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Character Association and Path Coefficient Analysis in Brinjal (*Solanum melongina* L.)

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Abstract

Character association and path coefficient analysis of 12 characters in 30 genotypes of brinjal were studied during the rabi season of 2008-2009. Significant differences were observed for almost all the traits under study viz., days to 50% flowering, plant height (cm), number of primary branches per plant, number of fruits per plant, fruit length (cm), fruit diameter (cm), number of seeds per fruit, seed yield per plant (g), 100 seed weight, average fruit weight (g), fruit yield (q/ha) makes them prime traits for direct selection. Fruit yield (q/ha) showed positive significant genotypic and phenotypic correlations with number of fruits per plant, seed yield per plant, weight of 100 seeds, fruit weight, fruit length and fruit diameter, so these traits should be kept in mind while improving fruit yield of brinjal. The characters viz., number of fruits per plant, average fruit weight, number of seeds per fruit, fruit diameter, fruit length and number of branches per plant had positive and significantly high direct effect on fruit yield.

Key words : Character association, Path coefficient analysis, Brinjal.

Brinjal is an important Solanaceous crop of subtropics and tropics grown throughout the year all over the country. India has wide range of variability in brinjal. In spite of a large number of varieties available in India, only few are promising. Yield is a complex and polygenic character, which is dependent on various components and is highly affected by environment and genotype × environmental variation. Hence information on association of component characters with yield and among themselves should be known for making desired improvement in yield and quality traits. The present investigation was therefore initiated to assess the extent of character association of important metric traits in 12 characters of brinjal.

Methods

The experimental comprised of 30 genotypes of brinjal, obtained from different sources, were evaluated in randomized block design with three replications at Vegetable Research Form, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, during *rabi* season of 2008-2009. Agronomic practices were followed to grow a better crop. Seedlings were transplanted at a spacing of 60 cm between rows and 45 cm between plants. Observations were recorded on five randomly selected plant for 11 characters viz., days to 50% flowering , plant height (cm), number of primary branches per plant, number of fruits per plant, fruit length (cm), fruit diameter (cm), number of seeds per fruit, seed yield per plant (g), 100 seed weight, average fruit weight (g), fruit yield per hectare (q/ha). Analysis of variance was carryout as suggested by Panse and Sukhatme (1). The correlation coefficient was estimated according to method suggested by Al-Jibouri et al. (2) and path coefficient analysis by Dewey and Lu (3).

Result and Discussion

Analysis of variance revealed significant differences among the genotypes for all the traits. The phenotypic and genotypic correlation coefficients were estimated to measure the degree of association between yield and its contributing characters. In present study the phenotypic and genotypic correlation coefficients were worked out in respect of 12 quantitative characters in all possible combinations.

Table 1. Phenotypic and genotypic correlation coefficient of 30 genotypes of brinjal for 12 characters. *, ** significant at 5 and 1% probability level, respectively.

Characters	G/P	Plant height (cm)	No. of branches/ plant	No. of fruits/ plant	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	No. of seeds/ fruit	100 seeds weight (g)	Seed yield / plant (g)	Fruit yield (q/ha)
Days to 50%	P	-0.027	0.225	-0.078	-0.12	0.212	0.171	-0.023	-0.087	-0.059	0.055
Flowering	G	-0.031	0.244	-0.87	-0.12	0.222	0.174	-0.022	-0.092	-0.059	0.058
Plant height	P		0.198	-0.076	0.107	0.074	0.114	-0.432*	-0.010	-0.382*	-0.009
(cm)	G		0.211	-0.106	0.106	0.079	0.126	-0.472 **	-0.008	-0.408*	-0.014
No. of branches	P			0.435*	0.239	0.091	0.277	-0.427*	-0.008	0.502**	-0.098
plant	G			0.525**	0.261	0.093	0.311	-0.472**	-0.001	0.568**	-0.119
No. of fruits/	P				-0.22	-0.120	-0.400*	0.150	0.179	0.616**	0.473**
plant	G				-0.24	-0.141	-0.387*	0.166	0.208	0.627**	0.475**
Fruit length (cm)	P					-0.717**	0.379*	0.606**	-0.405*	-0.653**	0.540**
	G					-0.751**	0.395*	0.642**	-0.412*	-0.676**	0.562**
Fruit diameter	P						0.835**	0.354	0.464**	0.338	0.667**
(cm)	G						0.869**	0.365*	0.481**	0.349	0.696**
Average fruit	P							0.105	0.341	0.005	0.574**
weight (g)	G							0.105	0.345	0.020	0.607**
No. of seeds/	P								-0.003	0.795**	0.296
fruit	G								-0.002	0.804**	0.302
100 seeds	P									0.351	0.434*
weight (g)	G									0.356	0.453*
Seed yield/	P										0.566**
plant (g)	G										0.569**

