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Correlation and Path Analysis Studies of Yield and Yield Components in Brinjal (*Solanum melongena* L.)

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ABSTRACT

Character association and path analysis in eighteen genotypically diverse indigenous genotypes of brinjal were studied at Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during the rabi season of 2015-2016 for fourteen characters. The genotypic association of fruit yield was significantly positive with plant spread and these traits were identified as yield components. The genetic improvement of fruit yield thus can be obtained by direct selection of these yield components. The path analysis study revealed that the fruits length is the most important yield determinant, because of its high direct effect and indirectly influence the yield through number of clusters per plant, plant height and plant spread is the another most important yield determinant. Thus, these characters should be given importance in selection programme for yield improvement in brinjal.

Key words: *Brinjal, correlation, Path analysis, Character association*

INTRODUCTION

Brinjal *(Solanum melongena* L, 2n = 24) belonging to family Solanaceae is one of the most important and popular vegetable crop grown round the year all over the country. The fruit is employed as cure for toothache and recommended as remedy for liver complaints. In Unani roots are used to alleviate pain. Fruits are used as cardio tonic, laxative and reliever of inflammation. There is an increasing demand for its varieties, which are used for different preparations. Yield is a complex character influenced by several genetic factors interacting with environment. Success of any breeding programme for its improvement depends on the existing genetic variability in the base population and on the efficiency of selection. Correlation and path co-efficient analysis are the important biometrical technique to determine the yield components. The characters that are positively correlated with yield are of considerably important to plant breeder for selection purpose. Although the correlation co-efficients indicates the nature of association among the different traits, path analysis splits the correlation co-efficients into measure of direct and indirect effects thus providing understanding of the direct and indirect contribution of each characters towards yield.

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Therefore, keeping this in view, the present study was under taken with the objective to understand the character association among the various traits and their direct and indirect effects on yield in brinjal. The information on such aspects can be of great help in formulating appropriate breeding strategy for genetic upgradation of this commercial vegetable crop.

MATERIAL AND METHODS

The present investigation was conducted during the year 2015-16 at Horticultural Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur. The experimental material consisted of eighteen genotypes of brinjal (2013/BRLVAR-1, 2013/BRLVAR-2, 2013/BRLVAR-3, 2013/BRLVAR-4, 2013/BRLVAR-5, 2013/BRLVAR-6, 2014/BRRVAR-1, 2014/BRRVAR-2, 2014/BRRVAR-3, 2014/BRRVAR-4, 2014/BRLVAR-1, 2014/BRLVAR-2, 2014/BRLVAR-3, 2014/BRLVAR-4, Kashi Taru, Swarna Mani, KS-224 and Punjab Sadabahar). These genotypes were planted in randomised block design with three replications at the spacing of 75 cm and 60 cm between rows and plants respectively. All the recommended cultural practices were followed to raise a healthy crop. Observations were recorded on five randomly selected plants for fourteen plant growth and fruit yield characters *viz*., days to 50% flowering, plant height (cm), number of primary branches per plant, plant spread (cm), number of fruits per cluster, number of clusters per plant, number of pickings, fruit stalk length(cm), fruit length (cm), fruit girth (cm), fruit weight (g), fruit colour, fruit shape, TSS (%), pericarp thickness (mm) and number of fruits per plant. The correlation and path co-efficient was computed by using the formula of Dewey and Lu[3]; Lohakare *et al*[6]; Singh *et al*[13].

RESULTS AND DISCUSSION

The correlation between fruit yield per plant with different yield attributes and among the attributes themselves are presented in table 1.Out of fourteen characters, plant spread exhibited a positive significant correlation at genotypic levels with fruit yield per plant indicating that the association between yield and this character was positive and high. The positive correlation between the desirable characters is favourable to the plant breeder because it helps in simultaneous improvement of all the characters. Similar significant positive association with fruit yield per plant was reported by Asati[1] for number of primary branches per plant, percentage of long-styled flowers, number of fruits per plant, number of secondary branches per plant, percentage of medium-styled flowers and plant spread; Sarnaik *et al*[10] for number of fruits per plant, fruit length, plant height, plant spread and number of primary branches; Bansal and Mehta[2] for plant height, plant spread, branches per plant, leaves per plant and fruits per plant.Days to fifty per cent flowering positively correlated with fruit weight, fruit girth, fruit weight fruit girth and pericarp thickness, while negatively correlated with number of clusters per plant, number of picking, fruit length and number of fruits per plant. Number of clusters per plant exhibited positive and significant correlation with fruit length and number of fruits per plant and number of picking whereas negative and significant correlation with fruit weight, fruit girth and pericarp thickness. Number of primary branches showed positive and significant correlation with number of clusters per plant and negative and significant correlation with fruit weight, fruit girth. Pericarp thickness showed significant and negative correlation with number of fruits per plant. These results were also confirmed by the findings of Dubey[4].Fruit girth showed highly positive and significant correlation with fruit weight, while positive correlation with pericarp thickness. Fruit weight showed highly positive and significant correlation with pericarp thickness, whereas highly significant and negative correlation with number of fruits per plant and similar findings were reported by Singh and Kumar[14] indicating that the limited number of fruits per plant more efficiently obtain larger share of the metabolites and thereby increase the fruit girth. These results

