Performance of different Dieffenbachia (*Dieffenbachia seguine*) varieties under Prayagraj agro-climatic conditions

ABSTRACT

The present investigation was under taken in the Department of Horticulture, Naini Agricultural Institute,Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj duringAugust, 2023 to February, 2024. The experiment was laid out in Completely Randomized Design with eight different dieffenbachia varieties,*viz.*Tropic Marianne,Star Bright, Picta,Sterling,Tropic Snow, Green Magic, Perfecta, Chandra, replicated thrice, under 50% shade net conditions. The variety V5 (Tropic Snow) recorded significantly betterperformance compared to other varieties, in terms of growth parameters like plant height (54.6 cm), number of leaves (11.2), plant spread (46.31 cm^2), stem girth (11.6cm), leaf area (210.41 cm^2), minimum leaf production interval (15 .3 days), plant growth index based on height of the plants (0.045), survival percentage (100%). The study concluded that the variety tropic snow observed to be the best at survival and establishment among other varieties under shade net condition.

***keywords*:** *Dieffenbachia seguine, evaluation, shade net, varieties, survival.*

1. INTRODUCTION

Foliage plants can act as a backdrop, highlighting the attributes of other plants and they can provide a variety of interesting textures and shapes.Dieffenbachiaalso called as dumbcanes, are one of the most important groups of ornamental tropical foliage plants (3) Dieffenbachia accounts for at least 7 percentage of total sales in the 269-million-dollar foliage industry [6,16,17,18,19].

Dieffenbachia plays a vital role in the ecosystem as a part of the understory vegetation. Its broad leaves provide shelter and nesting sites for small animals and insects, while its root system contributes to soil stability and nutrient cycling.Investigating the ecological interactions ofDieffenbachia within its native range could enhance our understanding of tropical forest dynamics and conservation strategies.They add multi-season color and leaf hues can complement and contrast. Foliage plants are generally grown for their attractive foliage and can be kept forlonger periods under indoor conditions.It belongs to the family Araceae, the chromosome number of the species is 2n=34[7]. There are about 135 species of dieffenbachia mostly occurring in central and South America [4]with spotted, striped or speckled with cream, white, yellow, gold, silver, or a combination of these coloured leaves.Dieffenbachia is cultivated as an ornamental plant in temperate shade gardens and as a potted house.

Dieffenbachia is a perennial herbaceous plant with straight stem, simple and alternate leaves containing white spots and flecks making it attractive as indoor foliage. Due to their attractive foliarvariegation,tolerancetolowlightlevels,andeaseofproduction,dumbcaneshavebeenproduce dasornamentalfoliageplantsforinteriordecorationorgrownasgroundcoverforshadedsitesintropic al regions [2].

Dieffenbachia propagation can be done in two ways – stem cuttings and air-layering.Air layering, on the other hand, is a type of layering where the dieffenbachia plant is wrapped or potted in a moist, growing medium to accelerate root growth. *D. seguine* reproduces vegetatively from rhizomes [13]. Stemcuttings is a fairly straight-forward and one of the most common processesto re-produce a plant. The best soil for Dieffenbachia should be well-draining, contain organic matter, have slightly acidic pH levels, and be fertilized regularly during the growing season.

This study provides informative information about dieffenbachia varietal growth, highlighting the crucial roles of potting mixture composition and polybag size. It thus acknowledges the significance of growing dieffenbachia in shade net. By elucidating the perfect growing conditions, this study aims to empower farmers in Prayagraj and other agroclimatic areas to fully harness dieffenbachia's potential as a well-known foliage plant in the global trade market.

2. MATERIALSANDMETHODS

The present investigation was conducted in a shade net house (50%) during 2023–2024 in the Department of Horticulture at the Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, from August 2023 to February 2024. Eight different Dieffenbachia types were used in the experiment: Tropic Marianne, Star Bright, Picta, Sterling, Tropic Snow, Green Magic, Perfecta, and Chandra. The varieties were planted on 180 polybags after being purchased from New Beena Nursery in Kerala. Soil, FYM, vermicompost, and cocopeat were combined in a 1:1:1:1 (v/v) ratio to fill the bags. Up to 180 days of observations on growth parameters were made at 30-day intervals. The standard scale was used to take the measurement. Eight distinct dieffenbachia types were used in the completely randomized design experiment, with three replications of each variation. Analysis of variance (ANOVA) was used to do statistical analysis on the data collected throughout the experiment.

3. RESULTS AND DISCUSSION

From the present investigation, it is concluded that significant variations were observed among the eight dieffenbachia varieties studied across all the growth parameters and the data is presented in Table 1.

Significantly taller plants (54.6 cm) were observed in variety V5 (Tropic Snow) followed by variety V6 (Green Magic, 44.18 cm) while shorter plant height (24.13 cm) was recorded in variety V2 (Star Bright) compared to all other varieties.Such a wide variability for plant height among the varieties is mainly due to genetic nature, environmental condition of the plant**.** The similar report was found indendrobium [10].

