Progressive Research 9 (Special) : 455-457 (2014) *Society for Sci. Dev. in Agric. and Tech.*

EVALUATION OF PHALAENOPSIS ORCHIDS FOR GROWTH AND YIELD UNDER PARTIAL CONTROL ENVIRONMENT

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ABSTRACT

Phalaenopsis orchids are among the most valuable potted flowering crops commercially produced throughout the world because of its fine texture, colour of the flower, keeping quality and its market value. Therefore evaluation of its growth habit, flowering behaviour and yield under the different growing conditions for a location specific is important. Ten different varieties of Phalaenopsis orchids were evaluated for growth and yield. The study revealed that among the different varieties evaluated, Acc. No.321239 recorded maximum plant height (6.82 cm), number of roots (9.60) and leaf area (86.6 cm2), where as Acc. No.351068) registered more number of leaves (5.20). T_7 (Acc. No. 351068) (57.0 days) has taken less number of days for spike emergence where as T_{10} (Acc. No.321239) exhibited minimum time interval for 1st floret opening (151.40 days). Out of the ten varieties studied, T_{10} (Acc. No. 321239) exhibited maximum flower length, width and spike length (7.30cm, 8.46cm and 57.14 cm respectively). The maximum field life (100.20 days) was recorded maximum in the T_{10} (Acc. No. 321239).

Key words : *Phalaenopsis, varieties, growth, yield, environment, evaluation.*

The Orchidaceae family is one of the largest and most diverse of the flowering plant family with 25,000 to 35,000 species belonging to 600-800 genera (1). In India, orchid comprises 158 genera and 1331 species which grow upto an elevation of 5000 m (2). Orchids are not only beautiful, but also commercially important and occupy the second place in the potted flowering plant market in the United States (3). Among potted orchids, Phalaenopsis comprises the majority of commercial orchids (50% to 90%) in the United States as a result of their long-lasting flowers, fine texture, and its market value (3, 4). The Phalaenopsis has approximately 62 species distributed in an area extending from Sri Lanka (east to west)and southern India to Papua New Guinea and from Australia (north-south) and from China and Taiwan to the Philippines. Research work on the evaluation of commercial hybrids and varieties for suitability to our condition is very limited. So, the present study is aimed to identify the suitable varieties for growth and yield under partial control environment in the eastern tract of West Bengal. The objective of this study was to evaluate the plant growth, development, early flowering and the quality of flowering of Phalaenopsis orchids.

MATERIALS AND METHODS

The experiment was carried out during the year 2011 to 2012, to evaluate the varieties of Phalaenopsis orchid under partially environment controlled polycarbonate covered poly house at Horticultural Research station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, West Bengal, India. The experimental site falls under subtropical humid climate zone with an altitude of 9.75m above mean sea level on 23.50N latitude and 89.00E longitude. The varieties used in the study were T_1 = Acc. No.331311, T_2 = Acc. No. 351135, T_3 = Acc. No.33605, T_4 = Acc. No.33605, T_5 = Acc. No.311370, T_6 = Acc. No. 311537, T_7 = Acc. No. 351068, T_8 = Acc. No.3311570, T_9 = Acc. No. 311295 and T_{10} = Acc. No. 321239. The planting materials used were nine month old tissue cultured plants collected from KF Bioplant, Pune, Maharashtra, India having the above accession number for each treatment. These plantlets were planted in the earthen pots of size 7" x 4" with 10-11 drainage holes at the bottom and sides and the potting media was prepared with a mixture of charcoal, broken brick and coconut husk at 1:1:1 ratio. The experiment was conducted in completely randomized block design with three replications for each treatment. Each replication consisted of five plants. Irrigation was done with overhead misting system and it was carried out daily during summer and once in 2 days during winter. Besides, water was also sprinkled once a day to the floor for maintaining the temperature and humidity

Table-1 : Vegetative performance of different varieties of Phalaenopsis Orchids.

Treatment	Plant height (cm)	No.of leaves per plant	No.of roots per plant	Leaf Length (cm)	Leaf Breadth (cm)	Leaf Area (cm^2)
1.	5.32	3.60	5.60	12.5	6.4	49.6
2.	4.40	3.57	5.60	13.0	5.6	52.9
3.	3.64	4.40	8.00	17.8	4.6	59.1
4.	5.72	4.70	7.20	18.9	5.4	50.9
5.	5.62	4.60	6.60	13.9	6.2	64.1
6.	6.26	4.20	5.40	15.3	5.7	59.6
7.	4.38	5.20	7.20	14.4	4.5	47.4
8.	5.60	4.00	6.60	17.4	5.8	80.6
9.	4.12	3.80	6.20	16.4	4.8	57.1
10.	6.82	4.80	9.60	12.6	7.0	86.6
SE(m)	0.18	0.16	1.40	1.24	0.61	2.39
CD(0.05)	1.26	0.42	2.531	3.07	1.74	7.82

