





## EVALUATION OF ORCHID SPECIES UNDER SUB-TROPICAL MID-HILLS OF MEGHALAYA

Rajiv Kumar<sup>1</sup>, Bidyut C. Deka and A.R. Roy

Division of Horticulture, All India Co-ordinated Research Project on Floriculture

ICAR Research Complex for NEH Region, Umiam 793 103, Meghalaya

Present address: <sup>1</sup>Division of Ornamental Crops, Indian Institute of Horticultural Research, Hesaraghatta lake Post, Bangalore 560 089, Karnataka

E-mail: [flori\\_rajiv@yahoo.co.in](mailto:flori_rajiv@yahoo.co.in)

**ABSTRACT:** Orchids are internationally acclaimed for their exquisite flower forms and attractive colours. Forty orchid species were evaluated for vegetative and flowering characters at ICAR Research complex for NEH region, Umiam, Meghalaya during 2009-10. The findings revealed that plant height ranged from 5.06 cm (*Pleione maculata*) to 140.00 cm (*Thunia marshalliana*). Significantly maximum number of stems/plant was recorded in *Arundina bambusifolia* (15.83). *Epidendrum* sp. recorded maximum stem length (130.50 cm) and internodal length (9.68 cm). However, maximum number of leaves/plant (99.76) and spikes/plant (17.80) was recorded in *Coelogyne nitida*. Earliest flowering was recorded in *Dendrobium aphyllum* (136 days) while it was delayed in *Cymbidium giganteum* (829 days). Number of flowers/spike varied from 1.00 (*Paphiopedilum spicarianum*) to 140.02 (*Aerides multiflorum*). Significantly maximum spike length (90.00 cm) and spike durability (58.90 days) was recorded in *Calanthe masuca* and *Cymbidium hybrid*, respectively. Flower size varied from 0.83 cm (*Pholidota* sp.) to 13.63 cm (*Paphiopedilum villosum*), while *Phaius tankervilleae* (7.86 cm) recorded the longest pedicel. Species *Calanthe masuca*, *Cymbidium giganteum*, *Dendrobium nobile*, *Phaius tankervilleae*, *Renanthera imschootiana*, *Thunia marshalliana*, *Vanda coerulea* were found promising as cut flower.

**Keywords :** Orchids, evaluation, flowering, north eastern region.

Orchids occupy a prime position in global cut flower trade due to their brilliant colours, delightful appearance, myriad sizes, shapes, forms and long lasting qualities. North Eastern Hill (NEH) region of India is rich in orchid diversity due to existing conducive climatological and phytogeographical conditions. Out of 800 orchid species distributed in the north eastern region of India, 352 species belonging to different genera were reported from Meghalaya. The study deals with the performance of 40 orchid species belonging to 16 genera and to notes the better performers for commercial exploitations under shade net house in sub-sub tropical mid hills of Meghalaya. Performance of orchid species from NEH region (Apang and Rao, 2; Devadas *et al.*, 3; Munsii *et al.*, 5; and Roychowdhury *et al.*, 7) and other parts of the country (Geetha, 4; Ramachandrudu, 6; Sundaram *et al.*, 8) have been reported.

### MATERIALS AND METHODS

The experiment was carried out at research farm of Division of Horticulture, ICAR Research Complex for NEH Region, Umiam, Meghalaya during 2009-10. Umiam is situated at 25° 41' N' latitude, 91° 55' E longitude and 1010 meter altitude. The experiment was laid out in completely randomized block design (CRD) with 40 treatments (orchid species) *i.e.* *Aerides odoratum*, *Aerides multiflorum*, *Arundina bambusifolia*, *Calanthe masuca*, *Coelogyne barbata*, *Coelogyne corymbosa*, *Coelogyne nitida*, *Cymbidium giganteum*, *Cymbidium hybrid*, *Cymbidium mastersii*, *Cymbidium aloifolium*, *Cymbidium elegans*, *Dendrobium nobile*, *Dendrobium moschatum*, *Dendrobium densiflorum*, *Dendrobium aphyllum*, *Dendrobium chrysanthum*, *Dendrobium chrysotaxum*, *Dendrobium wardianum*, *Dendrobium orchreatum*, *Epidendrum* sp., *Phaius*

