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Floral Characterization of Endangered *Dendrobium* Wild Orchid Species from Western Ghats of Kodagu District, India

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A B S T R A C T

Dendrobium species are the popular orchids in tropical countries and they are considered as most fascinating plants. Today orchids our precious heritage, have become rare, vulnerable, endangered, threatened and are suffering from a dubious future as its population is affected by over exploitation for therapeutic and ornamental purposes. To conserve and to study there floral characteristicsof *Dendrobium* wild orchid species, pot experiment was conducted which comprising of six endangered *Dendrobium* wild orchid species, collected from Western Ghats of Kodagu District *viz*., *Dendrobium barbatalum* Lindl., *Dendrobium jeradonianum* Wight., *Dendrobium herbaceum* Lindl., *Dendrobium heterocarpum* Wall. ex Lindl., *Dendrobium macrostachyum* Lindl. and *Dendrobium ovatum* (L.) Kraenz. The results reveled that *Dendrobium heterocarpum* Wall. ex Lindl. have showed a maximum pedicel length (2.50 cm), dorsal sepal length & width (3.22, 1.07 cm), lateral sepal length & width (3.37, 0.97 cm), petal length &petal width (3.10, 1.23 cm), labellum length & labellum width (2.90, 2.00 cm). The flower longevity of 26 days was recorded in *Dendrobium ovatum* (L.) Kraenz. Whereas maximum number of flowers per plant was found in *Dendrobium macrostachyum* Lindl. (28.33).

Introduction

Orchids are the nature's most extravagant group of flowering plants distributed throughout the world from tropics to high alpine, which occupy a top position among all flowering plants valued for cut flowers and as potted plants. They exhibit incredible range of diversity in size, shape and color of their flowers. Among the angiosperms, orchids are unique in their floral patterning, particularly in floral structures and organ identity. However, Orchidaceae is regarded as a largest family of plant kingdom, which is having 600 - 800 genera 25,000 species and more than one and half lakh human-made hybrids. In the

past couple of decades, orchids have occupied a coveted position in the International flower market, evolving into a multibillion-dollar business. With the recent increase in the world floriculture trade, orchids have become the second most popular plants as cut flowers as well as pot plants with an annual growth rate of 10 to 20 per cent (Hossain, 2010).

India annually imports cut flowers worth crores from Netherlands and Thailand, to meet the demand, especially during festive seasons wherein, the demand is highest. The import of orchid cut flowers has increased from 299.09 in 2008-09 to 3405.36 lakhs in 2015-16 (Anon., 2016).Orchids being tropical flower have a longer shelf life, as a result, they are marketed globally as cut flowers used for different purposes like flower arrangement, bouquets, corsages, stage decoration, floral jewellery, potted plant and as bedding ground orchids. *Cymbidiums* are leading cut flowers among orchids while *Phaelanopsis* are extensively used as pot plants and *Dendrobiums* are popular in tropical countries.

Materials and Methods

The experiment was conducted to study the Floral characteristics of *Dendrobium* Wild Orchid Species from Western Ghats of Kodagu District was carried out at Orchidarium, Plant Tissue Culture Laboratory, Department of Horticulture, University of Agricultural Sciences, GKVK, Bangalore during the period 2018-2020.The plants were grown in pots placed on raised platform, supplied with 25% charcoal, 25% Bricks and 50 % Coconut husk under bench system of cultivation in an area of 100 sq.m was shown in plate 1.

The experiment was laid out in a Randomized Block Design (RBD) with three replications *viz*., T_1- *Dendrobium barbatalum* Lindl., T2- *Dendrobium jeradonianum* Wight., T_3- *Dendrobium herbaceum* Lindl., T_4- *Dendrobium heterocarpum* Wall. ex Lindl., T_5- *Dendrobium macrostachyum* Lindl. and T_6- *Dendrobium ovatum* (L.) Kraenz. The observations on flower characteristics comprising of many components *viz*., Number of flowers per inflorescence, Pedicel length (cm), Dorsal sepal length (cm), Dorsal sepal width (cm), Lateral sepal length (cm), Lateral sepal width (cm), Petal length (cm), Petal width (cm), Labellum length (cm), Labellum width (cm) and Flower longevity (days) were recorded at active growth period of the crop as shown in the plate 2**.**

Results and Discussion

The data analysis has showed a significant difference between the *Dendrobium* wild orchid species for flower characteristics has shown in the Table 1a & 1b.

