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Morphological characterization in Mokara Orchids

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Key words: Hybrids, Characteristics, Descriptors, Mokara.

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Abstract

Morphological characterization is the basic tool for improvement programme of orchids which is required for conducting Distinctiveness, Uniformity and Stability (DUS) testing to provide and promote an effective system of plant variety protection. It provides rights for breeders and farmers to exploit or develop new plant varieties, to allow access to foreign varieties with widen gene pool, to promote intensive breeding activities and to prevent unauthorized varieties exploitations. In the present study, 8 hybrids of *Mokara* orchids were evaluated during 2017-18 for development of common descriptors. Usually, healthy and insect pest and disease free plants are selected for taking morphological observations without any chemical and bio-physical treatment and grown in warm and humid green houses with standard package of practices. Out of 61 common descriptors developed, plant width, number of flowers/inflorescence, flower length, flower width in front view, dorsal sepal main colour, lateral sepal main colour, petal main colour, lip apical lobe main colour and throat colour of lip were used for classified as grouping characteristics of hybrids.

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Introduction

The orchids are known for their highly diverse, habitat specific and actively evolving plants and popular for their beautiful and long-lasting flowers. Orchids belong to family Orchidaceae, one of the largest family of flowering plants with both terrestrial and epiphytic monocotyledonous members with more than 25,000 species and account for nearly 10% of the total species of flowering plant. Globally, more than 3,00,000 natural and man- made hybrids are registered and these include several multi generics involving three, four, five and even six genera. In India, the orchids are represented by over 1,300 species distributed mainly in North- Western Himalayas, North- Eastern and Western Ghats and Khasi hills. The orchids are cultivated as a cash crop in several countries including India (Vij and Pathak, 2012). The species of *Dendrobium, Paphiopedilum, Phalaenopsis Vanda, Cattleya, Cymbidium etc.* are having highly commercial importance as ornamental plant in the global market. Beside these some other species of *Dendrobium, Cymbidium, Orchis, Aerides, Cypripedium, Vanilla, Malaxis, Habenaria* etc are having high ethno botanical importance. Orchids are rich source of alkaloids, flavonoids, glycosides, carbohydrates and other phytochemical contents. Medicinally orchids are used for cardiac problem, rheumatic arthritis, respiratory problems etc. Dendrobine alkaloid of *Dendrobium sp.*is eefective in the treatment of pulmonary tuberculosis, night sweats, fever and anorexia. *Vanda roxburghii* leaf paste is used in high fevers. Its leaf juice is used in the treatment of otitis; rheumatic and similar kind of pain; diseases of nervous system and syphilis. Its root is used as antidote against scorpion sting and remedy for bronchitis (Tandon and Kumaria, 2010). Due to incalculable aesthetic pleasure conservation of orchids in North Eastern India these can be closely related to the socio-economic culture of the people of this region. Being of high socio-economic and cultural importance, The Protection of Plant Varieties and Farmers Right Authority Authority (PPV & FRA) has already notified seven genera viz. *Cymbidium, Dendrobium, Vanda, Phalaenopsis*, *Cattleya, Oncidium* and *Paphiopedilum* for registration of new varieties or clones of plant breeders and farmers.

Materials and methods

In the present study, 8 hybrids of Mokara (*Arachnis x Ascocentrum x Vanda*) were evaluated for development of common morphological descriptors. The study was carried out with o all vegetatively propagated varieties of Mokara of the family Orchidaceae. Usually, healthy and insect pest and disease free plants are required for testing for taking morphological observations without any chemical and bio-physical treatment.

Conduct of tests

Mokara plants were grown in warm and humid green houses at temperature of 34^{o}C in day and 20^{o}C in night during summer and 25^{o}C in day and 10^{o}C in night during winter season and 80-85 % relative humidity. A mixture of cocochips + brick pieces + leaf mould (1:1:1) was used as growing media for pot culture. Growth regulators were not applied.

