

The Diversity of Epiphytic Wild Orchids in Mallawa Resort Area of Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

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Abstract

This research aims to report the diversity of epiphytic wild orchids in Mallawa Resort area of Bantimurung Bulusaraung National Park (BBNP), South Sulawesi, Indonesia. Exploration methods were used in this study to search and record epiphytic wild orchids in this area. The technique of data collection comprised taking pictures with a digital camera for documentation and collecting specimens of wild orchids that were unidentified at the site. The identification of orchid species was conducted by matching the morphology and characterization of epiphytic wild orchids with appropriate photographs showing details to enable identification. The results of the study showed that there were 36 species of epiphytic wild orchids to be found in the study area. The identification to species level included 10 species, there were 17 specimens that were identified to genus level, and seven specimens remained unidentified. Sympodial type orchids dominated the suite of native orchids, with 23 species.

Keywords: epiphytes, Mallawa Resort, Bantimurung Bulusaraung National Park, wild orchids

Introduction

Epiphytic plants are a significant part of all the plant species that can be found in tropical forests. Although only a small group of plants, the epiphytes have a very important role in the characterization of tropical forest types, including the way nutrients are cycled in the various types of forest ecosystems.

In their natural habitat, most orchids live as epiphytes in the forest trees, attaching themselves to the trunk, branches, or twigs of both the living and dead trees. Orchids usually have a broad leaf shape that is

relatively thin. Their entire functional root system may be dangling in the air, while those roots attached to the media (substrate) only serve as an anchor, holding the plant in place (Sutiyoso and Sarwono, 2005).

Orchids belong as members of the flowering plant groups that are included in the family Orchidaceae and are widely distributed (Ruffo et al., 1996; Nguni et al., 2001; Mugasha et al., 2005; Niet and Gehrke, 2005). In Indonesia, there are about 5,000 species of orchids spread almost across the entire country (Jatmika, 2013). Some islands in Indonesia such as Java can have as many as 731 orchid species, Sumatera has 1,118 recorded species, and Borneo as many as 2,000 species. Sulawesi and Maluku may have 820 species, 548 species of which are in Sulawesi (Sulistiarini, 2008).

One of the conservation area in South Sulawesi is Bantimurung Bulusaraung National Park (BBNP) which spreads from Maros to Pangkep districts, which potentially has a highly diverse orchid population. It currently has seven resort areas i.e. Mallawa, Pattunuang-Karaenta, Bantimurung, Camba, Balocci, Minasate'ne and Tondong Tallasa. At this time, the diversity of wild orchids in Sulawesi, especially in BBNP, is recorded as 95 species in 43 families and 5 species unidentified. The population of wild orchids is dominated by epiphytic types (BTNBB, 2011). Based on information obtained from the BBNP office, that one of the resorts, namely Mallawa, has a lot of wild orchids, but not much information has been recorded about the diversity of wild orchids in this area, it was decided to investigate. This potential source of wild orchids could be a germplasm reserve for the future. Furthermore, the species of orchids collected can be revealed by its potential for the benefit of education, conservation, display, reintroduction and others. Therefore, this wealth of plant diversity needs to be recorded and disclosed for more attention.

Materials and Methods

Time and Location

The field research was carried out in June-July 2014 and data analysis in July-October 2014. The study

was conducted in three villages in Mallawa Resort of the conservation area at Bantimurung Bulusaraung National Park (119°34'17"–119°55'13" E; 4°42'49"–5°06'42" S) (Figure 1), i.e. Barugae, Bentenge and Samaenre. The Mallawa Resort is located about 90 km east of Makassar City and 60 km east of Maros City.

