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Path Coefficient Studies on Growth and Flower Quality Traits in Floribunda Rose Genotypes

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Abstract

Path coefficient studies on growth and flower quality parameter were conducted in 27 genotypes of floribunda rose. Path coefficient results revealed that length of leaf, weight of flower, length of flower and petal had positive and direct effect during both the years. Diameter of flowering shoot, height of plant, length and diameter of shoot also showed positive and direct effect in respect of number of flowers production of the genotypes. Production of more number of flowers/plant in Zambra, Neelambari, Bonanza and Illumination genotypes revealed positive and direct effect of above characters.

Keywords: Path Coefficient, Phenotypic, Genotypic, Traits, Flowers, Floribunda, Rose.

Introduction

Rose, 'Queen of flowers' acclaimed at international level, has been considered a source of earning for foreign exchange (Singh and Pradhan, 1988; Singh *et al.,* 1999; Mukherjee, 2017; Misra and Saini, 1998, Singh 2016). Floribunda varieties fetch profit in local and foreign markets (Swarup *et al.,* 1971, Singh *et al.,* 1999/2000; Kumar *et al.,* 2000, 2007).

Review of Lietrature

Floribunda roses had the most fascinating flower bunch on a single inflorescence exhibit a great commendable luster beauty and fragrance (Dadlani, 1996; Bajpai and Kumar, 1998; Kumar and Srivastava, 2001; Uma and Gowda, 1999). Rose varieties were deemed in a great demand due to its excellence which brings sweetness, magic sense of unique beauty and aesthetic value and medicinal properties (Swarup, *et al.,* 1971; Malik and Singh 1980; Irulapan and Rao; 1980; Gowda, 1996). Recommendations have been made that outstanding value added products and genotypes to export under floricultural industry (Kumar *et al.,* 1999; Singh *et al.,* 2013; Singh (2016), Singh and Kumar, 2016; Waranashiwar, 2017; Singh, *et al.,* 2017). Study of path coefficient is needed to standardize partial regression coefficient which measures the direct influence of one variable upon another and also permits separations of direct and indirect effects.

Aim of Study

In central U.P. under agro-climatic zone of Kanpur, there is a long felt need of production of Rose varieties. Now-a-days demand for new cultivars is increasing day by day and it is becoming a paying industry in floriculture field. The study deals with the important aspects of floribunda roses. The study includes the outstanding and promising genotypes alongwith the recent released varieties. All these germplasm need further information for making the improvement. Genotypes of the quality parameters have been selected on the basis of the available previous investigations and for gathering desired information. Since it has emphasis to develop quantitative and quality parameters in new improved material to be obtained from findings of the present study.

Thus the information obtained from this study would be very important for making improvement by the breeders and also for earning economic profit by the growers.

Materials and Methods

Floribunda roses i.e. Neel Kanti, Varoha, Ico pearl, Indraman, Kanak, Pushparani, Rare Addition, Thornless Beauty, Lovita, Prema, Delhi

Princess, Vichitra, Winter Holiday, All Freedom, Living Fire, Angel Pace, Neelambari, Bonanza, Shola, Gold, Bright Smile, Gold Moss,

Suryakiran, Suryodaya, Illumination, Zorina and Zambra varieties were included. 27 genotypes were taken and experiments were laid out in randomized block design with 3 replications at D.A-V. College, Kanpur during 2009-10 and 2010-11. Observations on growth and flowering traits were recorded and phenotypic and genotypic path coefficients were calculated by the methods of Dewey and Lu, (1959) and DeVaries *et al.* (1987). Path coefficient with number of flowers per plant Vs other characters were taken into account in Floribunda genotypes.

