CHARACTER ASSOCIATION AND PATH COEFFICIENT STUDIES IN SWEET POTATO [*IPOMOEA BATATAS* (L.) LAM.] GENOTYPES

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Abstract: Correlation coefficient analysis revealed that tuber yield^{-2} showed significant positive correlation with vine weight^{-2} and marketable tuber yield^{-2} at both genotypic and phenotypic level, suggesting that selection of these characters may be useful for the development of ideal plant type of sweet potato for the Chhattisgarh plains. Path coefficient analysis revealed that marketable tuber yield^{-2}, biological yield^{-2}, tuber diameter and dry matter per cent of tuber, neck length of tuber, tuber length and vine had positive direct effect on tuber, and therefore these traits could be utilized as selection criteria in sweet potato.

Keyword: Sweet potato, *Ipomoea batatas,* Correlation, Path coefficient

INTRODUCTION

In a selection programmer for high information on the nature and magnitude of its association with component traits is essential. The genotypic correlations existing between yield attributing characters themselves are important in the breeding programmer. The yield being the end product of many correlated characters, which are positive, correlated. When number of variables is considered correlation, the association become more and more complex .The use of path coefficient analysis under such situations world be more useful as it makes clear the direct and indirect associations and identifies the most reliable yield contributing characters .To understand association among various characters 15 genotypes.

MATERIALS AND MATHODS

Present investigation on correlation and path coefficient analysis in sweet potato genotypes was Carried out at experimental field of AICRP on tube crops, department of Horticulture, college of agriculture, indira Gandhi krishi vishwavidalaya, Raipur (C.G.) during *rabi* season of year 2004-05.The soil of the experimental field was well drained with send loam texture .The experimental material consisting of fifteen genotypes were planted in 9th November 2004 in the mound. Observations were taken from five randomly selected plants for biometrical traits.11 characters of sweet potato tuber of recorded at the time of harvest(120 DAP),top portion of vine cutting having length of 15 cm were used for planting at a spacing of 60 cm 20cm.the plot size were 3.0m×2.4m.Recommended dose of fertilizer NPK @75:60:75Kg per hectare. Half of N and K along with full dose of P were applied as basal and the remaining half N and K were applied along the rows at the time of earthing up (40 days after planting).

RESULTS AND DISCUSSION

In present investigation the observations were recorded on five selected plants for 11 characters namely vine length ,vine weight plant^{-1}, neck length of tuber, tuber length tuber yield plant^{-1},biologlcal yield plant^{-1},marketable tuber yield plant^{-1},harvest index ,dry matter per cent of vine, dry matter per cent of tuber and tuber yield plant^{-1}.The genotypic correlation coefficients (Table-1)conveyed ones for all the characters combinations, there by ascertaining predominant role of heritable factors. LilaBabu (1987), Nedunzhiyan and Reddy (2000) and Chowdhary *et.al.* (2000) also found similar results in their studies of sweet potato. Tuber yield per plant expressed a positive significant association with vine weight per plant, marketable tuber yield per plant and tuber diameter at both genotypic and phenotypic level, whereas, the harvest index of positively correlation at genotypic level. Similar results had been also reported by Amarchandra (1997). Dry matter per cent of tuber showed negative and significant correlation with vine length whereas, marketable tuber yield per plant and harvest index at genotypic level.

Table 1. Correlation coefficient of tuber yield and its components in sweet potato.

