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New Distribution Records of *Dendrobium discolor* Lindl. (Orchidaceae)

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Abstract
Dendrobium discolor (Orchidaceae) is one of the beautiful flowering orchid species, and is quite popular in Indonesia. The latest record of *D. discolor* in Java and Sumatra, extends the distribution range of this species further west. Previously, this species was only found in Sulawesi, Maluku, New Guinea, and Queensland, Australia. However, after conducting a thorough study of specimens from Java Island, coupled with recent references, we concluded that this species is also distributed in Java and Sumatra Islands as a new distribution record. Furthermore, this species has been used as a parent in subsequent new cultivars. New varieties can meet certain market needs, encouraging farmers in various regions to plant them, thus expanding their distribution.
Key Words: *Dendrobium discolor*, distribution, geography, Java, Sumatra.

INTRODUCTION

Dendrobium discolor is commonly found epiphytic or lithophytic orchids in Parts of New Guinea and North Queensland (Dockrill 1969, Cribb 1986). Both authors found that it is an extremely variable species, especially in the form, size, and colors of the sepals and petals. Taxonomically, this species consists of many varieties which shows extremely variable. The examination of various clones of this species both the wild and cultivated ones reveals that the labellum shapes may be correlated with geographical origin (Liddle & Forster 1990).

This Dendrobium is one of the three largest genera in the family Orchidaceae with more than 1580 identified species worldwide (Arobaya, 2020). Dendrobium orchids have high species diversity, habitat distribution in different environmental characteristics, and diverse character variations. According to data (Statista 2023), production of cut orchids in Indonesia in 2021 was 11,351,615 pieces, this figure decreased significantly compared to 2018 production of 24,717,840 pieces. One of the reasons for the decline in cut flower production in Indonesia is the shift in people's interest in choosing orchids for cultivation. The cultivated Dendrobium vary in flower shapes, patterns and colors. Curly Dendrobium have a higher economic value than Dendrobium hybrids with round flower shapes.

The development of new varieties needs to be done so that Indonesian orchids are in demand by consumers both at home and abroad and are highly competitive (Semiarti 2018). Plant breeding can be done by various methods such as gamma ray irradiation (Handini & Aprilianti, 2020) and plant crossing. Both methods have produce new varieties or at least new morphological appearance on the orchids. The second method which is interspecific hybridization was done in this study.

Dendrobium is a popular floricultural commodity because it has various character shapes and flower colors, and the flower has a longer shelf life compared to other types of orchids. The development of new varieties needs to be done so that Indonesian orchids are in demand by consumers both at home and abroad and have high competitiveness. Plant breeding by crossing between species to get new varieties of orchids whose flowers are unique and aesthetic so that they have high economic value.

Attempts to cross distant relatives were not easy due to natural constraints such as weak hybrid seeds which could not survive, and the F1 plants obtained became sterile, so it is necessary to study the compatibility of the crossed parents in order to obtain dentobium hybrid orchids which have variations in color, shape, and the different, unique and aesthetic floral patterns of the two parents. The objectives of this research stage are as follows. The morphological characters were examined to determine the Dendrobium species.

There are several kinds of crosses based on plant groupings. One of them is interspecific hybridization, which by definition is a cross between plants of the same genus but different species. Interspecific crosses are also called distantly related crosses (Kopecký et al. 2022). According to (Marwoto et al. 2012), Dendrobium interspecific crosses can produce different color variations and flower patterns from the two parents. Information on the inheritance of male and female parents can be used to produce new hybrids with unique characters. The more diverse the parental characters with the farther the genetic distance, the more varied the characters of the offspring can be observed from the stature, shape, size, and number of flowers. Crosses that are commonly carried out by Dendrobium orchid

breeders are based on phenotypic variations, especially related to color patterns and flower shapes (Hartati et al. 2014).

The relationship between the parents chosen as the source of the gene can influence success in genetic improvement through crosses (Marwoto et al., 2012). In its implementation, efforts to cross distant relatives were not easy due to natural obstacles such as hybrid seeds that were weak and unable to survive, and the F1 plants obtained became sterile. This can happen for two reasons, namely there are mechanisms that affect the development of the zygote and there is a mismatch between the nucleus and cytoplasm or between the embryo and endosperm of the species used (Hartati et al. 2014). The results of crossing can be observed based on qualitative and quantitative characters. Plant characters that are controlled by simple genes (one or two genes) and are very little influenced by the environment are called qualitative characters, for example flower color (De et al., 2015). This qualitative character is the goal of crossing ornamental plants, especially *Dendrobium* orchids.

