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Short communication

Impact of various trees barks potting mixture on performance of *Cymbidium* species

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ABSTRACT

To understand the impact of various tree barks (pine bark, oak bark and *Rhododendron*) as a component of potting mixture on flowering size plants of five species of *Cymbidium* (*C. longifolium*, *C. hookerianum*, *C. elegans*, *C. mastersii* and *C. gigantium),* a five year trial was conducted. Results showed significant improvement in number of shoots/ pot, height of plants at the time of flowering, plant fresh weight and dry weight, leaf number & length at six month and at flower emergence in all cymbidium species on pine bark potting mixture. Plant grown in pine bark containing potting mixture produced maximum number of spikes/plant and spikes/clump.

Key words: *Cymbidium* species, tree bark, potting mixture.

Pines bark (*Pinus* spp.) is often substituted for moss peat in container production of woody ornamentals and is sometimes used as a medium component in greenhouse flower crops because of its low cost, wide spread availability, pathogen-suppressive benefits and the slow rate of humification (Caceres *et al*., 2). The bark of the cork oak (*Quercus* spp.) and Burans (*Rhododendron* spp.) trees are extremely amenable to plant growth, very durable and locally available. Therefore, an effort has been made to study the impact of various trees bark as potting mixture on performance of *Cymbidium* sp. to maximizing productivity in qualitative as well as quantitative terms.

The experiment was carried out in the polyhouse at the Floriculture Section of VCSG College of Horticulture, Bharsar, Pauri Garhwal for two years during April 2006 to April 2010. Three-year-old flowering plants of five species, *viz*., *C. longifolium* (V1), *C. hookerianum* (V2), *C. elegans* (V3), *C. mastersii* (V4), and *C. gigantium* (V5) were taken for study. Basal potting mixture prepared from leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1). For different treatments, one part of pine bark(T1), oak bark (T2) and rhododendron (T3) were added separately in above potting mixture to get the ratio of 2:1:1:1:1. The experiment was conducted in completely randomized design with six replications, and each replication consisted of three plants. For post-harvest observations, flowers were harvested when the lower five to eight florets were opened with some buds on the top. The trial was conducted for four years but the results of second year and onward was considered for observation. All the data were pooled and subjected to statistical analysis.

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Significant improvement in number of shoots/ pot, plant height at the time of flowering, fresh weight of the plant and dry weight, number leaves, length of leaves at six month and at flower emergence were recorded in pine bark potting mixture (T1) irrespective of species. However, fresh weight and dry weight of leaves did not affected by growing medium. Bark of *Pinus* sp. contain numerous poly phenol polymers, condensed tannins and phenolic acid are similar to those naturally occurring in soil organic matter and known to be associated with soil pH, active cation adsorption and exchange attribute to colloids (Wang *et al*., 5). Better performance of all species in T1 growing medium might be due to have improved soil pH, active cation adsorption and exchange attribute to colloids. Variation in above growth attribute due to various growing medium were also reported by Barman *et al.* (1) in mid hill situation of Sikkim. In all species number, length, girth, fresh weight and dry weight of pseudo-bulb were maximum in oak bark (T2) potting mixture. Same pattern were also exhibited in number of roots/ clump, root length, fresh and dry weights of root per plants. In all the species, however, girth of roots of all species was not affected by the growing mixtures. Barman *et al.* (1) also observed the similar results in hybrids of *Cymbidium* at Sikkim. The bark of the oak is extremely amenable to plants root growth probably due to the optimum water holding capacity, better drainage and aeration in the growing media, which provide congenial conditions for pseudo-bulb development and root growth.

Significant effect of potting medium on floral character of various *Cymbidium* species was also observed (Table 3). Plant grown in pine bark potting

mixture produces maximum number of spikes/ plant and spikes/clump irrespective of species. However, it was the minimum in plants grown in *Rhododendron* bark containing growing medium T3 on all species. Organic matter is known to increase soil fertility and correlation between organic matter content and cation exchange capacity is well established (Ylmaz, 6). Bark of *Pinus* sp. has ability of chelation in naturally occurring organic material might be due to which increased availability of elements, especially plant micronutrient are the reason behind better performance of all species under pine bark potting mixture. Effect of growing media on number of spikes/pot and number of spikes/clump were also recorded by Barman *et al.* (1) under partially modified greenhouse at Sikkim. Days taken to first flower opening from inflorescence emergence were maximum in *Rhododendron* (T3) growing mixture and early opening recorded in pine bark (T1) mixture. Like other characters, the variation in spike length was also observed among various growing media, longest spike length was noticed in T1 medium. A minimum spike length was observed in T3 medium. Considerable variation in number of flowers/ spike also existed. Maximum number of florets was recorded in T1medium and minimum was on T3 medium. Distinguished variation in number of florets/ spike might be due to climatologically as well as physical factors governing growth and flowering. Size of flowers is one of the main dominating factors in floriculture market (Barman *et al.*, 1), which, was not affected by different growing media. Similarly, self-life and vase-life were not affected by growing medium. Wide variation in the post harvest quality had also been observed amongst different species of flowers and ornamental crops and cultivars of the same species by Lu *et al.* (4). The longevity of cut flowers is limited by their ephemeral nature and by several stresses leading to the decrease of water