Observations

For the assessment of Distinctiveness, Un and Stability, all observations were taken from 10 plants or parts taken from each of 10 plants. For the assessment of Uniformity, a population standard of 1% and an acceptance probability of at least 95% was applied. In the case of a sample size of 10 plants, the maximum permissible number of off-types was considered 1. All observations were taken of the shoot on the flowering shoot, of the leaf on the longest leaf of a flowering shoot, of the inflorescence and the flower at the time when 50% of the flowers on the inflorescence have opened and on the most recently fully opened flower on the inflorescence before fading of colour, of the length and width of the flower and parts of the flower in the spread out position, of the colour of sepal, petal, lip and column on the inner side. For the assessment of colour characteristics, the Royal Horticultural Society (RHS) colour chart was used.

Grouping of varieties

Grouping characteristics are defined as the

documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) by choosing hybrids of common knowledge that can be excluded from the growing trial used for examination of distinctiveness; and (b) by conducting the growing trial so that similar hybrids are grouped together.

Characteristics and Symbols

A table of characteristics is used to assess Distinctiveness, Uniformity and Stability of the morphological characteristics and their states. Notes 1-9 (numbers) were used to explain the state of each character for the purpose of electronic data processing. (*) Characteristics were observed during every growing season for hybrids and included in the description of the hybrids, except when the state of expression of any of these characters is rendered impossible by a preceding phenological characteristic or by the environment conditions of the testing places. Under such exceptional situation, adequate explanation is required. (+) indicates the explanations on the Table of Characteristics. Characteristics denoted with symbols QL, QN and PQ in the first column of the Table of Characteristics were described as Qualitative characteristic, Quantitative characteristic and Pseudo-qualitative characteristic, respectively.

Results

Characteristics indicated with (a), (b), (c), (d) and (e) in the first column of the Table of Characteristics (Table 1) were observations on the leaf made on the longest leaf of flowering plant (a), on the inflorescence and the flower made at the time when 50% of the flowers on the inflorescence have opened and the most recently fully opened flower on the inflorescence before the colour starts to fade (b), on the length and width of the flower and parts of the flower made on the spread out positions (c), on the colour of the sepal, the petal and the lip made on inner side at apex, mid and base portion (d) and on the colour of column made on inner side at apex, mid and basal region (e).

Table 1. Table of characteristics in Mokara orchids.

Sl. No.	Characteristic	State	Note	Example Varieties /hybrids	Type of Assessment
1. (*) (+) QN	Plant: width (cm)	narrow (<30cm)	3		MS
		medium (30-45cm)	5	Khaw Phiak Suan x V. Rasri Gold, Chark Kuan Red, Happy Beauty, Walter Oumae White	
		broad (> 45 cm)	7		
2. QN	Internode length (cm)	short (<1.0)	3		MS
		medium (1.0-2.0)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		long (>2.0)	7	Chark Kuan Red	
3. PQ	Leaf type	terete	1		VG
		semi-terete	2		
		channeled	3		
		strap	4	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
4. (+) QN (a)	Leaf: attitude (at flowering)	erect	1	Happy Beauty, Walter Oumae White, Jitti Orange	VS
		horizontal	3	Chark Kuan Red	
		Arching	5	Khaw Phiak Suan x V. Rasri Gold	
		pendulous	7		
5. QN (a)	Leaf: length (flowering shoot) (cm)	short <15)	3		MS
		medium (15-30)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long (>30)	7		
6. QN (a)	Leaf : width (cm)	narrow <1.0)	3		MS
		medium (1.0-2.0)	5		
		broad (>2.0)	7	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
7.	Leaf : emarginated tip	absent	1		VG

