

GENETIC VARIABILITY IN BANANA

A knowledge on the extent and nature of genetic variability is important for the improvement programme of any crop. The best picture of the amount of advance expected in a crop by selection can be assessed by calculating the phenotypic standard deviation and heritability. Though vegetatively propagated, high degree of variability is reported among banana cultivars, and heritability estimates are available for a few of the quantitative characters (Nayar *et al.*, 1979, 1980; Sreerangaswamy *et al.*, 1980; Rajeevan and Geetha, 1984). In the present study the extent of variability in 62 cultivars of banana for 26 quantitative and quality characters were studied.

Sixty two cultivars of banana were raised in a randomised block design at the College of Horticulture, Vellanikkara, Trichur, Kerala during 1981-83. Observations were recorded on plant height, plant girth, leaves per plant, leaf area per plant, petiole length, planting to flowering interval, flowering to harvest interval, bunch weight, hand weight, number of hands, number of fingers, pedicel length, finger length, finger girth, finger weight, finger volume, per cent pulp weight, pulp/peel ratio on weight basis, per cent pulp volume, pulp/peel ratio on volume basis, TSS, total sugars, reducing sugars, non-reducing sugars, acidity and sugar/acid ratio. The data were statistically analysed following Fischer (1960). The genetic parameters were estimated following Burton (1952). Estimates of heritability and genetic advance were obtained from the methods of Johnson *et al.*, (1955).

The experimental results presented in Table 1 indicate the range and general mean for each character. The data showed significant variation for all the characters, with wide variation in mean values. The maximum range in mean values was noted for hand weight.

The highest value for the genotypic coefficient of variation was recorded by petiole length (83.15) followed by pulp/peel ratio on weight basis (51.97), number of fingers (49.19) and finger volume (44.54) and the minimum by TSS per cent (4.77) (Table 2). Characters with low genotypic coefficient of variation indicate that they are more influenced by environment (Johnson *et al.*, 1955). The values for phenotypic coefficients of variation were higher than the values for genotypic coefficients of variation suggesting the influence of the environment on the expression of these characters as earlier reported in dessert type of banana by Nayar *et al.* (1979) and in the ratoon crop of banana by Rajeevan and Geetha (1984).

The magnitude of the genotypic coefficient of variation alone will not help to determine the extent of variation that is heritable (Gandhi *et al.*, 1964). Heritability estimates would give an index of the portion of variation transmissible to the progeny. The heritability estimates showed high values for most of the characters. The highest value was recorded for leaf area per plant (0.9998) followed by petiole length (0.9995) and pulp/peel ratio on volume basis (0.9983).

Table 1

Range, mean and analysis of variance of 26 characters in 62 cultivars of banana

Character	Range	Mean	F value	CD at 5%
Plant height (cm)	128.00— 451.50	243.54	288.04**	9.17
Plant girth (cm)	36.25- 85.25	56.65	5.67**	12.08
Leaves per plant	18.25— 60.00	27.92	281.12**	1.09
Leaf area per plant (m ²)	12.00— 51.24	25.99	635.65**	0.10
Petiole length (cm)	25.25- 67.75	46.02	400.54**	1.71
Planting to flowering interval (days)	162.50- 432.50	201.68	620.11**	4.43
Flowering to harvest interval (days)	63.00— 137.00	97.92	133.02**	3.53
Bunch weight (kg)	2.50— 1525	8.26	167.99**	0.75
Hand weight (g)	70.75-2725.00	1105.00	22.55**	274.98
Number of hands	3.50- 13.50	792	28.97**	1.62
Number of fingers	19.50— 231.50	104.01	92.88**	15.09
Pedicle length (cm)	1.28— 5.55	2.95	119.00**	0.28
Finger length (cm)	8.88— 19.75	13.45	96.07**	0.77
Finger girth (cm)	7.13— 14.88	10.81	15.94**	1.20
Finger weight (g)	30.25— 195.60	86.14	500.00**	4.57
Finger volume (cc)	25.50— 206.50	87.33	293.06**	6.42
Per cent pulp weight	49.88— 87.75	65.18	142.56**	1.28
Pulp/peel ratio on weight basis	0.79— 7.17	2.10	101.49**	0.28
Per cent pulp volume	46.75— 81.50	61.66	158.08**	1.00
Pulp/peel ratio on volume basis	1.21— 4.41	2.05	11.90**	0.06
TSS (%)	15.50— 29.00	32.71	36.50**	0.82
Total sugars (%)	5.60— 22.78	20.02	65.51**	1.18
Reducing sugars (%)	4.27— 18.72	12.77	30.51**	1.77
Non-reducing sugars (%)	0.50— 4.95	1.89	12.53**	1.48
Acidity (%)	0.14— 0.54	0.33	16.25**	0.40
Sugar/acidratio	17.76— 89.41	46.78	34.37**	7.51

