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Metroglyph Analysis in Rose (*Rosa hybrida*)

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ABSTRACT

An experiment was laid out in a Randomized Block Design (RBD) during 2013-14 and 2014-15 with three replications to evaluate ten genotypes of rose for various vegetative and floral traits to ascertain the pattern of morphological variations through metroglyph technique. The mean performance of cultivars for quantitative traits revealed that the cultivar First Red exhibited maximum for most of the characters. In the metroglyph analysis the ten cultivars of rose formed seven clusters based on selected growth and flower characters exhibited by the cultivars viz. plant height, number of flowers per plant per year, number of leaves per plant, internodal length, flower diameter, self life and fresh weight of flower at harvesting. Highest index score was recorded for the cultivar First Red with a total score of (20/21). First Red performed highly for six characters (plant height, number of flowers per plant per year, internodal length , diameter of flower, self life and weight of cut flower at harvest) and medium for one character (number of leaves per plant). Tineke and Manuparlae recorded the lowest index score (9/21).

Key words: *Vegetative traits, Floral traits, Metroglyph analysis, Cluster, Index Score*

INTRODUCTION

Rose is one of the natures beautiful creations and is universally acclaimed as the queen of flowers due to its variety of shapes, sizes, colours and versatility. It is certainly the best known and most popular of all garden flowers throughout the world and has been growing for many million years[4,3]. The rose because of its utility, occupies a pre-eminent place amongst the flower crops and is one of the oldest of fragrant flowers to be cultivated by man. In recent days, commercial production of rose is a major venture in India among the ornamentals in general and cut flower in particular for export as well as for domestic market. Roses are recognized as highly valuable for economical benefit, being the best source of raw material to be used in agro – based industry especially in the cosmetics and perfumery.

As the commercial cultivation of rose is gaining importance, introduction and identification of high yielding varieties are necessary. Varieties which perform well in one region may not do well in other regions of varying climatic conditions.

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Hence, it is important to study morphological variation and performance of genotypes in a new location to enhance the efficiency of a breeding programme. Metroglyph analysis is helpful for germplasm classification and divergence studies. Coupled with index score, this method is applicable for the screening and grouping of genotypes. As a result, the cultivars for use, as parents in any hybridization programme can be chosen from different groups representing distinct variability.

MATERIAL AND METHODS

The investigation was conducted in the Experimental Field, Department of Horticulture, Assam Agricultural University, Jorhat for two years, during 2013-14 and 2014-15. The experimental material consists of ten genotypes of rose including First Red, Texas, Sky Line, Konfetti, Mascara, Alinka, Grand Gala, Sarisha, Tineke and Manuparlae. . The experiment was laid out in randomized block design with three replications. Healthy budded plants were planted with the spacing of 30×30cm inside greenhouse. Twenty plants were accommodated in each bed. The data were recorded on three plants from each genotype collected at random in each replication for characters viz., plant height ,number of leaves per plant, internodal length, stem girth, bud length ,stalk length, flower diameter, number of petals per flower, self life ,vase life, number of flowers per plant per year and fresh weight of flower at harvesting . Metroglyph Analysis was performed following Anderson[1]. It was carried out involving seven characters, *viz*. plant height, number of flowers per plant per year, number of leaves per plant, internodal length, flower diameter, self life and fresh weight of flower at harvesting. . In the graph, plant height (cm) and number of flowers per plant per year, both the characters having high variability are chosen as the X-axis and Y-axis respectively. A glyph was established for each cultivar locating the position of a cultivar in the graph. Performance for the remaining five characters of each cultivar is displayed on the respective glyph by rays at specific points defined in the glyph. The length of the ray depends upon the index score of an individual character. Long ray length for high score, short ray length for medium score and there was no ray for the low score for a character. The index score was constructed by dividing each of the seven above mentioned character into three groups, *viz.,* low, medium and high. The cultivars with low, medium and high values were given index score 1, 2 and 3 respectively. The worth of the cultivar is calculated by adding the index values of all the seven characters.

The whole graph is divided into nine quadrants and after plotting of the glyphs in the graph, cultivars were divided into groups on the basis of their performance for the characters. The cultivars were classified based on the position of the respective glyphs in the quadrants and the rays on the glyphs[5].

