

Correlation and Path Analysis in Sweet Potato

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ABSTRACT

Sweet potato (*Ipomoea batatas* (L.) Lam.) is an important tuber crop grown in Chhattisgarh for tuber and tender leaves which are nutritious and tuber is used for vegetable purpose as boiled and dried product. tuber yield is a complex characters which is dependent on various components. In sweet potato correlation coefficient among tuber yield .So the relative contribution of each component character to the tuber yield could be assured. Hence, the objective of the present investigation was to study the direct and indirect influence of some yield components on tuber yield in sweet potato. The present investigation was carried out during rabi 2002-03 in randomized block design replicated thrice along with twenty four genotypes of sweet potato. Observations were recorded on vine length (cm), vine weight (g), number of tubers, number of marketable tuber, neck length of tuber (cm), tuber length (cm), tuber diameter (cm), biological yield (kg), tuber yield (t/ha), marketable tuber yield (t/ha), harvest index(%), total soluble solids (%), dry matter percentage of foliage and tubers in sweet potato. Results revealed that significant and positive correlation coefficient was found between tuber yield with biological yield and tuber diameter. Correlation coefficient between harvest index was also found to be positive. Path coefficient analysis revealed that vine weight per plant and number of marketable tuber per plant were important traits influencing tuber yield and could be utilized as selection Criteria in sweet potato improvement program for Chhattisgarh plains.

Keywords: Sweet potato, correlation, path analysis

Any complex character like yield of any crop fully or partially depends on its component characters which are themselves correlated to each other. However it is not possible to predict their causative ways by which they are related directly or indirectly. Therefore, to reveal the causal system or to assess how these components are acting to essential. Effect of component characters on yield in sweet potato was estimated by various workers (1,2).

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METHODS

A field experiment was conducted during the year 2002 at the Department of the Horticulture,

Indira Gandhi Agriculture University Raipur (CG). Twenty four genotypes of sweet potato (*Ipomoea batatas* (L.) Lam) drawn from germplasm collections were evaluated in a randomized block design with three replications. Total five plants were selected randomly from each genotypes per replication separately to record observation on vine length, vein weight, number of tuber diameter, biological yield, tuber yield, harvest index, total soluble solids, dry matter per cent of foliage and dry matter per cent of tuber. Mean of five plants was worked out following Robinson *et al.* (3) and path coefficient as suggested by Dewey and Lu (4).

RESULTS AND DISCUSSION

Phenotypic correlations, revealed that tuber yield was positively and significantly correlated with biological yield per plant, tuber diameter and harvest index. Vine weight per plant had positive

Table 1: Correlation coefficients of tuber yield and its components in sweet potato

Characters	Vine Weight/Plant (g)	No. of Tuber/Plant (no.)	Marketable Tuber/Plant (no.)	Neck Length of Tuber (cm)	Tuber Length (cm)	Tuber Diameter (cm)	Biological Yield/Plant (g)	Tuber Yield/Plant (g)
Vine length	0.471*	-0.083	0.077	-0.157	0.316	-0.185	0.189	-0.013
Vine weight per plant (G)		0.178	0.231	0.061	0.365	-0.163	0.624*	0.198
Number of tuber/plant			0.640**	-0.015	0.009	0.109	0.224	0.199
No. of marketable								
Tuber/plant				0.208	0.165	0.054	0.279	0.192
Neek length of tuber (cm)					0.015	-0.030	0.074	0.064
Tuber length (cm)						0.029	0.412*	0.288
Tuber diameter (cm)							0.505*	0.734*
Biological yield per								
Plant (g)								0.873*
Tuber yield per plant (g)								
Marketable tuber								
Yield/plant (g)								
Tuber yield (t/ha)								
Marketable tuber yield (t/ha)								
Harvest index (%)								
Total soluble solid (%)								
Dry matter per cent of foliage (%)								

Table 1: Continued.

Characters	Marketable tuber yield/plant (g)	Tuber yield (t/ha)	Marketable tuber yield (t/ha)	Harvest index (%)	Total soluble solids (%)	Dry matter per cent of foliage (%)	Dry matter per cent of tuber (%)
Vine length	0.013	-0.013	0.100	-0.393	-0.131	0.413*	0.094
Vine weight per plant (g)	0.235	0.198	0.235	-0.779*	-0.164	0.127	0.224
Number of tuber/plant	0.077	0.199	0.081	-0.054	-0.058	0.027	-0.151
No. of marketable tuber/plant	0.524*	0.192	0.528**	-0.100	0.063	-0.026	0.026
Neck length of tuber (cm)	0.210	0.064	0.212	-0.007	0.073	-0.356	0.005
Tuber length (cm)	0.355	0.288	0.353	-0.135	-0.093	0.275	-0.111
Tuber diameter (cm)	0.551*	0.734*	0.550	0.591**	0.270	-0.020	-0.174
Biological yield per plant (g)	0.767*	0.873*	0.767**	-0.041	0.104	0.103	0.034
Tuber yield per plant (g)	0.817*	0.999*	0.817**	0.428*	0.173	0.085	-0.112
Marketable tuber yield/plant (g)		0.817*	0.999**	0.288	0.206	0.044	0.040
Tuber yield (t/ha)			0.817**	0.428*	0.173	0.085	-0.112
Marketable tuber yield (t/ha)				0.288	0.206	0.043	0.035
Harvest index (%)					0.212	-0.030	-0.316
Total soluble solid (%)						0.048	0.026
Dry matter per cent of foliage (%)							-0.760

* Significant at 5%; Level; **significant at 1% level.

