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# Vase Life Studies on *Dendrobium* Cut Flowers Grown under Different Environment Conditions

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## ABSTRACT

*The present investigation was carried out at orchidorium, Regional Horticultural Research and Extension Centre, University of Horticultural Sciences campus, GKVK, Bengaluru during May 2017. The results indicated a significant influence on Fresh weight of spikes, cumulative water uptake, cumulative water loss and vase life of Dendrobium cut flowers as influenced by growing conditions and varieties. Fresh weight of spikes was observed maximum in var. Mona Red and var. Big White throughout the study. Highest cumulative water uptake (57.40 g) was observed in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (47.07 g). Whereas, it was lowest (18.30 g) in var. Burana Jade ($V_6$) Maximum cumulative water loss (48.11 g) was obtained under polyhouse condition ($G_1$) than the shadehouse condition ($G_2$) (39.68).With respect to Dendrobium varieties, cumulative water loss had showed significant effect. Highest amount of water loss (80.89 g) was recorded in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (76.10 g).Whereas, lowest (22.89 g) was noticed in var. Charming White ($V_3$).Relatively longer vase life of flowers was observed from polyhouse condition ($G_1$ (31.38 days) than shadehouse condition (29.08 days).Varieties showed significant influence on vase life of spikes. Variety Mona Red ($V_2$) and var. Big White ($V_7$) had longest vase life (40.00 and 40.00 days each respectively) followed by var. Ear Sakul ($V_1$) (32.50 days).While shortest vase life of 20.83 days was recorded in var. Nopporn Pink ($V_8$).*

***Key words:*** *Vase, Cumulative, Dendrobium*

## 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. 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.

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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 extending the flower life. Keeping this in view, the present investigation was undertaken to evaluate the performance of *Dendrobium* varieties for extending the vase life of cut flowers.

## MATERIAL AND METHODS

The present investigation was carried out at orchidorium, 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 (V1), Mono Red (V2), Charming White (V3), Bubble Gum (V4), Sonia-17 (V5), Burana Jade (V6), Big White (V7) and Nopporn Pink (V8) under naturally ventilated polyhouse (G1), and 50 per shade house condition (G2). Fresh weight of spikes, cumulative water uptake, cumulative water loss and vase life of *Dendrobium* cut flowers as influenced by growing conditions and varieties. The spikes were harvested, when all the florets were fully opened, soon after harvesting spikes were placed in bucket containing fresh water to remove the latent heat. Later the cut ends of spike were cut at uniform length. Such spikes were placed in 500 ml borsil conical flasks containing tap water. The weight of flask and without flower stalk were recorded observation on water uptake, transpiration loss and fresh weight of spikes were recorded at four days interval. Spikes were observed daily till they were found unfit for keeping in vase. Fading of florets was considered as end of vase life of flowers. Vase life was expressed in terms of days from the date of harvest till appearance of fading symptoms.

**a. Cumulative water uptake**

Difference between the initial weight (on the first day) and final weight (on the last day of vase life) of conical flask plus water gives the cumulative water uptake of cut flowers and expressed in grams per cut flower.

**b. Cumulative water loss**

Difference between the initial weight (on the first day) and final weight (on the last day of vase life) of cut flower along with conical flask and water gives the cumulative transpiration loss of water of cut flower and expressed in grams per flower.

**c. Fresh weight of spike (g)**

The difference between the weight of conical flask + water + flower spike and weight of conical flask + water represents the fresh weight of the flowers and expressed in grams per flower.

**d. Vase life (Days)**

Vase life of cut flowers was expressed in terms of days from the date of harvest till appearance of fading symptoms.

## RESULTS AND DISCUSSION

The experimental results revealed a significant variation on cumulative water uptake and cumulative water loss as influence by growing environment and *Dendrobium* varieties on vase are presented in table 1. Influence of growing conditions in *Dendrobium* orchid had shown significant effect with respect to cumulative water uptake. Maximum cumulative water uptake of 34.14g was obtained from flowers grown under polyhouse condition ($G_1$) as compared to shadehouse condition ($G_2$) (29.29). This may be due to flowers grown under polyhouse had longer and thicker stems it leads to higher level of metabolic activity compared to shadehouse. Similar results were previously confirmed by Mohanty *et al*.[3] in rose and Naik and Kumar[4] in *Dendrobium*. Cumulative water uptake had showed significant effect on varieties of *Dendrobium*. Among the varieties, highest cumulative water uptake (57.40 g) was observed in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (47.07 g). Whereas, it was lowest (18.30 g) in var. Burana Jade ($V_6$). The interaction between growing conditions and varieties was found significant effect on cumulative uptake of water. However, maximum cumulative water uptake (65.04 g)