Significantly a greater number of leaves (11.2) were observed in variety V5 (Tropic Snow) followed by varietyV3 (Picta, 10.0) while lesser number of leaves (4.9) were recorded in variety V2 (Star Bright) compared to all varieties.The variation in number of leaves per plant among the different varieties is driven by variation in the rate of vegetative growth among the genotypes, which is due to genetic makeup and may also have been influenced by agro climatic conditions. Similar results were reported by [11] in lilium, [12] in dahlia and [13] in orchids.

Significantly maximum spread (46.31cm^2) was observed in V5 (Tropic Snow) followed by variety V6 (Green Magic, 42.51cm^2) while minimum spread (29.76cm^2) was observed in V2 (Star Bright)compared to all varieties.The variation in plant spread (cm^2) of different dieffenbachia varieties might be due to the branch, number of leaves and Such as wide variability for plant height among the varieties is mainly due to genetic nature, growing situation and environmental condition of the plant. Similar report was observed [10]inDendrobium. Cane length a varietal character which varies from variety to variety. The varieties with longer branches, they spread more because, the length of the branches increases, resulting in higher plant spread due to the effect of genetic makeup and environmental effects. Similar results were noted in China aster by [8].

Significantly maximum stem girth(11.6cm) was observed in V5 (Tropic Snow) was followed by variety V7 (Perfecta, 9.16cm) minimum girth (5.95cm) was observed by V2 (Star Bright) compared to all varieties.Variation in girth of dieffenbachia varieties is due to the varietal character which varies from variety to variety and the morphological traits and adaptability of the variety to the prevailing climatic conditions. Similar result was noted in [15]in dahlia.

Significantly maximum estimated leaf area (210.41cm^2) was observed in V5 (Tropic Snow) was followed by V6 (Green Magic, 174.51cm^2) while lesser estimated leaf area (85.83cm^2) was observed in V2 (Star Bright) compared to all varieties.Variation in leaf area indicates additive gene effects would be effective in gerbera [9], [5] and[14] in dahlia.

Minimum days for leaf production interval (15.3) was observed in variety V5 (Tropic Snow) followed by V4 (Sterling, 19.0), maximum days for leaf production interval (32.33) was observed in variety V6 (Green Magic) compared to all varieties.Variations in leaf production could be expected among the cultivars as the attribute to a genetic character. These results are in conformity with the reports of[1].

Significantly higher plant growth index based on height of the plant was recorded in variety V5 (Tropic Snow, 0.045) followed by variety V7 (Perfecta, 0.041) minimum was observed inV2 (Star Bright, 0.027) compared to all varieties.

Significantly higher survival and establishment percentage observed in variety V5 (Tropic Snow, 100%) followed by V8 (Chandra, 93.66%), while lower survival and establishment percentage observed in variety V2 (Star Bright, 52.16%) compared to all varieties. Variation in survival and establishment percentage of different varieties might be attributed to adaptability of different varieties having different genetic makeup which give different response to a given environmental condition of a specific location.

Notation	Variety	Height (cm)	No. of leaves	Plant spread (cm^2)	Stem girth (cm)	Leaf area (cm^2)	Leaf production interval	Plant growth index (height)	Survival percentage
V1	Tropic Marianne	35.5	5.7	38.9	8.0	154.41	26	0.0324	73.56
V2	Star Bright	24.1	4.9	29.7	6.3	85.83	21	0.0270	52.16
V3	Picta	33.7	10.0	40.8	6.5	125.41	28.66	0.0350	93.26
V4	Sterling	31.4	6.9	37.6	7.8	142.58	19	0.0331	86.2
V5	Tropic Snow	54.6	11.2	46.3	11.6	210.41	32.33	0.0454	100
V6	Green Magic	44.1	7.3	42.5	8.2	174.51	15.33	0.0386	86.36
V7	Perfecta	35.9	9.3	41.2	8.8	159.16	20	0.0411	80.5
V8	Chandra	41.0	8.3	39.5	7.1	156.41	24	0.0366	93.66
F-TEST		**S**	**S**	**S**	**S**	**S**	**S**	**S**	S
SE.d (±)		1.03	0.39	1.12	0.23	6.78	0.91	0.002	73.56
CD0.05		2.20	0.83	2.40	0.50	14.49	1.95	0.004	52.16
CV		3.36	5.98	3.47	3.59	5.49	4.80	6.774	93.26

Table 1. Growth parameters of different dieffenbachia varieties.

4. CONCLUSION

On the basis of the research trial conducted on dieffenbachia (*Dieffenbachia seguine*)under 50% shade net conditions, it is concluded that varietyV5TropicSnowperformed significantly better in terms of plant height, number of leaves, spread of plant, girth, leaf area, chlorophyll content, plant growth index based on plant height per plant, plant growth index based on number of leaves, survival rate and establishment. Hence, Variety V5 (Tropic Snow) could be recommended for Prayagraj agro climatic conditions.

