

Characterize each specimen with type identification, determine the nature and type of growth, and visual needs of light.

The identification stage of orchid species is based on direct observation and matching documentation images with literature. Identification is carried out based on plant organs including roots, stems, leaves, flowers and fruit (if any).

The literature / book regarding the reference consists of Flora (Van Steenis, 2005), Orchid Species (Ramsay, 2014), Orchid of Sulawesi (Handoyo & Prasetya, 2012), Native Orchid of Indonesia (Handoyo & Prasetya, 2006), Koleksi Anggrek Kebun Raya Bogor (Puspitaningtyas & Mursidawati, 1999), Orchids of Java (Comber, 2001), An Alphabetical List of Indonesian Orchid Cultivated in Bogor Botanic Garden (Supardi et al., 1999), and Tropical Orchids of Southeast Asia (Banks, 1999). Besides that, it also uses several website sources, such as http://plants.usda.gov; http://flnativeorchids.comwww.flora.dempstercountry.org; www.theplantlist.org/;

RESULTS AND DISCUSSION

Comment [3]: explain total types of orchids endemic that found on Sulawesi Island.

Comment [4]: Chek

Based on the results of the research, it is known that the types of wild orchids at Resort Mallawa, Bantimurung Bulusaraung National Park Region have quite diverse types. The types of wild orchids found in the area are presented in Table 1 below.

Table 1. The types of natural orchids found at Resort Mallawa in Bantimurung Bulusaraung National Park.

No.	Latin name	Indonesian name	Nature of Growth	Growing Type
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	Anggrek peru	Epiphytic	monopodial
2	*Aerides inflexa* Teijsm. & Binm.	Anggrek lilin	Epiphytic	monopodial
3	*Aporum uncatum* (Lindl.) Brieger	-	Epiphytic	Sympodial
4	*Arundina* sp.	*Anggrek bambu*	Litofit	Sympodial
5	*Bulbophyllum* sp.	-	Epiphytic	Sympodial
6	*Calanthe triplicata* (Rumph.) Ames	Ahan abal Anggrek popocongan Bunga tida lapis Lemba utan	Terrestik	monopodial
7	*Cleistoma* sp.	-	Epiphytic	monopodial
8	*Coelogyne* sp.	Anggrek hitam	Epiphytic	Sympodial
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	*Anggrek lidah ular* *Anggrek pandan* *Anggrek perahu*	Epiphytic	Sympodial
10	*Cymbidium* sp.1	-	Epiphytic	Sympodial
11	*Cymbidium* sp.2	-	Epiphytic	Sympodial
12	*Dendrobiumphalaenopsis* Fitzg.	Anggrek larat	Epiphytic	Sympodial
13	*Dendrobium* sp.1	-	Epiphytic	Sympodial
14	*Dendrobium* sp.2	*Anggrek merpati*	Epiphytic	Sympodial
15	*Dendrobium* sp.3	-	Epiphytic	Sympodial
16	*Dendrobium* sp.4	-	Epiphytic	Sympodial
17	*Flickingeria* sp.	-	Epiphytic	Sympodial
18	*Gastrochillus* sp.	-	Epiphytic	monopodial
19	*Hebenaria radiata* (Thunb.) Spreng.	Anggrek bangau putih	Terrestik	monopodial
20	*Lipariscondybulbon* Rchb. f.	-	Epiphytic	Sympodial
21	*Lipariselegans* Lindl.	-	Epiphytic	Sympodial
22	*Liparis* sp.	Anggrek kutilang	Epiphytic	Sympodial
23	*Luisia* sp.	-	Epiphytic	monopodial
24	*Oberonia costeriana* J.J. Sm.	-	Epiphytic	monopodial
25	*Phaius* sp.	-	Epiphytic	Sympodial
26	*Phalaenopsis amabilis* (L.) Blume	*Anggrek bulan*	Epiphytic	monopodial
27	*Phalaenopsis* sp.1	-	Epiphytic	monopodial
28	*Phalaenopsis* sp.2	-	Epiphytic	monopodial
29	*Phalaenopsis* sp.3	-	Epiphytic	monopodial
30	*Phreatia* sp.	Anggrek upil	Epiphytic	Sympodial
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	Anggrek madu *Anggrek kobra*	Epiphytic	Sympodial

Comment [5]: Indonesian Name/Local name

Comment [6]: Habitus?