Results and Discussion

Data of table-1 revealed that height of plant showed positive and direct effect 0.0853 on number of flowers/plant while phenotypic correlation coefficient was negative -0.1049. It had positive and indirect effect via length of leaf 0.0722, length of flowering shoot 0.0832, length of flower bud 0.0583, diameter of flower bud 0.0172 and weight of flowers/plant 0.0257 during 2009-2010. In next character phenotypic correlation coefficient was observed positive 0.0463. It also showed positive and indirect effect with length of shoot 0.0754, diameter of shoot 0.0353, length of leaf 0.1786, length of flowering shoot, diameter of flower bud and weight per flower. Length of shoot exhibited negative -0.0031 and positive 0.2628 effects on number of flowers/plant and genotypic correlation coefficient was positive 0.0107 in these investigations. Present findings were found in accordance with the results reported by Irulappan and Rao (1980) and Kumar *et al.* (2001). Genotypic results of the investigations were also found similar to the findings observed by Hom (1969), Mukhopadhyay (1987), Pal (1991) and Singh *et al.* (2017) in their path coefficient investigations. Character separations have also been reported by Kumar *et al.* (2000), Patil (2017), Sharma (2017) and Singh *et al.* (2017a).

Diameter of shoot negatively and directly effected -0.1867 and -0.1978 during 2009-2010. Length of leaf, length and weight/flower and length of petal showed positive and direct effect with number of flowers/plant during 2010-2011. Direct and indirect effects of path coefficient studies given separations in variability of vegetative and reproductive growth parameters of genotypes which have also been advocated by Swarup *et al.* (1971), Singh *et al.* (1999, 2017a); Kumar *et al.* (1999), Kumar and Srivastava (2001), Singh (2016a) and Janakiram (2017). Recently, Rakha *et al.* (2017), Verma *et al.* (2016) and Singh *et al.* (2017b) also confirmed the results of present investigations.

Conclusion

Substantial genetic variability for number of flowers per plant, length of shoot and plant height observed in this investigation, suggests a great promise for selecting the parental lines for hybridization. It is very interesting that number of flowers per plant and size of flower are the ultimately very important traits in commercial factor in flowering plants especially in Rose.

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Table 1 : Phenotypic path coefficient with number of flowers per plant Vs other characters (2009-2010).

Sl. No.	Characters	Height of plant	Length of shoot	Dia. of shoot	Length of leaf	Length of flowering shoot	Dia. of flowering shoot	Length of flower bud	Dia. of flower bud	Weight of flowers/ flower	Length of flower	No. of petals/ flower	Length of petal	Dia. of petal	Phenotypic correlation coefficient with no. of flower/plant
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Height of plant	0.0853	-0.000	-0.0130	0.0722	0.0823	-0.0577	0.0583	0.0172	0.0257	-0.1301	-0.0073	-0.0285	-0.2012	-0.1049
2	Length of shoot	0.0045	-0.0003	0.0016	0.0007	0.0458	-0.0076	0.0293	-0.0115	-0.0230	0.0033	0.0026	-0.0282	-0.0064	0.0107
3	Dia. of shoot	0.0060	0.0000	-0.1867	-0.0041	0.0511	-0.0055	-0.0255	-0.0026	-0.0208	-0.0322	-0.0010	-0.0075	-0.1209	-0.3498
4	Length of leaf	0.0499	0.0000	0.0062	0.1233	-0.0249	-0.0325	0.0646	0.0274	0.0111	-0.2125	-0.0105	-0.0129	-0.0612	-0.0719
5	Length of flowering shoot	-0.0270	0.0001	0.0367	0.0118	0.2600	0.0090	0.0019	-0.0033	0.0357	0.0324	0.0121	0.0011	0.1171	-0.0323
6	Dia. of flowering shoot	0.0370	-0.0000	-0.0077	0.0302	0.0176	-0.1330	0.0379	0.006	-0.0104	-0.0561	-0.0039	-0.0003	-0.2424	-0.3306
7	Length of flower bud	-0.0348	-0.0001	-0.0333	-0.0557	0.0035	0.0353	-0.1429	-0.0123	-0.0006	0.0897	0.0090	-0.0257	0.1162	-0.0519
8	Dia. of flower bud	-0.0264	0.0001	-0.0089	-0.0607	-0.0152	0.0014	-0.0322	-0.0556	-0.0015	0.0673	0.0155	-0.0350	0.1184	-0.0329
9	Weight of flowers/ flower	0.0157	0.0000	0.0278	0.0098	-0.0665	0.0099	0.0006	0.0006	0.1397	0.0822	0.0136	0.0630	0.0443	0.3406
10	Length of flower	-0.0374	0.0000	0.0191	-0.0832	-0.0268	0.0237	-0.0407	-0.0119	0.0365	0.3150	0.0090	0.0634	0.0768	0.3434
11	No. of petals/ flower	0.0103	0.0000	0.0031	0.0212	0.0518	-0.0085	0.0211	0.0142	-0.0313	-0.0463	-0.0609	0.0443	-0.0392	-0.0264
12	Length of petal	-0.0088	0.0000	0.0050	-0.0057	-0.0011	0.001	0.0132	0.0070	0.0317	0.0720	-0.0097	0.2775	-0.0529	0.3285
13	Dia. of petal	0.0404	0.0000	-0.0532	0.0178	0.0717	-0.0760	0.0391	0.0155	-0.0196	-0.0570	-0.0056	0.0346	-0.4226	0.4117