Among the correlations, genotypic coefficients of correlation (rg) revealed higher magnitude than their corresponding phenotypic coefficients (rp) in most of the cases, indicating that there is an inherent association among various traits (Table 1). Among the fruit characters studied, number of fruits per plant, seed yield per plant, weight of 100 seeds, fruit weight, fruit length and fruit diameter showed significantly high and positive correlation with fruit yield. So, these traits should be kept in mind while improving fruit yield per hectare. Significant positive genotypic and phenotypic correlations were observed for number of branches per plant with number of fruits per plant and seed yield per plant; number of fruits per plant with seed yield per plant; fruit length with average fruit weight and number of seeds per fruit; fruit diameter with average fruit weight and 100 seeds weight; number of seeds per fruit with seed yield per plant. However a significant negative genotypic and phenotypic correlations were also observed for plant height with number of seeds per fruit and seed yield per plant; number of branches per plant with number of seeds per fruit; number of fruits per plant with average fruit weight; fruit length with fruit diameter, 100 seeds weight and seed yield per plant. Similar results on significant positive association between fruit yield per hectare and number of fruits per plant were reported bySingh and Akhilesh (4). The findings were also in consonance with Atul et al. (5).

For path analysis, fruit yield (q/ha) was taken as dependent variable while rest of the 10 traits were considered as causal/ independent variables (Table 2). The characters viz., number of fruits per plant, average fruit weight, number of fruits per plant, average fruit weight, number of seeds per fruit, fruit diameter, fruit length and number of branches per plant had positive and significantly high direct effect on fruit yield, ranging from 0.133 to 1.102. Therefore, due importance should be given to the characters like number of fruits per plant, average fruit weight, number of seeds per fruit, fruit diameter and fruit length for improvement of fruit yield in brinjal. The characters like seed yield per plant, days to 50% flowering and plant height exhibited negative direct effect towards fruit yield. Nainar et al. (6); Atul et al. (5); and Mishra et al. (7) also highlighted similar findings.

Table 2. Genotypic path of 30 genotypes of brinjal for 12 characters. Residual effect = 0.0109, Bold line indicate direct effect.

Characters	Days to 50% flowering	Plant height (cm)	No. of branches/ plant	No.of fruits/ plant	Fruits length (cm)	Fruits diameter (cm)	Average fruit weight (g)	No. of seeds/ fruit	100 seeds weight (g)	Seed yield/ plant (g)	Genotypic correla-tion coe-fficient with yield
Days to 50% flowering	-0.076	0.002	0.032	-0.096	-0.028	0.083	0.128	-0.009	-0.002	0.023	0.058
Plant height (cm)	0.002	-0.052	0.028	-0.117	0.025	0.030	0.093	-0.184	0.000	0.161	-0.014
No. of branches per plant	-0.019	-0.011	0.133	-0.578	0.061	0.035	0.229	-0.192	0.000	0.224	-0.119
No. of fruits per plant	0.007	0.005	-0.070	1.102	-0.057	-0.053	-0.285	0.067	0.004	-0.247	0.475
Fruits length (cm)	0.009	-0.005	0.035	-0.266	0.234	-0.281	-0.291	-0.254	-0.009	0.266	-0.562
Fruits diameter (cm)	-0.17	-0.004	0.012	-0.156	-0.176	0.375	0.640	0.148	0.010	-0.137	0.696
Average fruit weight (g)	-0.013	-0.007	0.041	-0.426	-0.092	0.326	0.737	0.043	0.007	-0.008	0.607
No. of seed per fruit	0.002	0.023	-0.063	0.182	-0.146	0.137	0.077	0.407	0.000	-0.316	0.303
Weight of 100 seeds (g)	0.007	0.000	-0.001	0.229	-0.096	0.180	0.254	-0.001	0.021	-0.140	0.453
Seed Yield per plant (g)	0.004	0.021	-0.075	0.690	-0.158	0.131	0.015	0.327	0.008	-0.394	0.569

Regarding indirect effects it was observed that plant height exhibited positive indirect effects towards fruit yield via number of seeds per fruit and seed yield per plant; number of branches per plant via days to 50% flowering, fruit length and average fruit weight; number of fruits per plant via number of seeds per fruit, 100 seed weight and seed yield per plant; fruit length via plant height and number of branches per plant; average fruit weight via days to 50% flowering, number of branches per plant and 100 seed weight; number of seeds per fruit via number of fruits per plant, fruit diameter and seed yield per plant; seed yield per plant via plant height, number of branches per plant and fruit length.

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