was recorded in $G_1$x $V_2$ (Polyhouse x var. Mona Red) followed by $G_2$x $V_2$ (Shadehouse x var. Mona Red) and minimum (17.27 g) was noticed in $G_2$ x $V_6$ (Shadehouse x var. Burana Jade). These variations might be attributed to genetic makeup and physiological difference among the genotypes as reported by the results of Ramachandradu[5], Sugapriya *et al.*[6] and Gopal *et al.*[1].

Influence of growing conditions in *Dendrobium* orchid had shown significant results with respect to cumulative water loss. Maximum cumulative water loss (48.11 g) was obtained under polyhouse condition ($G_1$) than the shadehouse condition ($G_2$) (39.68).With respect to *Dendrobium* varieties, cumulative water loss had showed significant effect. Highest amount of water loss (80.89 g) was recorded in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (76.10 g). Whereas, lowest (22.89 g) was noticed in var. Charming White ($V_3$). The interaction between growing conditions and varieties were found significant with respect to cumulative water loss. However, maximum water loss (85.71 g) was recorded in $G_1$x $V_2$ (Polyhouse x var. Mona Red) followed by $G_1$x $V_7$ (Polyhouse x var. Big White) (78.73 g) and minimum loss of water (20.83 g) was noticed in $G_2$ x $V_3$ (Shadehouse x var. Charming White). This variation may be due to flowers grown under polyhouse had stronger stems it leads to higher level of metabolic activity as compared to shadehouse. These results were previously observed by Mohanty *et al.*[3] in rose and Naik and Kumar[4] in *Dendrobium*.

Fresh weight of spikes in vase of *Dendrobium* as influenced by growing conditions, varieties and their interactions are presented in Table 2 a, b, c and d. On first day of vase period, significantly higher fresh weight was recorded in cut flowers of *Dendrobium* (16.63 g) grown under polyhouse condition as compared to shadehouse condition (14.64 g). Among varieties, fresh weight was maximum (22.62 g) in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) *Viz.*18.51g. While, lowest (10.96 g) was recorded in var. Burana Jade ($V_6$). Interaction between growing conditions and varieties indicated that, highest fresh weight of spikes was recorded in $G_1V_2$ (24.84 g) followed by $G_2V_2$ (20.39 g) and it was lowest in $G_2V_6$ (10.32 g). Fourth day of vase period significantly increases fresh weight of spike. Highest fresh weight of spikes (17.12 g) was noticed under polyhouse condition ($G_1$) and lowest (14.93 g) in shadehouse condition ($G_2$). *Dendrobium* varieties had significant effect on maintaining fresh weight of spike, maximum fresh weight (23.18 g) was observed in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) *Viz.*, 18.99 g and minimum (10.86 g) was noticed in var. Burana Jade ($V_6$). Interaction between growing conditions and varieties showed highest fresh weight of spikes (25.47 g) in $G_1V_2$ (Polyhouse x var. Mona Red) and lowest in $G_2V_6$ (Shadehouse x var. Burana Jade) (10.19 g).

On 8$^{th}$ day, significantly maximum fresh weight of spikes (16.81 g) was observed in flowers harvested from polyhouse condition ($G_1$) and minimum (14.89 g) under shadehouse condition ($G_2$). Among varieties, highest fresh weight (23.72 g) in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (19.72 g) and lowest (10.58 g) was in var. Burana Jade ($V_6$). Interaction effect between growing conditions and varieties had showed significant results, maximum fresh weight of spikes in $G_1V_2$ (25.87 g) and lowest in $G_2V_6$ (10.12 g). On 12$^{th}$ day of vase, higher fresh weight of spikes was recorded (15.90 g) in flowers harvested from polyhouse condition ($G_1$) and lowest (14.12 g) in shadehouse condition ($G_2$). Varieties had shown significant effect, maximum spike weight (22.71 g) was observed in var. Mona Red ($V_2$) and minimum (9.77 g) was noticed in var. Burana Jade ($V_6$). Interaction between growing conditions and varieties shown significant effect, highest fresh weight of spikes (25.07 g) in $G_1V_2$ (Polyhouse x var. Mona Red) and it was lowest (9.40) in $G_2V_8$ (Shadehouse x var. Nopporn Pink).

