Spesies richness of *Orchidaceae* in Selo Resort Mount Merbabu National Park Central Java

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**Abstract.** Mount Merbabu National Park with an area management system into 5 resort areas, namely Selo, Wonolelo, Pakis, Kopeng, and Ampel and diversity in these places is highly and still sustainable. One of the plants that has a high diversity of species is the orchid (*Orchidaceae*). Orchids are a family of plants that have a fairly high variation and are very interesting. It is estimated that in the world there are about 20,000 species. This study aims to determine the species richness of orchids in Mount Merbabu National Park resort Selo. This study uses the cruising method by making observations along the path with a radius of 10 m to the right and 10 m to the left. Then recorded any orchid species found. The research found 7 species of orchids in Mount Merbabu National Park resort Selo: *Habenaria multipartita*, *Oberonia similis*, *Liparis pallida*, *Malaxis kobi*, *Coelegyne sp*, *Bulbophyllum flavescens*, and *Cheirostylis sp*.

1. **Introduction**

Indonesia is one of the richest centers of biodiversity in the world, so Indonesia is called a megabiodiversity country, which means that it has many genetic uniqueness, high diversity of species, ecosystems and endemism.

Orchids (*Orchidaceae*) Orchids are a family of plants that have a fairly high variation and are very interesting. It is estimated that in the world there are about 20,000 species of orchids consisting of 700-800 genera [1]. Most of the orchids are cosmopolitan plants that are almost scattered in all parts of the world, but in limited vegetation areas. Like other groups of tall plants, orchids are more common in the tropics with uneven distribution areas. Orchid species can grow in lowland areas to upland areas, but the distribution of several species of orchids varies at certain altitude intervals which can determine the survival of orchid plants. Orchid experts consider that Indonesia is a country with the richest orchid species in the world, not only in terms of genera, but also in terms of varieties and species [2]. Various sources state that Indonesia has a diversity of natural orchids approximately 5000 species.

Mount Merbabu is an area managed by the National Park with an area management system into 5 resort areas, namely Selo, Wonolelo, Pakis, Kopeng, and Ampel. Administratively This mountain is located in Magelang Regency on the western slopes, Boyolali Regency on the eastern and southern slopes, and Semarang Regency on the northern slopes, Central Java Province [3]. Mount Merbabu is a conservation area, so that the diversity in these places is high and still sustainable, but not much...
biodiversity has been revealed. This study aims to determine the species richness of orchids in Mount Merbabu National Park especially in the Selo resort.

2. Methods

Research on the species richness of orchids was carried out in the area of Mount Merbabu National Park, Selo resort. This study used the roaming method by making observations along the path with a radius of 10 m to the right and 10 m to the left, then recording each species of orchid found. Orchids were identified using an Flora identification book, 68 species Orchid in Mount Ungaran [4].

3. Results and Discussion

Based on the research results, 7 species of orchids were found in Mount Merbabu Resort Selo National Park, namely Habenaria multipartita, Oberonia similis, Liparis pallida, Malaxis kobi, Coeleogyne sp., Bulbophyllum flavescens, and Cheirostylis sp. The spread of orchids in the Mount Merbabu National Park is in the core zone. This is because the environmental conditions in the core zone are in accordance with the environmental conditions for orchid growth. The environmental conditions in the core zone are very dense forests so that there are many large trees which are the habitat for epiphytic orchids. Forests are a place for various types of dense vegetation including trees, orchids, mushrooms, ferns, moss, and so on, occupying a very large area [5]. Generally, geographical position expressed by altitude, latitude, and longitude is a proxy for local climatic conditions [6).

The orchids found in Mount Merbabu National Park are epiphytic orchids. Epiphytic orchids are orchids that grow by attaching to other plants, but do not become parasites for their hosts. The trees in the forest are the hosts for epiphytic orchids, including the acacia and pine trees.

Epiphytes can disperse long distances and successfully establish in trees in open landscapes[7]. Rapid epiphyte colonization lasts for approximately the first 30 years of a host tree’s life, during which time species richness accumulates quickly and total abundance increases slowly[8]. Epiphytes grow slowly, and epiphyte communities assembled slowly on shade trees. Vascular epiphytes require a decade or more for multi-species assemblages to develop and only a few early colonizing species, mainly atmospheric bromeliads and ferns, arrived in five-year-old trees[9]. Epiphytic orchids, which live non-parasitically on another plant (host) are the important component of plant diversity, and occur diversely in tropical and sub-tropical forest[10].