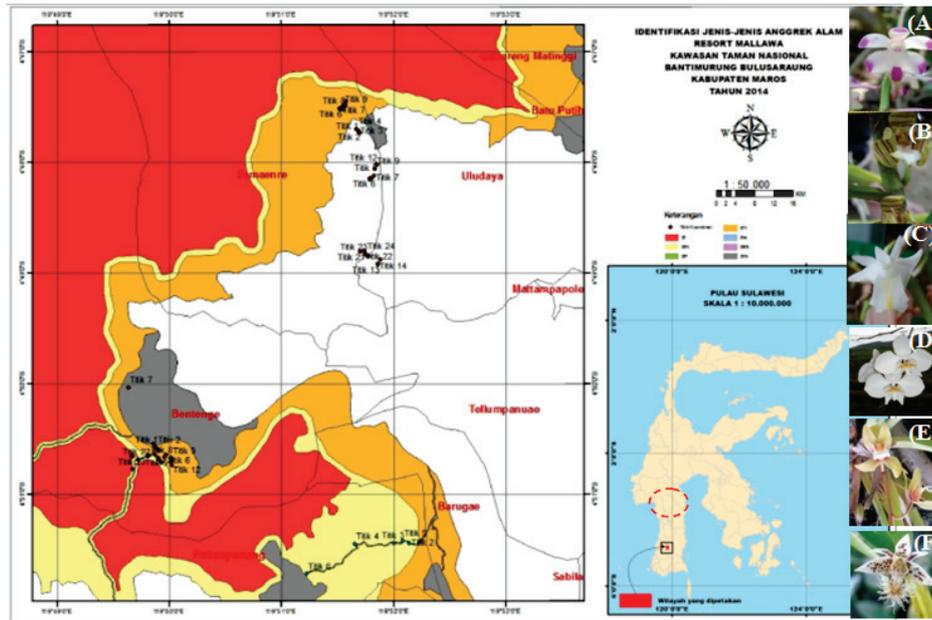


Figure 1. Location of study site at Mallawa Resort in Bantimurung Bulusaraung National Park, and some of orchid species at this area: (A) *Aerides inflexa* Teijsm. & Binm.; (B) *Trichoglottis geminata* (Teijsm. & Binn.) J. J. Sm.; (C) *Aporum uncatum* (Lindl.) Brieger; (D) *Phalaenopsis amabilis* (L.) Blume.; (E) *Cymbidium finlaysonianum* Wall. Ex Lindl.; and (F) *Flickingeria angulate* Blume.

Material and Tools

Materials used for this research were orchid plant guide books. Several books including *Tropical Orchids of Southeast Asia* (Banks, 1999), *Koleksi Anggrek Kebun Raya Bogor* (Puspitaningtyas and Mursidawati, 1999), *Orchid Species* (Ramsay, 2014), *Orchid of Sulawesi* (Handoyo and Prasetya, 2012), *Orchids of Java* (Comber, 1990), *Orchids of Sumatera* (Comber, 2001), *The Orchids of Peninsular Malaysia and Singapore* (Seidenfaden and Wood, 1992), *An Alphabetical List of Indonesian Orchid Cultivated in Bogor Botanic Garden* (Kosasih and Patimah, 1999) and *Flora* (Stenis, 2005) were used for orchid identification. Beside books, several website i.e. www.theplantlist.org/; <http://plants.usda.gov>; www.flnativeorchids.com; www.flora.dempstercountry.org; were consulted.

The tools used were tally sheet, camera, a compass,

GPS, binoculars, wrapping paper, paper bags, plastic sacks, labels, ropes, and a forest map of the study area.

Research Methods

The research methods used in this study involved developing an explorative inventory through purposive sampling to identify the native orchids according to their genera and species. Purposive sampling involved choosing exploration sites with the greatest diversity of orchids, based on information from the forest rangers. At the site, which was located in the villages of Barugae, Bentenge and Samaenre in Mallawa Resort, epiphytic orchids from the forest were collected and the fresh flowers and their plant parts were photographed by digital camera. The habitat and the locations where they were growing were recorded.

Orchids were identified to species level if possible, and the genus level were determined by visual examination of vegetative and floral characteristics. Identification was accomplished using the references that were mentioned previously. The orchids that were not found with flowers were collected by climbing the trees or gathered from fallen dead trees and put into paper bags. They were taken to the nursery and grown *ex situ*.

Result and Discussion

The results of this research indicate that there is a fairly diverse range of epiphytic wild orchids in Mallawa Resort at Bantimurung Bulusaraung National Park. There were 36 orchid specimens collected from various villages in the resort area. Of the 36 specimens, 10 were identified to species level, 17 to genus level, and the remaining seven specimens were unidentified (Table 1).

Table 1. List of the epiphytic wild orchids in Mallawa Resort at Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia.

