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Correlation Coefficient and Path Analysis in Brinjal (*Solanum melongena* L.)

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Abstract

The experiment was carried out during *kharif* season of 2008-2009. The experiment was laid out in randomized block design with three replications. The experiment materials consisted 15 genotypes of brinjal i.e. Aruna, DBL-24, DBR-8, Green Long, JB-7, KS-224, KS-356, Punjab Sadabahar, PB-70, Ram Nagar Giant, Surya, VR-14, Pusa Purple Long, KS-331 and Pusa Purple Cluster. The highest and significant direct effects on total yield per plant showed by weight of fruit followed by days to first fruit set and number of fruit per cluster, indicating that for bringing out desirable improvement towards total yield, diameter of fruit, days to first fruit set and number of primary branches per plant direct selection programs should be made.

Key words : Correlation, Path analysis, Brinjal.

Brinjal or egg plant (*Solanum melongena* L.) of the family solanaceae is one of the important and popular vegetable crops grown in India and other parts of the world and originated in its wild form in Indo-Burma region and is probably a native of India and has been in cultivation since prehistoric times. Lucknow grows brinjal in winter and in rainy season to meet the market demands throughout the year which needs genetic advancement for higher yield and productivity in available germplasms of brinjal (1—8). It is a nutritive vegetable having high percentage of carbohydrates, proteins and other essential nutrients and also has some medicinal properties. Various sizes, shapes, colors and forms of cultivated and wild type of brinjal are found in India, white type brinjal fruits is said to be good for diabetic patients. There are multifarious uses of brinjal. It is used as vegetable cooked, fried or roasted and in other culinary preparations. The brinjal fruit has cardiotonic, laxative and analgesic properties and enriches the blood. It is said to be good for diabetic patients.

Methods

The present experiment was carried out during *kharif* season of 2008-2009 at Horticulture Research Farm, Department of Applied Plant Science (Horticulture). Babasaheb Bhimrao Ambedkar University, Lucknow, India. The experiment was laid out in randomized block design with three replications. The experimental materials consisted of 15 genotypes of brinjal i.e. Aruna, DBL-24, DBR-8, Green Long, JB-7, KS-224, KS-356, Punjab Sadabahar, PB-70, Ram Nagar Giant, Surya, VR-14, Pusa Purple Long, KS-331 and Pusa Purple Cluster). At first field ploughing was done with the help of disc harrow and two to four ploughing with the help of cultivator followed by planking. Field should be prepared thoroughly with the help of spade and khurpi. In each treatments distance between row to row and plant to plant was 75 cm and 60 cm, respectively. The observations were recorded on 12 characters viz., days to 50% flowering, number of flowers per cluster, number of long and medium styled flowers per cluster, number of short styled flowers per cluster, days to first fruit set, plant height, number of primary branches per plant, number of fruits per cluster, length of fruit, diameter of fruit, weight of fruit (g), total yield per plant (kg). Correlations of various biometrical characters and path coefficient analysis were undertaken following the standard procedure.

Results and Discussion

Yield of crop is a complex character and it is the

Table 1. Genotypic path coefficient analysis (direct and indirect effect) of yield contributing characters in 15 parents of Brinjal. Residual effect=0.2603, Bold values show direct effect.

Characters	Days to 50% flowering	Number of flowers per cluster	Number of long and medium styled flowers per cluster L	M	Number of short styled flowers per cluster	Days to first fruit set	Plant height (cm)
Days to 50% flowering	**-3.578**	0.121	1.025	-0.903	2.624	-0.199	-0.669
Number of flowers per cluster	0.012	**0.345**	-0.081	-0.002	-0.001	0.002	-0.009
Number of long and medium L	-0.033	0.028	**0.116**	0.056	0.061	0.048	0.016
styled flowers per cluster M	-0.015	-0.000	0.028	**-0.058**	0.003	0.018	0.001
Number of short styled flowers per cluster	2.107	-0.009	-1.514	0.161	**-2.873**	-0.808	-0.402
Days to first fruit set	0.060	0.006	0.050	-0.344	0.305	**1.083**	0.358
Plant height (cm)	-0.118	-0.017	0.087	0.008	-0.089	-0.209	**-0.633**
Number of primary branches per plant	0.057	0.002	0.052	0.271	0.001	-0.011	0.207
Number of fruits per cluster	0.223	0.213	0.062	-0.082	-0.425	-0.273	0.199
Length of fruits (cm)	0.619	-0.042	-0.039	1.103	0.344	-0.072	-0.234
Diameter of fruits (cm)	0.337	0.298	0.170	-0.012	0.188	0.423	0.723
Weight of fruit (g)	-0.056	-0.030	0.175	0.122	0.262	0.218	0.242

Table 1. Continued.