RESULT AND DISCUSSION

Significant variations were observed for different characters in both the years. These variations may be due to inherent genetic factors present among the cultivars for different characters. From the results it was seen that the cultivar First Red recorded highest for the characters plant height (137.38cm), stem girth (1.03cm), internodal length (7.31cm), bud length (3.59cm), fresh wt of cut flower at harvest (12.25g), stalk length (42.00 cm), no of petals per flower (43.33cm),flower diameter (9.18 cm), no of flowers per plant per year (168.50) , self life (17.33days) and vase life(12.33 days). Cultivar Texus recorded highest for the character No of leaves per plant (605.33). (Table1 and Table 2).

For metroglyph analysis the cultivars in the form of glyphs have been plotted in the graph on the basis of mean performance for plant height and number of flowers per year . Out of the nine quadrants in the graph, seven clusters (Cluster I-VII) were observed based on the different morphological characters exhibited by the cultivars (Fig 1). The cultivars exhibiting similar performance for the characters were grouped in the same cluster.

Under Cluster II a maximum of three cultivars exhibiting medium plant height and minimum number of flowers per year viz Skyline (3), Grand Gala (7) and Manuparlae (10). Cluster V consisted of two cultivars *viz*. First Red (1) and Konfetti (4) with taller plant and higher number of flowers per plant per year. Cluster I consisted of one cultivar *viz*., Tineke (9) which exhibited shorter plant and lower numbers of flowers per year. Cluster III consisted of one cultivar *viz*., Sarisha (8) with taller plant and lower numbers of flower per year. Cluster IV consisted of one cultivar *viz*., Texus with taller plant and moderate numbers of flowers per year. Cluster VI also comprised of one cultivar *viz*., Mascara (5) which exhibited intermediate plant height and higher numbers of flowers per year. Finally, Cluster VII also consisted of one cultivar *viz*., Alinka (6) with shorter plant and higher numbers of flower per year. Similar analysis was also carried out by Bhargava *et al*.[2] in Chenopodium spp. The cultivars within a single cluster could be genetically closer with respect to plant height and number of flowers per plant per year.

The cultivars also exhibited significant variation for the other five characters (number of leaves, internodal length, flower diameter , self life and fresh weight of cut flower at harvest) as revealed by the rays of the glyphs of individual cultivars on the basis of the index scores(Table 3). The cultivar First Red (1) performed high for four characters like internodal length, diameter of flower, self life and weight of cut flower at harvest which were represented by longer rays and it performed medium for number of leaves per plant represented by medium rays. The cultivar Texus (2) performed high for number of leaves per plant which were represented by longer rays and it performed medium for fresh weight of cut flower at harvest represented by medium rays and lowest for internodal length and flower diameter represented by no rays. The cultivar Konfetti (4) performed high for internodal length represented by longer rays, medium for number of leaves and flower diameter represented by medium ray and lowest for self life and fresh weight of flowers at harvest represented by no rays. The cultivar Mascara (5) performed high for number of leaves per plant and flower diameter represented by longer rays and lowest for remaining characters represented by no rays. The cultivar Skyline (3) performed high for number of leaves per plant represented by longer rays, medium for internodal length, flower diameter and self life represented by medium rays and low for fresh weight of flower at harvest represented by no rays. The cultivar Alinka (6) performed medium for internodal length and flower diameter represented by medium rays and lowest for remaining characters represented by no rays. The cultivar Sarisha (8) performed medium for internodal length and self life represented by medium rays and lowest for remaining characters represented by no rays. The cultivar Grand Gala (7) performed medium for internodal length and fresh weight of cut flower at harvest represented by medium rays and lowest for remaining characters represented by no rays. The cultivar Tineke (9) performed medium for flower diameter and self life represented by medium rays and lowest for remaining character represented by no rays. The cultivar Manuparlae (10) performed medium for self life represented by medium rays and lowest for remaining characters.

Highest index score was recorded for the cultivar First Red (Fig 2) with a total score of (20/21) followed by score (15/21) recorded for the cultivars Texus and Konfetti whereas Tineke and Manuparlae recorded the lowest index score (9/21). The other cultivars recorded medium index score (10-14) (Table 4).