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5. REFERENCES

1. **Agasimani. A.D., Harish. D.K., Imamsaheb, S.J., Patil. V. S., Kamati. C. and Preveenkumar, D.A. (2011).** Anthurium Varieties Performance and Economics under Greenhouse. *R. J. Agri. Sci.*,**2**(2): 226-229.

2. **ChenJ.,HennyR.J.,andMcConnell.D.B.(2002)**.Developmentofnewfoliageplantc ultivars *Trendsinnewcropsandnewuses*,p.466–472.

3. **Conover, C. A., R. T. Poole, J. F. Knauss, R. A. Hamlen and R. W. Henley. (1973).**Florida's changing foliage industry. *HortScience***8**(6): 462-464. (1.c)

4. **Croat and Thomas. (2004).** Revision of Dieffenbachia (Araceae) of Mexico, Central America, and the West Indies. *Annals of the Missouri Botanical Garden*. **91.** 668-772.

5. **Hedge, B.N., Shirol, A.M. and Harshavardhan, M. (2022).** Evaluation of different Dahlia (*Dahlia variabilis L.)* genotypes for growth and development. *The Pharma Innovation*, **11**(4): 1060- 1062.
6. **Henny, R. J., A. R. Chase, C. A. Conover, R. T. Poole, R. A. Hamlen, and L. S. Osborne. (1984).** Dieffenbachia production guide. Fla. Coop. Ext. Serv., *Orn. Hort.*_ Commercial Fact Sheet No. 11.
7. **Jones,G.E. (1957**).ChromosomenumbersandphylogeneticrelationshipintheAraceae.PhDdiss., *Univ.Va.,Charlottesville.*
8. **Munikrishnappa, P.M., Patil, A.A., Patil, V.S., Patil, B.B., Channappagoudar, B.B. and Alloli, T.B. (2012).** Studies on the growth and yield parameters of different genotypes of China aster (*CallistephuschinensisNees.) Karnataka Journal of Agricultural Sciences*, **26**(1): 107- 110.
9. **Nair, S. A., and Shiva, K. N. (2003).** Genetic variability, correlation and path coefficient analysis in gerbera. *J. Orn. Hort*. **6**(3): 180-187.
10. **Roychowdhury, N. & Mandal, Tapas &Munsi, P.S.(2004).** Evaluation of different *dendrobium spp*. Under polyhouse in north-east Indian hills. *ActaHorticulturae*. 491-498.
11. **Sharma, Rupali & Kumar, Rajesh & Dahiya, D. (2018).** Studies on the performance of lilium varieties under polyhouse.*Phyto journal*; 2711-2713.
12. **Shukla, P., Prasad, V.M., Burondkar, S.S. and Ainarkar, A.A. (2018).** Evaluation of Dahlia hybrids (*Dahlia variabilis L.).Journal of Pharmacognosy and Phytochemistry*, **7**(5): 1109 - 1113.

13. **Space JC, Flynn T, 2002**. USDA Forest Service, Honolulu. Honolulu, Hawaii, USA*: USDA Forest Service.* 146 pp.

14. **Vikas, H. M., Patil, V. S., Agasimani, A. D. and Praveenkumar, D. A. (2011).** Studies on genetic variability in dahlia *(Dahlia variabilis L.)* Department of Horticulture, Agriculture College, Dharwad, Karnataka, India. *Indian J. S. N*. **2**(2): 372–375.

15. **Zala, K &Khoda, Karetha& Patel, V. S. & Solanki, K S. (2023).** Evaluation of different dahlia (*Dahlia variabilis L.)* varieties in Saurashtra region of Gujarat.*Pharma Innovation* ;**12**(9):1553-1555.

16. Bundela, Raja, and UrfiFatmi. 2024. "Evaluation of Different Hybrid Tea Roses (Rosa X Hybrida) under Prayagraj Agro-Climatic Conditions". Journal of Experimental Agriculture International 46 (6):715-22. https://doi.org/10.9734/jeai/2024/v46i62528.

17. Afzal, Muhammad, HafsaNaeem, Muhammad Waqas, Isbah Akhtar, Razaullah, Imranullah, SabeenAlam, MonazaTehseen, and Sanaullah. 2023. "Effect of Indole Butyric Acid and Zinc Sulphate in Different Media on Rooting of Olive Cuttings". Asian Journal of Soil Science and Plant Nutrition 9 (4):104-11. https://doi.org/10.9734/ajsspn

18. Perera TA, Jayasinghe GY, Halwatura RU, Rupasinghe HT. Modelling of vertical greenery system with selected tropical plants in urban context to appraise plant thermal performance. Ecological Indicators. 2021 Sep 1;128:107816.
19. Ayodele OP, Ewulo BS, Adenawoola AR. Effects of number of nodes per cutting and goat dung on the growth of Dumb cane (Dieffenbachia seguine JACQ) under screen-house conditions in Nigeria.