The maximum number of 28.33 flowers were recorded in *Dendrobium macrostachyum* Lindl., it was followed by *Dendrobium barbatalum* (24.33). The minimum of 3.67 flowers were recorded in *Dendrobium herbaceum* Lindl., it was followed by *Dendrobium heterocarpum* Wall. ex Lindl. (5.00). Sunil and Swati (2013) found that Sonia-17 produced 11.4 number of florets per spike.

Pedicel length (cm)

The maximum pedicel length of 2.50 cm was found in *Dendrobium heterocarpum* Wall. ex Lindl, which was followed by *Dendrobium ovatum* (L.) Kraenz (1.97 cm). The lowest pedicel length was found in *Dendrobium herbaceum* Lindl. (1.30), which was followed by *Dendrobium macrostachyum* Lindl. (1.37). This is an a finding ofLekha rani (2002) in *Dendrobium* orchids, Ninitha Nath (2003) in monopodial orchids.

Dorsal sepal length and width (cm)

Maximum dorsal sepal length of 3.22 was found in *Dendrobium heterocarpum* Wall. ex Lindl., which was followed by *Dendrobium jeradonianum* Wight. (2.20 cm). The maximum width of 1.07 cm was observed in *Dendrobium heterocarpum* Wall. ex Lindl., which was followed by *Dendrobium macrostachyum* Lindl. (0.68 cm). The minimum length 0.62 cm was found in *Dendrobium herbaceum* Lindl., it was followed by *Dendrobium ovatum* (L.) Kraenz (0.85 cm). The minimum width of 0.25 was observed in *Dendrobium herbaceum* Lindl., it was followed by *Dendrobium ovatum* (L.) Kraenz (0.35 cm). The variability in number of flowers size among different species is due to genetic and environmental effects (Sunil *et al*., 2015).

Lateral sepal length (cm)

Maximum lateral sepal length of 3.37 cm was observed in *Dendrobium heterocarpum* Wall. ex Lindl., it was followed by *Dendrobium jeradonianum* Wight.(2.32 cm). The minimum length was observed in *Dendrobium herbaceum* Lindl. (0.66 cm), it was followed by *Dendrobium ovatum* (L.) Kraenz (0.88 cm). The maximum lateral sepal width of 0.97 cm was found in *Dendrobium heterocarpum* Wall. ex Lindl., it was followed by *Dendrobium barbatalum* (0.85 cm). The minimum of 0.28 cm was observed in *Dendrobium herbaceum* Lindl., it was followed by *Dendrobium ovatum* (L.) Kraenz (0.38 cm).

Petal length and width (cm)

Maximum petal length of 3.10 cm was noticed in *Dendrobium heterocarpum* Wall. ex Lindl., it was followed by *Dendrobium barbatalum* Lindl.(1.82 cm). The minimum petal length of 0.52 cm was noticed in *Dendrobium herbaceum* Lindl., which was followed by *Dendrobium ovatum* (L.) Kraenz (1.03 cm). The maximum petal width of 1.23 cm was noticed in *Dendrobium heterocarpum* Wall. ex Lindl, which was followed by *Dendrobium barbatalum* Lindl. (0.90 cm). The minimum petal width of 0.15 cm was noticed in *Dendrobium herbaceum* Lindl., which was followed by 0.23 in *Dendrobium ovatum* (L.) Kraenz.