tankervilliae, *Phaius woodfordii*, *Pholidota* sp., *Paphiopedilum villosum*, *Paphiopedilum insigne*, *Paphiopedilum venustum*, *Paphiopedilum fairrieanum*, *Paphiopedilum spicarianum*, *Paphiopedilum hirsutissimum*, *Pleione praecox*, *Pleione maculate*, *Renanthera imschootiana*, *Rhynchostylis retusa*, *Spathoglottis plicata*, *Thunia marshalliana*, *Vanda coerulea*, *Vanda teres*, *Vanda stangeana* and *Vanda pareshii*, each replicated three times. Each replication had four pots. These species were collected from different location of Meghalaya. The plants were grown in 25 cm earthen pots containing media composed of broken brick pieces, charcoal pieces and moss grass for epiphytic orchids, and broken pot pieces, river sand, leaf mould and compost for terrestrial orchids. The whole experiment was conducted under 75% shade net house. Standard cultural practices were followed uniformly to all the treatments as per their growth habit. Observations on various vegetative and flowering parameters were recorded periodically and were subjected to statistical analysis.

## RESULTS AND DISCUSSION

The vegetative and flowering attributes of different orchid species differed significantly.

### (a) Vegetative characters

Data presented in Table 1 clearly indicated that there was significant difference among the orchid species for all the vegetative characters. Tallest plant was recorded in *Thunia marshalliana* (140.00 cm) followed by *Arundina bambusifolia* (112.46 cm) and *Calanthe masuca* (110.12 cm) while shortest plants were recorded in *Pleione maculata* (5.06 cm). Significant variation in plant height in *Dendrobium* spp. (Ramachandrudu, 6; and Roychoudhury *et al.*, 7) and in *Cymbidium* spp. (Munsi *et al.*, 5) has also been reported. The highest number of leaves per plant was recorded in *Coelogyne nitida* (99.76) followed by *Epidendrum* sp. (80.60) while the lowest number of leaves per plant was recorded in *Pleione praecox* and *Pleione maculata* (2.10 and 2.60, respectively). Species

*Arundina bambusifolia* (15.83) produced highest number of stems per plant which was followed by *Paphiopedilum venustum* (13.40) and *Dendrobium nobile* (12.90), whereas the least stems per plant was recorded in *Cymbidium elegans* (1.02). Roychoudhury *et al.* (7) has also reported significant differences in number of leaves and shoots per plant in 21 species of *Dendrobium*. Significantly longest stem was recorded in *Epidendrum* sp. (130.50 cm) followed by *Arundina bambusifolia* (91.62 cm) while shortest stem was noted in *Spathoglottis plicata* (2.56). Long Internode was found in *Epidendrum* sp. (9.68 cm) followed by *Dendrobium nobile* (5.46 cm), whereas short internode (0.36 cm) was recorded in *Pleione maculate*. Sundaram *et al.* (8) has also reported the variation in vegetative characters of different orchid species.

### (b) Flowering characters

Varieties differ themselves for all the flowering parameters under study (Table 2). Species *Dendrobium aphyllum* was recorded early in flowering (136.00 days) whereas *Cymbidium giganteum* was found late in flowering (829.00 days). Maximum number of flowering spikes per plant was recorded in *Coelogyne nitida* (17.80) followed by *Aerides odoratum* (9.36) and *Coelogyne barbata* (6.80) whereas minimum was recorded in *Paphiopedilum spicarianum* (1.00) and *Pleione praecox* (1.00). Significantly longest spikes were produced by *Calanthe masuca* (90.00 cm) followed by *Dendrobium aphyllum* (88.00 cm) and *Cymbidium giganteum* (75.25 cm). The shortest spike (1.26 cm) was produced in *Pleione praecox* (1.26 cm). Large variation was observed in flower size of different species of orchids under study. Species *Paphiopedilum villosum* (13.63 cm), *Cymbidium giganteum* (12.55 cm) and *Phaius tankervillae* (10.98 cm) produced bigger size of flowers. *Orchid Pholidata* sp. produced smallest flowers (0.83 cm). Variation in flowering characters such as number of spikes per plant, number of flowers per spike, spike length and flower size of different orchids has also been reported (Amin *et*

Table 1: Evaluation of orchid species for vegetative characters at Umiam, Meghalaya.