Table 1: Performance of rose cultivars for growth characters (Pooled data for two Years 2013-14 and 2014-15)

Cultivars	Plant Height (cm)	No of leaves per plant	Stem Girth(cm)	Internodal length (cm)	Bud length (cm)
First Red	137.38	404.66	1.03	7.31	3.59
Texus	120.76	605.33	0.61	4.60	3.41
Sky Line	106.88	437.00	0.83	5.79	2.91
Konfetti	133.65	288.83	0.83	6.25	3.24
Mascara	105.01	481.66	0.86	4.11	3.28
Alinka	76.58	239.16	0.65	5.88	3.40
Grand Gala	103.18	247.16	0.75	5.27	2.82
Sarisha	122.32	256.33	0.81	5.68	3.47
Tineke	56.32	85.50	0.65	3.81	3.55
Manuperlae	88.02	212.50	0.83	4.77	2.66
S.Ed±	3.62	14.18	0.033	0.15	0.04
CD (P=0.05)	NS	NS	NS	NS	NS

NS= Non Significant

Table 2: Performance of rose cultivars for floral characters (pooled data for two years 2013-14 and 2014-15)

Cultivars	Fresh wt of flower at harvest (g)	Stalk Length (cm)	Flower diameter (cm)	No of petals per flower	No. Of Flowers Per Plant Per Year	Self life (days)	(Days)
First Red	12.25	42.00	9.18	43.33	168.50	17.33	12.33
Texus	10.43	38.48	7.20	37.50	103.00	15.16	9.0
Sky Line	8.18	35.09	8.86	38.16	88.50	12.00	6.0
Konfetti	8.96	36.63	8.18	39.00	148.83	10.33	8.83
Mascara	8.43	26.79	9.06	41.50	166.83	9.66	7.50
Alinka	8.85	25.18	8.16	29.50	150.00	9.16	6.66
Grand Gala	9.06	26.73	7.21	41.66	75.70	11.16	8.50
Sarisha	7.37	40.50	7.16	32.50	74.41	12.33	8.50
Tineke	7.02	18.04	8.93	33.66	49.00	12.00	9.33
Manuperlae	7.07	28.87	7.10	38.83	61.83	12.16	7.5
S.Ed±	0.28	1.25	0.24	0.64	1.54	0.39	0.25
CD (P=0.05)	NS	2.54	NS	1.30	NS	NS	NS