(+) QL (a)		present	9	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
8. QN (a)	Leaf: folding	weak	3		VG
		medium	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Chark Kuan Red	
		strong	7		
9. (*) (+) QN (b)	Inflorescence: length (cm)	short (<30)	3		MS
		medium (30-60)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long (>60)	7		
10. (*) QN (b)	Inflorescence: no of flowers	few (<5)	3		VS
		medium (5-10)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White	
		many (>10)	7	Jitti Orange, Chark Kuan Red	
11. QL (b)	Inflorescence: branching	absent	1	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Chark Kuan Red	VG
		present	9		
12. PQ	Inflorescence orientation	erect	1	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	VG
		horizontal	3		
		drooping	5		
13. (*) (+) QN	Peduncle: length (cm)	short (<15)	3		MS
		medium (15-30)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long(>30)	7		
14.	Peduncle coloration	absent	1	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Chark Kuan Red	VG
		present	9		
15. (*) (+) QN	Pedicel : length (cm)	short (<3)	3		MS
		medium (3-6)	5	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long (>6)	7	Happy Beauty	
16. (*) (+) QN	Flower: length (cm)	short (<5)	3	Chark Kuan Red	MS
		medium (5-10)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		long (>10)	7		
17. (*) (+) QN	Flower: width (cm)	narrow (<5)	3	Chark Kuan Red	MS
		medium (5-10)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		broad (>10)	7		
18. QL	Flower: fragrance	absent	1	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	VG
		present	9		
19. (+) QN	Dorsal sepal curvature in longitudinal axis	strongly concave	1		VS
		weakly concave	3		
		straight	5	Happy Beauty, Jitti Orange, Chark Kuan Red	
		weakly convex	7		
		strongly convex	9		
20. (+) (*) QN	Dorsal sepal: length (cm)	short <3)	3		MS
		medium (3-6)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long(>6)	7		
21. (+) (*) QN	Dorsal sepal: width (cm)	narrow(<2)	3	Chark Kuan Red	MS
		medium (2-4)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		broad(>4)	7		
22. (+) (*) PQ	Dorsal sepal: shape	oblong	1		VG
		elliptic	2		
		obovate	3	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		spatulate	4		

23. PQ	Dorsal sepal: apex	acute	1	Walter Oumae White	VG
		notched	3		
		obtuse	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Chark Kuan Red	
24. (*) QL	Dorsal sepal: main colour	green	1		VG
		white	2	Walter Oumae White	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold,	
		pink	4		
		red	5	Chark Kuan Red	
		brown	6		
		purple	7	Happy Beauty	
		blue	8		
		violet	9		
25. QL	Dorsal sepal: colour pattern	uniform	1		VG
		shaded	2		
		edged	3		
		striped	4		
		netted	5	Happy Beauty, Jitti Orange	
		spotted	6	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red	
26. (+) PQ	Lateral sepal curvature in longitudinal axis	strongly concave	1		VG
		weakly concave	3	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Chark Kuan Red	
		straight	5		
		weakly convex	7		
		strongly convex	9		
27. (*) (+) QN	Lateral sepal: length (cm)	short(<3)	3	Chark Kuan Red	MS
		medium (3-6)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		long(>6)	7		
28. (*) (+) QN	Lateral sepal: width (cm)	short (<2)	3		MS
		medium(2-4)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long(>4)	7		
29. (*) (+) PQ	Lateral sepal: shape	oblong	1		VG
		elliptic	2		
		obovate	3	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		spatulate	4		
30. PQ	Lateral sepal: apex	acute	1		VG
		notched	3	Walter Oumae White	
		obtuse	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Jitti Orange, Chark Kuan Red	
31. (*) QL	Lateral sepal: main colour	green	1		VG
		white	2	Walter Oumae White	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold	
		pink	4		
		red	5	Chark Kuan Red	
		brown	6		
		purple	7	Happy Beauty	
		blue	8		
		violet	9		
32. QL	Lateral sepal colour pattern	uniform	1		VG
		shaded	2		
		edged	3		
		striped	4		
		netted	5	Happy Beauty, Jitti Orange	
		spotted	6	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red	
33. (+) QN	Petal curvature in longitudinal axis	strongly concave	1		VG
		weakly concave	3		
		straight	5	Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		weakly convex	7		
		strongly convex	9		