No.	Latin name	Indonesian name	Nature of Growth	Growing Type
32	*Trichoglottis* sp.	-	Epiphytic	Sympodial
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	Anggrek vanda merah	Litofit	monopodial
34	Spesies 1	-	Epiphytic	Sympodial
35	Spesies 2	-	Epiphytic	monopodial
36	Spesies 3	-	Epiphytic	Sympodial
37	Spesies 4	-	Epiphytic	Sympodial
38	Spesies 5	-	Epiphytic	Sympodial
39	Spesies 6	-	Epiphytic	monopodial
40	Spesies 7	-	Epiphytic	monopodial

Comment [5]: Indonesian Name/Local name

Comment [6]: Habitus?

Tabel 2. Types of Natural Orchid Based on Visual Light Intensity at Resort Mallawa at Bantimurung Bulusaraung National Park Area.

Comment [7]: Give some comment/description of table 1 before table 2

No.	Orchids Name	Visual Light Intensity		
		Shelter	Half Shelter	Open
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	√	-	-
2	*Aerides inflexa* Teijsm. & Binm.	√	√	-
3	*Aporum uncatum* (Lindl.) Brieger,	-	√	√
4	*Arundina* sp.	√	√	√
5	*Bulbophyllum* sp.	-	-	√
6	*Calanthe triplicata*(Rumph.) Ames	-	√	√
7	*Cleistoma* sp.	-	√	-
8	*Coelogyne* sp.	√	√	√
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	√	√	-
10	*Cymbidium*sp.1	√	-	-
11	*Cymbidium*sp.2	-	√	-
12	*Dendrobiumphalaenopsis* Fitzg.	-	√	-
13	*Dendrobium* sp.1	-	√	-
14	*Dendrobium* sp.2	-	√	-
15	*Dendrobium* sp.3	-	√	-
16	*Dendrobium* sp.4	-	√	-
17	*Flickingeria* sp.	-	√	√
18	*Gastrochillus* sp.	-	√	-
19	*Hebenaria radiata* (Thunb.) Spreng.	-	-	√
20	*Liparis condybulbon* Rchb. f.	√	√	-
21	*Liparis elegans* Lindl.	-	√	-
22	*Liparis* sp.	-	√	-
23	*Luisia* sp.	-	√	-
24	*Oberonia costeriana* J.J. Sm.	-	-	√
25	*Phaius* sp.	-	√	-
26	*Phalaenopsis amabilis* (L.) Blume	-	√	-
27	*Phalaenopsis* sp.1	-	√	-

28	*Phalaenopsis* sp.2	-	√	-
29	*Phalaenopsis* sp.3	-	√	-
30	*Phreatia* sp.	√	-	-
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	√	√	-
32	*Trichoglottis*sp.	√	-	-
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	-	-	√
34	Spesies 1	√	√	-
35	Spesies 2	-	√	-
36	Spesies 3	-	√	-
37	Spesies 4	-	-	√
38	Spesies 5	√	-	-
39	Spesies 6	-	√	-
40	Spesies7	-	√	-

Table 1 shows the number of species of natural orchids found in Resort Mallawa as many as 40 types. There are 13 types of natural orchids identified to species level, 20 species identified only to family level, and 7 species that have not been identified, this is because the type of orchid found has not had a generative organ making it difficult to identify. According to Hiola, et al (2017), to distinguish between one type of orchid with another orchid, one of which is seen from the flower.

Based on the nature of growth, there are 3 types of orchid growth properties, namely epiphytes, terrestics, and litophytes. The growth properties are dominated by epiphytes as many as 35 species, while based on the type of growth, the orchids found are mostly sympodial orchids as many as 24 species.

These natural orchids are found in different conditions. There are 12 types of shelter in the shelter, 28 in the half shelter, while 11 in the open place. Of the total types of orchids, there are 5 types of orchids that can grow in shelter and half shelter, 3 species that grow in half-sheltered and open places, and 2 species that can grow in three places (Table 2).