Orchid species	Plant height (cm)	Leaves/plant	Stems/plant	Stem length (cm)	Internodal length (cm)
<i>Aerides odoratum</i>	40.12	24.50	5.20	3.28	0.79
<i>Aerides multiflorum</i>	43.09	10.10	4.60	4.61	0.83
<i>Arundina bambusifolia</i>	112.46	33.06	15.83	91.62	5.10
<i>Calanthe masuca</i>	110.12	14.00	12.30	9.40	3.30
<i>Coelogyne barbata</i>	16.00	21.20	8.10	18.12	0.56
<i>Coelogyne corymbosa</i>	15.03	14.13	6.00	3.04	0.83
<i>Coelogyne nitida</i>	35.60	99.76	11.30	7.46	0.76
<i>Cymbidium giganteum</i>	75.20	15.80	10.40	5.98	2.41
<i>Cymbidium hybrid</i>	82.60	11.30	9.30	6.30	3.48
<i>Cymbidium mastersii</i>	36.50	15.00	6.50	12.50	1.28
<i>Cymbidium aloifolium</i>	43.00	12.63	3.00	3.30	0.83
<i>Cymbidium elegans</i>	40.30	16.40	1.02	29.70	0.63
<i>Dendrobium nobile</i>	55.00	45.00	12.90	55.20	5.46
<i>Dendrobium moschatum</i>	50.18	24.00	9.50	43.60	5.38
<i>Dendrobium densiflorum</i>	126.42	36.92	7.00	40.50	5.40
<i>Dendrobium aphyllum</i>	100.56	30.10	6.12	40.00	4.80
<i>Dendrobium chrysanthum</i>	42.40	34.50	4.00	36.05	4.58
<i>Dendrobium chrysotaxum</i>	51.00	12.06	6.50	41.60	5.30
<i>Dendrobium wardianum</i>	57.00	26.50	5.30	44.35	3.42
<i>Dendrobium orchreatum</i>	48.50	21.60	4.60	32.50	3.02
<i>Epidendrum sp.</i>	43.63	80.60	9.35	130.50	9.68
<i>Phaius tankervilleae</i>	61.00	10.20	7.06	40.63	4.60
<i>Phaius woodfordii</i>	64.30	12.60	6.40	36.40	3.82
<i>Pholidota sp.</i>	50.36	8.00	4.36	43.40	0.63
<i>Paphiopedilum villosum</i>	35.06	9.20	11.36	6.60	0.72
<i>Paphiopedilum insigne</i>	42.41	12.40	10.62	5.41	0.83
<i>Paphiopedilum venustum</i>	33.35	10.68	13.40	3.49	0.70
<i>Paphiopedilum fairrieianum</i>	28.40	12.62	1.80	3.60	0.43
<i>Paphiopedilum spicarianum</i>	36.40	10.60	1.20	4.62	0.44
<i>Paphiopedilum hirsutissimum</i>	29.51	11.12	6.20	2.58	1.79
<i>Pleione praecox</i>	15.00	2.10	2.10	4.00	0.53
<i>Pleione maculata</i>	5.06	2.60	1.50	3.50	0.36
<i>Renanthera imschootiana</i>	46.00	24.06	3.40	5.30	1.60
<i>Rhynchostylis retusa</i>	41.50	19.24	3.36	3.62	0.80
<i>Spathoglottis plicata</i>	32.00	8.10	2.16	2.56	0.50
<i>Thunia marshalliana</i>	140.00	40.62	4.62	32.14	5.40
<i>Vanda coerulea</i>	101.40	12.36	3.18	26.02	5.40
<i>Vanda teres</i>	30.00	13.46	2.00	26.50	2.20
<i>Vanda stangeana</i>	26.40	15.00	2.68	28.60	2.36
<i>Vanda pareshii</i>	50.60	12.90	5.42	30.40	4.40
C.D. (P=0.05)	1.86	1.33	1.26	1.82	0.15

