Potential of Local Orchid As a Source of Material for Genetic Improvement in Central Kalimantan

R Y Galingging[1], and *M* Gandhi[1]

[1]Horticulture and Plantation Research Center, National Research and Innovation Agency,

Abstract. Central Kalimantan Province is one of the largest provinces in Indonesia with quite a large diversity of genetic resources. This region has various land typologies which consequently have the potential for different biodiversity such as orchids. The research uses a methodology consisting of exploration, collection and collection of data in the field and measurement results, which was carried out in three districts, namely East Kotawaringin, Katingan and Seruyan, from October 2022 to December 2022. The objectives of this research are as follows: (1). Exploration process, (2). Ex-situ and in-situ conservation, (3). Characterization process, (4). Documentation process. From several exploration results, there are five local orchids that can be developed commercially, namely Coelogyne speciosa, Coelogyne foestermanii, Arundina gramminifolia, Bromheadya finlaysoniana, Dendrobium secundum. Selected local orchids have the potential to be developed and can be used in cross-breeding to produce superior new orchid types with attractive colors.
Keywords: exploration,collection, local orchid, Central Kalimantan

1 Introduction

Indonesia is the largest country that has the largest genetic resources after Brazil. Orchidaceae is a family the largest flowering plant consist of 25,000-35,000 species from 750 to 850. Indonesia has 6,000 local orchid species. This orchid lives in primary forests, even Chan et al (1994) thought that there were 2,500-3,000 types of local orchids [1] growing in Kalimantan or 75% of the Malesian orchid plants and around 30-40% were endemic to the island of Kalimantan. He Central Kalimantan Province spans approximately 15,380,000 hectares, [2] making up roughly 7.93% of Indonesia's total land area. It encompasses coastal regions, open waters, and expanses of open land, boasting significant biodiversity potential, including orchids. Currently, the existence of local orchids is almost extinct due to the felling of primary forests for plantation, housing and logging, so the current condition of the existence of local orchids is quite worrying. [3]The extinction of genetic resources will certainly result in losses of up to 35-50%. If this problem continues to occur, it will certainly result in the extinction of location-specific genetic resources,

[1*]Corresponding author: yuniarronny1@gmail.com

especially local orchids which are endemic to tropical forests. Saving local orchids is very necessary through exploration, characterization and multiplication of collections both naturally and plant biotechnology. It is hoped that this will be able to preserve local orchids as a genetic resource that must be preserved, especially Central Kalimantan.

1.1 Research objective

The results of exploration, collection and characterization provide information that can be useful for plant breeding. [4] In this research there are various activities, namely (a). Exploration activities, (b). Characterization (c) ex-situ and in-situ conservation, and (d). Documentation. The results of this exploration selected local orchids which could become genetic material for improving plant characteristics. It is hoped that the resulting cross will produce local orchid varieties that have the potential to developed and marketed on a national and even international scale. [5] The results of this research produced 5 local orchids which have the potential to be developed because they have attractive and unique flower shapes and colors. The orchid plant's conservation could be through in-situ and or ex-situ. [6] Local orchid planting activities are carried out with in-situ conservation carried out by planting local orchids in forest areas as a natural habitat, while ex-situ conservation is carried out outside their natural habitat, where local orchids are planted in the Bogor Botanical Gardens.

2 Material and method

2.1 Location

This research was conducted in three different districts namely, Katingan, East Kotawaringin, and Seruyan from Oktober 2022 until December 2022. These three areas have different land typologies, the consequence of which is that the genetic resources are different for each region

2.2 Materials

The results local orchid exploration measured qualitative and quantitative characteristics as data collection The results of observations and measurements are basic information on the existence of local orchid plants in government and private institutions. Ex-situ and in-situ conservation and preservation results are recorded and plant growth and development are measured. During the exploration, plant material, local orchid habitat, passport data, soil type, soil and water pH were collected as well as sampling location points using a GPS device.

2.3 Research procedures

Qualitative character The results of the observations show that the five selected local orchids have the potential to be developed commercially because the shape, color and unique shape of the flowers are very attractive. This research used materials namely exploration equipment, measuring tape, calipers, GPS, and local orchids. The evaluation of the qualitative and quantitative traits of indigenous orchids involved the utilization of guidelines from both the International Plant Genetic Resources Institute (IPGRI) and the Indonesian Ornamental Plant Research Institute. [7] The traits under examination

encompassed features like the form of flowers, stems, leaves, roots, and their natural environment. The orchids discovered during expeditions were subsequently cultivated in both controlled (ex-situ) and natural (in-situ) environments.