Based on the results of research, there were 40 types of natural orchids at Resort Mallawa. This was almost equivalent to the previous findings by TN. Babul in 2011 found 39 species. Thomas and Schuiteman (2002) in Sulistriani (2008) stated that there were about 548 types of Sulawesi orchids. When compared with the total number of orchid species in Sulawesi, the species found at Resort Mallawa only reached 7.3%.

In Table 1, it shows several types of natural orchids that do not yet have an Indonesian name or area name, this is because not all types of natural orchids have names that are popular or are still very rarely cultivated by the community. Each region has different terms and languages, so that one type of orchid can have more than one regional name.

The results of exploration of natural orchids were found in 85 distribution points. The characteristics and types of orchid growth that dominate are epiphytes and simpodial types. Trichoglottis geminata is the most growing species among the other species, namely as many as 10 points. Based on height, Coelogyne sp. at an altitude of 849 m above sea level which is the highest growth position compared to the other species found in Bentenge Hamlet, while the lowest level is Dendrobium sp.1 with an altitude of 432 m above sea level in Mallenreng I. Hamlet Based on the

distribution location, Mallenreng I Hamlet is the location of the most abundant orchid plants, followed by Mallenreng II, Bentenge and Ballanglohe. According to Fibriliani et al. (2013), the type of forest and the presence of vegetation can be a limiting factor for the distribution of these types of orchids. Each type of orchid has a different distribution level, so that each forest area contains different varieties of orchids. orchids as a place of refuge, taking nutrients, developing and regenerating. Therefore, the structure and diversity of vegetation types of tree stands at the study site will also affect the variety of types of orchids that exist.

Generally, natural orchids are found to grow in half-sheltered conditions. However, there are some that can grow in 2 or 3 types of conditions. Types of Aerides inflexa, Cymbidium finlaysonianum, Liparis condybulbon, Trichoglottis geminata and species 1 are types of orchids that can grow in shaded and half-sheltered conditions. Types of Aporum uncatum, Calanthe triplicata and Flickingeria sp. is a type that can grow in half-sheltered and open conditions. Type of Arundina sp. and Coelogyne sp. is a type that can grow in all three conditions.

According to Dressler (1982) in (Puspitaningtyas & Mursidawati, 1999) states that one of the differences in the way of life of epiphytic and terrestrial plants is in their light needs, so species of orchids that like bright light will grow as epiphytic plants, while those who like shade will grow on the forest floor. According to Wiharto et.al. (2018), tree vegetation that is not too tight causes the intensity of sunlight to reach the surface of the ground. Furthermore Hiola, et al. (2015) stated that physiologically the light energy has a large influence on orchids, either directly or indirectly. Direct influence is in the process of photosynthesis, while the indirect effect is on its growth, germination and flowering.

CONCLUSION

Based on the results obtained, it can be concluded as follows.

1. The number of natural orchids found at Resort Mallawa is 40 types. 13 species-level identified types, 20 family-level identified types, and 7 species not identified.
2. The nature of orchid growth is dominated by epiphytes as many as 36 species.
3. The type of orchid growth is mostly sympodial as many as 24 types.
4. Found 5 types of natural orchids in shelter, 21 types in half sheltered places, 4 types in open places, 5 types in shelter and half shelter, 3 types in half shelter and open, and 2 types in all three places.

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Comment [8]: Chek the manuscript template

