www.hortflorajournal.com ICV: 4.79

HortFlora Research Spectrum, 2(4): 346-351 (Oct.-Dec. 2013) ISSN : 2250-2823

CORRELATION AND PATH COEFFICIENT ANALYSIS IN BRINJAL (*Solanum melongena* L.)

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ABSTRACT: Genetic variability in terms of correlation and path coefficient were studied for yield per plant and its attributing traits in 16 genotypes of eggplant. Significant positive genotypic correlation coefficient was observed by fruit weight, number of leaves per plant, number of fruits per plant and number of flowers per plant. An overall observation of path coefficient studies revealed that the direct contribution of fruit yield per plant, fruit yield per hectare, fruit weight, number of fruits per plant, and number of flowers per plant was of higher magnitude on fruit yield. High negative direct effect was recorded in total sugar followed by reducing sugar and fruit length. Direct selection may be executed considering these traits as the main selection criteria to reduce indirect effects of the other characters during the development of high-yielding eggplant varieties/hybrids.

Keywords: *Eggplant, genetic variability, correlation coefficient, path coefficient.*

Brinjal (*Solanum melongena L.*), popularly known as eggplant or aubergine, is widely grown vegetable in Asia, parts of Europe and Africa. The natural variation in most of the yield contributing traits of this crop is considerably high and there is need to restructure the variation in the materials for higher yield. Correlation studies provide an idea about the degree of various genetic associations between the pairs of character at phenotypic and genotypic level. Thus, it only reveals the direction and magnitude of association between any two characters but the path coefficient analysis helps in partitioning genotypic correction coefficient into direct and indirect effects of various characters on fruit yield or any other attributes. The investigation was therefore, undertaken to study the nature and degree of direct and indirect effects of yield and fruit quality contributing characters in collections of brinjal germplasm.

MATERIALS AND METHODS

The materials for the present study comprised 16 genotypes of brinjal, which were collected from Indian Institute of Vegetable Research, Varanasi. The experiment was laid out in randomized block design with three replications at Horticulture Research Farm, under Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University Lucknow, during the autumn- winter to spring season. Suitable agronomic and cultural practices were adopted as per recommendations of the university. The observations were recorded on randomly selected three plants from each genotype in each replication for plant height, number of flowers per plant, number of branches per plant, number of leaves per plant, fruit length, fruit diameter, fruit weight, number of fruits per plant, fruit yield per plant, fruit yield per plot and fruit yield per hectare and T.S.S, total sugar and reducing sugar were recorded as quality attributes of fruit. Analysis of variance and co-variance for 14 characters and for all combinations of characters respectively were done following the procedure of Panse and Sukhatme (5). Phenotypic and genotypic correlations were worked out by the formula suggested by Burton and DeVane (1). Path coefficient of various characters was calculated according to Dewey and Lu (2).

RESULTS AND DISCUSSION

The correlation coefficients were calculated to measure the degree of association between pair of characters at phenotypic and genotypic levels.

Received : 30.09.2013 *Accepted : 25.10.2013*

Table 1: Phenotypic correlation coefficient for 14 characters in brinjal.

Character	Plant height (cm)	Number of branches per plant	Number of leaves per plant	Number of flowers per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Number of fruits per plant	Fruit yield per plant (kg)	Fruit yield per plot (kg)	Fruit yield per hectare (kg)	Total soluble solids	Total sugar (g)	Total reducing sugar (g)
Plant height(cm)	1.00	0.57**	-0.02	-0.14	-0.33**	0.31*	0.36*	-0.14	0.17	0.18	0.16	0.05	-0.03	-0.34*
Number of branches per plant		1.00	-0.19	-0.17	-0.59**	0.58**	0.35*	-0.16	0.15	0.16	0.14	0.37**	-0.18	-0.11
Number of leaves per plant			1.00	0.16	0.12	-0.10	0.04	0.20	0.18	0.18	0.18	-0.22	0.16	0.38**
Number of flowers per plant				1.00	0.18	-0.23	-0.05	0.98**	0.50**	0.49**	0.51**	0.07	0.10	0.15
Fruit length (cm)					1.00	-0.60*	-0.17	0.18	-0.06	-0.06	-0.06	-0.33*	-0.06	0.002
Fruit diameter(cm)						1.00	0.71**	-0.16	0.50**	0.50**	0.49**	0.05	-0.10	0.06
Fruit weight(g)							1.00	0.009	0.81**	0.82**	0.81**	-0.22	-0.45*	0.21
Number of fruits per plant								1.00	0.56**	0.55**	0.56**	0.06	0.14	0.17
Fruit yield per plant(kg)									1.00	0.99**	0.99**	-0.15	-0.29*	0..31*
Fruit yield per plot(kg)										1.00	0.99**	-0.14	-0.31*	0.31*
Fruit yield per hectare(kg)											1.00	-0.15	-0.29*	0.32*
Total soluble solids												1.00	0.24	-0.24
Total sugar(g)													1.00	-0.29*
Total reducing sugar (g)														1.000

*,** Significant at 5 and 1 per cent level of significance, respectively.

Table 2: Genotypic correlation coefficient for 14 characters in brinjal.