The orchids found in the Mount Merbabu National Park are not included as protected orchids in accordance with the Minister of Environment and Forestry Regulation No. P106 of 2018 concerning protected plant and animal species. Although they are not protected orchids and are not included in CITES, the orchids in Mount Merbabu National Park are still preserved. It is the duty of the officers of the Mount Merbabu National Park Office and the surrounding community to maintain the conservation and preservation of orchids so that their diversity can be preserved.

| No. | Species                  | Habitat    |
|-----|--------------------------|------------|
| 1   | Habenaria multipartite   | Terrestrial|
| 2   | Oberonia similis        | Epiphyte   |
| 3   | Liparis pallida         | Epiphyte   |
| 4   | Malaxis kobi            | Terrestrial|
| 5   | Coeleogyne sp.          | Epiphyte   |
| 6   | Bulbophyllum flavescens | Epiphyte   |
| 7   | Cheirostylis sp.        | Terrestrial|

3.1. Habenaria multipartite

Habenaria multipartite is including the species of ground orchid. These orchids live endemic in forests, grasslands and savanna. Orchid height reaches 40-60 cm. The roots form tubers. Leaves come out of the
tuber totaling 5 strands of narrow lanceolate folds. The flower comes out of the inflorescence stalk. In one stalk there are more than 10 flowers. Green petals and petals.

3.2. Oberonia similis

*Oberonia similis* including epiphytic orchids, growing attached to tree trunks in forest areas. These orchids are often found in the forests of the National Park area. Sympodial growth, growing hanging, short-stemmed, flattened and covered by leaves arranged alternately and thick, triangular leaves elongated like fingers. The wreath appeared on the tip of the stem in the shape of a grain and was very numerous.

Single inflorescence can produce 1 to 3 flowers and usually 1 or rarely 2 healthy pods. Flowers are thickly textured with wide openings. Petals are falcate, lip golden yellow to white, three-lobed and spurred. This species loves middle and lower trunks of host trees [11].

3.3. Liparis pallida

*Liparis pallida* including the type of epiphytic orchid that attaches to mossy (moist) branches or tree trunks and grows in shady areas. It has a large round pseudo bulb, each pseudo tuber supports a single leaf. Leaves cuff wide from the base of the narrow, blunt tip. Bunch inflorescences, growing at the tip of pseudo tubers, stalks up to 20 cm, the number of flowers up to 50. Orange yellow light brown flowers, reddish green petals and crown.

3.4. Malaxis kobi

*Malaxis kobi* including the species of terrestrial orchids, grow in environmental conditions that are slightly humid and shaded by large trees, attached to the ground and little exposure to sunlight. The leaves are folded, consisting of 4-6 leaves. Grain-shaped inflorescences, numbering up to 50, appear at the tips of the leaf base. Purple flowers, bloom sequentially from base to tip. Psedobulb appears on the surface of the ground, flat cylindrical, bulging at the base [12]

3.5. Coelegyne sp.

*Coelegyne sp.* is a epiphytic orchid, living clustered in trees. Has a wrinkled pseudo tuber, the size reaches 5 x 7 cm2, yellowish green, supports two leaves. The leaves are oval, wavy edges, pointed tips, green, rough leaf surface due to prominent leaf bones, measuring 3 x 13 cm. The pseudobulb is a rectangular pyramid, heteroblastic.

3.6. Bulbophyllum flavesens

*Bulbophyllum flavesens* including epiphytic orchids, growing attached to tree trunks in forest areas. Grow in humid environmental conditions, attached to large tree trunks and little exposure to sunlight. Sympodial growths, generally have a pseudobulb, some do not. Leaves emerge straight from the bulb. Uniquely, if the bulb is not in bloom, this orchid bulb is not as real as the bulb of the other *Bulbophyllum* members. Its flower bunches consisting of dozens of petals are also unique in that many other Bulbophyllum species have very few flower buds. When blooming bright yellow flowers. The ends of the flower jewelry are elongated like thread or ribbon.

