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EFFECT OF INFLORESCENCE PRUNING IN *PHALAENOPSIS* ORCHID

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Abstract

Phalaenopsis orchid is one of the most sought after pot plant as well as cut flower in the international market. It is a short stemmed monopodial orchid, producing lateral inflorescences, usually twice a year in the tropical conditions. To retain the flowers for a longer period, presently, inflorescence pruning and its effect on emergensce of new flower spike and flowering behaviour were studied. The spent (flowered) inflorescences were pruned at three different levels, 1st, 2nd, 3rd node, which was compared with that of control, wherein the spent inflorescences were retained as such. Results showed that the number of days taken for emergence of new flower spike were minimum (23.80 days) in plants where the spent inflorescences were pruned at the first node, compared to that at the third node (36.40 days) and second node (66.60 days). The treatments were significantly superior to non-pruned plants (control) as the new inflorescences emerged only after 174.40 days, in the latter case. The number of days taken for the first bud emergence and the first flower opening, showed no significant difference. Though inflorescence length and number of florets were at par amongst the treatments, flowering duration was longer in plants pruned at the first node.

Introduction

PHALAENOPSIS, COMMONLY called the moth orchid, is an important commercial genus of orchids. Species and hybrids in this genus are of high value in floriculture because of their beautiful and long-lasting flowers. Commercially, phalaenopses are categorised as *grandiflora* or cut flower types with large flowers and *multiflora* or pot plant types with numerous smaller sized flowers.The genus *Phalaenopsis* is widely distributed across SouthEast Asia and includes South India, Sri Lanka, Southern China to Taiwan, Indonesia, Thailand, Myanmar, Malaysia, the Philippines, Papua New Guinea, and Northern Australia. It has been identified as having 62 species (Christenson, 2001). Phalaenopses are short stemmed monopodial orchids; these are slow growing and mature plants attain an average height of twelve to fifteen centimeters, although a few individuals may grow taller (Sahavacharin, 1981). Its leaves are large, varying in colour, shape and orientation with a CAM pathway of photosynthesis and aerial roots are fleshy with velamen tissue that aid in absorption of moisture. Inflorescence, commonly referred to as 'spike', of *Phalaenopsis* is a long, arching raceme, with an indeterminate nature of growth. The inflorescence usually emerges from the 3rd or 4th node; it stays on the plant for 2 to 4 months (Bose *et al.,* 1999). At times, the inflorescence stays for as long as 8 months or more (Kaveriamma, 2007). The inflorescence becomes unruly, if left for longer periods on plant neither contributing to aesthetics nor growth of plant.

Materials and Methods

The present study was carried out inside a top ventilated rain-shelter greenhouse at the Department of Pomology and Floriculture, College of Horticulture, Vellanikkara, Kerala, India during November 2010 to May 2012. The site is situated at a latitude of 10°31' N and longitude of 76°13' E and lies 22.25m amsl. The experimental site enjoyed a humid tropical climate with maximum and minimum average temperatures of 36.59°C and 21.30°C during the period of investigation. The mean relative humidity varied from 46.86 per cent to 78.70 per cent. The light intensities varied between 6,000 and 11,000 Lux. Spent inflorescences of *Phalaenopsis* var. *Roxanne,* a cut flower variety, were pruned at three different levels *i.e.,* first node, second node and third node. In control, spent inflorescence was retained without pruning. Five plants were taken per treatment and three replications were included.

Results

Significant differences were observed amongst the treatments with regard to the number of days taken for the emergence of new inflorescence. The number of days taken were minimum (23.80 days) in plants where inflorescences were pruned at the first node, followed by inflorescences pruned at the third node (36.40 days) and distantly followed by inflorescences pruned at second node (66.60 days). Treatments were significantly superior as compared to plants with non

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Table1. Effect of different pruning treatments in *Phalaenopsis* var. *Roxanne* orchid.

Level of pruning	Emergence of		Opening of first flower bud (days)	Flowering duration (days)	Inflorescence		Flower	
	inflorescence (days)	first flower bud (days)			length (cm)	number	number	size [length (cm) × breadth (cm)]
Control (no pruning)	174.40 (12.61[b])*	31.60[a]	62.40[a]	32.40[ab]	33.22[a]	1.00[a]	4.00[a]	10.56[a]×8.82[a]
1st node	23.80 (4.88[a])*	31.00[a]	61.40[a]	38.80[a]	29.44[ab]	1.00[a]	3.60[a]	10.36[a]×8.52[a]
2nd node	66.60 (7.40[a])*	31.03[a]	62.40[a]	33.80[b]	29.30[b]	0.60[b]	3.20[a]	10.40[b]×8.70[a]
3rd node	36.40 (5.95[a])*	31.20[a]	64.00[a]	31.40[b]	31.06[ab]	0.80[ab]	3.80[a]	10.10[ab]×8.50[a]