34. (*) (+) QN	Petal length (cm)	short (<3)	3	Chark Kuan Red	MS
		medium (3-6)	5	Khan Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		long (>6)	7		
35. (*) (+) QN	Petal width (cm)	narrow (<2)	3	Chark Kuan Red	MS
		medium (2-4)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	
		broad(>4)	7		
36. (*) (+) PQ	Petal shape	oblong	1		VG
		elliptic	3		
		obovate	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange	
		spatulate	7	Chark Kuan Red	
37. PQ	Petal apex	acute	1		VG
		obtuse	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		notched	5		
		retuse	7	Happy Beauty,	
38. (*) QL	Petal main colour	green	1		VG
		white	2	Walter Oumae White	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold	
		pink	4		
		red	5	Chark Kuan Red	
		brown	6		
		purple	7	Happy Beauty	
		blue	8		
		violet	9		
39. PQ	Petal colour pattern	uniform	1		VG
		shaded	2		
		edged	3		
		striped	4		
		netted	5	Happy Beauty, Jitti Orange	
		spotted	6	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red	
40. QN	Petal: number of colour	single	1		VG
		two	3	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		more than two	5		
41. (*) (+) QN	Lip length of apical lobe (cm)	short (<1.5)	3	Walter Oumae White, Chark Kuan Red	MS
		medium (1.5-3.0)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty	
		long (>3.0)	7		
42. (*) (+) QN	Lip width of apical lobe (cm)	narrow (<1)	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red, Happy Beauty	MS
		medium (1-2)	5		
		broad (>2)	7		
43. (*) (+) PQ	Lip: apical lobe: lobing of apex	absent	1		VG
		present	9	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Chark Kuan Red	
44. (+) PQ	Lip: apical lobe: protrusion of ventral side	absent	1	Khaw Phiak Suan x V. Rasri Gold, Chark Kuan Red	VG
		weak	3	Walter Oumae White	
		strong	5	Happy Beauty	
45. * PQ	Lip : apical lobe : main colour	green	1		VG
		white	2	Walter Oumae White	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold	
		pink	4		
		red	5		
		brown	6		
		purple	7	Happy Beauty, Chark Kuan Red	
		blue	8		
		violet	9		
46. QL	Lip: apical lobe: colour pattern	uniform	1	Chark Kuan Red	VG
		shaded	2		

		edged	3		
		striped	4	Khaw Phiak Suan x V. Rasri Gold	
		netted	5		
		spotted	6	Walter Oumae White, Happy Beauty	
47. QN	Lip: apical lobe: colour (Nos.)	single	1	Chark Kuan Red	VS
		two	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Happy Beauty	
		more than two	5		
48. QN	Lip: lateral lobe: length (cm)	short (<1.5)	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Happy Beauty, Chark Kuan Red	MS
		medium (1.5-3.0)	5		
		long(>3.0)	7		
49. QN	Lip: lateral lobe: width (cm)	short (<1)	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red	MS
		medium(1-2)	5	Happy Beauty	
		long (>2)	7		
50. (*) QL	Lip: lateral lobe: main colour	green	1		VG
		white	2	Happy Beauty	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White,	
		pink	4		
		red	5		
		brown	6	Chark Kuan Red	
		purple	7		
		blue	8		
		violet	9		
51. QL	Lip: lateral lobe: colour pattern	uniform	1		VG
		shaded	2		
		edged	3		
		striped	4		
		netted	5		
		spotted	6	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Happy Beauty, Chark Kuan Red	
52. QN	Lip: lateral lobe: colour (Nos.)	single	1		VS
		two	3	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Chark Kuan Red	
		more than two	5	Happy Beauty	
53. * QL	Lip: colour of throat	green	1		VG
		white	2		
		yellow	3	Khaw Phiak Suan x V. Rasri Gold	
		pink	4		
		red	5		
		brown	6		
		purple	7	Happy Beauty, Chark Kuan Red	
		blue	8		
		violet	9		
54. QN	Keel nos.	absent	1		VS
		few (<2)	3		
		medium (2-4)	5	Walter Oumae White, Chark Kuan Red	
		many(>4)	7	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Jitti Orange	
55. QN	Column length (cm)	short (<0.5)	3		MS
		medium (0.5-1.0)	5	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		long (>1.0)	7		
56. QN	Column width (cm)	narrow (<0.5)	3		MS
		medium (0.5-1.0)	5	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Happy Beauty, Chark Kuan Red	
		broad (>1.0)	7		
57. QL	Column main colour	green	1		VG
		white	2	Walter Oumae White	
		yellow	3	Khaw Phiak Suan x V. Rasri Gold	
		pink	4		
		red	5	Chark Kuan Red	
		brown	6		

