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Performance of orchid species in Shevaroy hills of Eastern Ghats

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ABSTRACT

Performance of 24 orchid species was assessed in the net-house of Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud. Among the species studied, plant height was significantly high (105cm) in *Spathoglotts plicata*. At the end of the vegetative stage, number of leaves was maximum (30) in *Aerides.* Leaf was longest (49.8cm) and widest (17.6cm) in *Rhyncostylis retusa. Paphiopedilum insigne* produced largest flower size (14.4cm across). Pedicel length was highest in *Phaius tankervillae* (10.3cm) and *Renanthera inshootiana* (7.1cm). *Aerides multiflorum* recorded lowest pedicel length (1.24cm). *Epidendrum radicans* and *Spathoglottis plicata* produced flowers round the year. *Lucia virides* recorded maximum life (29 days) on plant, followed by *Arachnanthe clarkei* (18 days), *Dendrobium densiflorum* (18 days) and *Oncidium flexosum* (16 days), while, minimum (6 days) was observed in two orchid species, *Aerides crispum* and *Cattleya sp*. Maximum (23 days) vase life was recorded in *Lucia virides*. Results of the investigation thus reveal that among the 24 orchid species studied, *Epidendrum radicans, Lucia virides* and *Paphiopedilum insigne* performed better in terms of vegetative and floral characters under Shevaroy hill condition.

Key words: Orchid species, characterization, Shevaroy hills, Eastern Ghats

INTRODUCTION

Orchids enjoy the order of royalty in the world of ornamental horticulture and floriculture. Orchid flowers belong to the largest flowering family, *Orchidaceae*, with approximately 25,000 to 30,000 species occuring worldwide and fetching a very high price in the international market. India is endowed with a very rich flora and fauna and harbours more species of endemic plants than any other region of the world. Though the family is cosmopolitan, more species are found in the tropics rather than in the temperate regions (Abraham and Vatsala, 1981). Genera of orchids commercially important are *Cymbidium, Dendrobium, Phalaenopsis, Oncidium, Vanda, Mokara, Arachnis* and *Cattleya* (Hew, 1994; Laws, 1995). However, research work on evaluation of orchid species /commercial hybrids and varieties and their suitability for our conditions is very limited. Hence, the present study was aimed at identifying orchid species suitable for growth and flower yield under Shevaroy hills of Eastern Ghats in South India.

MATERIAL AND METHODS

Performance of 24 orchid species was evaluated at Horticultural Research Station, Tamil Nadu Agricultural University, Yercaud, between 2008 and 2011. The orchid species are as follows: *Aerides multiflorum, Aerides crispum, Acanthephippium bicolour, Arachnanthe clarkei, Cymbidium giganteum, Coelogyne flaccid, Cattaleys sp., Dendrobium chrysotoxum, Dendrobium moschatum, Dendrobium densiflorum, Epidendrum radicans, Epigenium ampulum, Odontoglossum crispum, Liparis griffithii, Lucia virides, Oncidium flexosum, Paphiopedilum insigne, Paphiopedilum villosum, Paphilianthe teres, Phaius tankervillae, Pholidata imbricate and Renanthera inshootiana, Rhyncostylis retusa and Spathoglottis plicata*. The experimental site is geographically situated between 11°04" and 11°05" North latitude, and 78°05" and 78°23" East longitude at an altitude of 1500m above Mean Sea Level. Average maximum and minimum temperature during the study was 31.0°C and 12.4°C, respectively. Mean annual rainfall recorded in Yercaud was 1572mm over 47 rainy days. Average relative humidity recorded was 75%. The orchid species were planted in earthen pots of size 6" x 4" and potting media prepared with a mixture of charcoal, broken bricks and characoal, in equal quantity. Irrigation was applied twice a day during the warmer months, and