MATERIAL AND METHODS

The materials used in this study were fresh orchid *Dendrobium discolor* obtained by extensive floristic exploration of Malang East Java carried out from 2022 to the beginning of 2023. Field plant collection and herbarium were prepared following customary method (Bridson & Forman, 1989). During the floristic survey in that city the authors came across a specimen of *D. discolor*. Identification had been conducted for two months by searching the references and comparing the specimens with photographs of type specimens stored K, and L. we finally decided that this species should be *Dendrobium discolor*. The Javanese specimens were firstly cultivated in Bogor Botanic Gardens and found as cultivated plant in the pots. In addition, we observed specimens from Purwokerto for materials from Java. So far, we discovered *D. discolor* in three places. The specimen was made into a sheet of herbarium *Tini 001*, stored in Herbarium Fakultas Biologi Unsoed (PUNS).

RESULTS AND DISCUSSIONS

Taxonomic Treatment

Dendrobium discolor Lindl., Edwards's Botanical Register 27 (1841). (Fig. 1)

Synonymy: *Callista undulata* Kuntze in Revis. Gen. Pl. 2: 655 (1891), nom. superfl. *Dendrobium arachnanthe* Kraenzl. in H.G.A.Engler (ed.), Pflanzenr., IV, 50 II B 21: 153 (1910); *Dendrobium brownii* F.Dietr. in Nachtr. Vollst. Lex. Gärtn. 10: 122 (1824), tentatively listed as a synonym. *Dendrobium elobatum* Rupp in Vict. Naturalist 69: 116 (1953); *Dendrobium undulans* Bakh.f. in Blumea 12: 68 (1963), nom. superfl. *Dendrobium undulatum* R.Br. in Prodr. Fl. Nov. Holland.: 332 (1810), nom. illeg.; *Dendrobium undulatum* var. *albertisianum* F.Muell. in Descr. Notes Papuan Pl.: 72 (1875); *Dendrobium undulatum* var. *carterae* F.M.Bailey in Queensland Agric. J. 27: 306 (1911); *Dendrobium undulatum* var. *gracile* J.J.Sm. in Nova Guinea 12: 47 (1913); *Durabaculum albertisiana* (F.Muell.) M.A.Clem. & D.L.Jones in Orchadian 13: 487 (2002); *Durabaculum arachnanthe* (Kraenzl.) M.A.Clem. & D.L.Jones in Orchadian 13: 487 (2002); *Durabaculum undulatum* M.A.Clem. & D.L.Jones in Orchadian 13: 489 (2002), nom. superfl.

Local names: Anggrek keriting (Jawa), Anggrek diskolor tanibar (Jawa).

Phenology: Flowering and Fruiting: September – November (Sastrapradja 1979), however, we discovered that it flowered from January – February

Distribution: (Fig. 2)

1. Indonesia: Sulawesi
2. Indonesia: Maluku (George 65!) Seram Island
3. Indonesia: Papua (Brown 1234!) manokwari ca. 10 m alt. This orchis was also reported by Arobaya et al (2020) in Wasur National Park which is a vast area of tropical lowland forest, swamp forest, savannah and wetland in the far south-east corner of Papua-Indonesia.
4. Indonesia: Java Malang, Purwokerto (Tini 001) (Fig. 1), Bogor, Pusat Penelitian Konservasi Tumbuhan dan Kebun Raya, BRIN Bogor (new record)
5. Indonesia: Sumatra Lampung, Universitas Lampung (Maulida et al 2023) (new record)
6. Australia: Queensland Bennett, J.J. 5510 June 1878

In the past there were 10 subspecies, varieties, and forma of *D. discolor* (IPNI 2023). The cultivar number of *D. discolor* is increasing very markedly because there are a lot of orchid shops and breeders which develop the orchids. There are at least 85 orchid shops and/or breeders in Indonesia (Admin 2014). They produced a lot of orchids hybrids, for example in Lumajang, a breeder has produced 17 new cultivar of *Dendrobium.* Furthermore, there were 169 crosses that have been registered with the Royal Horticulture Society, 104 crosses as male elders and 65 as female elders and are the result of interspecific and intersectional crosses (Lestari et al. 2022). High number of hybridizations will result in the increase of consumer number, and the distribution also widened (Fig. 2).

