

## Comparative Performance of Dendrobium Orchid Varieties on Floral Quality and Flower Yield under Different Growing Conditions

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### ABSTRACT

The present investigation was carried out at orchidarium, Regional Horticultural Research and Extension Centre, University of Horticultural Sciences campus, GKVK, Bengaluru during October 2015 to June 2017 to study the comparative performance of eight varieties of dendrobium orchid viz. Ear Sakul, Mono Red, Charming White, Bubble Gum, Sonia-17, Burana Jade, Big White and Nopporn Pink under naturally ventilated polyhouse and 50 per shade house condition. Plants grown under polyhouse condition took early days to bud initiation (291.55 days), days to first floret opening (33.17 days) as compare to shade house condition. The floral characters like spike length (30.90 cm), rachis length (17.59 cm), number of florets per spike (5.83) and floret diameter (7.04 cm) was found highest under polyhouse condition. Spike yield per plant and per meter square (1.48 and 51.63 respectively) was observed highest under polyhouse and least was noticed in shade house condition. With respect to varieties, early initiation of bud and spike emergence to first floret opening was (214.37 days and 30.42 days respectively) was recorded in var. Big White. The floral qualities like spike length (37.54 cm) and rachis length (23.06 cm) was recorded in highest in var. Mono Red. Number of florets per spike (7.55) was maximum in var. Bubble Gum and minimum in (3.70) was observed in var. Nopporn Pink. Floret diameter (8.40 cm) was found highest in var. Sonia-17. Spike girth (4.10 mm) and spike weight (22.98 g) was found superior in var. Mono Red. The number of spikes per plant and per meter square was found highest in var. Big White (1.77 and 61.83 respectively) and it was minimum in var. Burana Jade and Nopporn Pink (1.17 and 40.83 respectively). Relatively vase life was highest in var. Mono Red and Big White (40.00 days) and lowest was observed in var. Nopporn Pink (20.83 days)

**Key words:** Dendrobium, Varieties, Polyhouse, shade house, Spikes.

### INTRODUCTION

Orchids are one of the most distinctive plants of nature and highly priced in the international flower trade due to their incredible range of

diversity in size, color, shape, forms, appearance and long lasting qualities of flowers.

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Orchids belong to the family orchidaceae; it is the largest family of flowering plants with 25,000 species belonging to 600-800 genera. Dendrobium is the second largest genera of orchids which consist of 1,400 species. Dendrobium orchids are commercially grown in green house condition, it requires shade with low temperature and high humidity. The performance of any crop or variety largely depends on genotypic and environmental interaction. As a result, varieties, which perform well in one region, may not perform same in other region of varying climatic conditions. Hence, it is necessary to collect and evaluate the available varieties under polyhouse and shade house condition to find out the suitable varieties for the specific region. Keeping this in view, the present investigation was undertaken to evaluate the performance of dendrobium varieties for flowering, flower quality and spike production under polyhouse and shade hose condition.

#### MATERIAL AND METHODS

The present investigation was carried out at orchidarium, Regional Horticultural Research and Extension Centre, , Bengaluru during October 2015 to June 2017 to study the comparative performance of eight varieties of dendrobium orchid *Viz.* Ear Sakul (V<sub>1</sub>), Mono Red (V<sub>2</sub>), Charming White (V<sub>3</sub>), Bubble Gum (V<sub>4</sub>), Sonia-17 (V<sub>5</sub>), Burana Jade (V<sub>6</sub>), Big White (V<sub>7</sub>) and Nopporn Pink (V<sub>8</sub>) under naturally ventilated polyhouse (G<sub>1</sub>), and 50 per shade house condition (G<sub>2</sub>), Six months old healthy rooted tissue culture plants were taken for experiment. Before planting plants were treated with 0.3 per cent bavistin solution for 15-20 minutes to avoid fungal infection. Plants were planted in five inch size plastic pots and placed on iron bench system. The iron bench is made up of GI pipes have mesh with the size of 2 meter length and 1.5 meter width and having two feet height from the ground. In shade house, plants were potted and placed on the bench system using locally available bamboo materials. The trial was conducted in form of a factorial experiment following completely randomized design with