Labellum length and width (cm)

Maximum labellum length of 2.80 cm was observed in *Dendrobium heterocarpum* Wall. ex Lindl., it was followed by 2.47 cm in *Dendrobium macrostachyum* Lindl. Minimum of 0.52 cm was observed in *Dendrobium herbaceum* Lindl., it was followed by 0.88 cm in *Dendrobium ovatum* (L.) Kraenz. The maximum labellum width was observed in *Dendrobium heterocarpum* Wall. ex Lindl.(2.00 cm), it was followed by 1.93 cm in *Dendrobium barbatalum* Lindl. In addition, minimum labellum width was observed in *Dendrobium herbaceum* Lindl. (0.30 cm), it was followed by 0.60 cm in *Dendrobium ovatum* (L.) Kraenz.

Sugapriya *et al.,* (2012) reported that number of flowers per plant was varied due to the variation in species of *Dendrobium* orchid genus. The increased flower yield might be attributed to the greater leaf area; more number of pseudostem per plant, more number of leaves per plant as well as leaf chlorophyll content and these would have resulted in production and accumulation of maximum photosynthates, which ultimately results in production of more number of spikes with bigger sized flowers. Similarly, variation also observed among the varieties by Barman *et al.,* (2007) in *Cymbidium* and Thomas and Lekha rani (2008) in monopodial orchids.

Table.1 Floral characterization of *Dendrobium* Wild Orchid Species from Western Ghats of Kodagu District

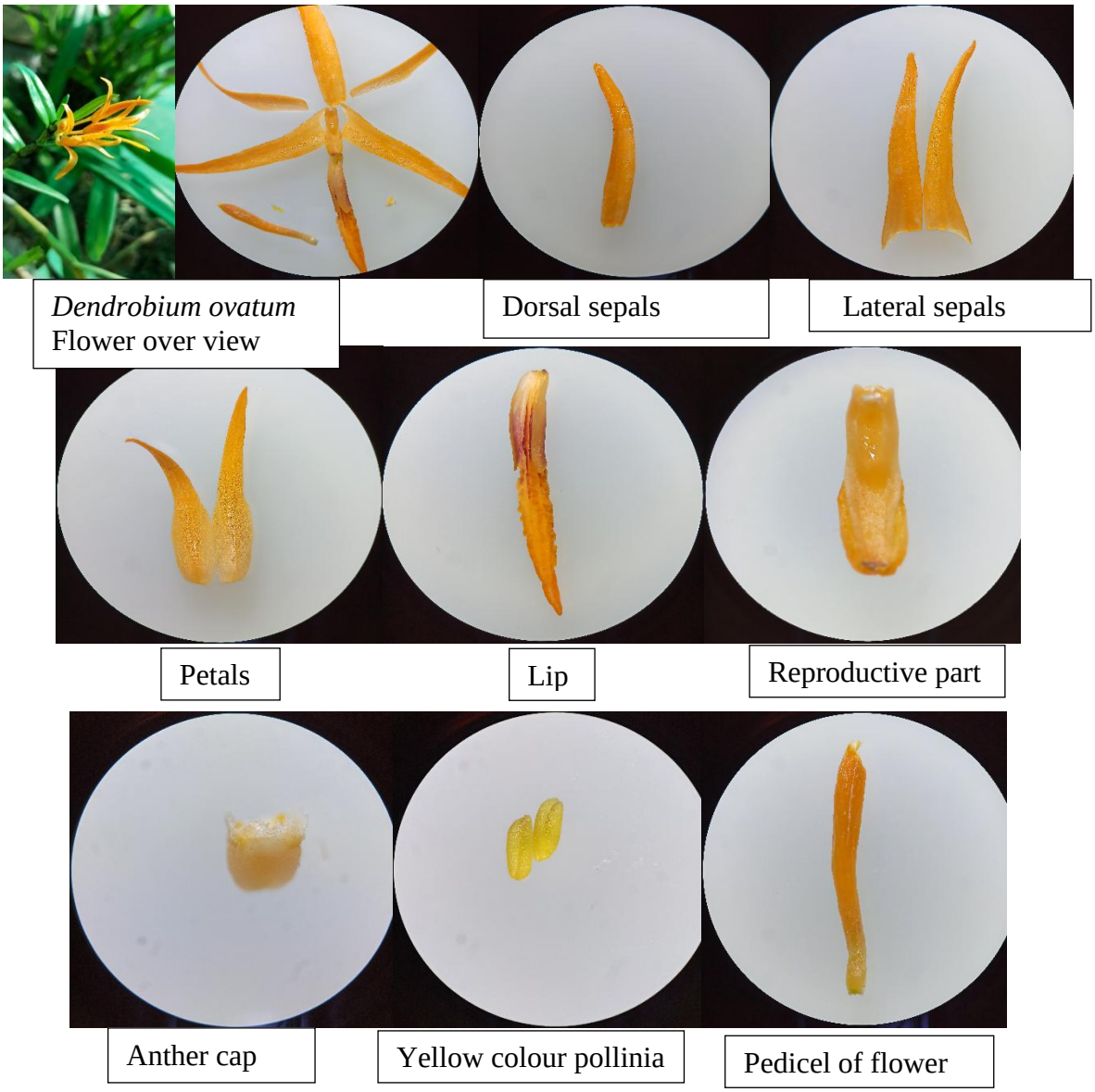
Species	Number of flowers per inflorescence	Pedicel length (cm)	Dorsal sepal length (cm)	Dorsal sepal width (cm)	Lateral sepal length (cm)	Lateral sepal width (cm)
***Dendrobium barbatalum*Lindl.**	24.33	1.83	2.13	0.48	2.23	0.85
***Dendrobium jeradonianum* Wight.**	6.00	1.53	2.20	0.45	2.32	0.47
***Dendrobium herbaceum* Lindl.**	3.67	1.30	0.62	0.25	0.66	0.28
***Dendrobium heterocarpum* Wall. ex Lindl.**	5.00	2.50	3.22	1.07	3.37	0.97
***Dendrobium macrostachyum* Lindl.**	28.33	1.37	1.82	0.65	1.94	0.50
***Dendrobium ovatum* (L.) Kraenz**	21.33	1.97	0.85	0.38	0.88	0.38
S. Em ±	**2.10**	**0.10**	**0.09**	**0.04**	**0.05**	**0.02**
CD at 5 %	**6.61**	**0.31**	**0.29**	**0.11**	**0.16**	**0.06**