Characters		Vine weight/ plant (g)	Neck length of tuber (cm)	Tuber length (cm)	Tuber diameter (cm)	Biological yield/ plant (g)	Marketable tuber yield/ plant (g)	Harvest index (%)	Dry matter per cent of vine	Dry matter per cent of tuber	Tuber yield per plant (g)
Vine length (cm)	P	0.540*	-0.159	0.243	-0.422	0.568*	0.512*	0.156	-0.449	-0.218	0.449
	G	0.580*	-0.179	0.291	-0.461	0.604*	0.527*	0.201	-0.541	-0.481*	0.467
	E	0.064	0.038	-0.112	-0.188	0.098	0.290	0.172	0.129	0.275	0.223
Vine weight/ plant (g)	P		-0.109	0.115	-0.130	0.805**	0.580*	-0.080	-0.292	-0.119	0.524*
	G		-0.108	0.087	-0.170	0.875**	0.632**	-0.064	-0.418	-0.119	0.581*
	E		-0.120	0.252	0.085	0.295	0.130	-0.150	0.22	-0.200	0.065
Neck length of tuber (cm)	P			-0.090	0.225	0.003	-0.021	0.086	0.348	0.066	0.004
	G			-0.124	0.275	0.000	0.009	0.197	0.476	0.250	0.056
	E			0.037	-0.003	0.024	-0.244	-0.135	-0.095	-0.148	-0.341
Tuber length (cm)	P				0.180	0.068	0.131	0.012	-0.293	0.153	0.145
	G				0.178	0.107	0.143	0.042	-0.433	0.613	0.239
	E				0.186	-0.113	0.088	-0.038	0.102	-0.29	-0.335
Tuber diameter (cm)	P					-0.039	-0.069	0.013	0.340	0.221	0.024
	G					-0.072	-0.072	0.056	0.411	0.358	0.043
	E					0.149	-0.056	-0.074	0.109	0.148	-0.097
Biological yield/plant (g)	P						0.893**	0.261	-0.312	-0.169	0.849**
	G						0.933**	0.390	-0.387	-0.416	0.906**

	E						0.530	0.014	-0.009	0.122	0.371
Marketable tuber yield/ plant (g)	P							0.398	-0.351	-0.268	0.971**
	G							0.578*	-0.419	-0.625**	0.998**
	E							0.042	-0.052	0.187	0.693
Harvest index (%)	P								-0.109	-0.016	0.422
	G								-0.145	-0.543*	0.587*
	E								-0.059	0.300	0.140
Dry matter per cent of vine	P									0.099	-0.304
	G									0.432	-0.374
	E									-0.207	-0.004
Dry matter per cent of tuber	P										-0.201
	G										-0.570
	E										0.307

Significant at 5%; **: Significant at 1%; P = Phenotypic; G = Genotypic; E = Environmental

Table 2. Genotypic path coefficient analysis showing direct and indirect effect of different characters on tuber yield per plant

Genotypes	Vine length (cm)	Vine weight/plant (g)	Neck length of tuber (cm)	Tuber length (cm)	Tuber diameter (cm)	Biological yield/ plant (g)	Marketable tuber yield/ plant (g)	Harvest index (%)	Dry matter per cent of vine	Dry matter per cent of tuber
Vine length (cm)	**0.015**	-0.146	-0.004	0.005	-0.038	0.089	0.582	-0.021	0.017	-0.033
Vine weight/ plant (g)	0.008	**-0.251**	-0.002	0.002	-0.014	0.129	0.698	0.007	0.013	-0.008
Neck length of tuber (cm)	-0.003	0.027	**0.020**	-0.002	0.023	0.001	0.010	-0.021	-0.015	0.017
Tuber length (cm)	0.004	-0.022	-0.003	**0.019**	0.015	0.016	0.158	-0.004	0.014	0.043
Tuber diameter (cm)	-0.007	0.043	0.006	0.003	**0.082**	-0.011	-0.079	-0.006	-0.013	0.025
Biological yield/plant (g)	0.009	-0.220	0.001	0.002	-0.006	**0.148**	1.030	-0.041	0.012	-0.029
Marketable tuber yield/ plant (g)	0.008	-0.159	0.001	0.003	0.006	0.138	**1.105**	-0.061	0.013	-0.043
Harvest index (%)	0.003	0.016	0.004	0.001	-0.005	0.058	0.639	**-0.105**	-0.005	-0.038
Dry matter per cent of vine	-0.008	0.105	0.010	-0.008	0.034	-0.057	-0.463	0.015	**-0.032**	0.030
Dry matter per cent of tuber	-0.007	0.030	0.005	0.011	0.029	-0.061	-0.690	0.057	-0.014	**0.069**

Table 3. Phenotypic path coefficient analysis showing direct and indirect effect of different characters on tuber yield per plant

