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Diversification of *Cymbidium aloifolium* found in Odisha

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Abstract

Cymbidium spp. a major orchid genera, which is of immense floricultural importance in world trade is of Indo-Malaysian origin and also abundantly found in Odisha. The experiment conducted by using three different *Cymbidium aloifolium* genotypes from three different geographical locations of Odisha from three different host plants were used for qualitative morphological evaluation by visual estimation. The difference in flowering morphology was evident from the shape, apex, colour and ornamentation of the sepal, petal, lip in the three genotypes. Inflorescence orientation, flowering season, ornamentation types were also found different in all the three genotypes. Qualitative evaluation and characterization of all the three genotypes depicted that the variation observed among the genotypes are genetic and least influenced by the host plants or geographical conditions.

Keywords: *Cymbidium aloifolium*, Orchids, colour variation, qualitative characters

Introduction

Orchids rightfully claim to be exquisite and ravishing pieces of nature's beauty being the most magnificent and precious flowers. Orchids are considered as the largest monocotyledonous flowering family. Till date 29,199 species of Orchids have been identified and accepted (Govaerts *et al.*, 2017) [2] distributed in almost all ecological conditions in the world. Economically they are of immense importance both in floriculture and pharmaceutical industry. According to a survey conducted by Botanical Survey of India (BSI) there are around 1256 orchids in India belonging to 155 genera out of which 388 are endemic to India. The state of Odisha, which is reported to have 20% of the Indian flora, is also home to nearly 130 species of Orchids under 48 Genera (Mishra, 2004) [4]. *Cymbidium spp.* a major orchid genera, which is of immense floricultural importance in world trade is of Indo-Malaysian origin and also abundantly found in Odisha. *Cymbidiums* are highly valued for genetic resources, cut flowers, hanging baskets, potted plants and herbal medicines (De *et al.*, 2014) [1]. Among orchids, *Cymbidiums* rank first and in floricultural industry, it accounts for 2.7% of total flower production (De *et al.*, 2014) [1]. *Cymbidiums* are mostly epiphytic, less frequent terrestrial and rarely mycotrophic species (Mishra, 2017) [7]. *Cymbidium* consists of seventy epiphytic and semi-terrestrial orchids of tropical and subs tropical Asia (De *et al.*, 2014) [1]. *Cymbidium* is known in India with 26 species, 3 sub species and 2 varieties (Mishra, 2007) [5] and is well distributed in north and eastern region where only two epiphytic species are found in Odisha, *i.e.*, *Cymbidium aloifolium* Sw. and *Cymbidium bicolor* sub sp. *obtusum* DuPuy and Cribb (Mishra, 2014) [1]. This species is abundantly available in many forest and hilly tracts of Odisha.

Materials and Methods

An experiment was conducted at Bio-technology cum Tissue Culture Centre (BTCC), Odisha University of Agriculture and Technology, Bhubaneswar with three genotypes of *Cymbidium aloifolium* collected from three different geographical locations of Odisha. Plant materials were separated vegetatively and a healthy population of nine plants with three replications each and three plants per replication was maintained in pots inside an Agro shade net house. All the three species were evaluated using Completely Randomised Design (CRD) during 2017 to 2019. The morphological characters of the three species were studied for several qualitative morphological parameters like type of stem, leaf, apex of leaf, sepal, petal, colour and margin of sepals, petals, lip, type and orientation of inflorescence, flowering season etc.

All the characters were observed by visual estimation with some standardized parameters used for characterization of Orchids.

Results and Discussion

This species, *Cymbidium aloifolium* was collected from three different locations of Odisha, i.e., from Jashipur (Mayurbhanj), Sagada (Rayagada) and from Narasinghapur (Cuttack) and from different host plants i.e., *Shorea robusta*, *Phoenix doctylifera* and *Mangifera indica* respectively. The species collected from all three regions represented variations in their flower morphology. The nature of stem as depicted in

table 1 is bulbous in all the three species irrespective of their size. The shape of leaf is strap, type of leaf is linear and apex of leaf is oblique in all three cases. However, there is a little difference in flowering season of three species. Where the flower commences during May-June in case of *Cymbidium aloifolium* genotype collected from Mayurbhanj and Cuttack, but the genotype collected from Rayagada flowers during June to July. All the three genotypes bear racemose inflorescence but the flowering orientation is Arching in the genotypes collected from Mayurbhanj and drooping in other two genotypes.

