

Growth and Flowering Behaviour of Dendrobium Cultivars

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Abstract

An experiment was conducted to evaluate growth and flowering behavior of three dendrobium cultivars coded from V₁ to V₃ (Sonia-17, Purple Boutonniere and Emma White respectively). Longest pseudobulb (78.9 cm) and maximum girth of pseudobulb (19.7 mm) was found with Sonia-17 cultivar. For the same cultivar, maximum other growth and flowering characteristics were observed and recorded as number of pseudobulb/plant (18.8), number of leaves/pseudobulb (5.3), leaf area (253.3 cm²), number of spikes/plant (14.9), spike length (44.6 cm), spike girth (7.4 mm), number of florets/spike (12.2), diameter of bud (26.1 mm) and diameter of floret (9.5 cm). Minimum chlorophyll content (58.8%) was also found from cultivar Sonia-17 (V₁).

Key words: Dendrobium cultivars, growth and flowering

I. Introduction

Dendrobium orchid is long-lasting and colorful cut flowers. The genus *Dendrobium* is the third largest in the family Orchidaceae, comprising 1184 species worldwide (Leitch *et al.*, 2009). *Dendrobium* genus has been produced in order to incorporate new color options for ornamental plants (Lavarack *et al.*, 2006). Dendrobium plants are among the most prevalent orchids for commercial production of cut flowers and potted plants (Chen and Tsi, 2000) and most popular genus in horticultural industries. The genetic diversity of the *Dendrobium* genus is not well known (Wang *et al.*, 2009). Comparative study of different cultivars were also conducted previously in dendrobium (Sunil and Swati, 2013; Ramachandrudu, 2008) gerbera (Ahlawat *et al.*, 2012; Shruti and Gajbhiye, 2012), gladiolus (Shaukat *et al.*, 2013), anthurium (Islam *et al.*, 2013; Rajeevan *et al.*, 2007), carnation (Singh *et al.*, 2013). Research work on the evaluation of dendrobium cultivars for suitability to our condition is very limited. So, this study was aimed to identify the suitable varieties for growth and flowering of three available dendrobium cultivars.

II. Materials and Method

Experimental site and duration: An experiment was conducted at 2a Rooftop garden, Department of Horticulture, Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during February 2013 to August 2013.

Experimental design, genetic materials and fertilization: The experiment was laid out in Completely Randomized Design with three replications. Same aged plantlets were used in the experiment. Three cultivars viz. V₁; Sonia-17, V₂; Purple Boutonniere and V₃; Emma White were used in the experiment. Nitrogen, phosphorus and potassium @ 1:1:1 ratio was sprayed at the entire period of the experiment.

Data collection and measuring procedures: Data were collected on different growth and flowering attributes. Among these attributes, length of pseudobulb, girth of pseudobulb, number of leaves/pseudobulb, leaf area and chlorophyll content were measured at 120 days after transplanting. Leaf area was measured by non-destructive method using CL-202 Leaf Area Meter (USA). SPAD-502 Chlorophyll Meter was used for measuring chlorophyll content (%). Girth of pseudobulb, girth of spike and diameter of flower bud were measured by using Digital Caliper-515 (DC-515).

Statistical analysis: Collected data were statistically analyzed by using MSTAT-C program. Mean for all cultivars was calculated and difference between cultivars was evaluated by Least Significant Difference (LSD) at 5% level of significance (Gomez and Gomez 1984).

III. Results and discussion

Length of pseudobulb

Length of pseudobulb varied significantly between dendrobium cultivars. Longest pseudobulb was found from V₁ (78.9 cm) while shortest from V₃ (45.7 cm) (Table 1). Length of pseudobulb of Sonia-17 was 54.57 cm and Emma red was 46.27 cm (Sugapriya *et al.*, 2012). Variation in length of pseudobulb among cultivars is mainly due to genetic nature. Similar variation among monopodial orchid *Dendrobium* was also found by Roychowdhury *et al.* (2004) and Thomas and Lekha Rani (2008).

Girth of pseudobulb

Maximum girth of the pseudobulb was found from V₁ (19.7 mm) which was statistically similar with V₂ (18.5 mm) whereas minimum from V₃ (15.4 mm) (Table 1). Sugapriya *et al.* (2012) found the variation in girth of pseudobulb among *Dendrobium* varieties.

Number of pseudobulbs/plant

Maximum number of pseudobulb was found from V₁ (18.8) while minimum from V₃ (13.0) which was statistically similar with V₂ (14.2) (Table 1). Sugapriya *et al.* (2012) found the variation in number of pseudobulb/plant among the *Dendrobium* varieties and ranged from 3.90 to 17.0/plant. Number of pseudobulb/plant was varied due to the variation of cultivars as reported by Talia *et al.* (1999) and Thomas and Lekha rani (2008).

Number of leaves/pseudobulb

Maximum number of leaves/pseudobulb was found from V₁ (5.3) while minimum from V₃ (2.6) which was statistically similar with V₂ (3.2) (Table 1). Sugapriya *et al.* (2012) found the variation in number of leaves/pseudobulb among the *Dendrobium* cultivars.