three replications. Dendrobium plants require equal quantities of Charcoal, Brick pieces and Coco peat (1:1:1) were used as a growing media. During vegetative phase N, P and K at the ratio of 3:1:1 and during flowering blooming phase 1:2:2 were provided. The commercially available water soluble fertilizers of different grade were used as a source for nutrients and applied through foliar spray. Temperature, Relative humidity and light intensity under different growing environments were measured at weekly interval during the experimental period. All the cultural management practices were followed throughout the experiment to grow a successful crop. Five plants were selected at random in each replication for recording the observations. Various flowering, flower quality and spike production parameters were periodically recorded and analyzed statistically.

#### RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below:

**Performance of flowering parameters :** The data pertaining to days taken for bud initiation, days for spike emergence to first floret opening and days taken form first floret opening to harvest as influenced by growing conditions, varieties and their interactions are furnished in Table 1. Days to bud initiation differed significant for growing conditions. Plants grown under polyhouse condition (G<sub>1</sub>) took early to bud initiation (291.55 days) and it was late under shade house condition (G<sub>2</sub>) (319.37 days). Early bud initiation in polyhouse may be due to accumulation of maximum photosynthates and favorable micro climatic as a result, plants grown under polyhouse starts early bud initiation as compare to shade house condition. The present findings are in the same line as reported by Kallihal<sup>2</sup>, in carnation, Kaveriamma<sup>3</sup>, in phalaenopsis and Shwetha<sup>10</sup>, in gerbera. These results were also in findings of Mohanty *et al.*<sup>6</sup>, in rose, and Naik and Kumar<sup>7</sup>, in dendrobium. Dendrobium varieties showed significant effect on bud initiation, early

initiation of bud (214.37 days) was recorded in variety Big White and it was on par with Mono Red ( $V_2$ ) *Viz.*, 224.50 days followed by Ear Sakul (278.77 days). Among the varieties studied, Burana Jade ( $V_6$ ) took late to initiation of bud (412.42 days), which could be attributed due to their genetic factors or genomic constitution. The results are corroborated with the findings of Ramachandradu<sup>9</sup>, and Sugapriya *et al*<sup>11</sup>. The interaction effect between growing conditions and varieties was found non-significant with respect to days to bud initiation. However, minimum days (201.00 days) to bud initiation was recorded in  $G_1 \times V_7$  (Polyhouse  $\times$  var. Big White) followed by  $G_1 \times V_2$  (210.33 days) and it was maximum (425.37 days) in  $G_2 \times V_6$  (Shade house  $\times$  var. Burana Jade) treatment combination.

The influence of growing conditions on days for spike emergence to first floret opening differed significantly. Plants grown under polyhouse condition ( $G_1$ ) took minimum days to first floret opening (33.17 days) and maximum in shade house condition ( $G_2$ ) (36.82 days). Significant variation was obtained with respect to days for spike emergence to first floret opening in different varieties of dendrobium orchid. Spike emergence to first floret opening was early (30.42 days) in var. Big White ( $V_7$ ) and it was on par with var. Mono Red ( $V_2$ ) *Viz.*, 31.41 days followed by var. Sonia-17 ( $V_5$ ) (32.26 days) and late to first floret opening (43.52 days) was recorded in var. Burana Jade ( $V_6$ ). Interactions between growing conditions and varieties were also found significant to days taken for spike emergence to first floret opening. Early spike emergence to first floret opening (30.33 days) was observed in  $G_1 \times V_7$  (Polyhouse  $\times$  var. Big White) treatment combination followed by  $G_1 \times V_2$  (30.82 days) and it was late (47.80 days) in  $G_2 \times V_6$  (Shade house  $\times$  var. Burana Jade) treatment combination. The earliness to first floret opening might be attributed to genetic makeup of the varieties and prevalence favorable growing condition under polyhouse condition. The results are in agreement with the earlier

