

VARIABILITIES AND MORPHOLOGICAL CHARACTERISTICS OF SOME HYBRID ORCHIDS

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Abstract

The experiment was conducted at the Orchidarium of Floriculture Division, Horticulture Research Center (HRC), Bangladesh Agricultural Research Institute, (BARI) Joydebpur, Gazipur to evaluate 21 epiphytic hybrid orchids. The results of the experiment revealed inflorescence length, number of inflorescence per plant, flowering area, number of florets per inflorescence, flower size, flowering duration and flowering tendency varied significantly among the variety. Among the 21 hybrid orchid varieties *Cattleya Pamela-Mench*, *Dendrobium Rinappa-White*, *Dendrobium Sonia*, *Dendrobium Sonia Bom*, *Oncidium Gower Ramsey* and *Oncidium Taka* were found better in respect of flower characteristics compared to the rest of the varieties. The highest flower size (11.14 cm) was obtained in variety *Cattleya Pamela-Mench*. In this variety flower scent was also present but florets per inflorescence was low. Flowering tendency, inflorescence length and flowering area were appreciable in *Dendrobium Rinappa-White*. *Dendrobium Sonia* showed maximum flowering duration (30.33 days). Number of inflorescences per plant, flower size and inflorescence length was also good in this variety but number of florets per inflorescence was low. In variety *Dendrobium Sonia Bom*, flowers were light maroon with white inner side and inflorescence length was preferable. Inflorescence length, flowering area, number of florets per inflorescence, flowering duration, flowering tendency and number of inflorescences per plant were reasonable in variety *Oncidium Gower Ramsey*. The plants of variety *Oncidium Taka* borne the maximum number of inflorescences per plant and number of florets per inflorescence, which was appreciable.

Key Words: Variability, morphological, characteristics, hybrid orchids.

Introduction

Orchids belong to the largest and most diverse family Orchidaceae, consisting of about 700-800 genera and 25,000 species (Singh and Voleti, 1995). The number constitutes roughly 7% of all flowering plants which probably makes the group as the largest family. Orchids occur almost throughout the world, except, perhaps, in the Antarctica. Some varieties are found even in the frozen areas of Alaska, the snow covered areas of the Himalayas and the sandy desert of Africa and Australia (Mukherjee, 1983). However, orchids are abundant in tropical countries in South-East Asia, South and Central America and South Africa. They are also distributed in China, Japan, the Philippines, Europe and Australia (Rao, 1989). In Bangladesh, the environmental conditions required for the survival and culture of orchids are adequately available throughout the year. The species of the family vary greatly and they may be terrestrial, epiphytic, lithophytic or even subterranean (Fanfani, 1989). They are of immense horticultural importance and play a very useful role to balance the forest ecosystem (Kaushik, 1983). As such this group of highly specialized plants are abundantly distributed in the country both in forest and non-forest areas (Chowdhury, 1975).

John Dominy is the first to produce a man-made hybrid which flowered in 1856 at the Veitch Nursery, England (Withner, 1959). Currently, some 1,800 new hybrids are registered every year by the Royal Horticultural Society, London, the International Registration Authority (Goh, 1989). In addition, about 25,000 hybrids have been produced by crossing wild and cultivated species (Shuttleworth *et al.*, 1970). *Doritaenopsis* is one of the most popular orchid genera which is an intergeneric hybrid of *Phalaenopsis* (hybrid of *Phalaenopsis* × *Doritis*). Recently, it has been increasing greatly in many countries of the world as a pot plant or cut flower. Their colourful and attractive big flowers remain attached to long flower stalk comparatively for long time and attract viewers. *Cattleya* flowers stay fresh and perfect for two to six weeks and *Phalaenopsis* can last for two to five weeks (Northern, 1970).