Characters	Number of primary branches per plant	Number of fruits per cluster	Length of fruits (cm)	Diameter of fruits (cm)	Weight of fruit (g)	Total yield per plant (kg)
Days to 50% flowering	0.466	-1.252	1.212	-1.250	0.361	-0.383
Number of flowers per cluster	-0.001	-0.114	-0.008	-0.106	0.019	0.225
Number of long and medium L	0.014	0.011	0.003	0.020	0.037	0.257
styled flowers per cluster M	0.036	0.007	0.035	0.001	-0.013	0.209
Number of short styled flowers per cluster	0.004	1.912	0.539	-0.559	-1.363	0.399
Days to first fruit set	0.101	-0.163	0.043	0.475	0.428	0.186
Plant height (cm)	0.298	-0.198	-0.081	-0.475	-0.277	-0.202
Number of primary branches per plant	**0.439**	-0.161	-0.073	0.124	0.130	-0.029
Number of fruits per cluster	0.233	**0.638**	0.245	0.099	-0.335	-0.461
Length of fruits (cm)	-0.303	-0.701	**-1.830**	0.411	0.464	-0.273
Diameter of fruits (cm)	0.272	0.149	-0.216	**0.964**	0.459	-0.034
Weight of fruit (g)	-0.164	-0.289	-0.139	0.263	**0.552**	0.462

ultimate product of action and interaction of various component characters. Further, it is well known that no independent gene system is present for yield, but genes are available only for component characters.

Estimate of correlation coefficient among yield contributing most important trait for 12 characters in brinjal. The genotypic and phenotypic correlation coefficient of parent are presented in Table 1. It reveals that total yield per plant had positive and highly significant genotypic correlation coefficient with long styled flowers per cluster (0.557), days to first fruit set (0.486) and weight of fruit (0.460). The weight of fruit recorded highly significant and positive genotypic correlation with diameter of fruit (0.476) and plant height (0.438). The diameter of fruit showed positive and significant correlation with plant height (0.750), days to first fruit set (0.438), days to 50% flowering (0.349) and number of flowers per cluster. The length of fruit showed negative and significant correlation with medium styled flowers per cluster (-0.603). The

Table 2. Genotypic (G) and phenotypic (P) correlation coefficient for different pairs of characters in 15 parents of Brinjal. *, ** Significant at 5 and 1% level, respectively.

Parents Line (Female)	Symbol	Number of flowers per cluster	Number of long and medium styled flowers per cluster: Long	Number of long and medium styled flowers per cluster: Medium	Number of short styled flowers per cluster	Days to first fruit set	Plant height (cm)
Days to 50% flowering	G	-0.034	-0.287	0.252	-0.734**	0.056	0.187
	P	0.002	-0.201	0.207	-0.588**	0.052	0.181
Number of flowers per cluster	G		0.238	0.005	0.003	0.006	0.027
	P		0.197	-0.004	0.057	-0.002	0.018
Number of long and medium styled flowers per cluster — Long	G			-0.484**	0.527**	0.552**	0.137
	P			0.318	0.275	0.338*	0.115
Medium	G				-0.056	-0.317*	-0.012
	P				-0.049	-0.259	-0.009
Number of short styled flowers per cluster	G					0.284	0.139
	P					0.244	0.111
Days to first fruit set	G						0.331
	P						0.329*
Plant height (cm)	G						
	P						
Number of primary branches per plant	G						
	P						
Number of fruits per cluster	G						
	P						
Length of fruits (cm)	G						
	P						
Diameter of fruits (cm)	G						
	P						
Weight of fruit (g)	G						
	P						

Table 2. Continued.