findings of Kallihal<sup>2</sup>, in carnation, Kaveriamma<sup>3</sup>, in phalaenopsis and Shwetha<sup>10</sup>, in gerbera. These results were also in findings of Mohanty *et al.*<sup>6</sup>, in rose, and Naik and Kumar<sup>7</sup>, in dendrobium orchid.

The effect of growing conditions on first floret opening to harvest in dendrobium was found significant. Early harvest of spikes (32.16 days) was observed in plants grown under polyhouse condition ( $G_1$ ) and late to harvest of spikes (34.73 days) under shade house condition ( $G_2$ ). Among varieties, there was a significant difference with respect to days taken for first floret opening to harvest in dendrobium. Early harvest of spikes (27.92 days) was registered in var. Sonia-17 ( $V_7$ ) and it was on par with var. Ear Sakul ( $V_1$ ) *Viz.*, 29.31 days followed by var. Nopporn Pink ( $V_8$ ) (30.33 days) and late to harvest of spikes (43.52 days) was recorded in var. Bubble Gum ( $V_4$ ). Non-significant results were obtained for interactions between growing conditions and varieties with respect to spike harvest.

#### Flower quality parameters

The data with respect to flower quality as influenced by different growing conditions, varieties and their interaction effects are presented in Table 2 and 3. The flower quality recorded in growing conditions differed significantly during entire experimental period. The plants exhibited significantly longest spike (30.90 cm), rachis length (17.59 cm) and highest number of florets per spike (5.83) grown under polyhouse, whereas, shortest was noticed under shade house environment. This is due to optimum growing condition, which prevailed throughout the growth period. This resulted in production of quality spike. The present findings are in the same line as reported by Kallihal<sup>2</sup>, in carnation, Kaveriamma<sup>3</sup>, in phalaenopsis and Shwetha<sup>10</sup>, in gerbera. These results were also in findings of Mohanty *et al.*<sup>6</sup>, in rose, and Naik and Kumar<sup>7</sup>.

Varieties of dendrobium showed significant variation on flower quality. Variety Mono Red (37.54 cm) recorded significantly longest spike and it was on par with var. Big White ( $V_6$ ) (36.12 cm) which was followed by

var. Bubble Gum (V<sub>4</sub>) (34.14 cm), whereas, it was shortest (20.72 cm) in var. Burana Jade (V<sub>6</sub>). Longest rachis length of 23.06 cm was recorded in var. Mono Red (V<sub>2</sub>) and it was on par with var. Big White (V<sub>7</sub>) *Viz.*, 20.82 cm followed by var. Bubble Gum (V<sub>4</sub>) (20.08 cm) and it was shortest (11.64 cm) in var. Burana Jade (V<sub>6</sub>). Variety Bubble Gum (V<sub>4</sub>) recorded maximum number of florets per spike (7.55) and minimum florets (3.70) were observed in var. Nopporn Pink (V<sub>8</sub>). The differences in spike length, rachis length and number of florets per spike can be attributed to genetic makeup of the varieties. These findings are in line with the observations of earlier workers *viz.*, of Ramachandradu<sup>9</sup>, Sugapriya *et al.*<sup>11</sup>, Gopal *et al.*<sup>1</sup>, Kumar and Sharma<sup>4</sup>, and Mehraj *et al.*<sup>5</sup>.