Orchid, having flowers of wonderful beauty and very good keeping quality, is of the highest value as cut flowers. Some orchid flowers last for one to three months if remained attached to the plant, and as cut flowers they remain fresh for one to four weeks. One cut flower in a simple little vase is a thing of beauty for table or mantel. Because of their long lasting qualities, orchids make attractive corsages. Ladies also

use orchid flowers for the adornment of their hair. Commercial cultivation of orchids both for plant sale as well as cut flower production has developed into vast industries in many countries and the sale of flowers runs into millions of dollars. Brazilian *Cattleyas*, Japanese *Phalaenopsis*, Indian *Dendrobium*, *Cymbidiums* and *Vandas* have played a major role in the development of modern orchid industry in the world (Singh, 1986). In Asia, Thailand has a long history of orchid trade, especially for export. It is estimated that 54% of the orchids produced are exported and the rest 46% consumed in the domestic market.

Several important hybrid orchids are grown in Bangladesh. But these orchids have not yet been described and characterized properly. Considering the above facts, the present work has been undertaken.

Materials and Methods

An investigation was carried out to study the variabilities and morphological characteristics of 21 epiphytic hybrid orchids varieties. The research work was carried out at the Orchidarium of Floriculture Division, Horticulture Research Centre (HRC), Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur during the period from July 2002 to April 2003. The climate of the experimental site is sub-tropical in nature characterized by three distinct seasons. The monsoon or rainy season extending from May to October, the winter or dry season from November to February and the premonsoon or hot season from March to April. In this experiment, the morphological characteristics of 21 hybrid orchid varieties were studied. Varieties were chosen primarily to represent the commercial types grown in our country. The following orchid variety were considered as the treatments of the experiment.

- V₁= Variety 1 (*Aranda* Udom)
- V₂= Variety 2 (*Aranda* waterouma)
- V₃= Variety 3 (*Doritaenopsis* Malibu Queen)
- V₄= Variety 4 (*Mokara* yellow)
- V₅= Variety 5 (*Mokara* Chark Kuan Pink)
- V₆= Variety 6 (*Mokara* Calipso)
- V₇= Variety 7 (*Mokara* Red)
- V₈= Variety 8 (*Phalaenopsis* Phuket Beauty)
- V₉= Variety 9 (*Phalaenopsis* Mount Kala)
- V₁₀= Variety 10 (*Rhynchostylis* Red)
- V₁₁= Variety 11 (*Cattleya* Pamela-Mench)
- V₁₂= Variety 12 (*Dendrobium* Rinappa-White)
- V₁₃= Variety 13 (*Dendrobium* Red)
- V₁₄= Variety 14 (*Dendrobium* Hieng-Beauty)
- V₁₅= Variety 15 (*Dendrobium* Sarifah Fatimah)
- V₁₆= Variety 16 (*Dendrobium* Milky White)
- V₁₇= Variety 17 (*Dendrobium* Sonia)

- V₁₈= Variety 18 (*Dendrobium* Sonia Bom)
- V₁₉= Variety 19 (*Dendrobium* Stripes)
- V₂₀= Variety 20 (*Oncidium* Gower Ramsey)
- V₂₁= Variety 21 (*Oncidium* Taka)

Experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. One variety represents one treatment and three plants in a variety represent one replication. The plants were always kept under careful observation. Necessary intercultural operations were done throughout the year for proper growth and development of the plant. The analyses of variance for most of the characters under consideration were performed by F variance test. The significance of the difference between treatment means were evaluated by least significance difference (LSD) test for the interpretation of the results (Gomez and Gomez, 1984).

Results and Discussion

The present study was conducted during the period from July 2002 to April 2003 to investigate the variability and morphological characters of 21 epiphytic hybrid orchid varieties. The variability among the varieties and correlation co-efficient among different flower characters were estimated. The flower characteristics like inflorescence length, flower size, flowering duration, flowering tendency, inflorescence type, number of inflorescences per plant, peak period of flowering, column size, column colour, flower scent, shape of sepals, shape of petals, number of pollinia, flowering area, flower colour, and number of florets per inflorescence were recorded and presented. Flowering duration as observed in this experiment varied from 15.11 to 30.33 days with the mean value of 31.698 days. The highest flowering duration (30.33 days) was found in variety 17 followed by variety 21 (30.22 days). While, the least flowering duration (15.11 days) was recorded in variety 14 (Fig. 1).