Character	Plant height (cm)	No. of branches per plant	No. of leaves per plant	No. of flowers per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	No. of fruits per plant	Fruit yield per plant (kg)	Fruit yield per plot (kg)	Fruit yield per hectare (kg)	Total soluble solids	Total sugar (g)	Total reducing sugar (g)
Plant height(cm)		**0.6709**	-0.0310	-0.1551	-0.3931	0.3223	00.3770	-0.1488	0.1783	0.1858	0.1713	0.0624	-0.0258	-0.3607
Number of branches per plant			**-0.2020**	-0.2027	-0.6464	0.6431	0.3859	-0.1883	0.1602	0.1777	0.1581	0.4172	-0.2030	-0.1298
Number of leaves per plant				**0.2006**	0.1271	-0.1088	0.0455	0.2087	0.1915	0.1925	0.1873	-0.2303	-0.1665	0.3887
Number of flowers per plant					**0.1885**	-0.2528	-0.0575	1.0137	0.5127	0.5082	0.5221	0.0777	0.1178	0.1564
Fruit length (cm)						**-0.6204**	-0.1744	0.1969	-0.0686	-0.0596	-0.069	-0.3420	-0.0657	0.0019
Fruit diameter(cm)							**0.7281**	-0.1759	0.5117	0.5068	0.5055	0.0513	-0.1139	0.0651
Fruit weight(g)								**0.0087**	0.8196	0.8267	0.8153	-0.2261	-0.4717	0.2172
Number of fruits per plant									**0.5531**	0.5446	0.5614	0.0691	0.1367	0.1818
Fruit yield per plant (kg)										**1.0000**	1.0003	-0.1498	-0.3186	0.3206
Fruit yield per plot (kg)											**1.0002**	-0.1414	-0.3442	0.3151
Fruit yield per hectare (kg)												**-0.1516**	-0.3164	0.3232
Total soluble solids													**0.2553**	-0.2465
Total sugar(g)														**-0.3076**
Total reducing sugar(g)														

Table 3: Direct (Diagonal) and indirect effects of different traits contributing to yield in brinjal (Genotypic level)

Characters	Plant height (cm)	No. of branches per plant	No. of leaves per plant	No. of flowers per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	No. of fruits per plant	Fruit yield per plant (kg)	Fruit yield per plot (kg)	Total soluble solids	Total sugar (g)	Total reducing sugar (g)
Plant height(cm)	**-0.0570**	-0.0383	0.0018	0.0088	0.0224	-0.0184	-0.0215	0.0085	-0.0102	-0.0106	-0.0036	0.0015	0.0206
Number of branches per plant	0.0455	0.0679	-0.0137	-0.0138	-0.0439	0.0436	0.0262	-0.0128	0.0109	0.0121	0.0283	-0.0138	-0.0088
Number of leaves per plant	0.0000	-0.0001	**0.0007**	0.0001	0.0001	-0.0001	0.0000	0.0001	0.0001	0.0001	-0.0002	-0.0001	0.0003
Number of flowers per plant	-0.0069	-0.0091	0.0090	**0.0447**	0.0084	-0.0113	-0.0026	0.0453	0.0229	0.0227	0.0035	0.0053	0.0070
Fruit length (cm)	0.0053	0.0087	-0.0017	-0.0025	**-0.0135**	0.0083	0.0023	-0.0026	0.0009	0.0008	0.0046	0.0009	0.0000
Fruit diameter(cm)	-0.0205	-0.0409	0.0069	0.0161	0.0395	**-0.0636**	-0.0463	0.0112	-0.0326	-0.0323	-0.0033	0.0072	-0.0041
Fruit weight (g)	0.0039	0.0039	0.0005	-0.0006	-0.0018	0.0074	**0.0102**	0.0001	0.0084	0.0084	-0.0023	-0.0048	0.0022
Number of fruits per plant	0.0102	0.0129	-0.0143	-0.0695	-0.0135	0.0121	-0.0006	**-0.0686**	-0.0379	-0.0373	-0.0047	-0.0094	-0.0125
Fruit yield per plant (kg)	0.0985	0.0885	0.1057	0.2831	-0.0379	0.2825	0.4525	0.3054	**0.5521**	0.5522	-0.0827	-0.1759	0.1770
Fruit yield per plot (kg)	0.0928	0.0887	0.0961	0.2537	-0.0297	0.2531	0.4128	0.2719	0.4993	**0.4993**	-0.0706	-0.1719	0.1574
Total soluble solids	-0.0022	-0.0149	0.0083	-0.0028	0.0123	-0.0018	0.0081	-0.0025	0.0054	0.0051	**-0.0358**	-0.0091	0.0088
Total sugar (g)	-0.0013	-0.0103	-0.0085	0.0060	-0.003	-0.0058	-0.0240	0.0070	-0.0162	-0.0175	0.0130	**0.0510**	-0.01570
Total reducing sugar (g)	0.0032	0.0012	-0.0035	-0.0014	0.000	-0.0006	-0.0019	-0.0016	-0.0028	-0.0028	0.0020	0.0027	**-0.0089**
Fruit yield per hectare (kg)	0.1713	0.1581	0.1873	0.5221	-0.06090.	0.5055	0.8153	0.5614	1.0003	1.0002	-0.1516	-0.3164	0.3232

Among the quality components, the number of flowers, fruit weight and fruit diameter were the desired quality of fruit, while increase in number of branches per plant and number of fruits per plant were required quality of fruit in brinjal. The remaining characters were related to the components of yield.