once a day during the cooler periods. Besides, water was also sprinkled on the plants once a day to maintain a conducive temperature and humidity inside the net-house. During the vegetative phase N, P and K were applied in the ratio of 3:1:1. During the blooming phase, this ratio was 1:2:2. Micronutrients were also applied at a concentration of 0.5% twice a week. The study was made in Completely Randomized Block Design, with three replications. Each replication consisted of five plants. Five plants from replication of each orchid species were used for obtaining biometric data on plant height (cm), plant spread (cm), leaf length (cm), leaf width (cm), leaf number, number of spikes / plant, spike/stalk length, flower size (cm), pedicel size, flower longevity and vase-life in water. Data collected was pooled and analyzed as per Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Vegetative growth characters in terms of plant height, number of leaves, leaf length, leaf width and habitat play a key role in ultimately deciding crop yield. These parameters differed significantly among the orchid species studied (Table 1).

Table 1. Data on vegetative parameters of orchid species grown in Shevroy hills (pooled mean of three years)

Species	Plant height (cm)	No. of leaves/ plant	Leaf length (cm)	Leaf width (cm)
Aerides multiflorum	40.0	11.0	17.2	2.4
Aerides crispum	53.0	30.0	19.1	11.7
Acanthephippium bicolour	40.0	8.0	38.2	13.5
Arachnanthe clarkei	38.2	12.0	18.6	4.0
Cymbidium giganteum	78.0	12.0	4.0	2.1
Coelogyne flaccida	32.0	9.0	13.2	4.6
Cattaleys sp.	40.2	10.0	13.3	3.9
Dendrobium chrysotoxum	46.7	15.0	13.6	7.7
Dendrobium moschatum	52.0	13.0	13.8	5.0
Dendrobium densiflorum	58.0	14.0	10.2	4.6
Epidendrum radicans	34.0	13.0	14.1	12.5
Epigenium ampulum	33.7	11.0	8.8	4.1
Odontoglossum crispum	37.2	14.0	16.7	5.6
Liparis griffithii	34.0	15.0	14.3	2.5
Lucia virides	23.8	8.0	24.4	5.2
Oncidium flexosum	85.5	8.0	14.8	4.1
Paphiopedilum insigne	47.0	9.0	17.9	3.5
Paphiopedilum villosum	32.5	11.0	13.0	6.5
Paphilianthe teres	31.4	10.0	39.0	15.7
Phaius tankervillae	59.0	8.0	27.2	6.6
Pholidata imbricate	40.5	10.0	13.5	3.0
Renanthera inshootiana	47.5	12.0	20.1	4.0
Rhyncostylis retusa	40.0	7.0	49.8	17.6
Spathoglottis plicata	105.0	5.0	48.0	13.7
SEm	1.05	3.96	2.04	1.58
CD*(P= 0.05)*	2.11	7.97	4.1	3.19

Table 2. Data on visual growth traits of 24orchid species

Species	Habit	Habitat	Growth habit	Blooming period
Aerides multiflorum	H	E	Monopodial	April
Aerides crispum	H	E	Monopodial	April-June
Acanthephippium bicolour	H	T	Sympodial	April-May
Arachnanthe clarkei	H	E	Monopodial	Jan-Feb
Cymbidium giganteum	H	T	Sympodial	April
Coelogyne flaccida	H	T	Sympodial	Jan
Cattaleys sp.	H	T, E	Sympodial	Oct
Dendrobium chrysotoxum	H	E	Sympodial	March
Dendrobium moschatum	H	E	Sympodial	May, June, Feb
Dendrobium densiflorum	H	E	Sympodial	Sep
Epidendrum radicans	H	E	Monopodial	Round the year
Epigenium ampulum	H	T	Sympodial	Oct
Odontoglossum crispum	H	E	Monopodial	March
Liparis griffithii	H	T	Sympodial	Aug
Lucia virides	H	T	Monopodial	March, Aug
Oncidium flexosum	H	T, E		March
Paphiopedilum insigne	H	T	Sympodial	Feb
Paphiopedilum villosum	H	T	Sympodial	Oct
Paphilianthe teres	H	T	Monopodial	June
Phaius tankervillae	H	T,E	Sympodial	April, May, July, Nov
Pholidata imbricate	H	T	Sympodial	Aug
Renanthera inshootiana	H	E	Monopodial	June
Rhyncostylis retusa	H	T	Monopodial	June
Spathoglottis plicata	H	E	Sympodial	Round the year