The different varieties showed a wide variation in colours of flower (Table 1). The flower colour of varieties 2, 4, 20 and 21 were yellow with various attractive colour combinations. It was pink with different attractive combination in varieties 1, 5 and 15. Maroon colour flower was observed in varieties 3, 11, 13, 17 and 18. Brick red colour flower was observed in varieties 7 and 10 while the rest of the varieties had white coloured flower with various colour combinations. The flowers of studied varieties have been shown in plate 2, 3, 4, 5, 6 & 7. From Table 1 it is evident that the flowers were scented in varieties 1, 2 and 11 while flower scent was absent in rest of the varieties. The types of inflorescences were categorized into two groups, raceme and panicles. It was panicle in varieties 20 and 21. Rest of the varieties had raceme type inflorescence. The type of inflorescences have

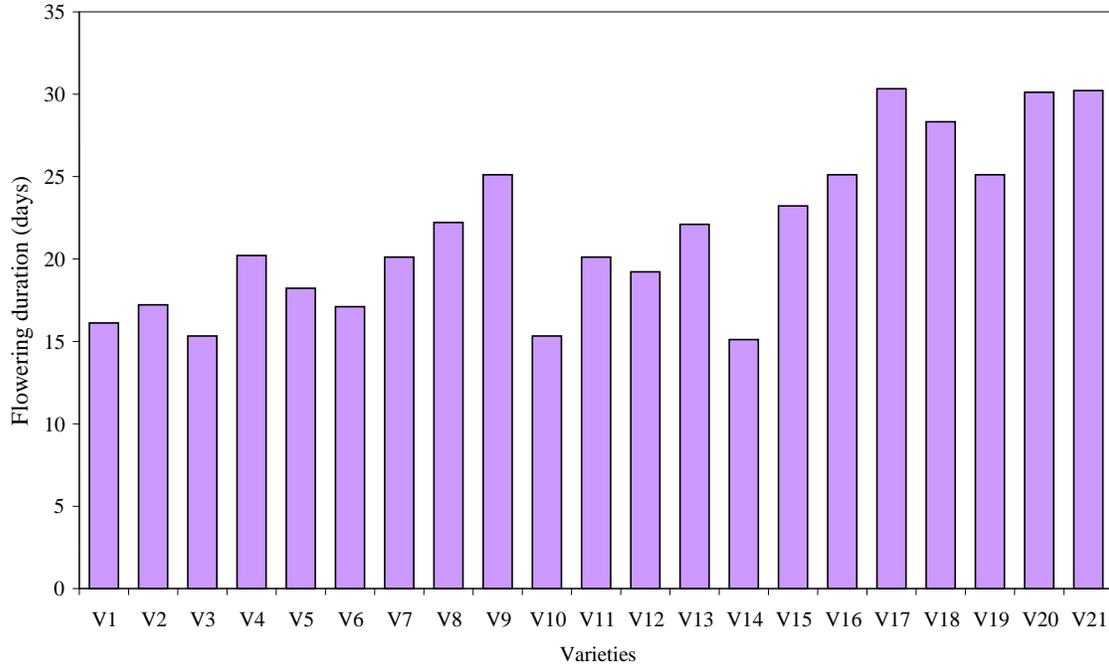


Fig. 1 . Flowering duration of 21 hybrid orchid varieties. Vertical bar indicates LSD (0.05)

Table 1. Flower characteristics in respect of flower colour, flower scent, inflorescence type, sepal number and sepal shape of 21 hybrid orchid varieties