Sixteenth day on vase period, significantly maximum fresh weight of spikes was recorded (14.51 g) in flowers harvested from polyhouse condition ($G_1$) than the

shadehouse condition ($G_2$) (13.01 g). Among varieties, highest fresh weight (21.21 g) in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (17.57 g) and lowest (8.12 g) was in var. Nopporn Pink ($V_8$). Interaction effect between growing conditions and varieties had showed significant effect, highest fresh weight of spike in $G_1V_2$ (23.74 g) and lowest was observed in $G_2V_8$ (7.74 g) treatment combination. On 20$^{th}$ day of vase period, fresh weight of spikes was higher (13.24 g) under polyhouse condition ($G_1$) and lowest (11.37 g) in shadehouse condition ($G_2$). Varieties had shown significant effect on fresh weight of flowers, maximum (18.71 g) was observed in var. Mona Red ($V_2$) and lowest (4.04 g) in var. Nopporn Pink ($V_8$). Interaction between growing conditions and varieties shown significant effect, highest weight of spikes (20.74 g) was in $G_1V_2$ (Polyhouse x var. Mona Red) treatment combination followed by $G_1V_6$(Polyhouse x var. Big White)and treatment combination $G_2V_8$ cut flowers start wilting at 20$^{th}$ day.

On twenty fourth day of vase period, growing condition had significant effect on fresh weight of spikes. Flowers harvested from polyhouse condition ($G_1$) produce maximum fresh weight of spikes (10.63 g) and minimum in (8.76 g) in shadehouse condition ($G_2$). Among varieties, higher fresh weight of spikes (16.04 g) in var. Mona Red ($V_2$) followed by var. Big White ($V_7$) (14.07 g) and var. Nopporn Pink ($V_8$) flowers were wilted. Interaction effect between growing conditions and varieties had showed significant effect, highest spike weight was registered in $G_1V_2$ (17.40 g), whereas, $G_1V_8$ (Polyhouse x var. Nopporn Pink) treatment combination flowers were wilted in 24$^{th}$ day. On 28$^{th}$ day of vase period, fresh weight of spikes was highest (5.70 g) under polyhouse than the shadehouse condition. Varieties had shown significant effect on fresh weight, maximum fresh weight of spikes (12.96 g) was observed in var. Mona Red ($V_2$), var. Charming White ($V_3$), var. Burana Jade ($V_6$) and var. Sonia-17 ($V_5$) flowers were wilted at 28$^{th}$ day. Interaction between growing conditions and varieties shown significant effect, highest fresh weight of spikes (14.04 g) was in $G_1V_2$(Polyhouse x var. Mona Red). The treatment combination $G_1V_3$, $G_1V_5$ $G_1V_6$, $G_2V_3$, $G_2V_5$ and $G_2V_6$ flowers were wilted in vase.

On 32$^{nd}$ day, significantly maximum fresh weight of spike (4.57 g) was recorded under polyhouse condition ($G_1$) and minimum was observed in (2.47 g) shadehouse condition ($G_2$). Among varieties, var. Mona Red ($V_2$) recorded highest fresh weight of spike (10.87 g) followed by var. Big White ($V_7$) (8.35 g) and lowest in var. Bubble Gum. Interaction effect between growing conditions and varieties had showed significant variation in fresh weight of spike. Higher fresh weight of spike was recorded in $G_1V_2$ (11.40 g) and treatment combination of $G_2V_1$ and $G_2V_4$ flowers were wilted in vase at 32$^{nd}$ day. Thirty six$^{th}$ day of vase period, highest fresh weight of spike (2.37 g) was recorded under polyhouse condition ($G_1$) and it was lowest in shadehouse condition ($G_2$). Varieties had shown significant effect with respect to spike weight, whereas fresh weight of spike was highest (8.87 g) in var. Mona Red ($V_2$). Flowers of var. Ear Sakul ($V_1$) and var. Bubble Gum ($V_4$) flowers were wilted at 36$^{th}$ day in vase. Interaction between growing conditions and varieties shown significant effect on fresh weight of spike, highest fresh weight of spikes (10.47 g) was recorded in $G_1V_2$(Polyhouse x var. Mona Red). On 36$^{th}$ day, treatment combinations with $G_1V_1$ and$G_1V_4$ flowers were wilted in vase. On 40$^{th}$ day of vase period, fresh weight of spike was highest (2.08 g) in flowers harvested from polyhouse condition ($G_1$) and lowest (1.81 g) in shadehouse condition ($G_2$). Maximum spike weight (7.88 g) was observed in var. Mona Red ($V_2$) followed by var. Big White ($V_6$). Interaction between growing conditions and varieties shown significant effect with respect to fresh weight, highest fresh weight of spike (8.40 g) was observed in $G_1V_2$ (Polyhouse x var. Mona Red) followed by (8.22 g) in $G_1V_7$(Polyhouse x var. Big White) and lowest in shadehouse. This variation might be due genetic characters of varieties and also get more studier and strong quality stems in polyhouse as compared