were also confirmed by the findings of Thangamani and Jansirani[15].The correlation coefficient between yield and a particular yield component was the net result of direct effect of that attribute and indirect effect through other yield contributing traits. The total correlation between yield and a component trait may sometimes be misleading as it might be an over-estimate or under-estimate., Hence, direct selection based on character association may not be fruitful. Therefore, it is necessary to partition the total correlation coefficients into direct and indirect effect of cause as devised by Wright[16].

Based on the above, the characters subjected to correlations were also subjected to path coefficient analysis for estimating the direct and indirect effects (tables 2), so as to formulate more authentic for selection in brinjal. The fruit length, number of fruits per plant, fruit girth, fruit weight, pericarp thickness, TSS, number of fruits per cluster, plant spread, fruit stalk length, number of primary branches per plant and plant height exerted a high positive direct effect on fruit yield per plant. The high direct effect of these traits appeared to be the main factor for their strong association with fruit yield per plant. Hence direct selection for these traits would be highly effective in improving the fruit yield per plant which is in consonance with the findings of Mishra *et al.*[7], Naliyadhara *et al*.[8] Lohakare *et al*.[6] and Shande *et al*.[11]. Lenka and Mishra[7] have suggested scales for path coefficients with values 0.00 to 0.09 as negligible, 0.10 to 0.19 low, 0.20 to 0.29 moderate, 0.30 to 0.99 high and more than 1.00 as very high path coefficients. Fruit length exhibited high positive indirect effect on number of clusters per plant followed by plant height, fruit stalk length, plant spread, number of primary branches per plant, number of fruits per cluster and TSS. Number of clusters per plant exhibited high positive indirect effect on days to 50% flowering followed by fruit weight, fruit girth and pericarp thickness. These results are in close conformity with Singh and Kumar[14], Rekha[9], Thangamani and Jansirani[15] and Shinde *et al*.[12]. The indirect contribution of most of the characters was through fruit length. This result suggests that importance has to be given to this trait in the selection of plants for higher yield. The residual effect of 0.256 indicated that some other possible characters, which have not been studied in the present investigation, need to be included in the analysis to account fully for the variation in fruit yield of brinjal.

Table 1: Genotypic and phenotypic correlation coefficient between fruit yield and its component characters in brinjal