Varieties	Flower colour	Flower scent	Inflorescence type	Sepal number	Sepal shape
V ₁	Creamy pink	Present	Raceme	3	Spathulate with curve
V ₂	Yellowish pink	Present	Raceme	3	Spathulate
V ₃	Glossy maroon	Absent	Raceme	3	Ovate
V ₄	Golden yellow with maroon spot	Absent	Raceme	3	Oblong-obovate
V ₅	Deep pink	Absent	Raceme	3	Oblong-obovate
V ₆	White with red	Absent	Raceme	3	Oblong-obovate
V ₇	Brick red colour	Absent	Raceme	3	Oblong-obovate
V ₈	White with maroon lip	Absent	Raceme	3	Ovate
V ₉	White with yellow lip	Absent	Raceme	3	Ovate
V ₁₀	Brick red	Absent	Raceme	3	Spathulate
V ₁₁	Light maroon with deep maroon lip	Present	Raceme	3	Lanceolate
V ₁₂	White with red inner side	Absent	Raceme	3	Ovate
V ₁₃	Deep maroon	Absent	Raceme	3	Lanceolate
V ₁₄	White with deep maroon	Absent	Raceme	3	Ovate
V ₁₅	Light pink	Absent	Raceme	3	Lanceolate
V ₁₆	Milky white	Absent	Raceme	3	Lanceolate
V ₁₇	Maroon with creamy inner side	Absent	Raceme	3	Lanceolate
V ₁₈	Light maroon with white inner side	Absent	Raceme	3	Lanceolate
V ₁₉	White with purple stripes	Absent	Raceme	3	Oblong-elliptical
V ₂₀	Yellow with maroon spot	Absent	Panicle	3	Spathulate
V ₂₁	Yellow with maroon spot	Absent	Panicle	3	Spathulate

been shown in Table 1. From the results presented in Table 1, it is evident that there was no variation in respect of number of sepals in flower. All of the studied orchid varieties had 3 sepals.

Clear cut variation was observed in the shape of sepal of different varieties (Table 1). The shape of sepal was divided into five groups, spathulate, ovate, oblong-obovate, lanceolate and oblong -elliptical. Only the

sepal of variety 19 was oblong-elliptical, varieties 3, 8, 9, 12 and 14 were ovate, varieties 1, 2, 20 and 21 were spatulate, varieties 4, 5, 6 and 7 were oblong-ovovate while the rest of varieties were lanceolate. The different varieties did not show any variation in number of petals in flower. There were 3 petals in all the studied varieties (Table 2). The different varieties showed a wide variation in the petal shape of flowers

(Table 2). The petal shape was categorized into four groups, spatulate, ovate, oblong-ovovate and cuneate. The petal shape of the flowers of varieties 1, 2, 10 and 19 were spatulate. It was oblong-ovovate in varieties 4, 5, 6 and 7. Cuneate in varieties 20 and 21 and rest varieties were ovate. From Table 2, it is evident that the varieties 4, 9, 10, 11, 20 and 21 bears 2 pollinia in flower. Rest of the varieties had 4 pollinia.

Table 2. Flower characteristics in respect of petal number, petal shape, number of pollinia, column size and peak period of flowering of 21 hybrid orchid varieties

Varieties	Petal number	Petal shape	Number of pollinia	Column colour	Column size	Peak period of flowering
V ₁	3	Spatulate with curve	4	Light yellow	Medium	March-April
V ₂	3	Spatulate	4	Light yellow	Medium	Feb-April
V ₃	3	Ovate	2	Creamy white	Medium	March-April
V ₄	3	Oblong-ovovate	4	Light yellow	Medium	March-April
V ₅	3	Oblong-ovovate	4	Creamy white	Medium	Feb-April
V ₆	3	Oblong-ovovate	4	Light yellow	Medium	March-April
V ₇	3	Oblong-ovovate	4	Creamy white	Medium	March-April
V ₈	3	Ovate	2	White	Medium	Feb-March
V ₉	3	Ovate	2	White	Medium	Feb-March
V ₁₀	3	Spatulate	2	Brick red	Medium	Feb-March
V ₁₁	3	Ovate	4	Pinkish white	Large	Feb-April
V ₁₂	3	Ovate	4	White	Medium	March-April
V ₁₃	3	Ovate	4	White	Medium	March-April
V ₁₄	3	Ovate	4	White	Medium	March-April
V ₁₅	3	Ovate	4	White	Medium	March-April
V ₁₆	3	Ovate	4	White	Medium	March-April
V ₁₇	3	Ovate	4	White	Medium	March-April
V ₁₈	3	Ovate	4	White	Medium	March-April
V ₁₉	3	Spatulate	4	White	Medium	March-April
V ₂₀	3	Cuneate	2	Light yellow	Small	Feb-April
V ₂₁	3	Cuneate	2	Light yellow	Small	Feb-April