3 Results and discussion

Results of local orchid exploration have attractive flower shapes and colors and of course have has the potential to be developed and used as genetic material in plant breeding activities, namely crossing orchids with other orchids that are closely related to produce new varieties. This new variety is the result of an interspecific cross, namely a cross between genera.

Not much is known about the fertility levels of various types of orchids, especially local Central Kalimantan orchids, even though this information is very important in cross-breeding and propagating plants. The results of the cross will of course produce seeds as propagation material, especially for the orchids Coelogyne speciosa and Coelogyne foestermanii. These orchids are endemic to Kalimantan. This species is certainly unique in the shape, color and aroma of its flowers as shown in table 1. [8] Based on its habitat, *Coelogyne* orchids have high adaptability because they can grow epiphytes, lithophytes and terrestrially so that the distribution of these orchids is quite wide and can be found in almost all districts in Central Kalimantan.

Arundina graminifolia (D.Don) Hochr is a ground orchid that has large and attractive flowers in white and purple and flowers diligently. This orchid can be a cross between ground orchids to produce flower colors that are different from their parents. This type of terrestrial orchid is widely used as an ornamental plant because it has flowers with attractive and varied shapes and colors, and has potential as a medicinal plant. Mutations with gamma ray irradiation can be carried out to increase the morphological diversity of this type, such as plants with shorter stems and longer flowering periods.

Bromheadia finlaysoniana is a ground orchid with white butterfly-shaped flowers. This orchid is also very diligent in flowering and has high adaptability. [9] *Bromheadia. finlaysoniana* (Lind.) Miq. useful as an ornamental plant and herbal medicine which has beautiful and unique flowers. Flowers are rare branched, wide open and large, with white color and the inner lip is yellow, inside side lobes are white with purple veins. Widespread distribution in tropical areas Asia from Myanmar to New Guinea. The use of this type of orchid uncontrolled as a herbal medicine ingredient as well as ornamental plants without cultivation causing this species to become threatened extinction. According to the IUCN, the orchid species is *Bromheadia finlaysoniana* including the Redlist of Threatened Species [2].

Table 1. Characterizationof five selected orchids resulting from exploration from Katingan, East Kotawaringin and Seruyan Regencies

Explanation	Local Orchid Name				
	Coelogyne speciosa (Anggrek coklat)	*Coelogyne foerstermannii* (Anggrek Meteor)	*Arundina* graminifolia (D.Don) Hochr (Anggrek Purun)	*Bromheadya finlaysoniana* (Anggrek Rotan Merah)	*Dendrobium secundum* (Anggrek Ekor Tupai)
a	b	c	d	e	f
Origin	Katingan	Seruyan	Katingan	East Kotawaringin	East Kotawaringin

Growth Type	Sympodial	Sympodial	Monopodial	Monopodial	Sympodial
Root	Root type: fiber soil root, dark brown root color.	Root type: fiber soil root, dark brown root color	Root type: ground roots, fibrous, light brown color	Root type: ground roots, fibrous, root color dark brown	Root type: aerial roots, fibers, dark green root color
Leaf character	The leaves are green, lanceolate with a pointed tip. The leaf surface is thick at the bottom with a symmetrical type. The surface texture of the leaves is glabrous with pointed leaf tips the table leaf tips are symmetrical	The leaves are green, lanceolate with a pointed tip. The leaf surface is thick at the bottom with a symmetrical type. The surface texture of the leaves is glabrous with pointed leaf tips the table leaf tips are symmetrical	The leaves are needle-shaped, the tip of the leaf is blunt. Cross section of a zygomorph type leaf. Double leaf arrangement, frayed leaf edges, bald leaf surface texture, asymmetrical leaf tips	Needle-shaped leaves, blunt leaf tips, zygomorphic leaf cross-section. Double leaf arrangement, frayed leaf edges, bald leaf surface texture and asymmetrical leaf tips	Dark green leaf color, oval shape, with split leaf tips, zygomorphic leaf cross-section, double leaf arrangement, frayed leaf edges, glabrous leaf surface texture with symmetrical leaf tips

a	b	c	d	e	f
Ecology	Prefers a damp environment within pristine forest areas near riverbanks.	Prefers a in a moist setting within primary forests located alongside riverbanks at an elevation of 1000 meters above sea level.	likes places full of sunlight, generally grows in mountainous areas at an altitude of	likes places full of sunlight, grows in sandy land and dry climates. Soil pH 5.5, water pH 5 with poor drainage	likes places full of sunlight, grows in sandy land and dry climates. Soil pH 5.5, water pH 5 with poor drainage