Table 2

Genotypic and phenotypic variances, coefficients of variation, heritability and genetic advance for 26 characters of banana

Character	Geno- typic variance	Feno- typic variance	Geno- typic coeffi- cient of variation	Pheno- typic coeffi- cient of variation PCV	Heritability in broad sense	Genetic advance
Plant height (cm)	3026.45	3047.48	22.59	22.68	0.9931	26.59
Plant girth (cm)	170.46	206.94	23.05	25.39	0.8237	24.41
Leaves per plant	41.96	42.25	23.14	23.22	0.9930	13.30
Leaf area per plant (m ²)	67.82	67.83	31.69	31.69	0.9998	16.80
Petiole length (cm)	1464.15	1464.88	83.15	83.16	0.9995	78.80
Planting to flowering interval (days)	1524.82	1529.72	19.36	19.39	0.9968	79.97
Flowering to harvest interval (days)	413.75	416.87	20.77	20.85	0.9925	41.74
Bunch weight (kg)	11.83	11.97	41.65	41.89	0.9883	7.05
Hand weight (g)	203691.51	222594.33	40.84	42.70	0.9151	281.22
Number of hands	9.23	9.89	38.36	39.70	0.9333	6.37
Number of fingers	2618.00	2674.92	49.19	49.73	0.9787	104.27
Pedicel length(cm)	1.18	1.20	36.70	37.01	0.9833	2.22
Finger length (cm)	7.36	7.28	19.85	20.06	0.9794	5.44
Finger girth (cm)	2.69	3.05	15.71	16.16	0.8820	3.17
Finger weight (g)	1304.89	1310.13	41.94	42.02	0.9960	74.26
Fingervolume(cc)	1502.62	1512.91	44.39	44.54	0.9932	74.68
Per cent pulp weight	29.02	29.43	9.98	10.05	0.9861	11.02
Pulp/peel ratio on weight basis	1.19	1.21	51.97	52.40	0.9835	2.23
Per cent pulp volume	19.63	19.88	8.18	8.23	0.9874	9.07
Pulp/peel ratio on volume basis	0.59	0.59	37.61	37.64	0.9983	1.59
TSS (%)	3.01	3.18	4.77	4.90	0.9467	3.48
Total sugars (%)	11.29	11.64	15.11	15.28	0.9699	6.82
Reducing sugars (%)	11.51	12.29	16.72	17.28	0.9365	6.76
Non-reducing sugars (%)	3.17	3.72	23.09	25.02	0.8522	3.39
Acidity (%)	0.30	0.34	17.05	18.13	0.8841	1.07
Sugar/acid ratio	235.36	249.47	32.80	33.76	0.9431	30.70

The lowest value was recorded for plant girth (0.8237) followed by non-reducing sugar content (0.8522) indicating that the environment influences more the expression of the characters compared to the other characters studied.

The heritability estimates are more reliable when accompanied by the estimates of genetic advance (Ramanujam and Thirurmalachar, 1967). This would indicate the possibility and the extent to which improvement could be brought out through proper selection. In the present study, the maximum value for genetic advance was obtained for hand weight (281.22) followed by the number of fingers (104.27) and the minimum for the percentage of acidity of the fruits (1.07). The characters, number of fingers, petiole length, finger weight and volume showed higher genetic advance combined with higher heritability and higher genotypic coefficient of variation compared to other characters. This suggests that the improvement is likely to be very effective for these characters through proper selection. High heritability values along with high genetic advance and genotypic coefficient of variation are reported for culinary bananas for number of fruits per bunch, weight of hand and fruit, length of pedicel and girth of plants (Nayar *et al.* 1980). High estimates of heritability and genetic advance were obtained for number of fruits, weight of bunch and days to flowering in dessert type and number of fingers and days to flowering in culinary bananas (Sreerangaswamy *et al.*, 1980).

സംഗ്രഹം

വെള്ളാനിക്കരയിലെ ഹോർട്ടിക്കറച്ചർ കോളേജിൽ 62 വാഴയിനങ്ങളിൽ 26 സ്വഭാവ ട്രിറ്റ്സ് ഉപയോഗിച്ച് നടത്തിയ പരീക്ഷണങ്ങളിൽ എല്ലാ സ്വഭാവങ്ങൾക്കും വ്യത്യസ്തമായ ഉള്ളതായി കണ്ടു. ഇവയിൽ കായുടെ എണ്ണം, ഇലഞ്ഞിന്റെ നീളം, കായുടെ തൂക്കം, കായുടെ വ്യാപ്തം എന്നീ സ്വഭാവങ്ങൾ കൂടുതൽ പാരമ്പര്യാർജ്ജനീതത്വവും ജനിതക പാരമ്പര്യ ബന്ധവും ജനിതക മേന്മയും ഉള്ളതായി കണ്ടു.

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