Table-2 : Reproductive Performance of different varieties of Phalaenopsis orchid

Treat-ment	Days taken for Spike emergence	Days taken for 1st floret opening	Flower length (cm)	Flower width (cm)	Spike length (cm)	Field life (days)	Flower characteristics
1.	68.40	158.60	5.84	6.66	50.06	95.60	Pink flower with vivid red lip
3.	60.20	168.20	5.82	6.90	36.36	85.00	White flower with pink veining
6.	60.80	158.60	6.54	7.52	53.24	97.20	Faint pink flower with red lip
7.	63.00	159.60	6.06	7.04	40.60	84.60	Flowers are pink tones with paler edge
8.	62.20	158.80	5.78	7.00	42.20	94.40	Pink flower with red lip
9.	60.00	155.20	6.34	7.18	52.28	98.40	White flower with pink at centre & lip
10.	57.00	153.60	5.64	6.94	46.24	92.40	White flower with pink lip
11.	67.20	170.40	6.46	7.24	48.36	97.40	Pink flower
12.	69.00	170.40	6.32	7.00	39.52	98.00	White flower, densely spotted purple and red lip
20	63.40	151.40	7.30	8.46	57.14	100.20	White flower with dark purple lip
SE(m)	1.22	2.09	0.10	0.11	1.23	2.72	
CD(0.05)	4.06	7.58	0.39	0.41	3.43	5.43	

inside the greenhouse. The plants are fertilized with N: P: K (19:19:19) as the source of nutrient twice in a week. The weekly mean maximum temperature during the crop period ranged from 23.63 to 34.02°C with an average of 29.48°C, while the mean minimum temperature was between 8.74 to 21.70°C with an average of 17.38°C. The relative humidity ranged between 68.33 to 80.19%. The fungicides Carbendazim (1.5 ml/l) and Mancozeb (3ml/l) were used to control fusarium wilt rot and leaf spot respectively. The selected materials were evaluated by recording observations on various growth and yield parameters. The collected data were analysed statistically.

RESULTS AND DISCUSSION

Data on evaluation of 10 different Phalaenopsis varieties under partial shade condition showed that significant variations were observed among varieties for most of characters (Table-1). The highest plant height was recorded in T_{10} (Acc. No. 321239) (6.82 cm) followed by T_6 (Acc. No. 311537) (6.26 cm) and the shortest plant height was found in variety T_3 (Acc.No. 33605) (3.64 cm). Such a wide range of variability for plant height among the varieties is mainly due to

genetic nature, growing situation and environmental conditions of the plant. These findings were in accordance with the reports of (5) in monopodial orchids. There was significant difference in number of leaves per plant in different varieties of Phalaenopsis as evaluated. The highest leaves number was found in T_7 (Acc.No. 351068) (5.20) followed by T_{10} (Acc. No. 321239) (4.80) on the other hand lowest leave number was found in T_2 (Acc. No. 351135) (3.57). Leaf length and breadth are the important parameters that influence photosynthesis ability and thereby plant spread. Maximum leaf length was recorded in T_4 (Acc.No. 33605) (18.9 cm) whereas minimum leaf length found in T_1 (Acc. No. 331311) (12.5cm). Leaf breadth was notice maximum in T_{10} (Acc. No. 321239) (7 cm) followed by T_1 (Acc. No. 331311) (6.4 cm). Varieties with more leaf length had less breadth and vice versa. The leaves with more breadth and less length exposed more surface for photosynthesis whereas leaves with more length and less breadth drooped which ultimately reduced its surface area for photosynthesis. This was in-line with the conclusions of (6, 8) in Cymbidium and Dendrobium orchid hybrids respectively. The number of roots per plant was recorded maximum in T_{10} (Acc. No. 321239) (9.60) and the minimum was found in variety T_6 (Acc. No. 311537) (5.40).

There was significant difference in days required for first flower spike emergence after planting among the Phalaenopsis varieties. It was found that T_7 (Acc. No.351068) took minimum days for spike emergence (57DAP) followed by T_6 (Acc. No. 311537) (60 DAP) and maximum days required for spike emergence in T_9 (Acc. No. 311295) (69 days). T_{10} (Acc.No. 321239) recorded minimum days for first flower opening (151.40 DAP) and maximum days was recorded in T_9 (Acc.No. 311295) (170.40 DAP). Days to first flower opening is primarily decided by the length of spike and its rate of growth. T_{10} (Acc. No. 321239) has longest spike with average number of flowers, but its rate of growth was more which reduced the time interval between the flower bud initiation and flower bud development. This is in accordance with the findings of (8) in monopodial orchids.The maximum flower length, width and spike length was observed in T_{10} (Acc. No. 321239) with flower length, breadth and spike length of 7.30 cm, 8.46 cm and 57.14 cm respectively. The spike length was minimum in T_2 (Acc. No. 351135) having 36.46 cm. The difference among the treatments with regard to field life has been found to be statistically significant. T_{10} (Acc. No. 321239) recorded maximum field life (99.20 days) followed by T6 (Acc.No.311537) 98.40 days. The field life was minimum in case of T_4 (Acc.No.33605) 84.60 days. Therefore it may be concluded that T_{10} (Acc. No. 321239) is the best varieties among the ten varieties and was followed by T_3 (Acc.No. 311537) and T_6 (Acc.No.311537) in the plains of West Bengal condition.

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