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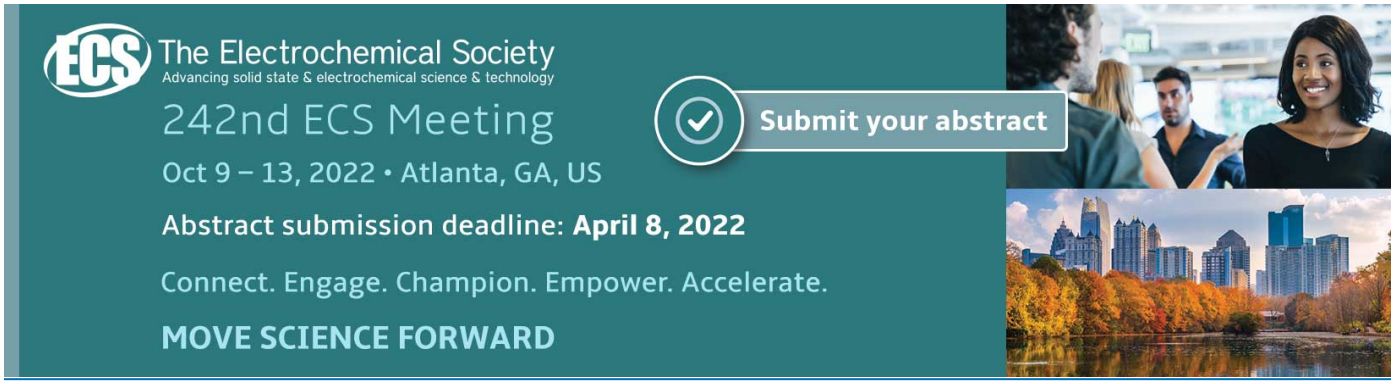

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Characteristics of Wild Orchids in Mallawa Resort at Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

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Abstract. This study aims to determine the characteristics of wild orchids in the area of Resort Mallawa, Bantimurung Bulusaraung National Park. This type of research is descriptive with the exploration method, which is tracking the study area which is known to have a fairly high distribution of wild orchids. Exploration of wild orchids is carried out at 85 distribution points, with an altitude of 432 meters above sea level to 849 m above sea level. The results showed that there were 40 types of orchids, 33 species identified, and 7 species not identified. Based on the growth properties of wild orchids found were dominated by 35 species of epiphytic orchids, while for the type of growth was dominated by 24 species of sympodial orchids. The most found locations of wild orchids are in Mallenreng Hamlet I. The most common species is *Trichoglottis geminata*. Based on the height of the place, the species that grows at the highest position is *Coelogyne* sp., while in the lowest position is *Dendrobium* sp. 1. Based on the visual intensity of light, orchids were found in the shade as many as 5 species, half sheltered as many as 21 species, while in the open as many as 4 species. There are 5 orchid species that can grow in the shade and half shade, 3 species that grow in half shade and open places, and 2 species that can grow in three places. By knowing the presence and diversity of wild orchids in the study area shows that the ecosystem in the area is still quite good, considering that wild orchids are plants that are quite susceptible to interference.

1. Introduction

The diversity of Indonesian orchids that are spread in various regions of the archipelago is a potential that has not been fully explored. The study of wild orchids is essential to increase knowledge about the possibility of flora in Indonesia.

Experts say that in the world there are an estimated 50,000 species of wild orchids collected in 1,200 genera [1]. Orchids are classified as members of the Orchidaceae genera. In Indonesia, there are around 5,000 orchid species which are spread in almost all parts of Indonesia. The islands in Indonesia which have known the number of species of orchids, among others in Java as many as 731 species, Sumatra as many as 1118 species, Borneo as many as 2000 species, Sulawesi and Maluku as many as 820 species, with 548 species of which are in Sulawesi [2]–[6].

Recorded species of orchids that are endemic in Sulawesi are estimated to be around 253 species. It shows that 80% of the total types of orchids found on Sulawesi Island are endemic [7]. The diversity of types of wild orchids in Sulawesi, especially in Bantimurung Bulusaraung National Park, Maros

Regency, South Sulawesi, recorded 90 species of wild orchids with 43 genera, 5 species have not been identified. The types of orchids that dominate the area are epiphytic orchids of 70 species [8].

One of the conservation areas in South Sulawesi that is often found in the presence of wild orchids is in the Bantimurung Bulusaraung National Park area, commonly abbreviated as Babul National Park (Babul NP). It occupies an area of 43,750 hectares between 119°34'17"-119°55'13" East and 4°42'49"-5°06'42" South. The area in Babul NP has eight resorts including, Mallawa Resort, Pattunuang-Karaenta Resort, Bantimurung Resort, Camba Resort, Balocci Resort, Minasate'ne Resort, Tondong Tallasa Resort, and Butterfly Park Resort. Based on the results of interviews from the officer of Babul NP, stated that Mallawa Resort has a better diversity of wild orchids than other resorts including the area in Babul NP. Therefore, it is necessary to collect data or record the diversity of orchids to become a database for the development of wild orchids in Bantimurung Bulusaraung National Park. [8].

