Correlation and path analysis in eggplant (*Solanum melongena* L.)

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Eggplant (*Solanum melongena* L.) is an important vegetable crop grown worldwide. For evaluating the yield potential of any variety of egg plant, it is necessary to give attention to all the yield contributing characters. It is essential to assess the degree of association of various quantitative characters in order to initiate effective selection programme. The knowledge of association of the various plant characters with yield and among themselves is required so that a rational choice of characters for selection can be exercised. An exclusively self pollinated vegetable is improved by selection. Efficiency of selection in any breeding programme mainly depends on the knowledge of association of characters. Therefore, information on the cause and effect of various yield attributes and the relative importance of their direct and indirect effects on yield are essential in crop improvement programmes. Path coefficient analysis facilitates the partitioning of correlation coefficients into direct and indirect effects of various characters on yield. The results of correlation and path analysis carried out in eggplant are presented in this paper.

The material under investigation consist of 65 genotypes with diverse morphological characters like fruit shape, fruit colour, growth habit and spiny ness characteristics and were collected from different parts of India and maintained at All India Coordinated Research Project on Vegetable Crops, Mahatma Phule Krishi Vidyapeeth, Rahuri. The experiment was laid out in a Randomized Block Design with three replication during kharif 2009. The recommended cultural practices for growing brinjal crops were adopted. Five plants from each genotype in each replication were selected at random for recording observation on fourteen quantitative characters viz. plant height (cm), plant spread (cm), number of primary branches per plant, days to 50% flowering, days to first harvest, length of fruit (cm), breadth of fruit (cm), girth

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of fruit (cm), average weight of fruit (g), number of fruits per plant, yield per plant (kg), yield q/ha and duration of harvest were recorded. The phenotypic and genotypic coefficient of correlation was computed as per formula suggested by Snedecor and Cochran (1967). The path coefficient analysis was worked out as suggested by Dewey and Lu (1959). In the present study, yield per plant was selected as dependent variable and other characters as independent variable.

Yield per plant had significant positive correlation with fruit length (0.482), average fruit weight (0.487), plant height (0.307), yield per hectare (0.701) at both the levels and with days to first harvest, fruit girth, number of primary branches at genotypic level, while it had negative correlation with days to 50 percent flowering. These results are similar to those reported by Lokhare *et.al.* (2008) and Yadav *et.al.* (1997). Average fruit weight had significant positive correlation with fruit girth, plant height, plant spread in North-South direction, yield per plant, yield per hectare, days to first harvest, duration of harvest, while it had negative correlation with days to 50 per cent flowering at both level. This was also reported by Bansal and Mehta (2008). Among the yield components the average weight of fruit, fruit girth, fruit breadth and number of primary branches per plant were positively and significantly inter related among themselves indicating that simultaneous selection for these characters might bring an improvement in yield per plant.

Yield per plant is the product of interaction of components traits. Path analysis is important to obtain information about different ways in which component characters influence yield. Direct effects of any character on yield gives idea about how reliable selection can be made for particular character to bring improvement in yield, if a correlation between a causal factor and direct effect is more or less of equal magnitude, it explain true relationship between character and direct selection through this trait will be effective. In present investigation it was found that number of fruits per plant recorded the highest positive direct effect on yield followed by number of primary branches, fruit weight (Table 2). The

Table 1. Estimates of genotypic (G) and phenotypic (P) correlation coefficients in brinjal.