to shadehouse condition, the longevity vase flowers might be due to higher levels of accumulated photosynthates. Constant maintenance of fresh weight and gradual decrease in fresh weight of cut flowers is an important prerequisite for extending vase life of any cut flower. Similar variation was previously observed by Mohanty *et al*.[3] in rose and Naik and Kumar[4] in *Dendrobium*.

Results of the vase life studies of *Dendrobium* cut flower as influenced by growing conditions and varieties is presented in Table 3. Data indicates that the vase life differed significantly. There was a statistical difference in the vase life of growing conditions. Relatively longer vase life of flowers was observed from polyhouse condition ($G_1$ (31.38 days) than shadehouse condition (29.08 days). Varieties showed significant influence on vase life of spikes. Variety Mona Red ($V_2$) and var. Big White ($V_7$) had longest vase life (40.00 and 40.00 days each respectively) followed by var. Ear Sakul ($V_1$) (32.50 days).While shortest vase life of 20.83 days was recorded in var. Nopporn Pink ($V_8$). Higher vase life probably due to strong genetic makeup of the variety. These results are in accordance with earlier reports of Ramachandradu[5], Sugapriya *et al.*[6] and Gopal *et al.*[1] in *Dendrobium* orchid. Growing conditions and varieties had shown significant difference for vase life of cut flowers. Relatively longest vase life was observed in $G_1$x $V_2$ and $G_1$x $V_7$ (40.00 and 40.00 days each respectively) followed by $G_1$x $V_4$ (Polyhouse x var. Bubble Gum) (35.00 days) .While shortest vase life of 19.33 days was recorded in $G_2$ x $V_8$ (Shadehouse x var. Nopporn Pink). This variation might be due genetic characters of varieties and also get more studier and strong quality stems under polyhouse as compare to shadehouse. Similar variation was previously observed by Mohanty *et al*.[3] in rose and Naik and Kumar[4] in *Dendrobium*.

**Table 1: Cumulative water uptake (g) and cumulative water loss of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| | **Cumulative water uptake** | | | **Cumulative water loss** | | |
|---|---|---|---|---|---|---|
| **Varieties (V)** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | 37.85 | 30.25 | 34.05 | 54.61 | 30.09 | 42.35 |
| $V_2$-Mona Red | 65.04 | 49.76 | 57.40 | 85.71 | 76.07 | 80.89 |
| $V_3$- Charming White | 22.26 | 20.47 | 21.37 | 24.94 | 20.83 | 22.89 |
| $V_4$-Bubble Gum | 33.82 | 30.34 | 32.08 | 49.69 | 36.18 | 42.93 |
| $V_5$-Sonia-17 | 27.78 | 26.15 | 26.97 | 35.47 | 36.47 | 35.97 |
| $V_6$-Burana Jade | 19.32 | 17.27 | 18.30 | 25.32 | 22.43 | 23.88 |
| $V_7$-Big White | 48.86 | 45.28 | 47.07 | 78.73 | 73.48 | 76.10 |
| $V_8$-Nopporn Pink | 18.21 | 14.78 | 16.50 | 30.41 | 21.92 | 26.17 |
| **Mean** | 34.14 | 29.29 | 31.71 | 48.11 | 39.68 | 43.90 |
| | **G** | **V** | **G X V** | **G** | **V** | **G X V** |
| **S.Em ±** | 1.11 | 2.21 | 3.13 | 0.95 | 1.90 | 2.68 |
| **C.D.@ 5%** | 3.19 | 6.37 | 9.19 | 2.73 | 5.46 | 7.73 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