Interaction between growing conditions and varieties shown significant result with respect to flower quality. Longest spike length (38.47 cm) was recorded in G<sub>1</sub> x V<sub>2</sub> (Polyhouse x var. Mono Red) treatment combination and it was on par with G<sub>2</sub> x V<sub>7</sub> (Shade house x var. Big White) and G<sub>2</sub> x V<sub>2</sub> (Shade house x var. Mono Red) (36.66. and 36.60 cm respectively) and minimum spike length (19.17 cm) was recorded in G<sub>2</sub> x V<sub>6</sub> (Shade house x var. Burana Jade). Maximum rachis length (26.36 cm) was recorded in treatment combination G<sub>1</sub> x V<sub>2</sub> (Polyhouse x var. Mono Red) followed by G<sub>1</sub> x V<sub>7</sub> (Polyhouse x var. Big White) (21.90 cm) and it was minimum (10.91 cm) was observed in G<sub>2</sub> x V<sub>8</sub> (Shade house x var. Nopporn Pink). Highest number of florets per spike (7.83) was produced in G<sub>1</sub> x V<sub>4</sub> (Polyhouse x var. Bubble Gum) treatment combination and it was on par with G<sub>1</sub> x V<sub>2</sub> (Polyhouse x var. Mono Red) (7.37) and lowest number of florets per spike (3.33) was observed in G<sub>2</sub> x V<sub>8</sub> (Shade house x var. Nopporn Pink). This may be due to prevalence of congenial growing conditions that prevailed during experimental period and also by genomic character of individual variety. These results are in agreement with Naik and Kumar<sup>7</sup>.

The results pertaining to floret diameter, spike girth and spike weight as

influenced by growing conditions, varieties and their interaction effects is presented in Table 3. Floret diameter, spike girth and spike weight had shown significant effect on growing conditions. Maximum diameter of floret (7.04 cm), spike girth (3.71 mm) and spike weight (16.02 g) was recorded in plants grown under polyhouse condition (G<sub>1</sub>) and minimum was observed under shade house condition (G<sub>2</sub>).

Diameter of floret recorded at the time of peak flowering stage differed significantly among the varieties, it was ranged from 8.40 cm to 4.70 cm. Variety Sonia-17 (V<sub>5</sub>) produced larger diameter of floret (8.40 cm) and it was on par with var. Mono Red (V<sub>2</sub>) (8.03 cm). While, var. Burana Jade (V<sub>6</sub>) produced less diameter of floret (4.70 cm). Maximum spike girth (4.10 mm) was recorded in var. Mono Red (V<sub>2</sub>) followed by var. Ear Sakul (V<sub>1</sub>) and var. Sonia-17 (V<sub>5</sub>) (3.79 and 3.72 mm respectively) and spike girth was less (3.25 mm) in var. Nopporn Pink (V<sub>8</sub>). Spike weight as significant influence on varieties of dendrobium which was ranged from 22.98 g to 9.94 g. Spike weight var. Mono Red (V<sub>2</sub>) recorded highest (22.98 g) which was followed by var. Big White (V<sub>7</sub>) and var. Bubble Gum (V<sub>4</sub>) (18.03 and 15.05 g respectively) and it was lowest (9.94 g) in var. Burana Jade (V<sub>6</sub>). This variation in flower weight among varieties might be attributed to the higher water and carbohydrate levels in the flower. Water plays a very important role to maintain flower turgidity, freshness and petal orientation. The ultimate effect of all these factors might have resulted in strong and long flower stalks, large sized buds and flowers and finally increase in flower weight. Similar variations were also recorded previously in Ramachandradu<sup>9</sup>, Sugapriya *et al.*<sup>11</sup>, Gopal *et al.*<sup>1</sup>, Kumar and Sharma<sup>4</sup>, and Naik and Kumar<sup>7</sup>.