			300-2000 m above sea level		
Flower season	The position of the flower is at the top, where this flower flowers throughout the year, the flowering period is 7 days. The flower shape is a type of flowering bunch, twisted. The flower decoration consists of 3 sepals, 2 petals and a labellum. Coelogyne speciosa orchid flowers are compound in shape with zigzag shaped stalks and have protective leaves.Flowers have a distinctive labellum or lip, large, bumpy, uneven, and hairy. The base color of the labellum is white to light green, with brown in the center and white at the tips	The position of the flower is at its peak where this flower flowers in March-May with a flowering period of 7 days. The flowers are bunched and twisted. The flower decoration consists of 3 sepals, 2 petals and a labellum. Flowers are lanceolate with a pointed tip. Flower stalk 50 cm long, number of flowers per bunch 7-30 flowers, flower diameter 7-9 cm	Flowers bloom at any time for 4 days The position of the flowers is located on the shoots with cluster flowering type. Flower stalk length 30-40 cm. The leaves are lanceolate, 5-6 cm long, 2-3 cm wide. The corolla is larger than the calyx, the top tapers by 3-4 cm. The lips are trumpet-shaped, 3 tiered, purple to dark purple in color	Flowers bloom all year round, lasting 7 days. Flowering position on the shoot, group flowering type. The flower decoration consists of 3 sepals, 2 petals and 1 labellum. The flowers are star-shaped, the sepals are straight ribbons, and the petals are oval. The labellum consists of the side, middle and callus. Spoon lip shape with complex callus type	flowering position on the side between two leaf axils, cluster flowering type, twisting resupinance and spurs. This orchid flowers all the time. The flower decoration consists of 3 sepals, 2 petals and a labellum. The flowers are round, the sepals are lanceolate, the petals are oval with an open arrangement. The shape of the tips of the sepals and petals is sharp with a concave cross-section. The labellum consists of side plates, middle layer and callus. Narrow triangular lip shape. The cross-section is quite deeply curved

Dendrobium secundum has a unique shape and color. There are lots of flowers on one stalk, where orchid flowers when the leaves have fallen. This flower has a very beautiful

light pink color. [10] Plant breeding activities to improve the quality of orchids or obtain new cultivars are by crossing parents that have certain characteristics.

Table 2. Local orchid characters that have the potential to be developed

Explanation	Local Orchid				
	Coelogyne speciosa (Anggrek Coklat)	*Coelogyne foestermanii* (Anggrek Meteor)	*Arundina* graminifolia (D.Don) Hochr (Anggrek Purun)	*Bromheadya finlaysoniana* (Anggrek Rotan Merah)	*Dendrobium secundum* (Anggrek Ekor Tupai)
Superior properties of plants	That the brown orchid has a brown tongue color and the sepals of the tepals are light green and the characteristic of many flowering in one stalk and is fragrant	Orchid breeding is endeavored to expand genetic diversity in unique shapes and colors, favored by consumers, high frequency of flowerig	*Arundina* graminifolia (D.Don) Hochr is a ground orchid that has large and attractive flowers in white and purple and flowers diligently	This local orchid is useful as an ornamental plant and herbal medicine which has beautiful and unique flowers. Flowers are rare branched, wide open and large, with white color and the inner lip is yellow, inside side lobes are white with purple veins. This orchid can be used as crossbreeding material to get ground orchids which have unique and large flower shapes with bright colors	This local orchid has flowers with a very unique and small combination of red and charcoal. The florets always face one direction, so they are called brush orchids

4 Conclusion

Preserving local orchid resources in Central Kalimantan is an urgent matter because the plant's habitat has been damaged, so that several local orchid species are feared to be threatened with extinction.

Local orchids that have the potential to be developed include Coelogyne speciosa, Coelogyne foestermanii, Arundina graminifolia (D.Don) Hochr, Bromheadya finlaysoniana

and Dendrobium secundum. [11] The characteristic of this local orchid is that it has a distinctive aroma. Crossing between species is expected to improve the characteristics of local orchids with better results, including fast flowering intensity, large number of flowers, large number of flower buds, fragrant, and having flower shapes and colors that are quite attractive compared to their parents.

This research was funded by the National Research and Innovation Agency

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