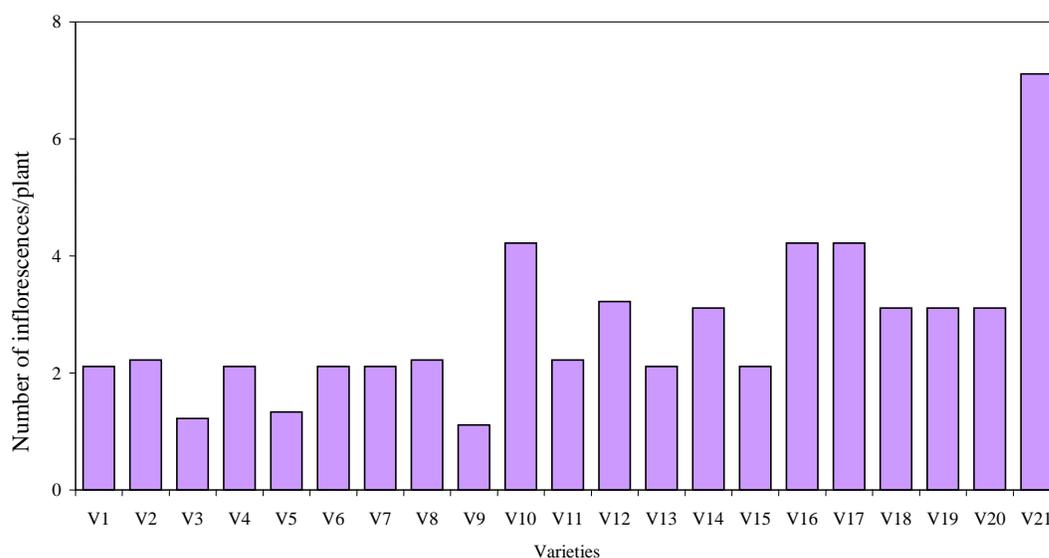


Fig. 2. Number of inflorescences per plant of 21 hybrid orchid varieties. Vertical bar indicates LSD (0.05)

