



ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(9): 2118-2120
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www.thepharmajournal.com

Received: 17-06-2021
Accepted: 30-07-2021

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Evaluation of sub-tropical orchids (*Dendrobium* sp.) for vegetative characters under Shadenet conditions

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Abstract

An experiment entitled Evaluation of sub-tropical orchids (*Dendrobium* sp.) for vegetative characters under Shadenet conditions was conducted in 50% Shadenet, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj (U.P), India. The experiment was conducted in Completely Randomized Design (CRD) with eight varieties replicated thrice. The varieties used were P957, P1006, P1019, Sonia White, Sonia 5N, Somark White, Pink Stripe and Burana Jade. The results revealed that the variety P1006 was significantly promising variety with respect to plant height (27.1 cm), internodal length (4.5 cm) and shoots per plant (8). Burana Jade had the shortest height (13.8 cm), shorter internodes (1.9 cm) and smaller leaves (25.7 cm²) which gives it a compact structure making it suitable variety as a potted plant.

Keywords: *Dendrobium* sp., Pink Stripe, vegetative characters

Introduction

Orchids are flowers of exquisite beauty and variety of patterns belonging to one of the largest family, the Orchidaceae family. They exhibit an incredible range of diversity in size, shape and colour of their flowers. There are about 24,000 species 32,000 hybrids of orchid. Orchids form nine per cent of our flora and are the largest family among the higher plants in India. The Botanical Survey of India (BSI) has undertaken a study on Orchidaceae, only recently, and according to their reports it is estimated there are about 1,256 species of orchids in India. India has a diversified climate, low cost of labor, and progressive farming technology, but despite these factors the orchid industry is not even in its infancy stage both in terms of micro-propagation and commercial cultivation.

Dendrobium is the second largest genera of Orchidaceae which contains more than 1,340 species (Baker and Baker, 2000) ^[1] and possibly thousands of hybrids which are distributed throughout the world. The genus *Dendrobium* was established in 1799 by Olof Peter Swartz. *Dendrobium* orchids are mostly endemic to Asia (South, East and Southeast), but also to Australia and New Zealand. *Dendrobium* (commonly abbreviated as 'Den' in horticulture) is popular flowering potted plant and cut flower around the world due to its wide range in flower colour, size and shape, year round availability and lengthy vase life. *Dendrobium*, occupy nearly 90 per cent of the area under orchid cultivation due to easy management practices and plant material availability (Sujatha and Sujatha, 2009) ^[11]. For most *Dendrobium* orchids, rapid vegetative growth occurs at temperature between 24°C and 30°C and temperature below 10°C cause leaf drop or abscission in some species. Orchids are considered outstanding among the ornamentals due to the exquisite beauty of flowers, variety of fragrance, diverse colors, remarkable range of sizes and shapes, forms and long lasting blooms. They are commercially grown worldwide as cut flower and potted plants with 8% share in floriculture trade. Evaluation of the vast varieties of orchids is necessary for further increasing the production of the highly demanded crop.

Materials and Method

Studies on the performance of eight *Dendrobium* orchid varieties were carried out under shade net condition at the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences during 2019-2020. The varieties used in the study were V₁ – P957, V₂ – P1006, V₃ – P1019, V₄ – Sonia White, V₅ – Sonia 5N, V₆ – Somark White, V₇ – Pink Stripe, V₈ – Burana Jade. The planting materials used were healthy and disease free kikies raised and obtained from K.F. Biotech Plants, Pune and Rise N Shine Biotech Pvt. Ltd., Pune.

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The orchids were raised in earthen pots of size 8 inches in diameter and the potting media was prepared with a mixture of charcoal, broken brick and coco husk. The experiment was conducted in completely randomized block design with three replications for each variety. Each replication consisted of five plants. During summer the plants were irrigated daily but in winter irrigation was done at an interval of 3 to four days or as per climatic conditions and requirements. The ground surface of the pots was also made wet occasionally for the humidity to rise in the shade net. NPK was applied using foliar application @ 0.2% thrice in a week. The nutrient schedule started 20 days after planting. The selected materials were evaluated by recording observations on growth and yield parameters. The collected data were pooled and analyzed statistically.