**Table 2a: Fresh weight (g) of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| Fresh weight (g) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1st Day | | | 4th Day | | | 8th Day | | |
| **Varieties(V)** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | 17.71 | 14.68 | 16.19 | 18.53 | 15.08 | 16.80 | 19.07 | 15.57 | 17.32 |
| $V_2$-Mona Red | 24.84 | 20.39 | 22.62 | 25.47 | 20.89 | 23.18 | 25.87 | 21.57 | 23.72 |
| $V_3$- Charming White | 14.20 | 12.89 | 13.54 | 14.83 | 13.30 | 14.06 | 13.96 | 12.57 | 13.26 |
| $V_4$-Bubble Gum | 16.33 | 15.90 | 16.12 | 16.96 | 16.24 | 16.60 | 16.05 | 15.84 | 15.95 |
| $V_5$-Sonia-17 | 15.43 | 15.19 | 15.31 | 16.25 | 15.76 | 16.00 | 15.30 | 15.24 | 15.27 |
| $V_6$-Burana Jade | 11.60 | 10.32 | 10.96 | 11.54 | 10.19 | 10.86 | 11.04 | 10.12 | 10.58 |
| $V_7$-Big White | 20.13 | 16.88 | 18.51 | 20.62 | 17.35 | 18.99 | 21.15 | 18.28 | 19.72 |
| $V_8$-Nopporn Pink | 12.80 | 10.83 | 11.82 | 12.73 | 10.66 | 11.70 | 12.01 | 9.94 | 10.97 |
| **Mean** | 16.63 | 14.64 | 15.63 | 17.12 | 14.93 | 16.02 | 16.81 | 14.89 | 15.85 |
| | **G** | **V** | **G X V** | **G** | **V** | **G X V** | **G** | **V** | **G X V** |
| **S.Em ±** | 0.24 | 0.48 | 0.68 | 0.24 | 0.47 | 0.67 | 0.22 | 0.43 | 0.61 |
| **C.D.@ 5%** | 0.70 | 1.39 | 1.97 | 0.68 | 1.37 | 1.93 | 0.62 | 1.24 | 1.76 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

**Table 2b: Fresh weight (g) of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| Fresh weight (g) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 12th Day | | | 16th Day | | | 20th Day | | |
| **Varieties (V)** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | 18.07 | 14.77 | 16.42 | 16.74 | 13.77 | 15.26 | 14.74 | 12.77 | 13.76 |
| $V_2$-Mona Red | 25.07 | 20.34 | 22.71 | 23.74 | 18.67 | 21.21 | 20.74 | 16.67 | 18.71 |
| $V_3$- Charming White | 12.92 | 11.84 | 12.38 | 12.12 | 11.18 | 11.65 | 11.45 | 10.84 | 11.15 |
| $V_4$-Bubble Gum | 15.01 | 15.18 | 15.09 | 14.34 | 14.28 | 14.31 | 13.34 | 13.61 | 13.48 |
| $V_5$-Sonia-17 | 14.93 | 14.76 | 14.85 | 13.60 | 13.76 | 13.68 | 12.60 | 13.09 | 12.85 |
| $V_6$-Burana Jade | 10.08 | 9.45 | 9.77 | 8.41 | 8.12 | 8.27 | 8.08 | 7.79 | 7.93 |
| $V_7$-Big White | 20.25 | 17.22 | 18.74 | 18.59 | 16.55 | 17.57 | 16.92 | 16.22 | 16.57 |
| $V_8$-Nopporn Pink | 10.84 | 9.40 | 10.12 | 8.51 | 7.74 | 8.12 | 8.07 | - | 4.04 |
| **Mean** | 15.90 | 14.12 | 15.01 | 14.51 | 13.01 | 13.76 | 13.24 | 11.37 | 12.31 |
| | **G** | **V** | **G X V** | **G** | **V** | **G X V** | **G** | **V** | **G X V** |
| **S.Em ±** | 0.24 | 0.48 | 0.68 | 0.25 | 0.50 | 0.71 | 0.29 | 0.58 | 0.82 |
| **C.D.@ 5%** | 0.69 | 1.39 | 1.96 | 0.72 | 1.44 | 2.03 | 0.83 | 1.67 | 2.36 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