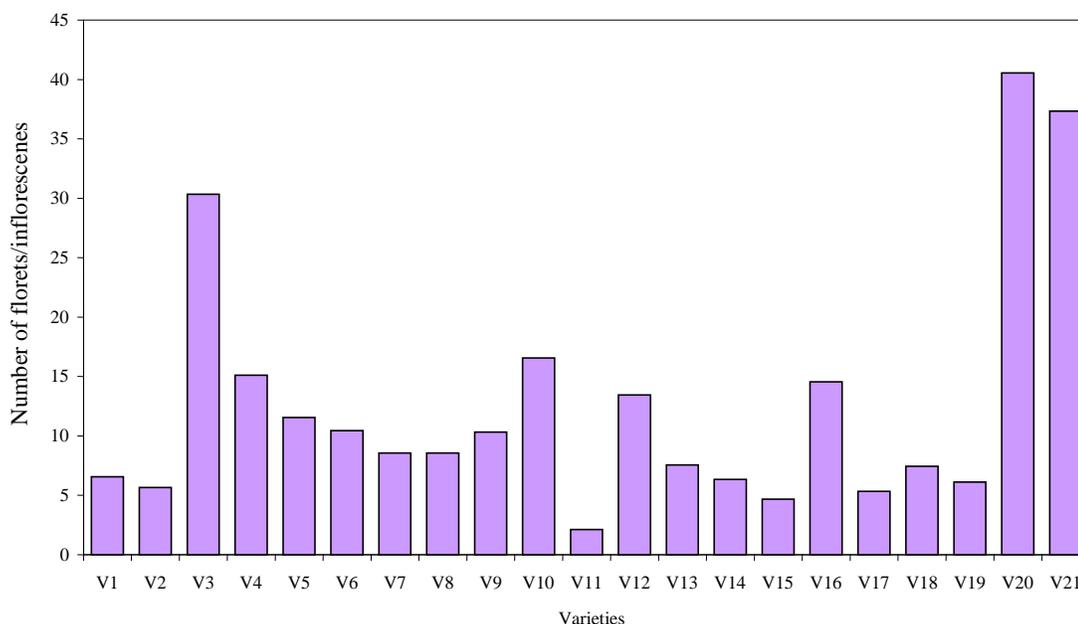


Fig. 3. Number of florets per inflorescences of 21 hybrid orchid varieties. Vertical bar indicates LSD (0.05)

Varieties were grouped into five groups on the basis of their colour of column. There are light yellow, creamy white, brick red, pinkish white and white. The column colour of varieties 1, 2, 4, 6, 20 and 21 were light yellow. It was pinkish white in variety 11, creamy white in varieties 5 and 7. Brick red column colour was observed in variety 10, whereas it was white in rest of the varieties (Table 2). Columns are categorized into three groups, small, medium and large in respect of its size (Table 2). Column in the flower of variety 11 were large. It was small in the varieties 20 and 21 and medium in the flowers of rest of the varieties. The peak period of flowering of orchids included in this experiment did not vary greatly. The most varieties showed peak period of flowering from the beginning of March and continued up to the end of April (Table 2). Significant variation in respect of number of inflorescences per plant among the varieties were found (Appendix I). Variety 21 produced the highest number of inflorescences (7.11) while variety 9 had the least number of inflorescences per plant (1.11) (Fig. 2). The number of florets per inflorescence varied significantly and ranged from 2.11 to 40.55. The plants of variety 11 borne the minimum number of florets per inflorescence (2.11), whereas variety 20 borne the maximum number of florets (40.55) (Fig. 2).

From the results of the experiment it may be concluded that varieties 11, 12, 17, 19, 20 and 21 were the best among 21 hybrid orchid varieties in respect of their different flower characteristics. Variety 11 had largest flower and variety 12 had nearly highest flowering area which was reasonable. Flowering duration was

the highest in variety 17 which appreciable as cut flower. Variety 19 produced maximum number of flower producing pseudobulbs. Its flower was beautiful maroon colour. The longest inflorescence and flowering area were observed from variety 20. It borne the maximum number of florets per inflorescence. Variety 21 produced maximum number of inflorescences per plant. Its flower was too much attractive which was bright yellow in colour. But the size of flower was the shortest. However, further intensive study may be carried out including more varieties to find out the appropriate hybrid orchid varieties for year round quality flower production.

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Appendix I. Analysis of variance of data of experiment of 21 hybrid orchid varieties

Sources of variation	Degrees of freedom	Number of flower producing pseudo bulbs	Inflorescence length (cm)	Flowering area (cm)	Number of inflorescences / plant	Number of florets/ inflorescence	Flowering tendency	Flowering duration (days)	Flower size (cm)
Rep	2	0.08	59.49	2.62	0.17	0.001	0.93	20.73	1.54
Hybrid orchid varieties	20	2.01**	475.68**	198.49**	5.59**	333.09**	3.01**	78.93**	12.12**
Error	40	0.06	5.26	3.33	0.09	1.58	0.08	2.88	0.18

** Significant at 0.01 level of probability