		purple	7	Happy Beauty	
		blue	8		
		violet	9		
58. QL	Column colour pattern	uniform	1	Happy Beauty, Walter Oumae White,	VG
		shaded	2	Khaw Phiak Suan x V. Rasri Gold, Jitti Orange, Chark Kuan Orange	
		edged	3		
		striped	4		
		netted	5		
		spotted	6		
59. QN	Column: no of colours	single	1	Khaw Phiak Suan x V. Rasri Gold, Walter Oumae White, Happy Beauty, Chark Kuan Red	VS
		two	3		
		more than two	5		
60. (+) PQ	Spur type	saccate	1		VG
		conical	3	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange, Chark Kuan Red	
		cylindric	5		
		tubular	7		
61. QN	Spur length (cm)	short (0.5)	3		MS
		medium (0.5-1.0)	5	Chark Kuan Red	
		long (>1.0)	7	Khaw Phiak Suan x V. Rasri Gold, Happy Beauty, Walter Oumae White, Jitti Orange,	

Type of assessment of characteristics indicated in column six of the Table of Characteristics were estimated by a single observation of a group of plants or parts of plants (MG), measurement of a number of individual plants or parts of plants (MS), visual assessment by a single observation of a group of plants or parts of plants (VG) and visual assessment by observations of individual plants or parts of plant (VS).

Fig. 1. Plant width

It is evident from Table 1 that Mokara hybrids tested had medium size plants (Fig.1) arranged with strap leaves of measuring 15-30 cm.

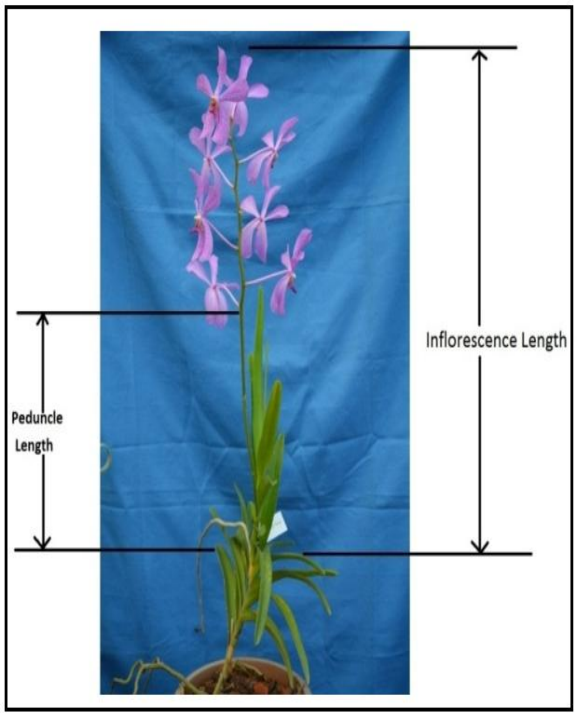

Fig. 2. Inflorescence length& peduncle length.

They had inflorescence length ranges from 30-60cm bearing 5-10 flowers. Most of hybrids had shown medium flower length and width (5-10cm) (Fig.3) arranged on medium size peduncle of measuring (15-30cm) (Fig.2). Most of hybrids had shown medium pedicel length (Fig.4) ranges from 3-6 cm except in

'Happy Beauty' which had more than 6cm. Flowers of all the hybrids had medium length and obovate dorsal sepals (3-6cm), weakly concave lateral sepal curvature and short to medium petal length and width (Fig.5) and short to medium length of apical lip lobe, narrow width of apical lip lobe (Fig. 6) and spotted lateral lobe.