NS= Non Significant

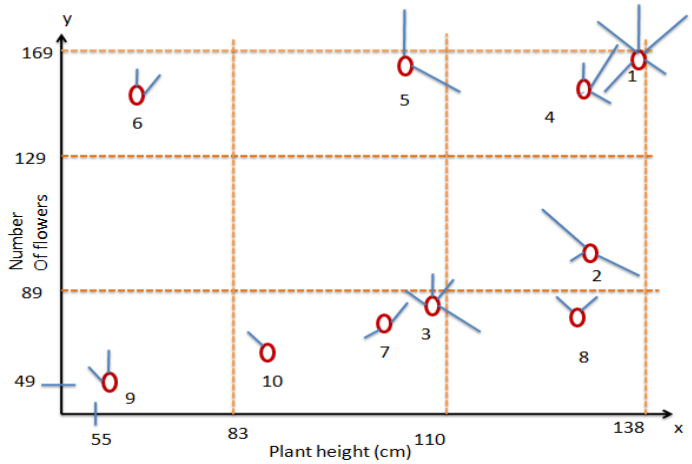

Fig. 1: Scatter Diagram of Metroglyphs Representing the Different Cultivars

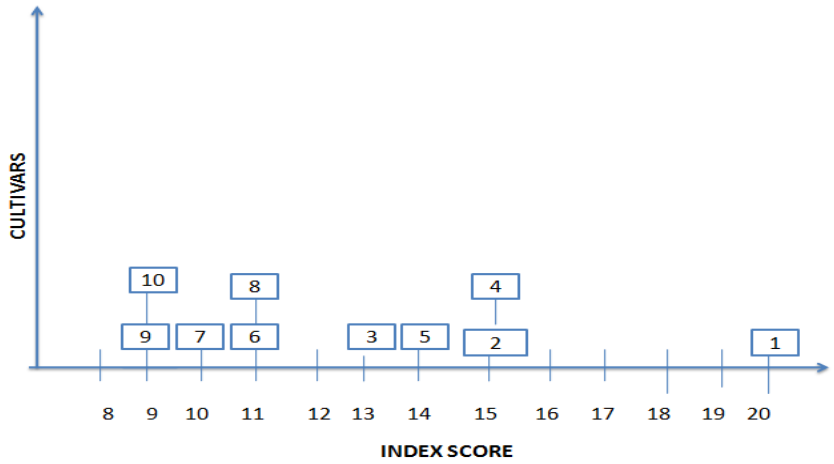

Fig. 2: Index Score of the Cultivars

Table 3: Index Score and Ray position for different characters in rose

Characters	Range of means	Score 1		Score 2		Score3	
		Value from-to	Sign	Value from-to	Sign	Value from-to	Sign
Plant height	55-137	55-82	X axis	83-109	X axis	43-54	X-axis
Number of flowers per plant per year	49-168	49-88	Y axis	89-127	Y-axis	54-62	Y-axis
Number of leaves per plant	86-606	86-260	o	261-434	o\	435-606	o\
Internodal length	3.81-7.31	3.81-4.97	o	4.98-6.13	o/	6.14-7.31	o/
Flower diameter	7-10	7-8	o	8.1-9	o|	9.1-10	o|
Self life	9-18	9-12	o	12.1-15	\o	15.1-18	\o
Fresh weight of flower at harvest	7-13	7-9	o	9.1-11	/o	11.1-13	/o

Table 4: Total index score of the rose cultivars

Cultivars	Plant height	Number of flowers per year per plant	Number of leaves per plant	Internodal length	Flower diameter	Self life	Fresh weight of flower at harvest	Total score
Fisrt Red	3	3	2	3	3	3	3	20
Texus	3	2	3	1	1	3	2	15
Skyline	2	1	3	2	2	2	1	13
Konfetti	3	3	2	3	2	1	1	15
Mascara	2	3	3	1	3	1	1	14
Alinka	1	3	1	2	2	1	1	11
Grand Gala	2	1	1	2	1	1	2	10
Sarisha	3	1	1	2	1	2	1	11
Tineke	1	1	1	1	2	2	1	9
Manuparlae	2	1	1	1	1	2	1	9

Table 5: Cultivars falling in different clusters

Cluster	Cultivars
Cluster I	Tineke (9)
Cluster II	Skyline (3), Grand Gala (7) and Manuparlae (10)
Cluster III	Sarisha (8)
Cluster IV	Texus (2)
Cluster V	First Red (1) and Konfetti (4)
Cluster VI	Mascara (5)
Cluster VII	Alinka (6)

CONCLUSION

The studies revealed that the genotypes from different clusters (Table 5) with high index score could be identified as parents in hybridization programs to combine desirable characters in the new improved cultivars and had maximum variability of good combinations of characters. The information could be helpful in identifying and engineering the crosses that could be attempted to obtain desired results. In the present study cultivars like First Red and Konfetti belonging to Cluster V may be considered as one of the parents and the other parent may be considered from a distant cluster like Cluster II (cultivar Skyline) for developing new potential hybrid with desirable characters from both the parents

REFERENCES

1. Anderson, E. A semigraphical method for the analysis of complex problems. *Proc. Natn. Acad. Sci. Wash*. **43:** 923-927 (1957).
2. Bhargava, A., Shukla, S., Kumar R. and Ohri, D. Metroglyph Analysis of Morphological Variation in *Chenopodium* spp. *World J. Agril. Sci*. **5(1):** 117-120 (2009).
3. Gault, S. M. and Synge, P. M. *Introduction "The Dictionary of roses in color"*. P: Xi Ebury Press and Medical Joseph, Hague (1971)
4. Fairbrother, F. *Roses*. Peguin books, Great Britaion. **37** (1965).
5. Tamuli, S. P. Morphophysiological characterization and extent of genetic variation in anthurium (*Anthurium andreanum* Linden Ex Andre). M.Sc. (Agri). Thesis submitted to A.A.U., Jorhat-13 (2013).