**Table 2c: Fresh weight (g) of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| Fresh weight (g) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 24th Day | | | 28th Day | | | 32th Day | | |
| **Varieties (V)** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | 13.91 | 11.11 | 12.51 | 11.57 | 8.71 | 10.14 | 8.91 | - | 4.45 |
| $V_2$-Mona Red | 17.40 | 14.67 | 16.04 | 14.40 | 11.51 | 12.96 | 11.40 | 10.34 | 10.87 |
| $V_3$- Charming White | 10.12 | 10.14 | 10.13 | - | - | - | - | - | - |
| $V_4$-Bubble Gum | 11.34 | 10.49 | 10.92 | 8.68 | 8.39 | 8.53 | 7.34 | - | 3.67 |
| $V_5$-Sonia-17 | 10.60 | 9.79 | 10.19 | - | - | - | - | - | - |
| $V_6$-Burana Jade | 7.41 | - | 3.70 | - | - | - | - | - | - |
| $V_7$-Big White | 14.25 | 13.88 | 14.07 | 10.92 | 10.55 | 10.74 | 8.92 | 7.78 | 8.35 |
| $V_8$-Nopporn Pink | - | - | - | - | - | - | - | - | - |
| **Mean** | 10.63 | 8.76 | 9.69 | 5.70 | 5.16 | 5.43 | 4.57 | 2.47 | 3.52 |
| | **G** | **V** | **G X V** | **G** | **V** | **G X V** | **G** | **V** | **G X V** |
| **S.Em ±** | 0.22 | 0.44 | 0.62 | 0.16 | 0.32 | 0.45 | 0.15 | 0.30 | 0.42 |
| **C.D.@ 5%** | 0.63 | 1.27 | 1.80 | 0.46 | 0.91 | 1.29 | 0.43 | 0.86 | 1.22 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

**Table 2d: Fresh weight (g) of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| Fresh weight (g) | | | | | | |
|---|---|---|---|---|---|---|
| | 36th Day | | | 40th Day | | |
| **Varieties (V)** | **$G_1$** | **$G_2$** | **Mean** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | - | - | - | - | - | - |
| $V_2$-Mona Red | 10.07 | 7.67 | 8.87 | 8.40 | 7.35 | 7.88 |
| $V_3$- Charming White | - | - | - | - | - | - |
| $V_4$-Bubble Gum | - | - | - | - | - | - |
| $V_5$-Sonia-17 | - | - | - | - | - | - |
| $V_6$-Burana Jade | - | - | - | - | - | - |
| $V_7$-Big White | 8.92 | 7.47 | 8.20 | 8.22 | 7.10 | 7.66 |
| $V_8$-Nopporn Pink | - | - | - | - | - | - |
| **Mean** | 2.37 | 1.89 | 2.13 | 2.08 | 1.81 | 1.94 |
| | **G** | **V** | **G X V** | **G** | **V** | **G X V** |
| **S.Em ±** | 0.06 | 0.13 | 0.18 | 0.04 | 0.08 | 0.12 |
| **C.D.@ 5%** | 0.19 | 0.37 | 0.53 | 0.12 | 0.24 | 0.33 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

**Table 3: Vase life (Days) of *Dendrobium* cut flower in vase as influenced by growing conditions and varieties**

| Vase life (Days) | | | |
|---|---|---|---|
| **Varieties (V)** | **$G_1$** | **$G_2$** | **Mean** |
| $V_1$-Ear Sakul | 34.00 | 31.00 | 32.50 |
| $V_2$-Mona Red | 40.00 | 40.00 | 40.00 |
| $V_3$- Charming White | 26.33 | 24.67 | 25.50 |
| $V_4$-Bubble Gum | 35.00 | 29.67 | 32.33 |
| $V_5$-Sonia-17 | 27.67 | 26.00 | 26.83 |
| $V_6$-Burana Jade | 25.67 | 22.00 | 23.83 |
| $V_7$-Big White | 40.00 | 40.00 | 40.00 |
| $V_8$-Nopporn Pink | 22.33 | 19.33 | 20.83 |
| **Mean** | 31.38 | 29.08 | 30.23 |
| | **G** | **V** | **G X V** |
| **S.Em ±** | 0.16 | 0.31 | 0.44 |
| **C.D.@ 5%** | 0.45 | 0.90 | 1.27 |

$G_1$: Polyhouse $G_2$: Shadehouse V: Varieties

## CONCLUSION

Varieties Mona Red and Big White grown under polyhouse has higher vase life might be due its genetic characters of varieties and also get more studier and strong quality stems. These two varieties have relatively longer vase life as compare to rest of varieties.

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