Table 1. Growth characteristics of various *Cymbidium* species on different growing media.

Variety		No. of shoots/ pot	Plant height (cm)	Plant FW (g)	Plant DW (g)	No. of leaves/ plant	Length of new leaves at six month	Length of new leaves at flower emergence	FW (g) of leaves/ plant	DW (g) of leaves/ plant
V1	T1	9.68	70.62	57.80	21.20	16.90	31.60	62.80	5.40	1.90
	T2	8.60	69.20	55.60	18.60	15.20	29.20	60.00	5.00	1.72
	T3	8.20	66.26	54.60	18.80	14.60	30.20	59.80	5.60	1.73
	CD at 5%	1.445	1.435	2.074	1.724	1.206	1.179	1.466	NS	NS
V2	T1	6.60	82.40	54.00	17.20	19.20	32.40	76.20	6.80	2.1
	T2	5.40	80.20	52.60	16.60	17.40	31.20	74.00	5.20	1.56
	T3	5.00	80.80	51.80	15.00	16.80	30.60	75.40	5.70	1.68
	CD at 5%	0.834	1.630	1.120	1.124	1.037	1.206	1.124	NS	NS
V3	T1	7.60	60.80	59.60	15.80	21.70	28.20	57.20	4.60	1.00
	T2	6.80	59.60	59.40	13.40	20.00	24.60	55.00	3.40	0.914
	T3	6.40	58.80	57.60	13.41	20.00	25.00	53.80	3.80	0.920
	CD at 5%	1.067	1.307	1.466	1.331	1.630	4.283	1.570	NS	NS
V4	T1	10.20	74.80	61.60	21.80	13.60	26.60	66.60	2.80	1.58
	T2	9.20	72.80	59.20	19.20	12.20	23.20	64.60	3.40	1.50
	T3	8.80	72.20	59.30	19.22	11.40	23.30	62.60	2.60	1.28
	CD at 5%	1.000	1.40	1.530	1.152	1.331	1.630	1.466	NS	NS
V5	T1	18.80	89.8	124.6	25.60	19.00	67.20	87.00	5.74	1.60
	T2	17.80	86.8	121.40	23.20	18.20	64.60	85.40	5.82	1.93
	T3	18.20	88.8	121.60	22.60	17.00	63.60	84.00	5..82	1.88
	CD at 5%	NS	1.706	6..506	2..221	1.179	1.649	1.067	NS	NS

V1 = *C. longifolium*, V2 = *C. hookerianum*, V3 = *C. elegans*, V4 = *C. mastersii*, and V5 = *C. gigantium* ; T1= Pine bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T2 = Oak bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T3 = Rhododendron one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); FW = Fresh weight, DW = Dry weight.

Table 2. Growth characteristics of various *Cymbidium* species on different growing media.