2. Research Method

This type of research is descriptive with exploratory methods, where observations of objects to be studied are carried out by tracing the study area, to collect images of objects (photo documentation), then identify each wild orchid found through orchid characterization.

This research was carried out in the Bantimurung Bulusaraung National Park area in the Mallawa Resort area. This research was conducted for four months (February-June 2017). Data retrieval is done by exploring and observing directly in the research area. This exploration area consists of 4 locations, namely: Barugae Village; Bentenge Village, Mallenreng I Hamlet, and Mallenreng II Hamlet, Samaenre Village.

The tools used in this study were digital cameras (optical zoom 63x, 20.1MP), magnifying glass, GPS Garmin Montana 655, binoculars, maps, literature/orchid identification reference books and writing instruments. The material used is orchid specimens, tally sheet, label, and plastic bags. Before conducting research, first, determine the wild orchid exploration route based on information from local people and field officers.

Characterize each specimen with identification, determine the nature and type of growth, and visual needs of light. The identification stage of orchid species is based on direct observation and matching documentation images with literature. Identification is carried out based on plant organs including roots, stems, leaves, flowers and fruit (if any).

The literature / book regarding the reference consists of Flora [9], The Orchid Book: A Guide to the Identification of Cultivated Orchid Species [10], Orchid of Sulawesi [11], Native Orchid of Indonesia [6], Koleksi Anggrek Kebun Raya Bogor [12], Orchids of Java [13], An Alphabetical List of Indonesian Orchid Cultivated in Bogor Botanic Garden [14], Orchids of Indonesia [3], and Tropical Orchids of Southeast Asia [2]. Besides that, it also uses several website sources, such as http://plants.usda.gov; http://flnativeorchids. com; www.flora.dempstercountry.org; www.theplantlist.org/;

3. Results and Discussions

Based on the results of the research, it is known that the types of wild orchids at Resort Mallawa, Bantimurung Bulusaraung National Park Region have quite diverse types. The types of wild orchids found in the area are presented in Table 1 below.

Table 1. The types of wild orchids found at Resort Mallawa in Bantimurung Bulusaraung National Park.

No.	Latin Name	Indonesian/Local Name	Habitus	Growing Type
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	Anggrek peru	Epiphytic	monopodial
2	*Aerides inflexa* Teijsm. & Binm.	Anggrek lilin	Epiphytic	monopodial

No.	Latin Name	Indonesian/Local Name	Habitus	Growing Type
3	*Aporum uncatum* (Lindl.) Brieger	-	Epiphytic	Sympodial
4	*Arundina* sp.	Anggrek bambu	Litophytes	Sympodial
5	*Bulbophyllum* sp.	-	Epiphytic	Sympodial
6	*Calanthe triplicata* (Rumph.) Ames	Ahan abal Anggrek popocongan Bunga tida lapis Lemba utan	Terrestics	monopodial
7	*Cleistoma* sp.	-	Epiphytic	monopodial
8	*Coelogyne* sp.	Anggrek hitam	Epiphytic	Sympodial
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	Anggrek lidah ular Anggrek pandan Anggrek perahu	Epiphytic	Sympodial
10	*Cymbidium* sp.1	-	Epiphytic	Sympodial
11	*Cymbidium* sp.2	-	Epiphytic	Sympodial
12	*Dendrobiumphalaenopsis* Fitzg.	Anggrek larat	Epiphytic	Sympodial
13	*Dendrobium* sp.1	-	Epiphytic	Sympodial
14	*Dendrobium* sp.2	Anggrek merpati	Epiphytic	Sympodial
15	*Dendrobium* sp.3	-	Epiphytic	Sympodial
16	*Dendrobium* sp.4	-	Epiphytic	Sympodial
17	*Flickingeria* sp.	-	Epiphytic	Sympodial
18	*Gastrochillus* sp.	-	Epiphytic	monopodial
19	*Hebenaria radiata* (Thunb.) Spreng.	Anggrek bangau putih	Terrestics	monopodial
20	*Lipariscondybulbon* Rchb. f.	-	Epiphytic	Sympodial
21	*Lipariselegans* Lindl.	-	Epiphytic	Sympodial
22	*Liparis* sp.	Anggrek kutilang	Epiphytic	Sympodial
23	*Luisia* sp.	-	Epiphytic	monopodial
24	*Oberonia costeriana* J.J. Sm.	-	Epiphytic	monopodial
25	*Phaius* sp.	-	Epiphytic	Sympodial
26	*Phalaenopsis amabilis* (L.) Blume	Anggrek bulan	Epiphytic	monopodial
27	*Phalaenopsis* sp.1	-	Epiphytic	monopodial
28	*Phalaenopsis* sp.2	-	Epiphytic	monopodial
29	*Phalaenopsis* sp.3	-	Epiphytic	monopodial
30	*Phreatia* sp.	Anggrek upil	Epiphytic	Sympodial
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	Anggrek madu Anggrek kobra	Epiphytic	Sympodial
32	*Trichoglottis* sp.	-	Epiphytic	Sympodial
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	Anggrek vanda merah	Litophytes	monopodial
34	Spesies 1	-	Epiphytic	Sympodial
35	Spesies 2	-	Epiphytic	monopodial
36	Spesies 3	-	Epiphytic	Sympodial
37	Spesies 4	-	Epiphytic	Sympodial
38	Spesies 5	-	Epiphytic	Sympodial
39	Spesies 6	-	Epiphytic	monopodial