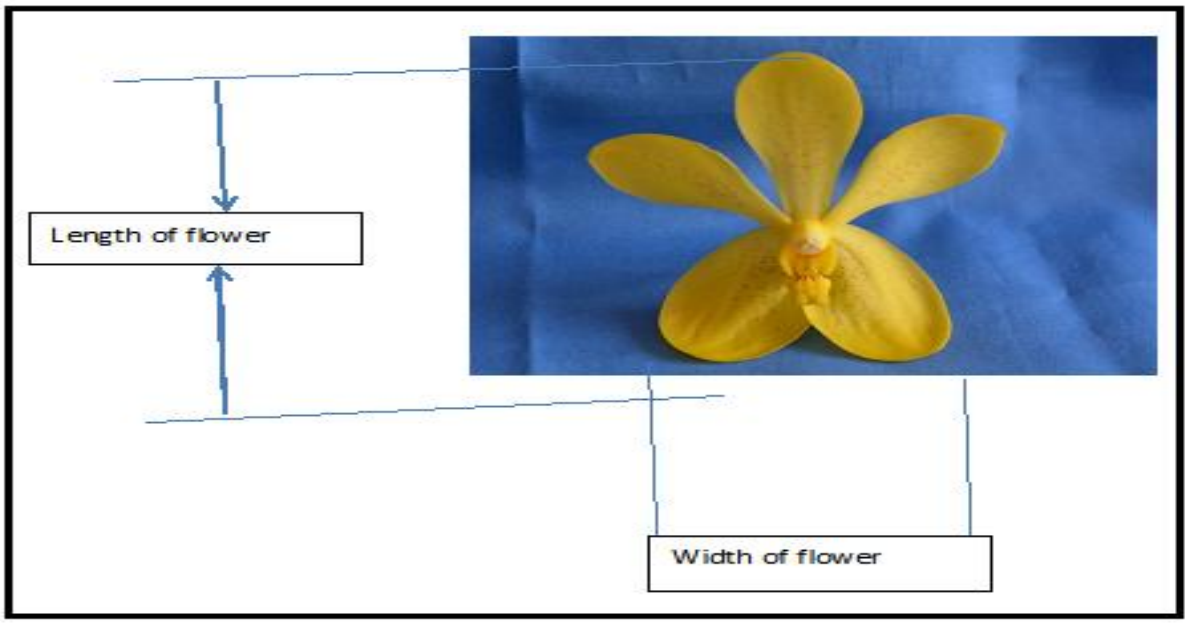

Fig. 3. Flower width & length

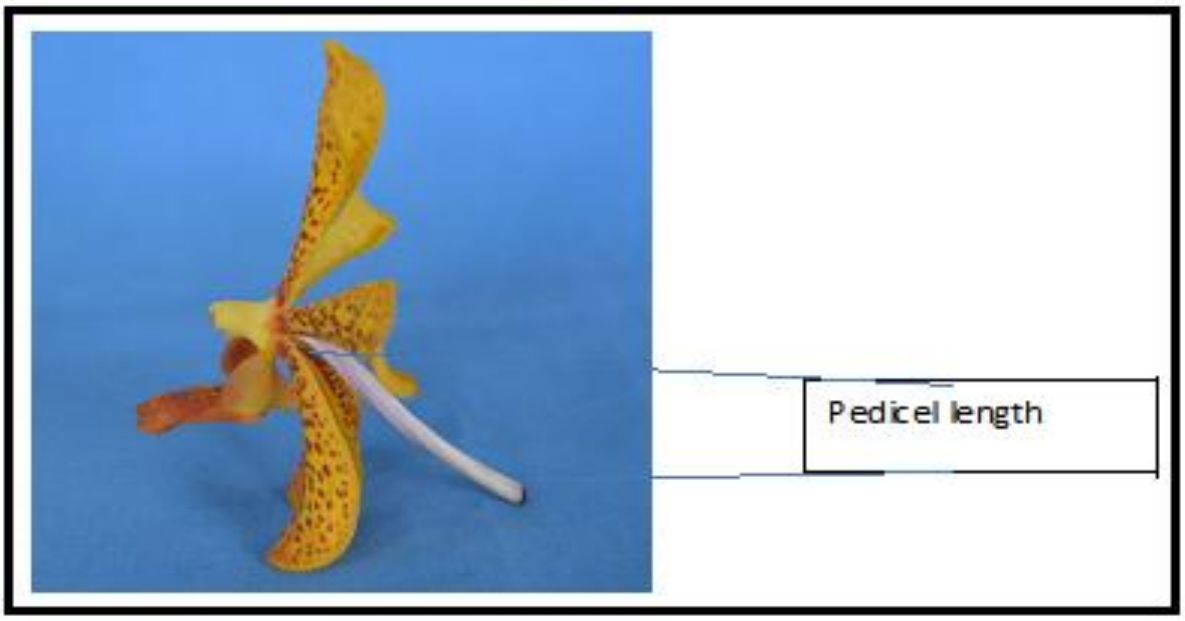

Fig. 4. Pedicel length.

