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Correlation and path analysis studies in round fruited brinjal

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Brinjal is an important solanaceous vegetable, which holds coveted position among the different vegetables. Yield is a complex character determined by several component characters (Singh, 2005). Improvement in yield is possible only through selection for the desired component characters. Hence knowledge of association between yield and its component characters and between component characters is essential for yield improvement through selection programme. Certain characters might indirectly influence yield, but their correlation with yield may not be statistically significant. In such cases, path coefficient analysis is an efficient technique, which permits the separation of coefficients into components of direct and indirect effects. Hence the study was carried out to know interrelations of 14 characters and to understand the nature of direct and indirect effects of these characters on yield.

The experiment was carried out at Department of Olericulture, College of Agriculture, Vellayani during 2010-2011 with 27 brinjal accessions. The trial was laid out in a randomized block design with two replications. Seedlings were transplanted at a spacing of 75 x 60 cm. The crop received timely management practices as per package of practices recommendations of Kerala Agricultural University. The crop was maintained properly till last harvest and observations on growth, yield as well as yield contributing characters was noted on five randomly selected plants in each plot at different stages of the crop. Genotypic correlation was computed as per the method suggested by Johnson *et al*., (1955). The path analysis was done as per the procedure outlined by Dewey and Lu (1959).

Correlation coefficient analysis measures the mutual relationship between various plant characters and determines the component characters on which selection can be based for improvement in yield. Correlation provides information on the nature and extent of relationship between all pairs of characters. So, when the breeder applies selection for a particular character, not only it improves that trait, but also those characters provides a reliable measure of genetic association between them, which is useful in the breeding programmes.

Genotypic correlation coefficients between marketable yield and its component characters are presented in Table 1. The correlation studies in the present investigation revealed that the yield per plant recorded positive correlation with percent of long and medium styled flowers (0.9387), number of primary branches (0.6368), fruit length (0.4936), number of secondary branches (0.4056), plant height (0.4027), canopy spread (0.3959) and fruits per plant (0.3839).

It exhibited negative correlation with fruit infestation by fruit and shoot borer (-0.3683). Shoot infestation by fruit and shoot borer exhibited negative correlation with canopy spread (-0. 6455), days to anthesis (-0.4329), days to 50 per cent flowering (-0.4255) and number of primary branches (-0.4180).

Positive genotypic correlation of yield with fruits per plant was in line with the results reported by Lohakare *et al*. (2008a) and Kalpana *et al*., (2010). Jadhao *et al*., (2009) reported that plant height was positively correlated with yield per plant. Positive correlation of yield with number of branches was in line with the results reported by Bansal and Mehta (2008) and Jadhao *et al*., (2009). Positive correlation of plant height and canopy spread with yield was in line with results reported by Singh *et al*., (2010) and Singh *et al*., (2011).

In the present study, high and positive phenotypic and genotypic correlation of fruit yield with, primary branches, fruit length, plant height, secondary branches, canopy spread and fruits per plant, while high and negative correlation with fruit and shoot borer infestation.

The path analysis unravels whether the association of the component characters with yield is due to their direct effect on yield, or is a consequence of their indirect

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Table 1. Genotypic correlation coefficients among yield and yield components

Character	X1	X2	X3	X4	X5	X6	X7	X8
X2	0.2771							
X3	0.3725	0.5913						
X4	0.4013	0.4513	0.446					
X5	0.1063	0.0093	0.1958	0.0573				
X6	0.4433	0.4947	0.6071	0.3861	-0.0386			
X7	0.1356	0.2591	0.2639	-0.0151	0.0511	0.4538		
X8	-0.0777	0.0064	0.1167	0.1719	-0.0946	0.2646	-0.2484	
X9	0.4027	0.3959	0.6368	0.4056	-0.0212	0.9387	0.4936	0.3839

1. Plant height (cm)
X2. Canopy spread (cm)
X3. Primary branches
X4. Secondary branches
X5 Days to 50% flowering
X6. Long and medium styled flowers (%)
X7. Fruit length (cm)
X8. Fruits per plant
X9. Yield per plant (g)
X10 Fruit weight
X11. Days to first flowering
X12. Fruit girth (cm)
X13. FSB Shoot damage
X14. FSB Fruit damage
*FSB – Fruit and shoot borer

Table 2. Direct and indirect effects of yield components of brinjal

Characters	Plant height	Canopy spread	Number of primary branches	Number of secondary branches	Days to 50 per cent flowering	Long and medium styled flowers (%)	Fruit length	Fruits per plant	Total correlation
Plant height	0.0219	-0.0452	0.0660	0.0338	-0.0026	0.3159	0.0297	-0.0167	0.4027
Canopy spread	0.0061	-0.1632	0.1047	0.0380	-0.0002	0.3526	0.0566	0.0014	0.3959
Primary branches	0.0082	-0.0965	0.1771	0.0375	-0.0049	0.4326	0.0577	0.0251	0.6368
Secondary branches	0.0088	-0.0737	0.0790	0.0842	-0.0014	0.2751	-0.0033	0.0369	0.4056
Days to 50 per cent flowering	0.0023	-0.0015	0.0347	0.0048	-0.0248	-0.0275	0.0112	-0.0203	-0.0212
Long and medium styled flowers(%)	0.0097	-0.0807	0.1075	0.0325	0.0010	0.7127	0.0992	0.0569	0.9387
Fruit length	0.0030	-0.0423	0.0467	-0.0013	-0.0013	0.3234	0.2187	-0.0534	0.4936
Fruits per plant	-0.0017	-0.0010	0.0207	0.0145	0.0024	0.1886	-0.0543	0.2149	0.3839

Residue (R) = 0.2212 (Underlined figures are Direct effects)

effect via some other trait(s). Thus, path analysis helps in partitioning the genotypic correlation coefficient into direct and indirect effects of the component characters on the yield on the basis of which improvement programmes can be devised effectively. If the correlation between yield and any of its components is due to the direct effect, it reflects a true relation between them and selection can be practiced for such a character in order to improve yield. But if the correlation is mainly due to indirect effect of the character another component trait, the breeder has to select the latter trait through which the indirect effect is exerted.

The direct and indirect effects of yield components on marketable yield are presented in Table 2. In the present study percent of long and medium styled flowers (0.7217) showed high and positive direct effect on yield. Fruit length (0.2187), fruits per plant (0.2149) and Number of primary branches (0.1771) showed positive direct effect on yield. This is in line with the findings of Jadhao *et al*., (2009) and Singh *et al*., (2011).

Canopy spread and days to fifty per cent flowering had negative direct effect on yield. Contrary to the present findings, Lohakare *et al*., (2008) reported that plant spread had positive direct effect on yield and Bansal and Mehta (2008) observed that days to fifty per cent flowering showed positive direct effect on yield.

The path analysis exhibited that the traits like number of branches per plant, percent of long and medium styled flowers, fruit length, number of fruits per plant were the most important yield contributing characters owing to their high direct effects and indirect effects via other traits.

It can be concluded that number of branches, percent of long and medium styled flowers, fruit length and number of fruits per plant 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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