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

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A B S T R A C T

A Field experiment was conducted at University of Agricultural Sciences, Bangalore with an objective to study the correlation and path analysis studies in Brinjal (*Solanum melongena* L.). The direct and indirect effects of yield components on fruit yield per plant in brinjal. In C-I fruit length (0.8351) and plant height (0.1554) recorded highest direct positive effects on fruit yield per plant. The major contribution of fruit length on fruit yield per plant was intensified further by positive indirect effect through plant height (0.06560 and fruit width (0.0265). The direct effect of plant height on fruit yield per plant was mainly increased by the indirect effects through fruit length (0.3572) and fruit width (0.0246). In C-II fruit length (0.9324), number of fruit per cluster (0.3028) and number of fruit per plant (0.2544) recorded highest direct positive effects on fruit yield per plant. The major contribution of fruit length on fruit yield per plant was intensified further by positive indirect effects through plant height (0.0233) and per cent fruit set (0.0321). The direct effect of number of fruit per cluster on fruit yield per plant was mainly increased by the indirect effects through per cent fruit set (0.0321). The direct effect of number of fruit per plant on fruit yield was intensified further by positive indirect effects through number of fruit per cluster and fruit width.

Introduction

Brinjal (*Solanum melongena* L.) is one of the important solanaceous vegetable crops grown almost throughout the country. Yield which is a dependent character is the resultant effect of a number of component characters, but direct selection for yield is often misleading and hence knowledge of interrelationship between pairs of these characters and yield is essential to bring a rational improvement in the desirable traits. Further, path coefficient analysis is helpful in partitioning the observed correlation coefficients into direct and indirect effects and their effective use in selection programme. Keeping this in view the present study was undertaken to work out the association of important traits and to study the path coefficient analysis in brinjal.

Materials and Methods

A Field experiment was conducted at University of Agricultural Sciences, Bangalore with an objective to study the Genetics of quantitative traits in Brinjal (*Solanum melongena* L.).The soil of the experimental site was red sandy loam in texture classified under the order *Alfisols*, Vijapura series, isohyperthermic family of *oxihaplustaf*. pH was slightly acidic (6.44) having low cation exchange capacity (7.50 C mol kg^{-1}) with an electrical conductivity of 0.23 dSm^{-1}. The average annual rainfall was 927 mm distributed in 62 rainy days (> 2.5 mm). The present investigation was carried out with Six diverse parents were crossed in a half diallel fashion without reciprocals to obtain 15 hybrids. Among the hybrid combinations developed from diallel cross, two hybrids i.e. Arka Keshav X Arka Sheel and Arka Sheel XAnnamalai were chosen for generation mean analysis. F_1's were raised and selfed to get F_2 population. Further, F_1's were crossed to respective parents to get BC_1P_1 and BC_1P_2 seeds. The seeds of six generations were sown in trays at vegetable seed production block, Division of Horticulture, University of Agricultural Sciences. G. K. V. K. Bangalore. Four week old healthy seedlings were transplanted at a spacing of 60 x 60 cm in randomized complete block design with three replications. All the recommended package of practices was followed during the crop period. The correlation coefficient analysis among all possible character combination was worked out following the procedure described by Al-Jibouri *et al.*, (1958). While, direct and indirect effect of component characters on fruit yield were estimated following Dewey and Lu (1959).

Results and Discussion

The estimates of phenotypic correlation coefficients among nine characters are presented in Table 1 and 2. In C-II fruit yield per plant was positive and significant correlation with fruit length (0.4223), fruit width (0.5311) and number of fruits per plant (0.9191). Number of fruits per plant with fruit width (0.4223): per cent fruit set with number of fruit per cluster (0.7352): Number of fruit per cluster with plant height (0.6763), number of branches (0.7158) and number of flower per cluster (0.8883): Number of flower per cluster with plant height (0.7592) and number of branches (0.8181). In C-I fruit yield per plant was positive and significant correlation with number of fruits per plant(0.9648): per cent fruit set with plant height (0.4513), number of branches (0.4598), number of flower per cluster (0.5551) and number of fruit per cluster (0.8368): Number of fruit per cluster with plant height (0.7100), number of branches (0.7534) and number of flower per cluster (0.9146): Number of flower per cluster with plant height (0.7539) and number of branches(0.8067): number of branches per plant with plant height (0.8811). Similar findings were reported by Chadha and Sidhu (1983).