Out of 61 common descriptors developed, plant width, number of flowers /inflorescence, size, flower length, flower width in front view, dorsal sepal main colour, lateral sepal main colour, petal main colour, main colour of apical lobe of lip and throat colour of lip were used for grouping of hybrids.

Discussion

A variety is eligible for registration under the Act if it essentially fulfils the criteria of Distinctiveness, Uniformity and Stability (DUS) which means that the candidate variety must be distinguishable by at least one essential characteristic from a variety which is a

matter of common knowledge in any country at the time of filing application, sufficiently uniform in expression of its essential characteristics which should remain unchanged even after repeated propagation. The variety should also have a single and distinct denomination (Henke, 2008).

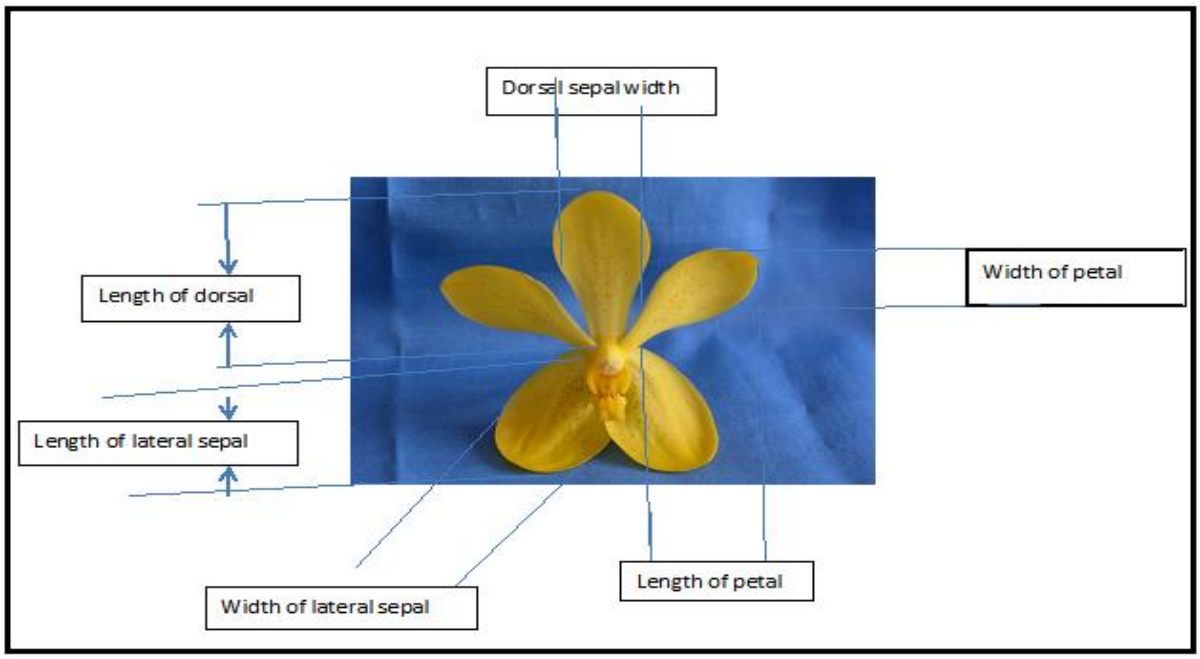

Fig. 5. Length and width of dorsal sepal, Lateral sepal & Petal.