No.	Genus	Species
1	<i>Abdominea</i>	<i>Abdominea minimiflora</i> (Hook. f.) J. J. Sm.
2	<i>Aerides</i>	<i>Aerides inflexa</i> Teijsm. & Binm.
3	<i>Aporum</i>	<i>Aporum uncatum</i> (Lindl.) Brieger
4	<i>Bulbophyllum</i>	Unidentified/species 1
5	<i>Cleistoma</i>	Unidentified/species 1
6	<i>Coelogyne</i>	Unidentified/species 1
7	<i>Cymbidium</i>	<i>Cymbidium finlaysonianum</i> Wall. Ex Lindl.
8	<i>Cymbidium</i>	Unidentified/species 1
9	<i>Cymbidium</i>	Unidentified/species 2
10	<i>Dendrobium</i>	<i>Dendrobiumphalaenopsis</i> Fitzg.
11	<i>Dendrobium</i>	Unidentified/species 1
12	<i>Dendrobium</i>	Unidentified/species 2
13	<i>Dendrobium</i>	Unidentified/species 3
14	<i>Dendrobium</i>	Unidentified/species 4
15	<i>Flickingeria</i>	Unidentified/species 1
16	<i>Gastrochillus</i>	Unidentified/species 1
17	<i>Liparis</i>	<i>Lipariscondybulbon</i> Rchb. f.
18	<i>Liparis</i>	<i>Lipariselegans</i> Lindl.
19	<i>Liparis</i>	Unidentified/species 1
20	<i>Luisia</i>	Unidentified/species 2
21	<i>Oberonia</i>	<i>Oberonia costeriana</i> J.J. Sm.
22	<i>Phaius</i>	Unidentified/species 1
23	<i>Phalaenopsis</i>	<i>Phalaenopsis amabilis</i> (L.) Blume
24	<i>Phalaenopsis</i>	Unidentified/species 1
25	<i>Phalaenopsis</i>	Unidentified/species 2
26	<i>Phalaenopsis</i>	Unidentified/species 2
27	<i>Phreatia</i>	Unidentified/species 1
28	<i>Trichoglottis</i>	<i>Trichoglottis geminata</i> (Teijsm. & Binn.) J. J. Sm.
29	<i>Trichoglottis</i>	Unidentified/species 1
30	Unidentified specimen 1	
31	Unidentified specimen 2	
32	Unidentified specimen 3	
33	Unidentified specimen 4	
34	Unidentified specimen 5	
35	Unidentified specimen 6	
36	Unidentified specimen 7	

Table 1, showed that of the 36 specimens, 17 were identified only to genus level. That was because no flowers were found as the regenerative organs in those plants, while there were 7 specimens which could not be identified. In addition to the fact that there were no regenerative organs, due to the location of the orchids on the host trees, they were difficult to reach, so the observations could only be made from a picture. Jamil (2014) states that identifying methods for plants is through observation

to characterization of the plant's morphology such as shape, size, number of organs, and other characteristics like colour, aroma and taste of leaf, stem, and branch, with thorns, other accessories, fruit and seed.

There is considerable variation among the 36 specimens. All specimens are listed in Table 2, with observations about type of growth, lighting intensity, and location where found.

Table 2. Diversity of epiphytic wild orchids by type of growth, lighting intensity, and location in Mallawa Resort of Bantimurung Bulusaraung National Park, South Sulawesi, Indonesia