* Square root transformation value.

pruned inflorescences (control), wherein new inflorescences emerged after 174.40 days. No marked difference followed among treatments with respect to the number of days taken for the emergence of the first bud on the newly emerged inflorescences. Flowering period was longer in plants pruned at the first node (38.80 days). Other treatments were at par with values 33.80 days, 32.40 days and 31.40 days for inflorescences pruned at second node, control and third node, respectively. Amongst all the treatments, no

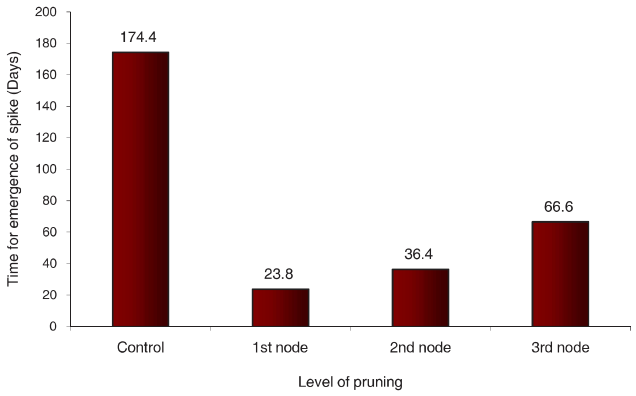

Fig 1. Influence of different levels of pruning on time taken for the emergence of new spike in *Phalaenopsis* var. *Roxanne*

significant difference was observed with regard to inflorescence length. Flower count and flower size also showed no significant differences amongst the treatments.

Discussion

Pruning is a widely followed operation targeted at an increased productivity in a range of horticultural crops with an idea to direct the energy towards a desired region so that the physiological stress caused in the process may induce blooms. In ornamental flowering plants, pruning usually is focussed on initiating a new flowering shoot by creating or increasing the availability of metabolic sinks. The increase in hormone levels is considered to be probably responsible for stimulating cell division, new shoot formation and, ultimately, more flowers per branch and frequent bud initiation in *Bougainvillea glabra* (Saifuddin *et al.,* 2010). Maintenance of spent flower spikes can be demanding for the plant as it is a metabolic sink and affects vegetative growth and production of new inflorescence (Kaveriamma, 2012). In *Phalaenopsis,* to conserve the plant's energy and force it to rest for preparing it for a good presentation of flowers in the following blooming season, the inflorescence is cut off at its lowest point with a sterilized tool. This prevents an enzyme produced in the nodes and tip of the inflorescence (which keeps the plant in the reproductive mode) from entering the plant, thus allowing the plant to devote all its energies to growth, following a brief rest. Carmi and Staden (1983) revealed that pruning increased the supply of cytokinins from the roots, measured as concentration in the remaining above ground tissues, in *Phaseolus vulgaris*. Yaqin *et al.* (2006) analysed endogenous hormones including GA_3, GA_{4+7} (mixture of GA_4 and GA_7), IAA, ABA, ZR and iPA in different buds located in different nodes of two-year-old Kyoho grape seedlings. The results revealed that the reproductive phase appeared at about 20th node.

In the present study, in *grandiflora* type of *Phalaenopsis* var. *Roxanne,* the spent inflorescences were pruned at three different levels; above 1st node, 2nd node and 3rd node, which were compared with the plants where spent inflorescences were not pruned.The plants, where inflorescences were pruned at the 1st node, produced inflorescence within a month of pruning and was better than pruned inflorescences at the 2nd and 3rd node. All the treatments were significantly superior compared to control. Physiological stress caused due to inflorescence pruning could have caused the initiation of new inflorescence in the plants. Stress was severe when pruned at the first node. Partitioning of assimilates occurred to the maximum

extent in plants where inflorescences were pruned above the first node and the time taken for producing the new inflorescence was also the minimum. This further necessitates study of translocation of nutrients or other factors as a result within the plant. The floral characters like emergence and opening of first bud, flowering duration, inflorescence length and flower count were at par amongst treatment plants and control. The concentration of flowering hormones could be high in the first node. Quantification of endogenous hormones at different nodes needs to be attempted in further studies.

Conclusion

The spent (flowered) inflorescences of *Phalaenopsis* var. *Roxanne* were pruned at three different levels, above 1st, 2nd and 3rd node, and were compared with that of control, wherein spent inflorescences were retained as such. The number of days taken for the emergence was minimum (23.80 days) in plants where the inflorescences were pruned at the first node. The number of days taken for first bud emergence and first flower opening showed no significant difference. Flowering duration was longer in the plants pruned at the first node (38.80 days). The data regarding inflorescence length and flower count were at par amongst different treatments. The concentration of flowering hormones could be high in the first node. The detailed work on quantification of hormones is suggested, in future investigations.

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