3.7. Cheirostylis sp

*Cheirostylis sp.* including terrestrial orchids. This orchid is found in the forests of the Mount Merbabu National Park. The pseudo tuber is above the ground. Dark stems support alternate leaves, piled up when seen from above. The leaves are green with an abstract pattern on the upper leaf surface, the leaves are 4-8, 2.5 x 3 cm in size [4]

Epiphytic orchid is orchid that grow sattached to a substrate, which is generallyin the form of tree stem, tree branch, and other. The advantage of this life form is the availability of optimal light intensity compared to terrestrial orchid, which growson the forest floor which only gets 1-2% of the light from canopy. The disadvantage is limited contact to soil, sometime causing problems with water
supply and anchorage[13]. Although some morphological differences may occur between species, pollination biology studies indicated that some species share the same group of pollinators.

Epiphytic orchids, which have limitations in water supply, can grow well and have a high diversity because of its association with moss plants that provide water supply and maintain micro humidity of orchid habitat. The abundance of mosses can also be used as an indicator of air humidity of a habitat [14] and air quality [15].

Terrestrial orchids are orchids that grow on soil substrates and generally have special structures, such as rhizomes or tubers that are found below the soil [12]. Terrestrial orchids mainly get nutrients from soil, while epiphytic orchids get from air, solid substrate, wet or dry deposition, and nitrogen from microorganisms[6].

![Picture of orchids](image1.jpg)

**Figure 1.** Picture of the richness of orchids in Mount Merbabu National Park. A. *Habenaria multipartita*, B. *Oberonia similis*, C. *Liparis pallida*, D. *Coelegyne* sp., E. *Malaxis kobi* F. *Bulbophyllum flavescens*, G. *Cheirostylis* sp

The information on the species richness of orchids in Merbabu greatly supports efforts to conserve wild orchids. Monitoring of biodiversity is an essential part, allowing government and civil society to identify the problem and also what the solution [16].

4. **Conclusion**
The conclusion of this study showed that Mount Merbabu National Park was suitable habitat of 7 species of orchids, namely *Habenaria multipartita, Oberonia similis, Liparis pallida, Malaxis kobi, Coelegyne* sp., *Bulbophyllum flavescens*, and *Cheirostylis* sp.

**References**
[1] Simpson MG 2006 *Plant Systematics* (Elsevier Academic Press USA)
[2] Sadili A 2013 *Indonesian Journal of Biology* **9** 63
[3] Gilang. 2018 *Pros Sem Nas Masy Biodiv Indon* **4** 195
[4] Utami N R, Rahayuningsih M, Abdullah M, Kurniawan F H, Nazar L 2018 68 *Species of Ungaran Orchid* (Mathematic and Natural Sciences Faculty)
[5] Sitorus W M, Sukmono A and Bashit N 2019 *Jurnal Geodesi Undip* **8** 338
[6] Djordjevi´c V, Tsiftsis S 2020 *Springer International Publishing: Basel, Switzerland* **1** 71
[7] Einzmann HJR and Zotz G 2017 *AoB Plants* **9** 56
[8] Spruch L, Hellwig J, Zott G and Blasius B 2019 *Theor. Ecol.* **12** 513
[9] Toledo A T, Mehlreter K, Garcia F J G, Hernández R A and Sosa V J 2013 *Agric. Ecosyst. Environ.* **181** 149
[10] Sangram K and Suresh K G 2020 *J of Plant Resources* **18** 157
[11] Raskoti B B and Ale R 2019 *Phytotaxa* **394** 257
[12] Siregar and Yusni L. 2017 *Proceding of the 2th National Seminar of Biology Education and Saintech* **476** 543
[13] Gegenbauer C, Huber W, Pupulin F, Rakosy D, Speckmaier M, Wanek W, Weber A, Weissenhofer A 2013 *Orchids botanical jewels of the GofloDukce Region, Costa Rica* (Verein zur Förderung der Tropenstation La Gamba, University of Vienna, Rennweg 14, 1030 Vienna, Austria)
[14] Karger D N, Lehtonen S, Amoroso V B and Kessler M 2012 *Phytotaxa* **56** 15
[15] Zhang S, Yang Y, Li J, Qin J, Zhang W, Huang W, Hu H. 2018 *Plant Divers* **40** 196
[16] Rahayuningsih M, Priyono ABP, Widjarnako A, Ayu G 2020 *J. Phys. Conf.* **1567** 001245