No.	Species	GT	Light Intensity			Altitude (m asl)	Location (village)
			S	SS	FS		
1	<i>Abdominea minimiflora</i> (Hook. f.) J. J. Sm.	M	√	-	-	820	Bentenge
2	<i>Aerides inflexa</i> Teijsm. & Binm.	M	√	√	-	584-636	Samaenre
3	<i>Aporum uncatum</i> (Lindl.) Brieger	S	-	√	√	561	Samaenre
4	<i>Bulbophyllum</i> sp.	S	-	-	√	816	Bentenge
5	<i>Cleistoma</i> sp.	M	-	√	-	846	Bentenge
6	<i>Coelogyne</i> sp.	S	√	√	√	570-848	Bentenge, Samaenre
7	<i>Cymbidium finlaysonianum</i> Wall. Ex Lindl.	S	√	√	-	546-620	Samaenre
8	<i>Cymbidium</i> sp.1	S	√	-	-	590-630	Samaenre
9	<i>Cymbidium</i> sp.2	S	-	√	-	439	Samaenre
10	<i>Dendrobium phalaenopsis</i> Fitzg.	S	-	√	-	486	Barugae
11	<i>Dendrobium</i> sp.1	S	-	√	-	432	Samaenre
12	<i>Dendrobium</i> sp.2	S	-	√	-	505-507	Samaenre, Barugae
13	<i>Dendrobium</i> sp.3	S	-	√	-	825	Bentenge
14	<i>Dendrobium</i> sp.4	S	-	√	-	486-546	Barugae, Samaenre
15	<i>Flickingeria</i> sp.	S	-	√	√	470-561	Barugae, Samaenre
16	<i>Gastrochillus</i> sp.	M	-	√	-	825	Bentenge
17	<i>Liparis condybulbon</i> Rchb. f.	S	√	√	-	544-849	Bentenge, Samaenre
18	<i>Liparis elegans</i> Lindl.	S	-	√	-	544	Samaenre
19	<i>Liparis</i> sp.	S	-	√	-	816	Bentenge
20	<i>Luisia</i> sp.	M	-	√	-	486	Barugae
21	<i>Oberonia costeriana</i> J.J. Sm.	M	-	-	√	827	Bentenge
22	<i>Phaius</i> sp.	S	-	√	-	808	Bentenge
23	<i>Phalaenopsis amabilis</i> (L.) Blume	M	-	√	-	470-633	Barugae, Samaenre
24	<i>Phalaenopsis</i> sp.1	M	-	√	-	450	Barugae, Samaenre
25	<i>Phalaenopsis</i> sp.2	M	-	√	-	432-507	Barugae, Samaenre
26	<i>Phalaenopsis</i> sp.3	M	-	√	-	442	Samaenre
27	<i>Phreatia</i> sp.	S	√	-	-	810	Bentenge
28	<i>Trichoglottis geminata</i> (Teijsm. & Binn.) J. J. Sm.	S	√	√	-	432-636	Samaenre
29	<i>Trichoglottis</i> sp.	S	√	-	-	624-627	Samaenre
30	Unidentified 1	S	√	√	-	486-635	Barugae, Samaenre
31	Unidentified 2	M	-	√	-	435-485	Samaenre
32	Unidentified 3	S	-	√	-	453	Samaenre
33	Unidentified 4	S	-	-	√	497	Barugae
34	Unidentified 5	S	√	-	-	581	Samaenre
35	Unidentified 6	M	-	√	-	817	Bentenge
36	Unidentified 7	M	-	√	-	810	Bentenge

Note: GT: Growth Type; M: monopodial; S: sympodial; S: shade; SS: Semi shade; FS: full sun; m asl: meters above sea level.

Table 2, showed that wild orchids were found growing in various conditions. There are two types of growth, monopodial (orchids grow as a single upright "stem" with one leaf following another on opposite sides of the center) and sympodial (an orchid that does not grow from a single vertical stem but from a stem that is more or less horizontal), and three levels of lighting such as shade, semi-shade and full sun, as well as a range in altitude where these orchids are growing. Accordance by type of growth, of the 36 specimens, 23 species are sympodial orchids and 13 are monopodial. In light intensity, 28 species are semi-shaded and many are capable of growing over a range in altitude, starting from 432 m and going up to 846 m above sea level.

The majority of epiphytic wild orchids were found to grow in the semi-shaded areas. However, there are some wild orchids able to grow in two or three light condition. From Table 2, it can be seen that *Cymbidium finlaysonianum* Wall. Ex Lindl., *Liparis condybulbon* Rchb. f., *Trichoglottis geminata* (Teijsm. & Binn.) J.J.Sm. and unidentified species 1 all grew in shaded and semi-shaded conditions. *Aporum uncatum* (Lindl.) Brieger., and *Flickingeria* sp. are capable of living in semi-shade or full sunlight, whereas *Coelogyne* sp. is one wild orchid that can live in any condition in respect to light.

In this study, the presence of wild orchids in three locations with different light conditions and across a range in altitude showed that wild orchids are capable of adaptation. According to Fibriliani et al. (2013), the vegetation and forest type may be a limiting factor affecting the spread of orchids, so the nature of the forest and the amount of light admitted are important factors in determining the growth and development of wild orchids that may be present.