In general, the genotypic correlations were higher in magnitude over respective phenotypic correlations (Table 1), suggesting a strong inherent relationship in different genotypes. This is not unusual in brinjal and has been reported by Singh and Singh (8). Data pertaining to the phenotypic correlations revealed that fruit yield per plant was positively and significantly associated with number of flowers per plant, number of fruits per plant and average fruit weight. Similar observations were also reported by Sharma and Swaroop (7). This indicated that the improvement in fruit yield could be expected with increase in number of fruits, number of branches and weight of fruits in brinjal. The total sugars had positive and significant correlation with number of fruits per plant and number of flowers per plant. The total reducing sugars had positive and significant correlation with number of leaves per plant, fruit yield per plot and fruit yield per hectare. The total soluble solid had positive significant correlation with number of branches per plant.

The average fruit weight had positive significant correlation with fruit yield per plot, fruit yield per plant, fruit yield per hectare, plant height and number of branches per plant. The fruit diameter had positive significant correlation fruit weight and number of branches per plant. Number of fruits per plant showed significant positive association with fruit yield per plant, fruit yield per plot and fruit yield per hectare.

At the genotypic level, it was recorded that fruit yield per plant was positively and significantly correlated with average fruit weight, number of leaves per plant, number of fruits per plant and number of flowers per plant. These results are in conformity with the findings of Manna and Paul (3) and Prabhu and Nataranjan (6). The total sugar had positive and significant correlation with number of fruits per plant and number of flowers per plant. The total reducing sugars were positive and significant correlation with average fruit weight and number of leaves per plant. The T.S.S. had positive and significant correlation with number of branches per plant and plant height. These observations suggest that simultaneous improvement of desired quality of fruit along with fruit yield could be possible with the balance selection of its components characters.

Among the other yield components, the average fruit weight was positively and significantly correlated with plant height, fruit diameter, number of leaves per plant and number of branches per plant. The fruit diameter had positive and significant correlation with plant height. The number of leaves per plant was positively and significantly correlated with number of flowers per plant, number of fruits plant and fruit length. Similarly, the number fruits per plant was positively correlated with number of leaves per plant and number of flowers per plant.

The path analysis was carried out at phenotypic and genotypic level to assess the direct and indirect effect of different characters on fruit yield. The direct and indirect effect of yield contributing traits on yield revealed that the maximum positive direct effect was exhibited by fruit yield per hectare followed by fruit yield per plant, fruit weight, number of fruits per plant and number of flowers per plant. High negative direct effect was recorded in total sugars followed by reducing sugar and fruit length. Similar, findings were also observed by Mishra and Mishra (4). These characters emerged as essential components of yield per plant and should be kept in mind during selection of any genotypes. These characters with indirect effect are not directly involved in increase of yield per plant.

CONCLUSION

The correlation studies revealed that the

magnitude of genotypic correlation coefficient was higher than the corresponding phenotypic correlation coefficient. It is apparent that fruit yield per hectare may be improved with increasing number of fruits per plant. Path coefficient analysis at phenotypic level revealed that fruit yield per plot has maximum direct effect on fruit yield per hectare followed by fruit yield per plant, fruit weight, number of fruits per plant and number of flowers per plant. However, the highest negative direct effect towards fruit yield was recorded for total sugar followed by total soluble solids and fruit length.

REFERENCES

1. Burton, G.W. and DeVane, E.H. (1953). Estimating heritability in tall fescue (*Festuca arundinaceae*) from replicated clonal material. *Agron. J.*, **45**: 478-81.
2. Dewey, D. and Lu, K.H. (1959). A correlation and path coefficient analysis in crested wheat grass seed production. *Agron J.*, **54**: 515-8.
3. Manna, M. and Paul, A. (2012). Studies on genetic variability and character association of fruit quality parameters in tomato. *HortFlora Res. Spectrum,* **1**(2) : 110-116
4. Mishra, S.N. and Mishra, R.S. (1990). Correlation and path coefficient analysis in brinjal. *Indian J. Hort.*, **42**(1A): 162-166.
5. Panse, V.G. and P.V. Sukhatme, (1967). *Statistical Methods for Agricultural Workers*, I.C.A.R., New Delhi.
6. Prabhu, M. and Natarajan, S. (2007). Genetic variability studies in brinjal (*Solanum melongena L.). J. Ecobiol*., **19**(2): 159-162.
7. Sharma, T.V. and Swaroop, Kishan (2000). Genetic variability and character association in brinjal (*Solanum melongena* L.). *Indian J. Hort*., **57**(1): 59-65.
8. Singh, S.N. and Singh, N.D. (1981). Correlation and path analysis in brinjal. *Prog. Hort.*, **13**: 13-16.