

Trait linkages among brinjal (*Solanum melongena*) genotypes

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ABSTRACT

Correlation and path analysis of thirty four genotypes indicated that yield per plant showed high positive correlation with fruits per plant and average fruit weight while negative correlation with days to first harvest and fruit borer infestation. Fruits per plant recorded the highest genotypic and phenotypic correlation with yield. Fruit borer infestation also recorded the negative genotypic and phenotypic correlation with fruits per plant. Path coefficient analysis revealed that fruits per plant and average fruit weight had high direct effect on yield per plant. Hence selection based on these characters can be effective for developing high yielding brinjal varieties.

Keywords: Brinjal; fruit borer; correlation; path analysis

INTRODUCTION

Brinjal is an important solanaceous vegetable which holds coveted position among 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 among 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 eight characters

and to understand the nature of direct and indirect effects of these characters on yield in brinjal.

MATERIAL and METHODS

A field experiment with 34 genotypes including ten parents, twenty one F_1 hybrids and three checks was laid out in a randomized block design with three replications during summer season of 2014 at three locations viz Horticultural College and Research Institute, Tadepalligudem, West Godavari; Horticultural Research Station, Pandirimamidi, East Godavari and Horticultural Research Station, Aswaraopet in Andhra Pradesh. Hybrids were developed by using seven lines and three testers in line x tester fashion. Thirty day old seedlings were transplanted on the ridges in a spacing of 90 x 75 cm. Standard horticultural practices and plant protection measures were undertaken to raise the crop. The crop was maintained healthy till last harvest and observations were recorded on five randomly selected plants in each plot on eight quantitative characters. Genotypic and phenotypic correlation between fruit yield per plant and other characters viz days to first harvest, average fruit weight, fruits/plant, shelf-life, fruit borer infestation, ascorbic acid, phenols and yield per plant.

Genotypic and phenotypic correlation coefficients were estimated according to the formulae given by Johnson et al (1955) and their significance was tested as given by Snedecor and Cochran

(1967). Path coefficient analysis as suggested by Dewey and Lu (1959) was used to partition the genotypic correlation coefficients of fruit yield into direct and indirect effects. Yield per plant was selected as dependent variable and other characters as independent variables.

RESULTS and DISCUSSION

Genotypic and phenotypic correlation coefficient effects estimated for various traits in brinjal (Table 1) indicated higher magnitude of genotypic correlations than phenotypic correlations indicating a strong inherent association among various characters.

Yield per plant showed significant positive correlation with fruits per plant and average fruit weight suggesting that these characters are the most important yield components and effective improvement in yield can be achieved through selection based on these characters. These results are in close agreement with the findings of Singh and Kumar (2004) and Shinde et al (2012). A significant negative correlation of yield was observed with days to first harvest and fruit borer infestation. The same negative association on yield was also observed by Rekha (2011).

Days to first harvest showed significant negative genotypic correlation with fruits per plant, yield per plant and fruit borer infestation. These results indicate that early genotypes give less number of fruits

Table 1. Estimates of phenotypic and genotypic correlation coefficients in brinjal

Character	Days to first harvest	Average fruit weight (g)	Fruits /plant	Shelf-life (days)	Fruit borer infestation (%)	Ascorbic acid (mg/100 g)	Phenols (mg/100 g)	Yield/ plant (kg)
Phenotypic correlation								
Days to first harvest	1.000							
Average fruit weight (g)	-0.011	1.000						
Fruits/plant	-0.127*	-0.391**	1.000					
Shelf-life (days)	0.036	0.224**	-0.087	1.000				
Fruit borer infestation (%)	-0.119	0.230**	-0.361**	0.293**	1.000			
Ascorbic acid (mg/100 g)	0.041	-0.101	0.064	-0.056	0.150**	1.000		
Phenols (mg/100 g)	-0.001	0.124*	-0.012	0.092	-0.142*	-0.136*	1.000	
Yield/plant (kg)	-0.143*	0.155**	0.778**	-0.034	-0.280**	-0.100	0.130*	1.000
Genotypic correlation								
Days to first harvest	1.000							
Average fruit weight (g)	-0.006	1.000						
Fruits/plant	-0.183**	-0.442**	1.000					
Shelf-life (days)	0.105	0.270**	-0.084	1.000				
Fruit borer infestation (%)	-0.255**	0.265**	-0.439**	0.352**	1.000			
Ascorbic acid (mg/100 g)	0.056	-0.103	0.068	-0.068	0.168**	1.000		
Phenols (mg/100 g)	-0.034	0.132*	-0.014	0.109	-0.170**	-0.142*	1.000	
Yield/plant (kg)	-0.212**	0.173**	0.737**	-0.015	-0.355**	-0.115*	0.146*	1.000

Table 2. Genotypic path coefficient of various yield components on yield per plant in brinjal

Character	Days to first harvest	Average fruit weight (g)	Fruits /plant	Shelf-life (days)	Fruit borer infestation (%)	Ascorbic acid (mg/100 g)	Phenols (mg/100 g)
Days to first harvest	-0.0042	0.0000	0.0008	-0.0004	0.0011	-0.0002	0.0001
Average fruit weight (g)	-0.0038	0.5990	-0.2646	0.1617	0.1585	-0.0616	0.0788
Fruits/plant	-0.1812	-0.4382	0.9920	-0.0836	-0.4352	0.0671	-0.0134
Shelf-life (days)	-0.0079	-0.0204	0.0064	-0.0754	-0.0265	0.0051	-0.0082
Fruit borer infestation (%)	-0.0081	0.0084	-0.0139	0.0111	0.0317	0.0053	-0.0054
Ascorbic acid (mg/100 g)	-0.0086	0.0156	-0.0103	0.0103	-0.0255	-0.1518	0.0215
Phenols (mg/100 g)	-0.0020	0.0077	-0.0008	0.0063	-0.0099	-0.0083	0.0584

Bold and underlined figures are direct effects, Residual effect= 0.324

that leads to low yield per plant. The same negative association of fruits per plant and yield was also observed by Singh and Kumar (2004).

Fruit weight showed significant and positive association with yield, fruit borer infestation and total phenol content and negative correlation with number of fruits per plant. Similar findings were observed by Rekha (2011).

The fruit borer infestation showed significant and negative correlation with days to first harvest, fruits per plant, total phenols and yield per plant. Presence of high total phenol content in brinjal would have resulted in lower borer incidence as a biochemical basis of non-preference host mechanism of brinjal fruit borer (Kalloo 1988). Similar negative association of fruit borer infestation with polyphenol content was reported by Thangamani and Jansirani (2012). Total phenol content at vegetable maturity was found to be negatively associated with fruit borer infestation. From the results it is evident that the phenols of the fruits play an important role in reducing the fruit borer infestation level. Thus resistant or susceptible nature could depend upon the relative content of the total phenols in the fruits. These results are supported by the work of Praneetha (2002) and Thangamani and Jansirani (2012).

The path coefficient analysis provides an effective means of finding out

direct and indirect effect of association and permits a critical examination of specific forces acting to produce given correlation and measure the relative importance of each factor. The direct and indirect effects of different characters on yield at genotypic level are presented in Table 2.

The path analysis study revealed that the characters viz average fruit weight and number of fruits per plant exerted positive direct effect on yield. Similar results were reported by Jadhao et al (2009). The indirect contribution of most of the characters was through average fruit weight. This suggests that importance has to be given to this trait in the selection of hybrids for higher yield.

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Received: 27.2.2015

Accepted: 18.6.2015