No.	Latin Name	Indonesian/Local Name	Habitus	Growing Type
40	Spesies 7	-	Epiphytic	monopodial

Table 1 shows the number of species of wild orchids found in Resort Mallawa as many as 40 types. There are 13 types of wild orchids identified to species level, 20 species identified only to genera level, and 7 species that have not been identified. This is because the type of orchid found has not had a generative organ making it difficult to identify. According to Hiola, et al [4], to distinguish between one type of orchid with another orchid, one of which is seen from the flower.

Based on the type of growth, there are three types of orchid habitus, namely epiphytes, terrestics, and litophytes. The habitus is dominated by epiphytes as many as 35 species, while based on the type of growth are mostly sympodial orchids as many as 24 species.

These wild orchids are found in different conditions. There are orchids were found in the shade as many as 5 species, half sheltered as many as 21 species, while in the open as many as 4 species. There are 5 orchid species that can grow in the shade and half shade, 3 species that grow in half shade and open places, and 2 species that can grow in three places (Table 2).

Table 2. Types of Wild Orchid Based on Visual Light Intensity at Resort Mallawa at Bantimurung Bulusaraung National Park Area.

No.	Orchids Name	Visual Light Intensity		
		Shade	Half Shade	Open
1	*Abdominea minimiflora* (Hook. f.) J. J. Sm.	+	-	-
2	*Aerides inflexa* Teijsm. & Binm.	+	+	-
3	*Aporum uncatum* (Lindl.) Brieger,	-	+	+
4	*Arundina* sp.	+	+	+
5	*Bulbophyllum* sp.	-	-	+
6	*Calanthe triplicata*(Rumph.) Ames	-	+	+
7	*Cleistoma* sp.	-	+	-
8	*Coelogyne* sp.	+	+	+
9	*Cymbidium finlaysonianum* Wall. Ex Lindl.	+	+	-
10	*Cymbidium*sp.1	+	-	-
11	*Cymbidium*sp.2	-	+	-
12	*Dendrobiumphalaenopsis* Fitzg.	-	+	-
13	*Dendrobium* sp.1	-	+	-
14	*Dendrobium* sp.2	-	+	-
15	*Dendrobium* sp.3	-	+	-
16	*Dendrobium* sp.4	-	+	-
17	*Flickingeria* sp.	-	+	+
18	*Gastrochillus* sp.	-	+	-
19	*Hebenaria radiata* (Thunb.) Spreng.	-	-	+
20	*Lipariscondybulbon* Rchb. f.	+	+	-
21	*Lipariselegans* Lindl.	-	+	-
22	*Liparis* sp.	-	+	-
23	*Luisia* sp.	-	+	-
24	*Oberonia costeriana* J.J. Sm.	-	-	+
25	*Phaius* sp.	-	+	-
26	*Phalaenopsis amabilis* (L.) Blume	-	+	-
27	*Phalaenopsis* sp.1	-	+	-