Table 1: Different qualitative characters of three *Cymbidium* genotypes

Genotypes	Nature of stem	Leaf shape	Leaf type	Leaf apex	Fl. season	Fl. pattern	Infl. orientation
<i>Cymbidium aloifolium</i> (Mayurbhanj)	Bulbous	Strap	Linear	Oblique	May-June	Raceme	Arching
<i>Cymbidium aloifolium</i> (Rayagada)	Bulbous	Strap	Linear	Oblique	June-July	Raceme	Drooping
<i>Cymbidium aloifolium</i> (Cuttack)	Bulbous	Strap	Linear	Oblique	May- June	Raceme	Drooping

(Fl. = Flowering, Infl. = Inflorescence)

Table 2: Characteristics of petal of three different *Cymbidium* genotypes

Genotypes	Shape	Apex	Base colour	Mark colour	Mark type	mark position	Mark coverage (%)
<i>Cymbidium aloifolium</i> (Mayurbhanj)	Elliptic	Acute	Green	Purplish maroon	Longitudinal lines	Base, mid line	20
<i>Cymbidium aloifolium</i> (Rayagada)	Elliptic	Obtuse	Yellow	Purplish maroon	Longitudinal lines	Base, mid line	25
<i>Cymbidium aloifolium</i> (Cuttack)	Elliptic	Acute	Creamy white	Purplish maroon	Longitudinal lines	Base	20

It is evident from the Table 2 that the petal characteristics of the three species have clear difference which is reflected in petal apex being obtuse in the *Cymbidium aloifolium* collected from Rayagada and acute in other two. Though the petal shape is elliptic in all the cases, but distinguished difference can be found in the predominant colour of the petals which is green in genotype from Mayurbhanj, Yellow in the genotype from Rayagada and creamy white in the genotype from Narasinghpur, Cuttack. However, there is no difference in the type of mark and colour of mark on petals which is longitudinal blush and purplish maroon respectively. But

mark or ornamentation position and coverage of ornamentation in percentage has a slight difference which can be evident from the fig. 1 and table 2.

The three different *Cymbidium aloifolium* genotypes possess very little difference in terms of sepal characteristics which is only found in sepal apex and predominant colour of the sepal equivalent to the petals described in the previous section (Table 3). The interesting observation found was the coverage of ornamentation, which is less (5%) in sepals as compared to 20-25% in petals irrespective of genotypes.

Table 3: Characteristics of sepal of three different *Cymbidium* genotypes

Genotypes	Shape	Apex	Base colour	Mark colour	Mark type	mark position	Mark coverage (%)
<i>Cymbidium aloifolium</i> (Mayurbhanj)	Elliptic	Acute	Green	Purplish maroon	Blush	Base	5
<i>Cymbidium aloifolium</i> (Rayagada)	Elliptic	Obtuse	Yellow	Purplish maroon	Blush	Base	5
<i>Cymbidium aloifolium</i> (Cuttack)	Elliptic	Acute	Creamy white	Purplish maroon	Blush	Base	5

Similarly, lip characteristics of three different genotypes (Table 4) collected from three different places also had some morphological differences, which are distinguished in their lip ornamentation. Though the lip predominant colour was found to be purple in all the cases, the ornamentation colour was found to be yellow in the genotype obtained from Rayagada and white in the rest two species. Similarly in case of type of ornamentation, it was 'blush' with central position in the *Cymbidium aloifolium* collected from Rayagada and 'longitudinal lines' with position throughout the lip in case of the species collected from Mayurbhanj and Cuttack. However, the percentage of coverage of marking was 40% in the species collected from Mayurbhanj and Rayagada and 30% in the species collected from Cuttack.