Interaction between growing conditions and varieties shown significant result with respect to flower quality. Among different treatment combinations, maximum floret diameter (8.84 cm) was recorded in G<sub>1</sub> x V<sub>2</sub> (Polyhouse x var. Mono Red) and

minimum diameter of floret (4.65 cm) was observed in  $G_2 \times V_6$  (Shade house x var. Burana Jade). Highest spike girth (4.39 mm) was noticed in  $G_1 \times V_2$  (Polyhouse x var. Mono Red) followed by  $G_1 \times V_5$  (Polyhouse x var. Sonia-17) and lowest girth of spike (3.04 mm) was observed in  $G_2 \times V_8$  (Shade house x var. Nopporn Pink). Highest spike weight (25.47 g) was recorded in  $G_1 \times V_2$  (Polyhouse x var. Mono Red) followed by  $G_1 \times V_7$  (Polyhouse x var. Big White) (20.93 g) and lowest spike weight (9.49 g) was noticed in  $G_2 \times V_6$  (Shade house x var. Burana Jade). This variation might be due to favorable micro climate which is mainly responsible to develop good quality spikes. The results are in close conformity with the findings of Mohanty *et al.*<sup>6</sup>, in rose and Naik and Kumar<sup>7</sup>, in dendrobium.

#### Flower yield per plant and per meter square

The data on spike yield per plant and per meter square in dendrobium orchid as influenced by growing conditions, varieties and their interaction are presented in Table 4. In the present investigation, plants grown under polyhouse environment recorded highest number of spikes per plant and per m<sup>2</sup> (1.48 and 51.63 respectively) as compare to shade house (1.28 and 44.92 respectively). This variation might be due to desirable optimum light intensity in combination with warmer environment and higher relative humidity inside the polyhouse. The polyhouse might have increased number of flowers had positive and significant correlation with shoots and pseudobulbs production. Thus, the increased number of leaves, leaf area on plant growth helped in better way to synthesis of carbohydrates and their utilization to give up extra growth, thereby increasing the production of spikes as compare to shade house. These results are in close conformity with the findings of Negi<sup>8</sup>, and Kaveriamma<sup>3</sup>, in phalaenopsis. These findings are also in findings Mohanty *et al.*<sup>6</sup>, in rose and Naik and Kumar<sup>7</sup>, in dendrobium.

Varieties showed significant influence for spike yield per plant which was ranged

from 1.77 to 1.13. The var. Big White ( $V_7$ ) recorded highest number of spikes per plant (1.77) and it was on par with var. Mono Red ( $V_2$ ) followed by var. Bubble Gum ( $V_4$ ) (1.60 and 1.43 respectively). Whereas, it was lowest (1.17) in var. Burana Jade ( $V_6$ ) and var. Nopporn Pink ( $V_8$ ). Maximum spike yield per square meter (61.83) was recorded in var. Big White ( $V_7$ ) and it was on par with var. Mono Red ( $V_2$ ) followed by var. Bubble Gum ( $V_4$ ) (56.00 and 50.17 respectively). While, minimum number of spikes per square meter (40.83) was found in var. Burana Jade ( $V_6$ ) and var. Nopporn Pink ( $V_8$ ). It could be due to influence of genetic makeup of the varieties. Increased number of flowers had positive and significant correlation with shoots, pseudobulbs, leaf length and leaf width. Thus, the increased number of leaves, leaf area on plant growth helped in better synthesis of carbohydrates and their utilization to build up extra growth, thereby increasing the production of flowers. Similar kinds of results were reported in dendrobium by previous authors like Ramachandradu<sup>9</sup>, Sugapriya *et al.*<sup>11</sup>, Gopal *et al.*<sup>1</sup>, Kumar and Sharma<sup>4</sup>, Naik and Kumar<sup>7</sup>, and Mehraj *et al.*<sup>5</sup>.

In polyhouse condition, var. Big White recorded maximum spike yield per plant and per meter square (2.07 and 72.33 respectively) and minimum spike yield (1.13 and 39.67 respectively) was noticed under shade house in Burana Jade and Nopporn Pink. Variation in spike yield might be due to interaction of varieties with varying genetically controlled character and environmental factors. Similar variation was also observed previously by Negi<sup>8</sup>, and Kaveriamma<sup>3</sup>, in phalaenopsis, Mohanty *et al.*<sup>6</sup>, in rose and Naik and Kumar<sup>7</sup>, in dendrobium.