Characers		Plant height (cm)	Number of 1^0 branches per plant	Plant spread (cm)	Number of fruits per cluster	Number of cluster per plant	Number of picking	Fruit stalk length (cm)	Fruit length (cm)	Fruit girth (cm)	Fruit weight (g)	TSS (%)	Pericarp thickness (mm)	Number of fruits per plant	Fruit yield per plant (kg)
Days to 50% flowering	P	-0.248	-0.249	0.016	-0.125	-0.707**	-0.297	-0.033	-0.318	0.584*	0.588*	-0.081	0.405	-0.457	-0.096
	G	-0.425	-0.366	-0.133	-0.354	-0.982**	-0.755**	-0.050	-0.547*	0.828**	0.863**	-0.019	0.555*	-0.640**	-0.018
Plant height (cm)	P		0.184	0.180	0.438	0.544*	0.108	0.454	0.348	-0.445	-0.416	-0.025	-0.274	0.150	0.063
	G		0.207	0.213	0.495*	0.569*	0.066	0.477*	0.385	-0.457	-0.440	0.004	-0.294	0.162	0.008
Number of 1^0 branches per plant	P			0.210	0.183	0.471*	0.294	0.199	0.205	-0.463	-0.502*	0.168	-0.414	0.348	-0.108
	G			0.279	0.179	0.503*	0.458	0.207	0.233	-0.505*	-0.560*	0.192	-0.447	0.438	-0.146
Plant spread (cm)	P				0.185	0.175	0.019	0.191	0.251	-0.273	-0.219	0.381	-0.046	0.244	0.316
	G				0.248	0.208	0.117	0.237	0.289	-0.352	-0.258	0.479*	-0.066	0.282	0.574*
Number of fruits per cluster	P					0.264	0.036	0.270	0.252	-0.408	-0.331	0.164	-0.268	-0.037	-0.131
	G					0.300	0.026	0.297	0.205	-0.461	-0.368	0.109	-0.289	-0.027	-0.262
Number of clusters per plant	P						0.340	0.262	0.540*	-0.804**	-0.868**	0.083	-0.518*	0.503*	0.025
	G						0.514*	0.264	0.605**	-0.829**	-0.884**	0.094	-0.537*	0.536*	0.035
Number of picking	P							0.084	-0.084	-0.170	-0.305	-0.027	-0.101	0.386	0.056
	G							0.118	-0.111	-0.219	-0.400	-0.114	-0.172	0.572*	-0.033
Fruit stalk length (cm)	P								0.265	-0.178	-0.132	0.110	0.001	-0.066	0.094
	G								0.305	-0.182	-0.132	0.123	-0.001	-0.056	0.162
Fruit length (cm)	P									-0.725**	-0.420	0.177	-0.391	-0.078	0.248
	G									-0.820**	-0.490*	0.183	-0.472*	-0.090	0.339
Fruit girth (cm)	P										0.709**	-0.347	0.505*	-0.200	-0.104
	G										0.745**	-0.370	0.525*	-0.232	-0.119
Fruit weight (g)	P											-0.107	0.639**	-0.671**	-0.045
	G											-0.103	0.673**	-0.725**	-0.113
TSS (%)	P												0.071	-0.097	0.033
	G												0.113	-0.123	-0.010
Pericarp thickness (mm)	P													-0.487*	-0.150
	G													-0.523*	-0.202
Number of fruits per plant	P														0.310
	G														0.248

* Significant at 5%, ** Significant at 1%

Table 2: Direct and indirect effect of component characters on fruit yield in brinjal

Characters	Days to 50% flowering	Plant height (cm)	Number of 1^0 branches per plant	Plant spread (cm)	Number of fruits per cluster	Number of cluster per plant	Number of picking	Fruit stalk length (cm)	Fruit length (cm)	Fruit girth(cm)	Fruit weight (g)	TSS (%)	Pericarp thickness (mm)	Number of fruits per plant	Fruit yield per plant (kg)
Days to 50% flowering	**-0.868**	-0.019	-0.029	-0.019	-0.067	0.981	0.195	-0.004	-1.020	0.910	0.732	-0.004	0.179	-0.986	-0.018
Plant height (cm)	0.369	**0.044**	0.016	0.030	0.093	-0.569	-0.017	0.042	0.718	-0.502	-0.373	0.001	-0.095	0.250	0.008
Number of 1^0 branches per plant	0.318	0.009	**0.078**	0.040	0.034	-0.502	-0.119	0.018	0.434	-0.555	-0.475	0.044	-0.144	0.674	-0.146
Plant spread	0.116	0.009	0.022	**0.142**	0.047	-0.208	-0.030	0.021	0.539	-0.386	-0.219	0.110	-0.021	0.434	0.574*
Number of fruits per cluster	0.307	0.022	0.014	0.035	**0.188**	-0.300	-0.007	0.026	0.381	-0.507	-0.313	0.025	-0.093	-0.041	-0.262
Number of cluster per plant	0.852	0.025	0.039	0.030	0.056	**-0.999**	-0.133	0.023	1.128	-0.911	-0.750	0.022	-0.173	0.826	0.035
Number of picking	0.655	0.003	0.036	0.017	0.005	-0.513	**-0.259**	0.010	-0.207	-0.240	-0.339	-0.026	-0.056	0.882	-0.033
Fruit stalk length (cm)	0.044	0.021	0.016	0.034	0.056	-0.264	-0.031	**0.088**	0.569	-0.200	-0.112	0.028	-0.000	-0.086	0.162
Fruit length (cm)	0.475	0.017	0.018	0.041	0.038	-0.604	0.029	0.027	**1.865**	-0.902	-0.416	0.042	-0.152	-0.139	0.339
Fruit girth (cm)	-0.718	-0.020	-0.040	-0.050	-0.087	0.828	0.057	-0.016	-1.530	**1.099**	0.632	-0.085	0.169	-0.358	-0.119
Fruit weight (g)	-0.749	-0.019	-0.044	-0.037	-0.069	0.883	0.104	-0.012	-0.914	0.818	**0.848**	-0.024	0.217	-1.116	-0.113
TSS (%)	0.016	0.000	0.015	0.068	0.020	-0.094	0.029	0.011	0.341	-0.407	-0.087	**0.230**	0.036	-0.189	-0.010
Pericarp thickness (mm)	-0.481	-0.013	-0.035	-0.009	-0.054	0.537	0.045	-0.000	-0.881	0.577	0.571	0.026	**0.323**	-0.806	-0.202
Number of fruits per plant	0.555	0.007	0.034	0.040	-0.005	-0.536	-0.148	-0.005	-0.168	-0.255	-0.615	-0.028	-0.169	**1.540**	0.248