H- Herbaceous, T- Terrestrial , E- Epiphytic

Plant height ranged from 23.8cm to 105cm and was significantly higher in *Spathoglottis plicata* (105.0cm), followed by *Oncidium flexosum* (85.5cm) and *Cymbidium giganteum* (78.0cm). Lowest plant height was recorded in *Lucia virides* (23.8cm). Variability for plant height among different species was due to genetic and environmental effects. These results are in agreement with those of Thomas and Lekharani (2008). Leaves are important functional units for photosynthesis and greatly influence growth and yield by affecting plant spread. Number of leaves recorded at

the end of the vegetative stage was maximum in *Aerides crispum* (30), followed by *Liparis griffithii* (15) and *Dendrobium chrysotoxum* (15). Minimum number of leaves was noticed in *Spathoglottis plicata* (5). Similar difference in leaf number among species was also observed by Fadelah (2007). Leaf length and width are important parameters influencing total photosynthetic ability and, thereby, plant spread. Leaf length was higher in *Rhyncostylis retusa* (49.8cm), followed by *Spathoglottis plicata* (48.0cm) and *Paphilianthe teres* (39.0cm), whereas, leaf length was minimum in *Cymbidium giganteum* (4.0cm). Leaf width was maximum in *Rhyncostylis retusa* (17.6cm) and *Spathoglottis plicata* (13.7cm), while, it was minimum in *Cymbidium giganteum* (2.1cm). Habit and habitat of the 24 orchid species were also studied (Table 2).

Floral characters, viz., flower size, pedicel size, flowering period, number of spikes per plant and spike/stalk length were recorded, and are presented in Table 3.

Paphiopedilum insigne produced the largest flowers (14.4cm), followed by *Lucia virides* (13.9cm) and *Oncidium flexosum* (13.4cm). *Phaius tankervillae* produced smaller flowers (0.6cm) than the other orchid species. Pedicel size differed significantly among orchid species, and ranged from 1.2 to 10.3cm. Maximum pedicel size was seen in *Phaius tankervillae* (10.3cm) and *Renanthera inshootiana* (7.1cm), while, *Aerides multiflorum* recorded the lowest pedicel size (1.24cm).

Observation on blooming period was recorded to bring out a floral calendar for the 24 orchid species for the year. *Dendrobium densiflorum* flowered in April, while *Aerides multiflorum, Aerides crispum, Dendrobium moschatum* and *Paphilianthe teres* flowered in June. *Lucia virides* and *Rhyncostylis retusa* flowered during July. *Phaius tankervillae* flowered during May and August, while, *Lucia virides* and *Cymbidium giganteum* flowered in September. *Paphiopedilum insigne* and *Paphiopedilum villosum* flowered during October - November. *Aerides crispum* and *Cattleya Sp.* flowered in October. During the month of November *Epigenium ampulum* had flowered, while, *Phaius tankervillae* flowered during December. *Epidendrum radicans* and *Spathoglottis plicata* produced flowers round the year.

The longest spike length was noticed in *Paphilianthe teres* (66.60cm), followed by *Lucia virides* (65.40cm),

Table 3. Data on floral and yield parameters of orchid species (pooled mean of three years)