Data indicates that the vase life results were differed significantly. There was a statistical difference in the vase life of growing conditions. Relatively longer vase life was recorded in flower grown under polyhouse condition (31.38 days) than shade house condition (29.058 days). Similar findings were previously observed by Mohanty *et al.*<sup>6</sup>, in

rose and Naik and Kumar<sup>7</sup>, in dendrobium. Varieties showed significant influence on vase life of spikes. Var. Mono Red and Big White had longest vase life (40.00 and 40.00 days each respectively) followed by Ear Sakul (32.50 days). While shortest vase life of 20.83 days was recorded in var Nopporn Pink. Higher vase life probably due to strong genetic makeup of the variety. These results are in accordance with earlier reports of

Ramachandradu<sup>9</sup>, Sugapriya *et al.*<sup>11</sup>, and Gopal *et al.*<sup>1</sup>. Growing conditions and varieties had shown significant influence on vase life of spikes. Relatively longest vase life was recorded in Mono Red and Big White (40.00 and 40.00 days each respectively) spikes grown under polyhouse, While shortest vase life of 19.33 days was recorded in variety Nopporn Pink under shade house.

**Table 1: Days taken for bud initiation , spike emergence to first floret opening and first floret open to harvest of dendrobium as influenced by growing conditions, varieties and interaction effect**

Varieties (V)	Days taken for bud initiation (Days)			Days taken for spike emergence to first floret opening (Days)			Days taken form first floret opening to harvest (Days)		
	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean
V <sub>1</sub> -Ear Sakul	265.80	291.73	278.77	35.91	36.53	36.22	27.96	30.67	29.31
V <sub>2</sub> -Mona Red	210.33	238.67	224.50	30.82	32.00	31.41	36.35	40.60	38.48
V <sub>3</sub> -Charming White	343.70	363.20	353.45	31.85	36.59	34.22	30.18	33.92	32.05
V <sub>4</sub> -Bubble Gum	366.33	395.47	380.90	37.95	43.73	40.84	39.25	40.92	40.08
V <sub>5</sub> -Sonia-17	260.40	299.73	280.07	31.00	33.52	32.26	26.80	29.03	27.92
V <sub>6</sub> -Burana Jade	399.47	425.37	412.42	39.25	47.80	43.52	32.58	34.50	33.54
V <sub>7</sub> -Big White	201.00	227.73	214.37	30.33	30.51	30.42	34.50	37.17	35.83
V <sub>8</sub> -Nopporn Pink	285.33	313.07	299.20	35.46	39.60	37.53	29.66	31.00	30.33
Mean	291.55	319.37	305.46	33.17	36.82	34.99	32.16	34.73	33.44
	G	V	G X V	G	V	G X V	G	V	G X V
S.E.M. <sub>±</sub>	4.80	9.60	13.57	0.47	0.94	1.33	0.54	1.09	1.54
CD ( P=0.05)	13.82	27.65	NS	1.35	2.70	3.82	1.57	3.13	NS

**Table 2: Spike length, rachis length and number of florets per spike of dendrobium as influenced by growing conditions and varieties**