Table 2: Path coefficients of the character contributing towards tuber yield (t/ha) in sweet potato

Characters	Vine length (cm)	Vine weight/plant (g)	No. of tuber/plant (g)	No. of marketable tuber/plant (No.)	Neck length of tuber (cm)	Tuber length (cm)	Tuber diameter (cm)	Biological yield/plant (g)
Vine length (cm)	-0.003	0.002	0.002	0.001	0.000	-0.001	0.001	-0.002
Vine weight per plant (g)	-0.001	0.003	-0.003	0.006	0.000	-0.001	0.001	-0.006
Number of tuber/plant	-0.000	0.001	-0.014	0.010	0.000	0.000	-0.001	-0.002
No. of marketable tuber/plant	0.000	0.002	-0.017	0.008	-0.001	-0.001	-0.002	-0.008
Neck length of tuber (cm)	0.000	0.000	0.001	0.004	-0.001	0.000	0.001	-0.001
Tuber length (cm)	-0.001	0.001	0.000	0.003	0.000	-0.002	0.000	-0.004
Tuber diameter (cm)	0.001	0.001	-0.002	0.004	0.000	0.000	-0.005	-0.005
Biological yield per plant (g)	0.000	0.002	-0.003	0.007	0.000	-0.001	-0.003	-0.010
Tuber yield per plant (g)	0.000	0.001	-0.003	0.005	0.000	0.000	-0.004	-0.009
Marketable tuber yield/plant (g)	0.000	0.001	-0.001	0.003	0.000	-0.001	-0.004	-0.009
Marketable tuber yield (t/ha)	0.000	0.001	-0.001	0.003	0.000	-0.001	-0.004	-0.009
Harvest index (%)	0.001	-0.003	0.001	-0.002	0.000	0.000	-0.004	0.001
Total soluble solid (%)	0.000	0.000	0.000	0.001	0.000	0.000	-0.001	-0.001
Dry matter per cent of foliage (%)	-0.001	0.001	0.000	-0.002	0.001	-0.001	0.000	-0.001
Dry matter per cent of tuber (%)	0.000	0.001	0.003	0.000	0.000	0.000	0.001	0.000

Table 2: Continued.

Characters	Tuber yield/plant (g)	Marketable tuber yield/plant (g)	Marketable tuber yield (t/ha)	Harvest index (%)	Total soluble solids (%)	Dry matter per cent of foliage (%)	Dry matter per cent of tuber (%)	Genotypic correlation with tuber yield (t/ha)
Vine length (cm)	-0.058	0.040	-0.040	0.001	0.000	0.000	0.000	-0.056
Vine weight per plant (g)	0.191	0.140	-0.146	0.002	0.000	0.000	-0.001	0.185
Number of tuber/plant	0.239	0.030	-0.033	0.000	0.000	0.000	0.001	0.231
No. of marketable tuber/plant	0.675	0.153	-0.157	0.001	0.000	0.000	0.000	0.654**
Neck length of tuber (cm)	0.045	0.109	-0.114	0.000	0.000	0.000	0.000	0.044
Tuber length (cm)	0.339	0.200	-0.209	0.000	0.000	0.000	0.001	0.329
Tuber diameter (cm)	0.826	0.359	-0.375	-0.002	0.000	0.000	0.001	0.801**
Biological yield per plant (g)	0.912	0.440	-0.459	0.000	0.000	0.000	0.000	0.885**
Tuber yield per plant (g)	0.999	0.466	-0.486	-0.001	0.000	0.000	0.000	0.999**
Marketable tuber yield/plant (g)	0.999	0.466	-0.485	-0.001	0.000	0.000	0.000	0.999**
Marketable tuber yield (t/ha)	0.999	0.466	-0.485	-0.001	0.000	0.000	0.000	0.999**
Harvest index (%)	0.393	0.136	-0.142	-0.002	0.000	0.000	0.001	0.381
Total soluble solid (%)	0.150	0.087	-0.091	-0.001	0.000	0.000	0.000	0.145
Dry matter per cent of foliage (%)	0.090	0.27	-0.027	0.000	0.000	-0.000	0.000	0.087
Dry matter per cent of tuber (%)	-0.108	0.023	-0.021	0.001	0.000	0.000	0.004	-0.104

Residual effect=0.000. The italic figures denote the direct effect

and significant correlation with vine length (Table 1) which was in agreement with the findings of Ibrahim (5). Biological yield had significant and positive association with vine weight, tuber diameter and with tuber length, respectively. Similarly, the positive association of harvest index, tuber diameter and tuber yield. Naskar *et al.* (2) and Kamalam *et al.* (6) had also suggested positive association of number of tuber with tuber yield.

Path coefficient analysis revealed that the direct effect on tuber yield was positive on number of marketable tuber per plant, whereas rest of the characters under study exhibited direct effects (table 2). Similarly, the indirect effects of marketable tuber yield per plant and vine weight were observed. Vine weight had positive indirect effect via tuber yield per plant tuber, tuber length, tuber diameter, diameter, biological and marketable tuber yield. Neck length of yield, harvest index, total soluble solids, dry matter per cent of foliage and dry matter percent of tuber all the characters exhibited positive indirect effects through tuber yield. The positive direct effect on number of tuber per plant on tuber yield was in agreement with the findings of Alam *et al.* (7) and Parida *et al.* (8).

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