Table.2 Floral characterization of *Dendrobium* Wild Orchid Species from Western Ghats of Kodagu District

Species	Petal length (cm)	Petal width (cm)	Labellum length (cm)	Labellum width (cm)	Flower longevity (days)
***Dendrobium barbatalum* Lindl.**	1.82	0.90	2.33	1.93	16.00
***Dendrobium jeradonianum* Wight.**	1.73	0.42	1.90	0.57	23.33
***Dendrobium herbaceum* Lindl.**	0.52	0.15	0.52	0.30	15.00
***Dendrobium heterocarpum* Wall. ex Lindl.**	3.10	1.23	2.90	2.00	24.33
***Dendrobium macrostachyum* Lindl.**	1.58	0.59	2.47	1.23	18.00
***Dendrobium ovatum* (L.) Kraenz**	1.03	0.23	0.88	0.60	26.00
S. Em ±	**0.03**	**0.03**	**0.04**	**0.03**	**1.44**
CD at 5 %	**0.10**	**0.08**	**0.13**	**0.08**	**4.53**

Plate.1 General view of the experimental block

Plate.2 Wild orchid species used to study the flower characters



Flower longevity (days)

Highest flower longevity of 26 days was noticed in Dendrobium *heterocarpum* Wall. ex Lindl., it was followed by *Dendrobium ovatum* (L.) Kraenz 24.33. The least flower longevity was observed in Dendrobium *herbaceum* Lindl. (15 days). It was followed by 16 days in *Dendrobium barbatalum* Lindl. It may be due to content of lesser number of floret which took lesser days for opening as well as wilting. The distinct variation may be due to amount of food reserve in the spikes. The findings were also co related to Kumar *et al.,* (2013).

It is concluded in the present study the result revealed that flower characteristics of *Dendrobium* wild orchid species are significantly varied between the species it is mainly attributed due to genetic and environmental interaction in the western Ghats of Kodagu District. Eventhough flowers are small in nature they have more flower longevity due to their specialized genetic makeup character.

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