Varieties (V)	Spike length (cm)			Rachis length (cm)			Number of florets per spike		
	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean
V <sub>1</sub> -Ear Sakul	30.25	32.92	31.59	14.94	16.52	15.73	4.67	4.90	4.78
V <sub>2</sub> -Mona Red	38.47	36.60	37.54	26.36	19.76	23.06	7.37	6.47	6.92
V <sub>3</sub> -Charming White	27.60	22.95	25.27	14.23	13.67	13.95	5.43	5.20	5.32
V <sub>4</sub> -Bubble Gum	35.92	32.36	34.14	20.17	20.00	20.08	7.83	7.27	7.55
V <sub>5</sub> -Sonia-17	28.43	27.85	28.14	15.54	15.04	15.29	4.53	4.40	4.47
V <sub>6</sub> -Burana Jade	22.27	19.17	20.72	12.27	11.02	11.64	6.27	5.40	5.83
V <sub>7</sub> -Big White	35.59	36.66	36.12	21.90	19.73	20.82	6.47	6.27	6.37
V <sub>8</sub> -Nopporn Pink	28.64	21.70	25.17	15.06	10.91	12.99	4.07	3.33	3.70
Mean	30.90	28.78	29.84	17.56	15.83	16.70	5.83	5.40	5.61
	G	V	G X V	G	V	G X V	G	V	G X V
S.E.M. <sub>±</sub>	0.44	0.89	1.26	0.39	0.79	1.11	0.11	0.22	0.32
CD ( P=0.05)	1.28	2.56	3.62	1.13	2.26	3.20	0.32	0.65	0.91

**Table 3: Floret diameter, spike girth and spike weight of dendrobium as influenced by growing conditions and varieties**

Varieties (V)	Floret Diameter (cm)			Spike girth (mm)			Spike weight (g)		
	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean
V <sub>1</sub> -Ear Sakul	8.51	6.57	7.54	3.92	3.65	3.79	15.71	13.51	14.61
V <sub>2</sub> -Mona Red	8.84	7.22	8.03	4.39	3.80	4.10	25.47	20.49	22.98
V <sub>3</sub> -Charming White	6.45	5.75	6.10	3.37	3.06	3.22	13.40	9.87	11.64
V <sub>4</sub> -Bubble Gum	6.15	7.13	6.64	3.51	3.31	3.41	15.44	14.65	15.05
V <sub>5</sub> -Sonia-17	8.47	8.33	8.40	4.04	3.41	3.72	13.61	13.51	13.56
V <sub>6</sub> -Burana Jade	4.75	4.65	4.70	3.29	3.26	3.28	10.40	9.49	9.94
V <sub>7</sub> -Big White	6.39	6.30	6.34	3.68	3.54	3.61	20.93	15.12	18.03
V <sub>8</sub> -Nopporn Pink	6.72	6.08	6.40	3.45	3.04	3.25	13.23	11.13	12.18
<b>Mean</b>	7.04	6.50	6.76	3.71	3.38	3.55	16.02	13.47	14.75
	<b>G</b>	<b>V</b>	<b>G X V</b>	<b>G</b>	<b>V</b>	<b>G X V</b>	<b>G</b>	<b>V</b>	<b>G X V</b>
<b>S.E.M.<sub>±</sub></b>	0.15	0.30	0.42	0.03	0.07	0.10	0.34	0.68	0.96
<b>CD ( P=0.05)</b>	0.43	0.85	1.21	0.10	0.20	0.28	0.97	1.95	2.75

**Table 4: Number of spikes per plant, spike yield per square meter and vase life of dendrobium as influenced by growing condition and varieties**