Results and Discussion

The results indicated significant variation among varieties for all the characters observed (Table 1). Among the different varieties P957 recorded maximum (27.1 cm) plant height, while Burana jade recorded minimum (18.1 cm). Some of the varieties were tall, few were dwarf and maximum were intermediate in nature. Such a wide variability for plant height among the varieties is mainly due to genetic nature, growing situation and environmental conditions of the plant. This was in accordance with the reports of Roychowdhury *et al.* (2004) [9] who performed an evaluation programme on 21 *Dendrobium spp.*

Production of shoots per plant also followed the same pattern. In general, vigorous plants produced more number of shoots. Number of shoots per plant was maximum (8) in variety P1006 and minimum (5) in variety Sonia 5N. The variability of the number of shoots produced maybe because of the

genetic makeup and the environmental conditions of the plant. These readings were similar with the findings of Talia *et al.* (2000) [2] in different genera of orchids. Maximum internodal length (4.5 cm) was observed in P1006 while the minimum (1.9 cm) was noticed in Burana Jade. The difference in the length of the internode among the various varieties was controlled highly by the genetic constitution along with the growing conditions. These results confirmed the opinion expressed by Thomas and Lekha (2008) [13] in monopodial orchids. The position and orientation of leaves which depend on length of internode is an important factor that exposes the surface of the plant properly for the photosynthesis.

Leaves are important functional units for photosynthesis, which greatly influence the growth and yield by affecting plant spread. Significant difference could be observed among the varieties for leaf number which is due to the genetic components and the growing environment. Among the varieties the studied the variety Pink Stripe (15) recorded the maximum number of leaves, while the minimum leaf per plant (9) was observed in Sonia White. Similar difference in leaf production among varieties was also noticed by Fadelah *et al.* (2007) [3] in *Dendrobium* hybrids. The leaf areas were maximum (54.4 cm²) in the variety P957 while minimum in the variety Burana Jade (25.7cm²). The variation may be due to the difference in the growth habits among the varieties Krishnapriya *et al.* (2005) [4]. The variation was also suggested by Sugapriya *et al.* (2009) [10] that it may be due to the genetic nature. The leaf area is an important parameter that influences photosynthesis ability and there by plant spread Kumari *et al.* (2012) [6]. Hence the leaves with more surface area exposed more surface for photosynthesis. These results are in agreement with the findings of Nair *et al.* (2002) [8] and Bhattacharjee *et al.* (2004) [2].

Table 1: Vegetative parameters of different Orchid (*Dendrobium sp.*) varieties under shade net condition

Variety	Plant height (cm)	Number of shoots per plant	Internodal length (cm)	Number of leaves per plant	Leaf area (cm ²)
P957	26.1	6	4.3	11	54.4
P1006	27.1	8	4.5	13	53.6
P1019	18.9	7	3.1	11	44.9
Sonia White	19.6	6	3.9	9	35.4
Sonia 5N	16.5	5	3.3	13	36.8
Somark White	19.3	7	2.2	11	27.0
Pink Stripe	24.9	6	4.1	15	27.4
Burana Jade	13.8	7	1.9	11	25.7
F-test	S	S	S	S	NS
S.Ed (±)	0.296	0.251	0.166	0.303	0.285
CV	1.244	4.042	5.795	3.070	0.881
CD _{0.05}	0.607	0.516	0.344	0.621	0.582

Conclusion

It is concluded that among the various varieties, P1006 (V₂) gave the best performance in terms plant height, longest internodal length and maximum shoots per plant. Burana Jade (V₈) has the shortest height, shorter internodes and smaller leaves which gives it a compact structure making it the most recommended variety for potted plants.

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