Table 2 : Genotypic path coefficient with number of flowers/plant characters (2010-2011)

Sl. No.	Characters	Height of plant	Length of shoot	Dia. of shoot	Length of leaf	Length of flowering shoot	Dia. of flowering shoot	Length of flower bud	Dia. of flower bud	Weight of flowers/ flower	Length of flower	No. of petals/ flower	Length of petal	Dia. of petal	Genotypic correlation coefficient with no. of flower/plant
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	Height of plant	3.7286	-0.3320	-0.6566	-1.6652	1.9284	1.1708	2.9541	1.0480	0.0692	0.3148	0.4420	0.3874	-1.1947	-0.1464
2	Length of shoot	0.2569	-4.8188	-0.2827	0.3273	2.5349	0.3356	2.6571	-1.1303	-0.0837	-0.0173	-0.3657	0.9864	0.2266	0.1124
3	Dia. of shoot	-1.0830	-0.6026	2.2605	-0.2029	4.0289	0.5970	-0.8492	1.3075	-0.1719	0.2975	-1.6596	1.2025	-1.7555	-1.1517
4	Length of leaf	2.2896	0.5815	-0.1691	-2.7117	-0.5916	0.6713	3.4140	1.6348	0.0250	0.4889	-0.8345	0.1519	0.4252	-0.0544
5	Length of flowering shoot	1.2679	2.1541	1.6060	-0.2829	-5.6708	-0.2404	-0.1609	-0.2964	0.0936	-0.0797	0.8367	-0.0532	0.8058	-0.0199
6	Dia. of flowering shoot	-1.7705	-0.6558	-0.5473	-0.7383	0.5528	2.4657	2.0204	0.0945	-0.0041	0.1339	0.4752	-0.0067	-1.4531	-0.3838
7	Length of flower bud	1.9499	2.2667	-0.3398	1.6389	-0.1615	-0.8819	-5.6488	-0.9346	0.0090	-0.2367	0.8406	0.5375	0.8761	-0.0846
8	Dia. of flower bud	1.9106	-1.9663	1.0670	1.6004	-0.6067	-0.0841	-1.9060	-2.7700	-0.0117	-0.2132	1.6655	0.8557	0.9232	-0.0357
9	Weight of flowers/ flower	-0.8732	1.3645	1.3145	-0.2289	-1.7963	-0.0342	-0.1719	0.1094	0.2955	-0.02039	1.1779	-0.7759	0.2272	0.4048
10	Length of flower	1.7922	0.1274	1.0268	2.0241	-0.6899	-0.5042	-2.0411	-0.9018	0.0920	-0.6549	0.9551	-1.0524	0.4839	0.4024
11	No. of petals/ flower	-1.1789	-1.2606	-2.6837	-1.6189	3.3943	0.8382	3.3967	3.3004	-0.2490	0.4475	-1.3979	-1.3059	-1.4751	0.2070
12	Length of petal	0.4628	1.5227	0.8708	0.1320	0.0966	0.0053	0.9726	0.7594	0.0735	-0.2208	-0.5848	-3.1215	0.2855	0.4898
13	Dia. of petal	-1.8899	0.4632	-1.6836	-0.4892	1.9387	1.5201	2.0997	1.0850	0.0285	0.1345	-0.8749	0.3781	-2.3570	-0.4599