Variety		No. of pseudo-bulbs	Length of pseudo bulb	Girth of pseudo-bulb (cm)	FW (g) of pseudo-bulb	DW of pseudo-bulb	No. of roots/ clump	Length of root (cm)	Root girth (cm)	Root FW (g)/ plant	Root DW (g)/ plant
V1	T1	3.10	6.60	3.87	35.60	10.60	419.80	63.80	1.13	492.60	39.80
	T2	3.60	7.00	4.16	36.40	12.47	424.40	66.80	1.19	506.20	42.00
	T3	2.94	6.36	3.78	35.80	12.40	419.00	64.20	1.14	488.20	39.40
	CD at 5%	0.837	0.814	0.464	0.969	0.821	4.569	2.263	NS	12.952	1.124
V2	T1	3.00	11.00	6.40	33.20	11.00	383.6	62.20	0.88	201.60	50.40
	T2	3.60	12.40	7.20	34.00	12.40	392.20	66.20	0.96	211.00	51.80
	T3	2.30	10.20	6.60	31.40	10.60	373.00	61.20	0.91	194.00	49.60
	CD at 5%	0.906	0.974	0.906	1.124	1.964	14.732	1.610	NS	9.296	0.906
V3	T1	1.20	4.50	2.20	56.20	11.20	114.00	55.80	0.93	106.00	24.80
	T2	2.00	5.40	4.80	57.00	12.40	130.00	59.60	0.95	122.00	27.60
	T3	1.10	4.40	2.40	55.80	10.20	102.00	57.00	0.86	112.00	23.80
	CD at 5%	0.787	0.941	1.307	1.096	1.630	13.777	1.590	NS	11.798	1.724
V4	T1	1.20	9.40	4.60	45.80	10.60	122.20	40.40	0.91	334.00	70.40
	T2	1.80	10.40	5.60	44.60	11.80	137.00	45.00	1.00	354.00	75.80
	T3	1.00	8.60	4.20	43.45	9.80	124.00	44.60	0.93	337.00	73.60
	CD at 5%	0.503	0.754	0.906	1.067	1.179	12.302	1.282	NS	14.450	1.067
V5	T1	3.10	11.40	5.58	30.60	10.40	656.00	81.60	1.22	456.00	45.40
	T2	3.80	12.30	6.04	33.40	11.80	678.00	86.60	1.30	477.00	47.80
	T3	3.20	11.20	5.42	32..60	10.60	658.80	84.40	1.23	461.00	46.40
	CD at 5%	0.616	0.775	0.310	0.754	0.711	17.737	2.332	NS	14.331	1.331

V1 = *C. longifolium*, V2 = *C. hookerianum*, V3 = *C. elegans*, V4 = *C. mastersii*, and V5 = *C. gigantium* ; T1= Pine bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T2 = Oak bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T3 = Rhododendron one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); FW = Fresh weight, DW = Dry weight

uptake, depletion of stored carbohydrates; increase of respiratory activities and ethylene production and by enhancing the flower sensitivity to ethylene (Chadha, 3).

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Table 3. Floral characteristics of various *Cymbidium* species on different growing media.

Variety		No. of spikes/ plant	No. of spikes/ clump	Days to opening of first flower	No. of flowers/ spike	Spike length (cm)	Single flower dia (cm)	Self-life (days)	Vase-life (days)
V1	T1	2.30	3.40	31.60	7.40	41.20	4.84	68.60	26.40
	T2	1.40	2.20	32.40	6.80	40.00	4.72	66.80	24.00
	T3	1.40	1.80	33.40	6.40	39.40	4.76	67.00	24.40
	CD at 5%	0.834	1.037	0.941	0.711	0.974	NS	NS	NS
V2	T1	2.60	5.20	33.60	11.60	54.80	5.40	63.40	23.20
	T2	1.60	3.40	34.20	9.40	51.60	4.20	63.00	21.80
	T3	1.80	3.00	34.80	9.56	51.60	3.60	61.00	20.40
	CD at 5%	0.906	0.974	1.179	0.754	2.490	NS	NS	NS
V3	T1	3.40	7.80	27.40	42.60	45.00	3.60	75.60	32..00
	T2	2.80	6.40	29.00	40.00	43.20	2.60	74.20	27.00
	T3	2.40	5.60	31.20	39.20	42.40	2.40	73.20	29.00
	CD at 5%	0.711	0.906	0.974	0.971	0.973	NS	NS	NS
V4	T1	3.60	4.40	29.80	35.60	21.20	3.60	71.20	25.20
	T2	2.60	3.00	31.60	33.80	18.20	3.10	69.00	25.00
	T3	2.40	3.10	30.40	33.10	19.40	3.20	69.20	24.80
	CD at 5%	0.754	0.906	0.906	0.178	1.630	NS	NS	NS
V5	T1	3.00	3.80	34.60	12.00	43.80	5.10	71.00	31.20
	T2	2.20	3.40	37.40	10.00	42.20	4.54	70.00	30.40
	T3	2.200	3.20	36.80	10.00	39.20	4.20	69.60	30.00
	CD at 5%	0.941	0.665	1.742	0.562	4.032	NS	NS	NS

V1 = *C. longifolium*, V2 = *C. hookerianum*, V3 = *C. elegans*, V4 = *C. mastersii*, and V5 = *C. gigantium* ; T1= Pine bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T2 = Oak bark one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); T3 = Rhododendron one part + leaf mould, broken brick, charcoal and farm yard manure (2:1:1:1); FW = Fresh weight, DW = Dry weight

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