Varieties (V)	Number of spikes per plant			Number of spikes per square meter			Vase life (Days)		
	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean	G <sub>1</sub>	G <sub>2</sub>	Mean
V <sub>1</sub> -Ear Sakul	1.33	1.33	1.33	46.67	46.67	46.67	34.00	31.00	32.50
V <sub>2</sub> -Mona Red	1.80	1.40	1.60	63.00	49.00	56.00	40.00	40.00	40.00
V <sub>3</sub> -Charming White	1.33	1.20	1.27	46.67	42.00	44.33	26.33	24.67	25.50
V <sub>4</sub> -Bubble Gum	1.60	1.27	1.43	56.00	44.33	50.17	35.00	29.67	32.33
V <sub>5</sub> -Sonia-17	1.27	1.33	1.30	44.33	46.67	45.50	27.67	26.00	26.83
V <sub>6</sub> -Burana Jade	1.20	1.13	1.17	42.00	39.67	40.83	25.67	22.00	23.83
V <sub>7</sub> -Big White	2.07	1.47	1.77	72.33	51.33	61.83	40.00	40.00	40.00
V <sub>8</sub> -Nopporn Pink	1.20	1.13	1.17	42.00	39.67	40.83	22.33	19.33	20.83
<b>Mean</b>	1.48	1.28	1.38	51.63	44.92	48.27	31.38	29.08	30.23
	<b>G</b>	<b>V</b>	<b>G X V</b>	<b>G</b>	<b>V</b>	<b>G X V</b>	<b>G</b>	<b>V</b>	<b>G X V</b>
<b>S.E.M.<sub>±</sub></b>	0.03	0.06	0.09	1.09	2.18	3.09	0.16	0.31	0.44
<b>CD ( P=0.05)</b>	0.09	0.18	0.25	3.14	6.29	8.89	0.45	0.90	1.27

### CONCLUSION

Results from the present investigation it can be concluded that improvement in flower quality and flower production was found under polyhouse as compare to shade house condition. Variety Mono Red, var. Big White and var. Bubble Gum were early in flowering and superior in production of better quality of spike as compare to other varieties. Var. Big White and var. Mono Red were found were found promising for cut flower production under eastern dry zone condition of Karnataka.

### REFERENCES

- Gopal, B., Srinivas, P. T. and Naik, M. H., Evaluation of performance of Dendrobium orchid hybrids. *J. Res. ANGRAU.*, **41(1)**: 93-95 (2012).
- Kallihal., Reddy, B.S., Kulakarni, B.S. and Kamble, B.S., Effect of growing environment on different cultivars of carnation. *Asian. J. Hort.* **2(2)**: 88-93 (2005).
- Kaveramma, Comparative performance of eight phalaenopsis varieties on different growing condition. *P.hD. (Hort) Thesis, Kerala. Agric. Univ., Thrisur* (2012).
- Kumar and Sharma., Studies on performance, genetic variability, heritability and correlation of Dendrobium orchids under agro-climatic conditions of Pasighat Arunachal Pradesh. *Int. J. Agri. Envi. Biotech.*, **6 (1)**: 101-108 (2013).

5. Mehraj, H., Shikha, K. J., Nusrat, A., Shiam, I. H. and Jamal Uddin, F. M., Growth and flowering behaviour of *Dendrobium* cultivars. *J. Bioscie. Agri. Res.*, **2(2)**: 90-95 (2014).
6. Mohanthy, C.R., Mohanthy, A., Das, A.B. and Kar, D.S., Comparative performance of some rose varieties under open and protected environment. *Asian. J. Hort.* **6(2)**: 288-293 (2011).
7. Naik. M. and Kumar. K, Effect of various plant growth promoters and growing conditions on flowering of *Dendrobium* cv. Earsakul. *J. Agric. Technol.*, **1(1)**: 25-35 (2014).
8. NEGI, Performance of phalaenopsis varieties on different growing condition. *M.Sc.(Hort) Thesis, Kerala. Agric. Univ., Thrisur* (2012).
9. Ramachandrudu, K., Performance of *Dendrobium* orchids under agro-climatic conditions of Goa. *J. Ornt. Hort.*, **11(3)**: 232-236 (2006).
10. Shwetha, B., Assesment of gerbera cultivars under different growing conditions. *M.Sc. (Hort) Thesis, Bagalkot. Hort. Univ., Karnataka* (2013).
11. Sugapriya, S., Mathad, J. C., Patil, A. A., Hegder. V., Lingaraju, S. and Biradar, M. S., Evaluation of *Dendrobium* orchids for growth and yield grown under greenhouse. *Karnataka J. Agric. Sci.*, **25(1)**: 104-107 (2012).