Parents Line (Female)	Symbol	Number of primary branches per plant	Number of fruits per cluster	Length of fruit (cm)	Diameter of fruit (cm)	Weight of fruit (g)	Total yield per plant (kg)
Days to 50% flowering	G	-0.130	0.349**	-0.339*	0.349*	-0.101	-0.383**
	P	0.093	0.392**	-0.324*	0.322*	-0.099	-0.372**
Number of flowers per cluster	G	0.004	0.333*	0.023	0.309*	-0.054	0.225
	P	-0.032	0.303*	0.016	0.276	-0.051	0.199
Number of long and medium styled flowers per cluster — Long	G	0.118	0.098	0.021	0.177	0.318	0.557**
	P	0.125	0.131	0.009	0.123	0.271	0.549**
Medium	G	-0.617**	-0.128	-0.603**	-0.012	0.222	0.209
	P	-0.214	0.058	0.505**	-0.036	0.179	0.144
Number of short styled flowers per cluster	G	0.001	0.665**	-0.188	0.195	0.474**	0.399**
	P	0.403	0.250	0.161	0.141	0.392**	0.309*
Days to first fruit set	G	0.009	-0.427**	0.039	0.438**	0.395**	0.486**
	P	0.044	0.271	0.038	0.394**	0.393**	0.489**
Plant height (cm)	G	-0.470	0.313*	0.128	0.750**	0.438**	-0.202
	P	-0.280	0.172	0.123	0.681**	0.437**	-0.201
Number of primary branches per plant	G		0.566**	0.166	-0.282	-0.296	-0.029
	P		0.118	0.094	-0.226	-0.179	-0.010
Number of fruits per cluster	G			0.383	0.154	-0.525**	-0.460**
	P			0.257	0.004	-0.317	0.266
Length of fruits (cm)	G				-0.224	-0.254	-0.272
	P				-0.208	-0.249	0.265

Table 2. Continued.

Parents Line (Female)	Symbol	Number of primary branches per plant	Number of fruits per cluster	Length of fruit (cm)	Diameter of fruit (cm)	Weight of fruit (g)	Total yield per plant (kg)
Diameter of fruits (cm)	G					0.476**	-0.034
	P					0.429**	-0.050
Weight of fruit (g)	G						0.462**
	P						0.455**

number of fruits per cluster showed positive and significant correlation with number of primary branches per plant (0.566) and days to first fruit set correlation with long styled flowers per cluster (0.552). The number of short styled flowers per cluster recorded positive and significant coefficient with long styled flowers per cluster (0.527) and medium styled flowers per cluster showed negative and significant correlation with long styled flowers per cluster (-0.484). The number of primary branches per plant showed negative and significant correlation with medium styled flowers per cluster (-0.617).

At the phenotypic correlation level, total yield per plant showed positive and significant correlation with number of long styled flowers per cluster (0.549), days to first fruit set (0.489) and weight of fruit (0.455) (Table 1). Weight of fruit showed positive and highly significant correlation with plant height (0.437), diameter of fruit (0.429), days to first fruit set (0.393) and number of short styled flowers per cluster (0.392). Diameter of fruit recorded positive and significant correlation with plant height (0.681), days to first fruit set (0.394) and days to fifty per cent flowering (0.322). A highly positive and significant correlation was also observed for weight of fruit with number of medium styled flowers per clusters (0.505). Number of fruits per clusters recorded positive and significant correlation with days to 50% flowering (0.392), number of flowers per clusters (0.303) and number of short styled flowers per clusters (0.250). The plant height recorded significant and positive phenotypic correlation with days to first fruit set (0.329). Days to first fruit set had positive and significant phenotypic correlation with number of long styled flower per clusters (0.338) and number of short styled flowers per cluster (0.244). However, negative and significant correlation were observed number of short styled flowers per clusters with days to 50% flowering (-0.588), while number of primary branches per plant recorded negative and non-significant phenotypic correlation with plant height (-0.280), (-0.214) and number of long styled flower per cluster (-0.201).

The path analysis provides an effective means of separating direct and indirect effect. The results of path coefficient are presented in Table 2.

At genotypic level, highest positive direct effect toward days to first fruit set (1.083) followed by diameter of fruit (0.964), number of fruits per cluster (0.638), weight of fruit (0.552) and number of long styled flowers per cluster (0.116), while, highest negative effect toward days to 50% flowering (-3.578) followed by number of short styled flowers per cluster (-2.873), length of fruit (-1.830), plant height (-0.633), number of primary branches per plant (-0.439), number of flowers per cluster (-0.345) and number of medium styled flowers per cluster (-0.058).

From the estimate of correlation coefficient and direct effect of total yield per plant attributing traits, it is concluded that for improvement on total yield per plant in brinjal, days to first fruit set, weight of fruit, diameter of fruit and number of fruits per cluster can be used as direct selection parameters.

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