Figure 1. *Dendrobium discolor*: A habit; B flowers; C pseudobulb and leaves; D labellum and pollinia

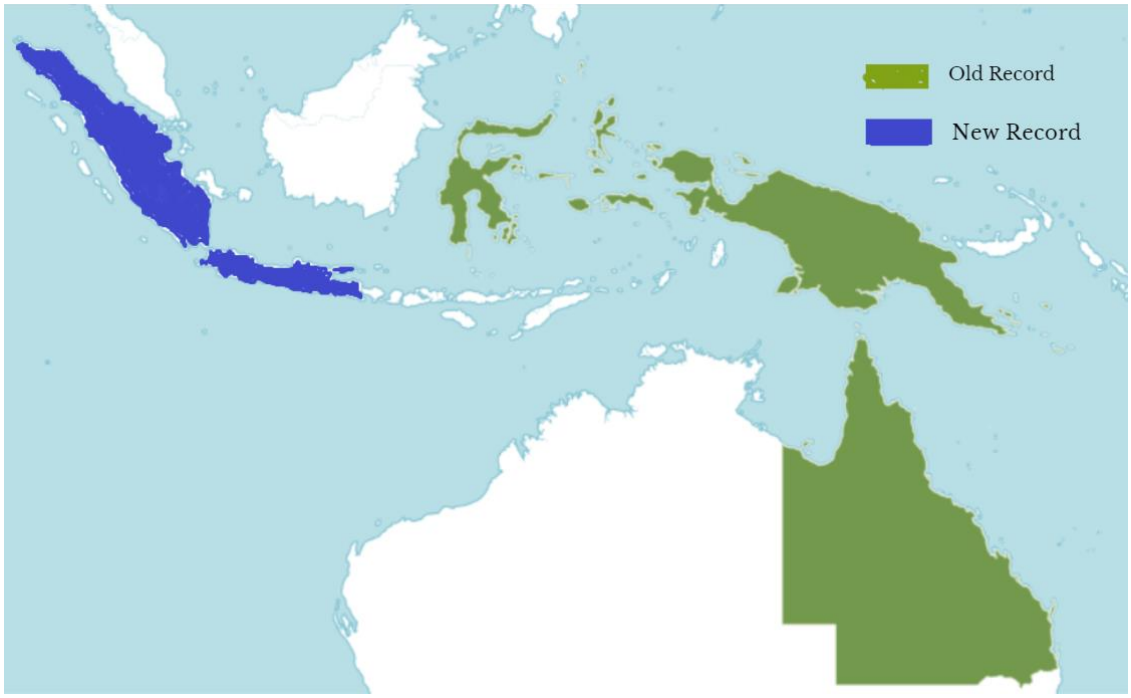

Figure 2. Distribution of *Dendrobium discolor:* Old Record Green, New Record Blue.
(Map source: POWO 2023)

Many orchids, including *D. discolor* will continue to widely spread due to human activities to produce better cultivars. Increasing market circulation and rising trade in orchids is forcing breeders to develop varieties with unique characteristics, including flower color, morphology, and resistance using a range of approaches, including traditional and molecular breeding. Orchids are also harvested, grown and traded for a variety of purposes, including as ornamental plants, medicinal products and food (Hinsley et al. 2018).

Dendrobium with both self-compatibility and self-incompatibility, accounts for nearly half of all self-compatibility orchids (Niu et al., 2018). Hybridization, both natural and artificial, has the effect of integrating the excellent characteristics of the two parents within the hybrid offspring. As a result, orchid population will increase more quickly. At present, innovations of the hybrid grex and a shortening of the breeding cycle, are the main targets of propagation in vitro, and significant progress has been made in attaining these targets (Chengru et al. 2021). This, wil also increase the ditribution areas.

In the future, more new orchid products being developed by non-conventional technologies, such as biotech-oriented efficient breeding, may help offer new opportunities for orchid production (Yuan et al. 2021). New cultivars of many orchids have been

actively developed and released to the market worldwide (Chen et al. 2020). These novel new orchid hybrids will widen the orchid distribution around the world.

The potential of this orchid for curing skin diseases (Perwitasari 2020), may also increase the breeder number which lead to the increase of plant distribution. Breeding can enhance genetic diversity (Rauf et al. 2010), creating new varieties that are better suited to different climates and soil types. This adaptability can help plants thrive in various regions. New varieties can meet specific market needs, encouraging farmers in diverse regions to grow them, thereby expanding their distribution.

CONCLUSIONS

Dendrobium discolor is an interesting orchid species that was originally found only in Sulawesi, Maluku, New Guinea, and Queensland, Australia. However, our observations and identification results show that the species is also found as a cultivated plant in Java and Sumatra. Thus we propose a new distribution map of this orchid species. Plant breeding, the discovery of new cultivars, and the increasing number of orchid enthusiasts have led to the wider distribution of *D. discolor*. The new varieties which can meet certain market needs, encouraging farmers in various regions to plant them, thus expanding their distribution.

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