Genotypes		Fruit length (cm)	Fruit breadth (cm)	Fruit weight (g)	Fruit girth (cm)	Plant height (cm)	Number of primary branches	Plant Spread (NS) (cm)	Plant spread (EW) (cm)	Days to 50% flowering	Number of fruits per plant	Yield/ plant (kg)	Yield /ha (q)	Days first harvest	Duration harvesting
Fruit length (cm)	G	1	0.227**	0.669**	0.272**	0.390**	0.250**	0.256**	0.006	-0.316**	-0.246**	0.482**	0.110	0.441**	0.241**
	P	1	0.180*	0.582**	0.161	0.365**	0.183*	0.215	0.015	-0.287**	-0.154	0.322**	0.097	0.267**	0.169
Fruit breadth (cm)	G		1	0.391**	1.055**	0.228**	0.465**	0.326**	0.290**	-0.433**	-0.424**	0.128	0.058	0.339**	0.432**
	P		1	0.231	0.505**	0.151	0.293**	0.210*	0.182*	-0.221*	-0.207*	0.073	0.045*	0.149	0.172*
Average fruit weight (g)	G			1	0.451**	0.365**	0.157	0.228**	-0.047	-0.307**	-0.143	0.487**	0.196*	0.226**	0.426**
	P			1	0.368**	0.342**	0.100	0.224*	-0.044	-0.273**	-0.136	0.438**	0.195*	0.124	0.260**
Fruit girth (cm)	G				1	0.191*	0.292**	0.318**	0.210*	-0.361*	-0.265**	0.172*	0.069	0.440**	0.476**
	P				1	0.118	0.142	0.241**	0.151	-0.275**	-0.224*	0.088	0.050	0.110	0.259**
Plant height (cm)	G					1	0.660*	0.465**	0.424**	-0.319**	0.018	0.307**	0.212*	-0.111	0.073
	P					1	0.425**	0.426**	0.414**	-0.276**	0.002	0.268**	0.208*	-0.021	0.055
Number of primary branches	G						1	0.372**	0.362**	-0.189*	-0.007	0.377**	0.290**	0.099	0.188*
	P						1	0.261**	0.263**	-0.211*	0.014	0.171	0.200*	0.175*	0.055
Plant spread (North-South)(cm)	G							1	0.778**	-0.317*	-0.264**	0.031	-0.100	0.002	0.255*
	P							1	0.747**	-0.272**	-0.227**	0.046	-0.092	0.020	0.124
Plant spread (East-West) (cm)	G								1	-0.273**	-0.239**	-0.110	-0.083	0.077	-0.006
	P								1	-0.252**	-0.206*	-0.074	-0.082	0.064	0.006
Days to 50% flowering	G									1	0.219*	-0.363**	-0.062	0.047	-0.440**
	P									1	0.167	-0.245**	-0.060	-0.071	-0.285**
Number of fruits per plant	G										1	0.397**	0.667**	0.017	-0.172*
	P										1	0.327**	0.596**	-0.074	-0.097
Yield/plant (kg)	G											1	0.701**	0.287**	0.156
	P											1	0.609**	0.100	0.051
Yield/ha (q)	G												1	0.259**	0.111
	P												1	0.123	0.043
Days to first harvest	G													1	-0.104
	P													1	-0.015
Duration of harvesting	G														1
	P														1

*,** significant at 5 and 1 per cent level of significance, respectively.
G: Genotypic correlation coefficient, P: Phenotypic correlation coefficient

Table 2: Direct and indirect effects of various yield components on yield per plant in brinjal.