No.	Orchids Name	Visual Light Intensity		
		Shade	Half Shade	Open
28	*Phalaenopsis* sp.2	-	+	-
29	*Phalaenopsis* sp.3	-	+	-
30	*Phreatia* sp.	+	-	-
31	*Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.	+	+	-
32	*Trichoglottis*sp.	+	-	-
33	*Vandopsis lissochiloides* (Gaudich) Pfitzer	-	-	+
34	Spesies 1	+	+	-
35	Spesies 2	-	+	-
36	Spesies 3	-	+	-
37	Spesies 4	-	-	+
38	Spesies 5	+	-	-
39	Spesies 6	-	+	-
40	Spesies7	-	+	-

Note: + = exist

Based on the results of research, there were 40 types of wild orchids at Resort Mallawa. This was almost equivalent to the previous findings by TN. Babul in 2011 found 39 species. Thomas and Schuiteman (2002) in Sulistriani (2008) stated that there were about 548 types of Sulawesi orchids. When compared with the total number of orchid species in Sulawesi, the species found at Resort Mallawa only reached 7.3%.

In Table 1, it shows several types of wild orchids that do not yet have an Indonesian name or area name, this is because not all types of wild orchids have names that are popular or are still very rarely cultivated by the community. Each region has different terms and languages, so that one type of orchid can have more than one regional name.

The results of exploration of wild orchids were found in 85 distribution points. The characteristics and types of orchid growth that dominate are epiphytes and sympodial types. *Trichoglottis geminata* is the most growing species among the other species, namely as many as 10 points. Based on height, *Coelogyne* sp. at an altitude of 849 m above sea level which is the highest growth position compared to the other species found in Bentenge Hamlet, while the lowest level is *Dendrobium* sp.1 with an altitude of 432 m above sea level in Mallenreng I. Hamlet Based on the distribution location, Mallenreng I Hamlet is the location of the most abundant orchid plants, followed by Mallenreng II, Bentenge and Ballanglohe. According to Hiola et al. [15], the type of forest and the presence of vegetation can be a limiting factor for the distribution of these types of orchids. Each type of orchid has a different distribution level, so that each forest area contains different varieties of orchids. orchids as a place of refuge, taking nutrients, developing and regenerating. Therefore, the structure and diversity of vegetation types of tree stands at the study site will also affect the variety of types of orchids that exist.

Generally, wild orchids are found to grow in half-shade conditions. However, there are some that can grow in 2 or 3 types of conditions. Types of *Aerides inflexa*, *Cymbidium finlaysonianum, Liparis condybulbon, Trichoglottis geminata* and species 1 are types of orchids that can grow in shaded and half-sheltered conditions. Types of *Aporum uncatum, Calanthe triplicata* and *Flickingeria* sp. is a type that can grow in half-shade and open space. Type of *Arundina* sp. and *Coelogyne* sp. is a type that can grow in all three conditions.

According to Suwila [16] states that one of the differences in the way of life of epiphytic and terrestrial plants is in their light needs, so species of orchids that like bright light will grow as epiphytic plants, while those who like shade will grow on the forest floor. According to Wiharto et al. [17], tree vegetation that is not too tight causes the intensity of sunlight to reach the surface of the ground. Furthermore Hiola, et al. [4] stated that physiologically the light energy has a large influence

on orchids, either directly or indirectly. Direct influence is in the process of photosynthesis, while the indirect effect is on its growth, germination and flowering.

4. Conclusions

Based on the results obtained, it can be concluded as follows.

- The number of wild orchids found at Resort Mallawa is 40 types with 13 species-level identified, 20 genera-level identified, and 7 species unidentified.
- The habitus of wild orchid is dominated by epiphytes as many as 36 species.
- The type of orchid growth is mostly sympodial as many as 24 types.
- Found 5 types of wild orchids in shade, 21 types in half shade, 4 types in open places, 5 types in shade and half shade, 3 types in half shade and open, and 2 types in all three places.

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