Table 1. Response of dendrobium cultivars to different growth characters^x

Variety	Height of pseudobulb (cm)	Girth of pseudobulb (mm)	Number of pseudobulbs /plant	Number of leaves /pseudobulb	Leaf area (cm ²)
V ₁	78.9 a	19.7 a	18.8 a	5.3 a	253.3 a
V ₂	27.9 c	18.5 a	14.2 b	3.2 b	182.3 b
V ₃	45.7 b	15.4 b	13.0 b	2.6 b	168.3 c
LSD 0.05	5.9	1.5	2.0	1.2	2.1
CV %	9.8	10.3	10.6	8.5	1.2

^xIn a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

Leaf area

Leaf area of the dendrobium cultivars varied significantly. Maximum leaf area was found from V₁ (253.3 cm²) followed by V₂ (182.3 cm²) while minimum from V₃ (168.3 cm²) (Table 1). The results are in agreement with the findings of Nair *et al.* (2002) and Bhattacharjee (1981). Sugapriya *et al.* (2012) were also found the variation in leaf area among the *Dendrobium* varieties.

Chlorophyll content

Chlorophyll content of dendrobium cultivars varied significantly. Maximum chlorophyll content was found from V₂ (71.2%) which was statistically similar with V₃ (70.5%) whereas minimum from V₁ (58.8%) (Table 2). Maximum chlorophyll 80.53% and minimum 58.90% was found from the varietals evaluation of *Dendrobium* orchid (Sugapriya *et al.*, 2012) that is similar to current study. Variation in chlorophyll content of leaf among the varieties might be attributed to the genetic constitution. Similar variation in chlorophyll content among varieties was also observed by Shiragur *et al.* (2004).

Days to 1st flower bud initiation

Early flower bud initiation was observed from V₁ (125.8 days) which was statistically similar with V₂ (130.4 days) while late was found from V₃ (154.6 days) (Table 2). Earliness in flowering (96 days) was found from cv. Sonia-17 (Sunil and Swati, 2013).

Days to 1st flower opening

Early flower opening was found from V₁ (16.0 days) which was statistically similar with V₃ (16.4 days) and V₂ (17.3 days) (Table 2).

Number of spike/plant

Significant variation was found from the dendrobium cultivars on number of spikes/plant. Maximum number of spikes/plant was found from V₁ (14.9) while minimum from V₃ (11.5) which was statistically similar with V₂ (12.7) (Table 2). Sugapriya *et al.* (2012) reported that number of spike/plant was varied due to the variation of varieties of *Dendrobium* orchid. The increased flower yield might be attributed to the greater leaf area; more number of pseudobulbs 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 2. Response of dendrobium cultivars on chlorophyll content, 1st flower bud initiation, flower opening and number of spike^x

Variety	Chlorophyll content (%)	Days to 1 st flower bud initiation	Days to 1 st flower opening	Number of spike/plant
V ₁	58.8 b	125.8 b	16.0 a	14.9 a
V ₂	71.2 a	130.4 b	17.3 a	12.7 b
V ₃	70.5 a	154.6 a	16.4 a	11.5 b
LSD0.05	2.7	6.7	1.3	1.9
CV%	4.9	5.8	9.5	6.9

^xIn a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

Length of spike

Length of spike varied significantly among the dendrobium cultivars. However, longest spike was found from V₁ (44.6 cm) while V₂ (32.0 cm) had the shortest one (Table 3). Longest spike (54.2 cm) was found from cv. Sonia-17 (Sunil and Swati, 2013) which is the resemblance of the current study. This is in accordance with the findings of Lekha rani (2002) in *Dendrobium* orchids, Ninitha Nath (2003) in monopodial orchids.

Girth of spike

Significant variation was recorded from the dendrobium cultivars for girth of spikes. Maximum girth of spikes was found from V₁ (7.4 mm) while minimum from V₂ (5.8 mm) (Table 3).

Table 3. Response of dendrobium cultivars on flower characteristics^x

Variety	Length of spike (cm)	Girth of spike (mm)	Number of floret/spike	Diameter of bud (mm)	Diameter of floret (cm)
V ₁	44.6 a	7.4 a	12.2 a	26.1 a	9.5 a
V ₂	32.0 c	5.8 c	9.8 b	18.3 c	8.5 b
V ₃	34.5 b	6.6 b	4.4 c	22.7 b	9.0 ab
LSD0.05	0.8	0.7	1.6	1.6	0.7
CV%	6.8	3.6	9.3	8.7	9.0

^xIn a column means having similar letter(s) are statistically identical and those having dissimilar letter(s) differ significantly as per 0.05 level of probability

Number of floret/spike

Maximum number of floret/spike was found from V₁ (12.2) followed by V₂ (9.8) whereas minimum from V₃ (4.4) (Table 3). Sunil and Swati (2013) found that Sonia-17 produced 11.4 number of florets/spike.

Diameter of the bud

Maximum bud diameter was found from V₁ (26.1 mm) followed by V₃ (22.7 mm) while minimum from V₂ (18.3 mm) (Table 3).

Diameter of floret

Maximum floret diameter was found from V₁ (9.5 cm) which was statistically similar with V₃ (9.0 cm) while minimum from V₂ (8.5 cm) (Table 3).

IV. Conclusion

It may be concluded that growth and flowering behaviour of three tested cultivars of dendrobium varied significantly. Among these cultivars, V₁ (Sonia-17) performed best in terms of growth and flowering potentiality; thus could be further experimented for varietal selection and or improvement.

V. References

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Citation for this article (APA Style):

Mehraj, H., Shikha K. J., Nusrat A., Shiam I. H. & Jamal Uddin, A. F. M. (2014). Growth and Flowering Behaviour of Dendrobium Cultivars. *Journal of Bioscience and Agriculture Research* 02(02), 90-95.

Retrieved December 28, 2014, from <http://www.journalbinet.com/current-issue-jbar-1.html>