Name of character	Fruit length (cm)	Fruit breadth (cm)	Average fruit weight (g)	Fruit girth (cm)	Plant height (cm)	Number of primary branches	Plant spread (North-South) (cm)	Plant spread (East-West) (cm)	Days to 50% flowering	Number of fruits per plant	Days to First harvest	Duration of harvesting	Correlation value (yield/ plant)
Fruit length (cm)	0.3192	0.0214	0.2655	-0.0365	-0.1416	0.1166	0.0060	-0.0007	0.1336	-0.1442	-0.0033	-0.0533	0.4826**
Fruit breadth (cm)	0.0725	0.0944	0.1554	-0.146	-0.0830	0.2166	0.0076	-0.0299	0.1829	-0.2481	-0.0026	-0.0953	0.1289
Average fruit weight (g)	0.2137	0.0370	0.3965	-0.0606	-0.1324	0.0731	0.0053	0.0049	0.1298	-0.0839	0.0017	-0.0942	0.4875**
Fruit girth (cm)	0.0867	0.0997	0.1791	-0.1342	-0.0696	0.1362	0.0074	-0.0216	0.1526	-0.1553	-0.0033	-0.1052	0.1724*
Plant height (cm)	0.1245	0.0216	0.1447	-0.0257	-0.3629	0.3072	0.0108	-0.0436	0.1349	0.0108	0.0008	-0.0161	0.3072**
Number of primary branches	0.0800	0.0400	0.0623	-0.0393	-0.2395	0.4655	0.0087	-0.0373	0.0799	-0.0045	-0.0008	-0.0415	0.3775**
Plant spread (North-South) cm	0.0819	0.0308	0.0907	-0.0427	-0.1688	0.1734	0.0233	-0.0799	0.1340	-0.1547	0.0000	-0.0562	0.0317
Plant spread (East-West) (cm)	0.0021	0.0275	-0.0188	-0.0283	0.1540	0.1689	0.0181	-0.1027	0.1153	-0.1399	-0.0006	0.0014	-0.1109
Days to 50% flowering	-0.1011	-0.0410	-0.1220	0.0485	0.1161	-0.0881	-0.0074	0.0281	-0.4219	0.1281	-0.0004	0.0971	-0.3639**
Number of fruits per plant	-0.0788	-0.0401	-0.0569	0.0357	-0.0067	-0.0036	-0.0062	0.0246	-0.0925	0.5843	-0.0001	0.0380	0.3977**
Days to first harvest	0.14080.	0.0321	0.0898	-0.0591	0.0401	0.0462	0.0001	-0.0079	-0.0199	0.0100	-0.0076	0.0228	0.2874**
Duration of harvesting	0.0772	0.0408	0.1692	-0.0640	-0.0264	0.0876	0.0059	0.0007	0.1857	-0.1006	0.0008	-0.2206	0.1563

characters viz; fruit breadth, plant spread (NS) and fruit length had low positive direct effect on yield. While fruit girth, plant spread (EW), days to 50% flowering, days to first harvest and duration of harvest had negative direct effect on yield per plant. Randhawa *et.al.* (1993) and Khurana *et. al.* (1988) reported highest direct effect of number of primary branches on yield. Vedivel and Bapu (1990) and Kalda *et.al.* (1996) reported that the number of fruits per plant, number of primary branches and fruit weight had direct positive effects on yield. Highest direct positive effect of number of fruits per plant on yield followed by fruit weight was reported by Bansal and Mehta (2008) and Lokhare *et.al.* (2008).

Negative direct effect was observed for days to first harvest, days to 50% flowering, plant spread (E-W), plant height and fruit girth. Similar results were also reported by Kalda *et.al.* (1996). The average fruit weight had its indirect effects on yield was positive via fruit length, fruit breadth, number of primary branches, plant spread (N-S and E-W), days to 50% flowering, days to first harvest, whereas it had negative effects through fruit girth, plant height, number of fruits per plant and duration of harvest. The number of fruits per plant had its indirect effects via fruit girth, plant spread (EW) and duration of harvest were positive, while indirect effects via fruit length, fruit breadth, average fruit weight, plant height, number of primary branches, plant spread (N-S), days to 50% flowering and days to first harvest were negative. The indirect effects which affects the yield in brinjal via another character should be considered for further improvement programme in brinjal.

From this investigation, it was observed that the characters which were showing high positive direct effect along with positive significant correlation with yield per plant can be directly selected for improvement programme to increase yield, while character having

negative direct effect but having positive significant correlation for them. The characters which show high positive indirect effects are selected to improve the yield of the plant. Similar results were obtained by Randhawa *et.al.* (1993). The characters viz; fruit length, average fruit weight, plant height, fruit breadth, days to first harvest, fruit girth, number of primary branches per plant, number of fruit per plant, plant spread should be given due emphasis in egg plant improvement programme.

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