Table.1 Estimates of phenotypic correlation coefficients for nine quantitative traits in F_2 population of cross I

	Fruit length (Cm)	Fruit width (Cm)	Plant height (Cm)	Number of branches	Number of flower per cluster	Number of fruit per cluster	Per cent fruit set	Number of fruit per plant	Fruit yield per plant (g)
Fruit length (Cm)	**1.0000**	**0.3286**	**-0.0048**	**-0.0439**	**-0.0438**	**-0.0157**	**0.0297**	**0.3536**	**0.4223****
Fruit width (Cm)		**1.0000**	**-0.0392**	**0.0386**	**-0.0006**	**0.0034**	**-0.0060**	**0.4223****	**0.5311****
Plant height (Cm)			**1.0000**	**0.8175****	**0.7592****	**0.6763****	**0.2640**	**-0.0284**	**-0.0888**
Number of branches				**1.0000**	**0.8181****	**0.7158****	**0.2630**	**0.0642**	**-0.0084**
Number of flower per cluster					**1.0000**	**0.8883****	**0.3468**	**0.1061**	**0.0138**
Number of fruit per cluster						**1.0000**	**0.7352****	**0.0991**	**-0.0020**
Per cent fruit set							**1.0000**	**0.0230**	**-0.0459**
Number of fruit per plant								**1.0000**	**0.9191****
Fruit yield per plant (g)									**1.0000**

** - Significant at 1% level

Table.2 Estimates of phenotypic correlation coefficients for nine quantitative traits in F_2 population of cross II

	Fruit length (Cm)	Fruit width (Cm)	Plant height (Cm)	Number of branches	Number of flower per cluster	Number of fruit per cluster	Per cent fruit set	Number of fruit per plant	Fruit yield per plant (g)
Fruit length (Cm)	**1.0000**	**-0.0549**	**-0.0114**	**-0.0025**	**0.0497**	**0.0250**	**-0.0034**	**-0.1129**	**-0.1272**
Fruit width (Cm)		**1.0000**	**-0.1899**	**-0.1414**	**-0.1103**	**-0.1091**	**-0.0720**	**0.2901**	**0.3645**
Plant height (Cm)			**1.0000**	**0.8811****	**0.7539****	**0.7100****	**0.4513****	**-0.0766**	**-0.1395**
Number of branches				**1.0000**	**0.8067****	**0.7534****	**0.4598****	**-0.1009**	**-0.1496**
Number of flower per cluster					**1.0000**	**0.9146****	**0.5551****	**-0.1082**	**-0.1279**
Number of fruit per cluster						**1.0000**	**0.8368****	**-0.0757**	**-0.0831**
Per cent fruit set							**1.0000**	**-0.0018**	**0.0166**
Number of fruit per plant								**1.0000**	**0.9648****
Fruit yield per plant (g)									**1.0000**

** - Significant at 1% level

Table.3 Estimates of direct and indirect effects of yield components on fruit yield in F_2 population of cross I