**Table 2:** Evaluation of orchid species for flowering characters at Umiam, Meghalaya.

Orchid species	Days to flowering	Spikes/ plant	Flowers /spike	Spike length (cm)	Flower size (cm)	Pedicel length (cm)	Spike durabi- lity (days)
<i>Aerides odoratum</i>	138	9.36	24.72	20.67	3.48	1.63	26.00
<i>Aerides multiflorum</i>	268	1.20	140.02	41.00	1.86	1.26	11.20
<i>Arundina bambusifolia</i>	306	4.60	7.03	12.62	6.70	3.02	15.83
<i>Calanthe masuca</i>	312	2.30	18.30	90.00	2.50	1.60	18.00
<i>Coelogyne barbata</i>	350	6.80	9.65	45.00	7.00	0.88	13.50
<i>Coelogyne corymbosa</i>	348	3.10	3.50	22.16	3.52	1.00	12.00
<i>Coelogyne nitida</i>	178	17.80	15.00	21.60	6.40	3.10	24.30
<i>Cymbidium giganteum</i>	829	3.10	21.24	75.25	12.55	5.40	50.61
<i>Cymbidium hybrid</i>	425	3.67	9.00	60.61	9.66	6.30	58.90
<i>Cymbidium mastersii</i>	362	1.86	10.00	26.50	5.00	4.30	38.00
<i>Cymbidium aloifolium</i>	366	2.60	16.22	50.00	4.20	3.30	28.50
<i>Cymbidium elegans</i>	382	3.16	22.16	36.34	4.90	3.10	33.60
<i>Dendrobium nobile</i>	563	4.69	12.00	33.90	5.56	4.50	15.20
<i>Dendrobium moschatum</i>	482	1.20	11.63	10.60	5.58	2.32	8.80
<i>Dendrobium densiflorum</i>	496	4.28	52.62	20.46	4.06	5.23	15.30
<i>Dendrobium aphyllum</i>	136	3.36	2.90	88.00	3.00	0.60	36.50
<i>Dendrobium chrysanthum</i>	440	4.36	6.68	4.58	4.57	3.43	9.60
<i>Dendrobium chrysotaxum</i>	466	1.12	6.68	4.58	4.57	3.43	9.60
<i>Dendrobium wardianum</i>	396	3.82	3.50	18.20	9.86	3.20	20.40
<i>Dendrobium orchreatum</i>	428	2.46	6.92	12.40	7.52	2.86	32.50
<i>Epidendrum sp.</i>	238	5.52	86.02	18.60	2.53	4.02	34.22
<i>Phaius tankervilliae</i>	306	3.00	6.68	65.00	10.98	7.86	14.50
<i>Phaius woodfordii</i>	318	3.44	5.90	61.00	8.90	6.72	12.31
<i>Pholidota sp.</i>	298	1.32	44.30	13.60	0.83	3.20	9.00
<i>Paphiopedilum villosum</i>	192	3.36	5.06	34.05	13.63	5.60	8.30
<i>Paphiopedilum insigne</i>	179	4.21	1.30	27.37	9.26	3.68	30.54
<i>Paphiopedilum venustum</i>	228	3.92	1.77	30.40	10.82	4.78	25.60
<i>Paphiopedilum fairrieianum</i>	268	1.06	1.02	25.00	6.52	2.40	24.60
<i>Paphiopedilum spicearianum</i>	250	1.00	1.00	30.00	6.00	2.30	28.00
<i>Paphiopedilum hirsutissimum</i>	236	5.53	1.68	18.92	10.92	1.06	21.60
<i>Pleione praecox</i>	220	1.00	3.21	1.26	10.00	0.53	10.40
<i>Pleione maculata</i>	232	1.06	4.30	1.48	5.20	0.40	12.00
<i>Renanthera imschootiana</i>	368	1.10	55.40	20.60	0.88	0.90	8.60
<i>Rhynchostylis retusa</i>	336	2.36	39.50	36.00	2.50	3.02	13.00
<i>Spathoglottis plicata</i>	328	2.10	8.20	30.00	2.50	0.42	14.20
<i>Thunia marshalliana</i>	326	1.16	5.40	15.00	5.86	3.72	25.30
<i>Vanda coerulea</i>	329	2.90	15.50	42.23	5.38	7.18	23.68
<i>Vanda teres</i>	340	2.23	9.63	24.50	2.90	0.60	15.80
<i>Vanda stangeana</i>	310	2.30	14.60	22.10	2.00	0.45	20.86
<i>Vanda pareshii</i>	360	3.40	6.52	2.16	6.46	3.80	40.28
C.D. (P=0.05)	18.20	0.78	0.82	2.12	0.20	0.68	3.35