Species	No. of spikes/ plant	Spike /stalk length (cm)	Flower size (cm)	Length of pedicel (cm)	Flower longevity (days)	Vase life in water (days)
Aerides multiflorum	1.0	22.4	3.0	1.2	10.0	9.0
Aerides crispum	2.0	3.6	2.7	2.6	6.0	5.0
Acanthephippium bicolour	3.0	5.2	6.8	6.4	8.0	8.0
Arachnanthe clarkei	3.0	9.6	6.3	4.3	18.0	15.0
Cymbidium giganteum	1.0	3.2	4.9	4.6	9.0	8.0
Coelogyne flaccida	2.0	12.0	4.6	2.5	9.0	7.0
Cattaleys sp.	1.0	3.1	5.0	3.2	6.0	6.0
Dendrobium chrysotoxum	1.0	10.9	4.4	3.7	7.0	6.0
Dendrobium moschatum	2.0	9.1	6.1	2.3	13.0	12.0
Dendrobium densiflorum	3.0	53.8	5.5	4.0	16.0	15.0
Epidendrum radicans	5.0	11.0	7.1	2.7	12.0	10.0
Epigenium ampulum	1.0	10.5	4.9	5.6	11.0	9.0
Odontoglossum crispum	2.0	17.9	5.0	6.7	8.0	6.0
Liparis griffithii	2.0	1.5	2.3	2.3	10.0	9.0
Lucia virides	3.0	65.4	13.9	1.5	29.0	23.0
Oncidium flexosum	1.0	24.2	13.4	4.6	16.0	15.0
Paphiopedilum insigne	3.0	25.5	14.4	5.1	15.0	14.0
Paphiopedilum villosum	3.0	12.9	5.9	6.1	15.0	14.0
Paphilianthe teres	2.0	66.6	9.8	2.7	15.0	13.0
Phaius tankervillae	3.0	17.9	0.6	10.3	9.0	8.0
Pholidata imbricate	1.0	26.2	5.1	1.3	8.0	7.0
Renanthera inshootiana	1.0	26.3	4.2	7.1	9.0	12.0
Rhyncostylis retusa	2.0	47.3	3.2	2.5	12.0	10.0
Spathoglottis plicata	1.0	45.8	3.8	4.8	13.0	11.0
SEm	0.104	2.96	3.63	2.78	2.88	2.39
CD *(P= 0.05)*	0.209	5.96	7.3	0.56	5.79	4.82

Dendrobium densiflorum (53.08cm), *Rhyncostylis retusa* (47.30cm) and *Spathoglottis plicata* (45.8cm) which were statistically on par with each other. The shortest spike was seen in *Cattleya sp*. (3.10cm). Rest of the varieties produced spike length ranging from 3.2cm to 26.3cm. Variation in spike length among varieties is a genetic character (Thomas and Lekha Rani, 2008). Among the various orchid species under study, *Epidendrum radicans* recorded the highest number of spikes per plant (5) followed by *Cymbidium giganteum* (4). Some of the orchid species produced fewer spikes probably due to the effect of environmental factors. This is in accordance with Barman *et al* (2007) in *Cymbidium* orchids and Roy Chowdhury *et al* (2004) in *Dendrobium* sp.

Longevity of flower spike on the plant is an important factor in potted plants (Wang, 2004). *Lucia virides* recorded maximum life (29 days) on the plant, followed by *Arachnanthe clarkei* (18 days), *Dendrobium densiflorum* (18 days) and *Oncidium flexosum* (16 days). Minimum life (6 days) of the spike on the plant was observed in two orchid species, *Aerides crispums* and *Cattleya sp*. Genetic makeup of the variety decides the longevity of spikes on the plant (Nagare and Pal, 2008; Sakai *et al*, 1995)

Maximum (23 days) vase-life (complete wilting of spikes in the vase) was recorded in *Lucia virides,* followed by *Arachnanthe clarkei* (17 d). *Aerides crispum* registered the shortest (5 days) vase-life in water. This may be due to total carbohydrate reserves in the florets, osmotic concentration and pressure potential of petal cells. Vascular block could be regarded as a major cause for wilting, leading to a reduction in the longevity of cut-flowers (Bala *et al*, 2008). Results of the present investigation thus revealed that among the 24 orchid species studied *Epidendrum radicans*, *Lucia virides* and *Paphiopedilum insigne* performed better in terms of vegetative and floral characters under Shevaroy hills of the Eastern Ghats.

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