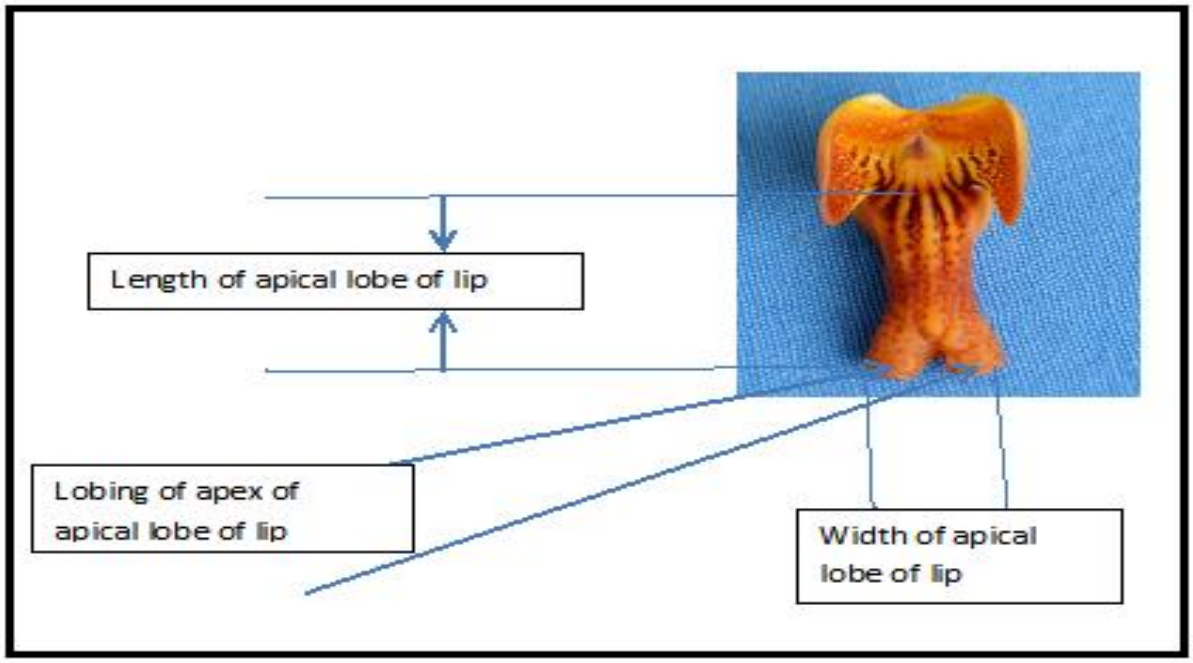

Fig. 6. Lip: apical lobe: length, width and lobing of apex.

Mokara hybrids showing significant variation in morphological characters could be used as parents for developing new hybrids. *Vanda* 'Miss Joaquim' is said to have taken the form of *V. hookeriana* and the colour of *V. teres* as reported by Tim Wing Yam, 2001. Fuchs (1997) reported that *Vanda sanderiana* and *V. coerulea* are the two important vanda species found in the background of most of the vandaceous hybrids. *V. sanderiana* gives full form, whereas *V. coerulea* imparts the rich blue violet colouration,

lobely tessellation as well as the long inflorescence. Some of the important hybrids of Vanda which contributed as parent plant for production of many more hybrids are “Amoene’, ‘Betsy Summer’, ‘Bull Sutton’, ‘Eisenhower’, ‘Ellen Noa’, ‘Emily Notley’, ‘ Ernest’,Fujinaga’, ‘Frank Crook’, ‘Haledena’, ‘Helen Reynolds’, ‘HiloBlue’, ‘Honolulu’, ‘Jennie Hashimoto’, ‘Josephine Van Bero’,‘Kapolio’, ‘Manila’, ‘Manisaki’, ‘Miss Joaquim’, Noel’, ‘Nora Potter’, ‘Norbert Alphanso’, Onomea’, ‘Poepoe’, ‘Rubella’,‘Ruby Prince’, ‘Tan Chay Yan’, ‘Tatzeri’, ‘Trimerrill’,‘Trisher’, ‘Venus’ and ‘Waipuna’ (De and Bhattachrjee, 2011).

Conclusion

It is concluded that in general morphological characterization of an orchid genera could be a practical guidance for the harmonized examination of distinctiveness, uniformity and stability (DUS) and in particular to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

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