Residual value: 0.256

Diagonal and bold underlined figures show direct effect on fruit yield

CONCLUSION

Correlation studies provide information on the nature and extent of association between any two pairs of metric traits. Thus, it could be possible to bring about genetic upgradation in one trait by selection of the other trait. It can be concluded that fruit length, number of fruits per plant, fruit girth, fruit weight and pericarp thickness were the major contributing characters towards yield and selection based on these characters can be effective for developing high yielding brinjal varieties.

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REFERENCES

1. Asati, B.S., Evaluation of brinjal (round) varieties under Chhattisgarh condition. M.Sc. (Ag) Thesis. IGKV, Raipur. (2001).
2. Bansal, S. and Mehta., A.K., Phenotypic correlation and path coefficient analysis of some quantitative traits in eggplant. *Indian J. of Tropical Biodiversity*, **16(2):** 185-190 (2008).
3. Dewey, D.R. and Lu, K.H., A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agron. J.,* **51:** 512-515 (1959).
4. Dubey, A., Genetic variability, Correlation and path coefficient analysis for fruit yield and its contributing characters in brinjal hybrids (*Solanum melongena* L.). M.Sc. (Ag.) Thesis, Indira Gandhi Krishi Vishwavidyalaya, Raipur: 73-77 (2012).
5. Lenka, D. and Mishra, B., Path coefficient analysis of yield in rice varieties. *Indian J. Agric. Sci.,* **43:** 376-379 (1973).
6. Lohakare, A.S., Dod, V.M. and Peshattiwar, P.D., Correlation and path analysis studies in green fruited brinjal. *Asian J. of Hort.,* **3(1):** 173-175 (2008).
7. Mishra, S.V., Warade, S.D. and Nayakwadi, M.B., Correlation and path coefficient analysis in brinjal. *J. Maharastra Agri. Universities*, **32(1):** 74-76 (2007).
8. Naliyadhara, M.V., Golani, I.J., Mehta, D.R. and Purohit, V.L., Genetic

variability, correlation co-efficient and path analysis in brinjal. *Orissa J. Hort.*, **35**(2):92-96 (2007).

9. Rekha, K.G., Evaluation of round fruited brinjal genotypes for yield, quality and tolerance to fruit and shoot borer. M.Sc. (Hort.) Thesis, Kerala Agricultural University, Thrissur. 133pp. (2011).
10. Sarnaik, D.A., Verma, S.K. and Verma, D.P., Correlation studies in brinjal (*Solanum melongena* L.). *Advances in Hort. and Forestry*, **7:** 91-94 (1999).
11. Shande, R.A., Desai, S.S. and Dalvi, V.V., Character association and path analysis in brinjal (*Solanum melongena* L.). *Int. J. Agri. Sci*., **10(2):** 631-633 (2014).
12. Shinde, K.G., Birajdar, U.M., Bhalekar, M.N. and Patil, B.T., Correlation and path analysis in eggplant (*Solanum melongena* L.). *Vegetable Sci.*, **39(1):** 108-110 (2012).
13. Singh, A.K., Tripathi, M.K., Rai, V.K. and Mishra, R., Character association and path coefficient analysis in brinjal (*Solanum melongena* L.) *Environ. and Eco.,* **29(3):** 1201-1203 (2011).
14. Singh, O. and Kumar, J., Correlation and path analysis in brinjal (*Solanum melongena* L.). *Veg. Sci.,* **31(2):** 161-163 (2004).
15. Thangamani, C. and Jansirani, P., Correlation and path coefficient analysis studies on yield and attributing characters in brinjal (*Solanum melongena* L.). *Elec. J. Plant Breed.*, **3(3):** 939-944 (2012).
16. Wright, S., Correlation and causation. *J. of Agri. Res*., **20**: 557-587 (1921).