Genotypes	Vine length (cm)	Vine weight/plant (g)	Neck length of tuber (cm)	Tuber length (cm)	Tuber diameter (cm)	Biological yield/ plant (g)	Marketable tuber yield/ plant (g)	Harvest index (%)	Dry matter per cent of vine	Dry matter per cent of tuber
Vine length (cm)	**0.011**	0.014	0.001	-0.004	-0.037	-0.087	0.560	0.004	-0.004	-0.012
Vine weight/ plant (g)	0.006	**0.026**	0.001	-0.002	-0.012	-0.124	0.640	-0.002	-0.003	-0.007
Neck length of tuber (cm)	-0.002	-0.003	**0.002**	0.002	-0.020	-0.001	-0.023	0.002	0.003	0.004
Tuber length (cm)	0.003	0.003	0.001	**-0.017**	0.016	-0.011	0.145	0.001	-0.003	0.009
Tuber diameter (cm)	-0.005	-0.003	0.001	-0.003	**0.089**	0.006	-0.076	0.001	0.003	0.013
Biological yield/plant (g)	0.006	0.021	0.001	-0.001	-0.003	**-0.154**	0.987	0.006	-0.003	-0.010
Marketable tuber yield/ plant(g)	0.006	0.015	0.001	-0.002	-0.006	-0.137	**1.105**	0.010	-0.003	-0.015
Harvest index (%)	0.002	-0.002	0.001	0.001	0.001	-0.040	0.440	**0.024**	-0.001	-0.001
Dry matter per cent of vine	-0.005	-0.008	0.001	0.005	0.030	0.048	-0.387	-0.003	**0.009**	0.006
Dry matter per cent of tuber	-0.002	-0.003	0.001	-0.003	0.020	0.026	-0.293	0.000	0.001	**0.057**

Above findings are in conformity with the result of Lila Babu (1987). Harvest index (%) showed positive correlation with marketable tuber yield per plant at genotypic level .Nedunzhiyan and Reddy (2000), Chowdhary *et al.* (2000) also reported similar results in sweet potato .Marketable tuber yield per plant showed positive significant correlation with vine length, vine weight and biological yield per plant at both genotypic and phenotypic level .The results in the accordance with the study of Pushkaran et al.(1978).Biological yield per plant at showed significant correlation with vine length ,vine weight per plant at genotypic and phenotypic level .Similar findings were also obtained by Nedunzhiuyan and Reddy (2000).They reported strong correlation between growth parameters with tuber yield of sweet potato. Vine weight per plant also showed significant correlation with the vine length at genotypic and phenotypic level. Nedunzhiyan and Reddy (2000) reported strong correlation between growth parameters. On the basis of correlation studies, it was concluded that the selection of traits should be based on vine weight, biological yield per plant, harvest index, vine length and marketable tuber yield per plant and this may be utilized for development of high yielding cultivars of sweet potato. The path coefficient analysis is very useful as it provides an effective means of direct and indirect causes of association and permits a critical examination of these specific forces acting to produce a give collection and measure the relative importance of each causal factor (Dewey and Lu,1959). Direct and indirect effect of yield attributing characters on total tuber yield per plant are presented in Table -2.1&2.2. Marketable tuber yield per plant showed positive direct effect on tuber yield per plant (1.105) followed by biological yield per plant (0.148),tuber diameter (0.082),dry matter per cent of tuber (0.069),neck length of tuber(0.020),tuber length (0.019) and vine length (0.015). Positive and direct effect were noted in the tuber yield per plant ,biological yield per plant and tuber diameter indicated that correlation had true relationship and a direct selection through these traits may be effective. In genotypic path coefficient analysis, the highest positive direct effect on tuber yield per plant was observed by the marketable tuber yield per plant (1.105)followed by biological yield per plant(0.148),tuber diameter(0.082),dry matter per cent of tuber (0.069)which indicated that these are the main contributors to the tuber yield which is in consonance with the findings of Nedunzhiyam *et. al.*(2000).Marketable tuber yield per plant exhibited high positive direct effect on biological yield per plant (1.030) followed by vine weight per plant (0.698),harvest index (%)(0.639) and vine length (0.582).In phenotypic path coefficient analysis ,marketable tuber yield per plant (1.105) showed high positive direct effect on tuber yield per plant followed by tuber diameter (0.089),dry matter per cent of tuber (0.057) and harvest index (%)(0.024) whereas, biological yield per plant (0.987) exhibited high positive indirect on marketable tuber yield per plant and followed by vine weight per plant (0.640),vine length (0.560)and tuber length(0.145).

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