al., 1; Munsu et al., 5; Ramachandrudu, 6; and Roychowdhury et al., 7). Longest flower pedicel (7.86 cm and 7.18 cm, respectively) was recorded in *Phaius tankervilleae* and *Vanda coerulea*. Shortest pedicel (0.40 cm) was recorded in *Pleione praecox*. Significant variation was exhibited in durability of spike which was varied from 8.30 days (*Paphiopedilum villosum*) to 58.90 cm (*Cymbidium hybrid*). Apang and Rao (2) also reported flowering period of 109 species orchid species at Arunachal Pradesh.

### Summary

Forty orchid species belonging to 16 genera were evaluated for vegetative and flowering characters at ICAR Research complex for NEH region, Umiam, Meghalaya during 2009-10. Based on the observations recorded, species *Calanthe masuca*, *Cymbidium giganteum*, *Dendrobium nobile*, *Phaius tankervilleae*, *Renanthera imschootiana*, *Thunia marshalliana*, *Vanda coerulea* were found promising as cut flower.

### REFERENCES

1. Amin, M.M.U., Mollah, M.S., Tania, S.A., Ahmad, M.R. and Khan, F.N. (2004). Performance study of six indigenous epiphytic monopodial orchids of Bangladesh. *J. Biol. Sci.*, **4**(2): 87-89.
2. Apang, Ona and Rao, A.N. (2008). Flowering period of some native orchid species in Arunachal Pradesh, India. *Indian Forester*, **134**(8): 1116-1131.
3. Devadas, R. Upadhyaya, R.C. and Khatiwara, P. (2009). Characterization and evaluation of a rare orchid *Renanthera imschootiana* role from Manipur and Nagaland, *J. Horti. Sci.*, **4**(2) : 181-183.
4. Geetha, K.R. (2000). *Ex situ* performance of wild orchids in Botanical garden, University of Agricultural Science, Bangalore, *Zoos' Print Journal*, **15**(11) : 369-370.
5. Munsu, P.S., Mandal, T. and Roychowdhury, N. (2004). Performance of different *Cymbidium spp.* and hybrids under polyhouse in Darjeeling hills. *Acta Hort.*, **659**(1): 483-490.
6. Ramachandrudu, K. (2008). Performance of *Dendrobium* orchids under agro-climatic conditions of Goa. *J. Orna. Hort.*, **11**(3): 232-234.
7. Roychowdhury, N., Mandal, T. and Munsu, P.S. (2004). Evaluation of different *Dendrobium spp.* under polyhouse in North-East Indian hills. *Acta Hort.*, **659**(1): 491-498.
8. Sundaram, K.S., Rajamani, K., Azhakiyanavalan, R.S. and Rengasamy, P. (1996). A note on performance of certain orchid species at Yercaud. *South Indian Hort.*, **44**(5/6): 166-167.