Each orchid has a different method of dissemination and they need the forest canopy for protection, as a nutrient source, and to regenerate their species. This highlights the need for conservation areas to maintain orchid species, especially those specimens that have not yet been identified, and the value of off-site propagation to observe their growth characteristics and provide the information needed for identification.

Conclusions

There are 36 specimens of the epiphytic wild orchids collected in a study of the Mallawa Resort area of Bantimurung Bulusaraung National Park in Indonesia. Of the 36 specimens collected, 10 were identified to species level, 19 were identified to

genus level, and seven specimens were not able to be unidentified. The dominant type of growth is sympodial, observed in 23 species which is determined by the light level in semi-shaded areas.

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References

- Banks, D.P. (1999). "Tropical Orchids of Southeast Asia". Periplus Edition (HK) Ltd., Singapore.
- Balai Taman Nasional Bantimurung Bulusaraung (BTNBB). (2011). "Identifikasi Jenis Anggrek Alam di Taman Nasional Bantimurung Bulusaraung. Maros". (unpublished).
- Comber, J.B. (1990). "Orchids of Java". 407 pp. Bentham-Moxon Trust and The Royal Botanic Gardens. Kew.
- Comber, J.B. (2001). "Orchids of Sumatera". 1036 pp. The Royal Botanic Gardens. Kew.
- Fibriliani, Ningsih, S., and Muslimin. 2013. Analisis vegetasi habitat anggrek di sekitar Danau Taming kawasan Taman Nasional Lore Lindu. *Warta Rimba* 1, 1-9.
- Handoyo, F. and R. Prasetya (2012). "Orchids of Sulawesi". Perhimpunan Anggrek Indonesia (PAI): Jakarta.
- Jamil, A.S. (2014). "Identifikasi Tumbuhan". <http://pharmacy.umm.ac.id/pdf>. Accessed on October 20th, 2014, Makassar.
- Jatmika, Y.N. (2013). "Tanaman-Tanaman Hias Ajaib untuk Kesehatan dan Kecantikan". Buku Biru. Yogyakarta.
- Kosasih, R.N.A., and Patimah, E. 1999. "An

- Alphabetical List of Indonesian Orchid Cultivated in Bogor Botanic Garden". 260 pp. Botanic Gardens of Indonesia, Indonesian Institute of Sciences. Bogor.
- Mugasha, A. G., Ngaga, Y.M., and Nshubemuki, A. (2005). "Development of Strategies for Sustainable Management of Selected Orchids in Some SADC Countries: Baseline Findings from Tanzania".
- Nguni, D., Chuba, D., and Phiri, P. (2001). A survey of the edible orchids of Zambia. *Sabonet News* **6**, 90-91.
- Niet, T. van der., and Gehrke, B. (2005). Rare terrestrial orchids on Mbeya peak, southern Tanzania. *Journal of East African National History* **94**, 279-285.
- Puspitaningtyas, D.M. and S. Mursidawati (1999). "Koleksi Anggrek Kebun Raya Bogor". UPT Balai Pengembangan Kebun Raya, Lembaga Ilmu Pengetahuan Indonesia, Bogor.
- Ramsay, B.J. (2014). *Orchid Species*. <http://pbase.com/bjramsay>. [April 7, 2014]. Makassar.
- Ruffo, C.K., Chilongola, S.B., and Mabula, C.K. (1996). "Catalogue of Lushoto Herbarium Tanzania". 467 pp. Tanzania Forestry Research Institute and Tanzania National Tree Seed Programme. Morogoro.
- Seidenfaden, G., and Wood, J. J. (1992). "The Orchids of Peninsular Malaysia and Singapore (A Revision of R.E. Holttum: Orchids of Malaya)". 779 p. Olsen and Olsen. Fredensborg.
- Steenis, C.G.G.J. (2006). "Flora Pegunungan Jawa". 259 pp. LIPI. Bogor.
- Sulistiarini, D.(2008). Keanekaragaman jenis anggrek Pulau Wawonii. *Berkala Penelitian Hayati* **14**, 21-27.
- Sutiyo, Y., and Sarwono, B. (2005). "Merawat Anggrek". 93 pp. Penebar Swadaya. Cimanggis.