Similar observations on species specific colour variation from different geographical location were made by Mishra, 2004^[4] on *Vanda spp.* from Odisha, where he reported 10-12 shades of *Vanda tasselata* in Odisha. Similarly, Jayaweera (1984)^[3] from Sri Lanka reported 50 shades of colour variation in *Vanda*

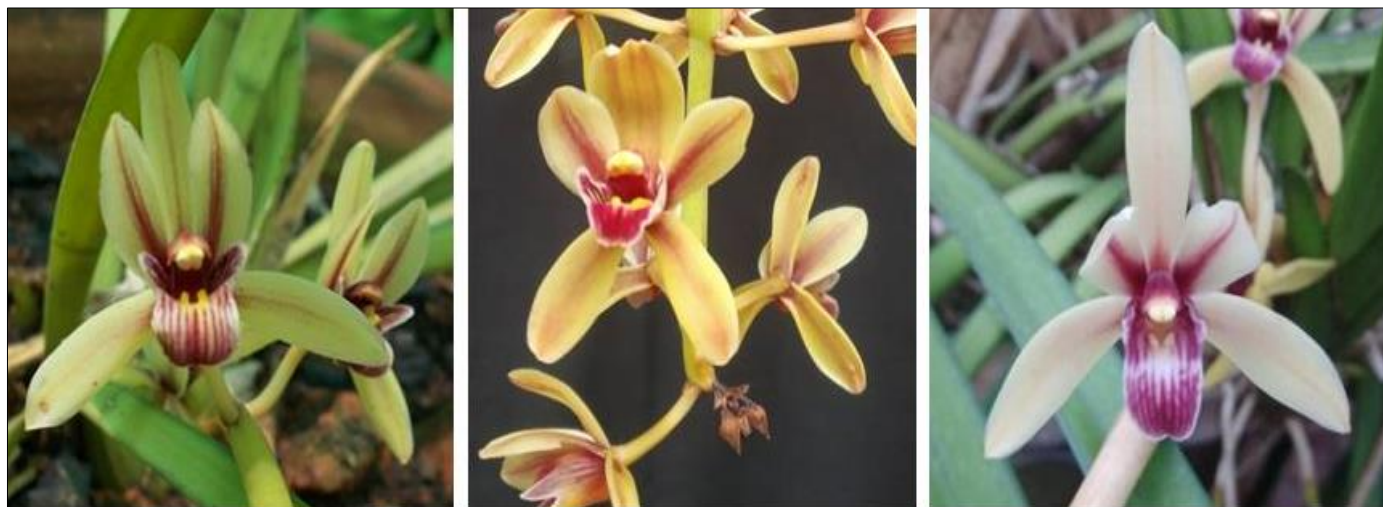
tasselata. Mujjaffar *et al.*, 2013^[8] also reported colour variation in *Vanda tasselata* from east Nimar, Madhya Pradesh. Prakash and Bais (2016)^[9] reported colour variation in *Vanda tessellata* in Madhya Pradesh and also narrated that the increasing temperature due to rapid urbanization which may not be the case everywhere. Some suggest that colour variation may be due to environmental effects like geographical location, climatic condition or host tree. But, the colour variation may be due to genotypic variation as even after planting it in pots under Agro shade nets, the colour variations were retained in the genotypes.

Conclusion

From this experiment and visual estimation of qualitative morphological characters, it can be concluded that the *Cymbidium aloifolium* species collected from three different parts of Odisha are different from each other. The colour variation is genetic and it can be distinguished irrespective of host plants.

Table 4: Characteristics of lip of three different *Cymbidium* genotypes

Genotypes	Shape	Apex	Base Colour	Mark colour	Mark type	mark position	Mark coverage (%)
<i>Cymbidium aloifolium</i> (Mayurbhanj)	Tri lobed	Obtuse	Purple	Whitish yellow	Longitudinal lines	Throughout	40
<i>Cymbidium aloifolium</i> (Rayagada)	Tri lobed	Obtuse	Purple	Yellow	Blush	Central	40
<i>Cymbidium aloifolium</i> (Cuttack)	Tri lobed	Obtuse	Purple	White	Longitudinal lines	Throughout	30

*Cymbidium aloifolium*
(Mayurbhanj)*Cymbidium aloifolium*
(Rayagada)*Cymbidium aloifolium*
(Cuttack)**Fig 1:** Difference in flower morphology of *Cymbidium aloifolium* genotypes of Odisha**Acknowledgements**

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