	Fruit length (Cm)	Fruit width (Cm)	Plant height (Cm)	Number of branches	Number of flower per cluster	Number of fruit per luster	Per cent fruit set	Number of fruit per plant	'r'
Fruit length (Cm)	**0.8351**	**0.0265**	**0.0656**	**0.0000**	**-0.0015**	**0.0072**	**-0.0144**	**0.0005**	**0.9191****
Fruit width (Cm)	**0.2953**	**0.0750**	**0.0510**	**0.0000**	**0.0010**	**-0.0030**	**0.0023**	**0.0007**	**0.4223**
Plant height (Cm)	**0.3527**	**0.0246**	**0.1554**	**0.0000**	**-0.0009**	**0.0000**	**-0.0005**	**-0.0001**	**0.5311**
Number of branches	**-0.0237**	**-0.0004**	**-0.0061**	**0.0008**	**-0.0189**	**0.0516**	**-0.0980**	**0.0059**	**-0.0888**
Number of flower per cluster	**0.0536**	**-0.0033**	**0.0060**	**0.0006**	**-0.0231**	**0.0556**	**-0.1038**	**0.0059**	**-0.0084**
Number of fruit per cluster	**0.0886**	**-0.0033**	**-0.0001**	**0.0006**	**-0.0189**	**0.0680**	**-0.1288**	**0.0078**	**0.0138**
Per cent fruit set	**0.0828**	**-0.0012**	**0.0005**	**0.0005**	**-0.0166**	**0.0604**	**-0.1450**	**0.0165**	**-0.0020**
Number of fruit per plant	**0.0192**	**0.0022**	**-0.0009**	**0.0002**	**-0.0061**	**0.0236**	**-0.1066**	**0.0225**	**-0.0459**

Main diagonal (in bold) are direct effects
Residual = 0.1180

Table.4 Estimates of direct and indirect effects of yield components on fruit yield in F_2 population of cross II

	Fruit length (Cm)	Fruit width (Cm)	Plant height (Cm)	Number of branches	Number of flower per cluster	Number of fruit per cluster	Per cent fruit set	Number of fruit per plant	'r'
Fruit length (Cm)	**0.9324**	**0.0025**	**0.0233**	**0.0066**	**0.0010**	**-0.0328**	**0.0321**	**-0.0004**	**0.9648****
Fruit width (Cm)	**-0.1053**	**-0.0222**	**-0.0044**	**0.0010**	**0.0000**	**0.0150**	**-0.0106**	**-0.0009**	**-0.1272**
Plant height (Cm)	**0.2705**	**0.0012**	**0.0804**	**0.0164**	**0.0014**	**-0.0334**	**0.0463**	**-0.0183**	**0.3645**
Number of branches	**-0.0715**	**0.0003**	**-0.0153**	**-0.0863**	**-0.0085**	**0.2283**	**-0.3014**	**0.1148**	**-0.1395**
Number of flower per cluster	**-0.0940**	**0.0001**	**-0.0114**	**-0.0761**	**-0.0096**	**0.2443**	**-0.3198**	**0.1170**	**-0.1496**
Number of fruit per cluster	**-0.1009**	**-0.0011**	**-0.0089**	**-0.0651**	**-0.0078**	**0.3028**	**-0.3883**	**0.1412**	**-0.1279**
Per cent fruit set	**-0.0706**	**-0.0006**	**-0.0088**	**-0.0613**	**-0.0073**	**0.2770**	**-0.4245**	**0.2129**	**-0.0831**
Number of fruit per plant	**-0.0016**	**0.0001**	**-0.0058**	**-0.0390**	**-0.0044**	**0.1681**	**-0.3552**	**0.2544**	**0.0166**

Main diagonal (in bold) are direct effects
Residual = 0.0541

The direct and indirect effects of yield components on fruit yield per plant are presented in Table 3 and 4. In C-I fruit length (0.8351) and plant height (0.1554) recorded highest direct positive effects on fruit yield per plant. The major contribution of fruit length on fruit yield per plant was intensified further by positive indirect effect through plant height (0.06560 and fruit width (0.0265). The direct effect of plant height on fruit yield per plant was mainly increased by the indirect effects through fruit length (0.3572) and fruit width (0.0246). In C-II fruit length (0.9324), number of fruit per cluster (0.3028) and number of fruit per plant (0.2544) recorded highest direct positive effects on fruit yield per plant. The major contribution of fruit length on fruit yield per plant was intensified further by positive indirect effects through plant height (0.0233) and per cent fruit set (0.0321). The direct effect of number of fruit per cluster on fruit yield per plant was mainly increased by the indirect effects through per cent fruit set (0.0321). The direct effect of number of fruit per plant on fruit yield was intensified further by positive indirect effects through number of fruit per cluster and fruit width. These findings are in agreement with the findings of Rathod (1997), Patil (1998) and Bhutani and Kalloo (1991).

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