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Research Note

Association of charecters on yield and shoot and fruit borer resistance in brinjal (*Solanum melongena L.*)

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Abstract:
Eighty one brinjal genotypes (nine parents and 72 hybrids) were evaluated for 14 characters. Results showed that marketable yield per plant had significant positive association for both at genotypic and phenotypic level with all the characters studied *viz.,* plant height, number of branches per plant, fruit girth, calyx length, number of fruits per plant, single fruit weight, protein content and total phenol content. The earliness showed positive association with fruit borer infestation both at genotypic and phenotypic level. The marketable yield per plant had significant negative association both at genotypic and phenotypic level with shoot and fruit borer infestation. Neither positive nor negative significant correlation was registered by shoot borer infestation with other characters. The shoot borer infestation showed negative relation with ascorbic acid content, protein content of fruit and total phenol content at vegetable maturity.

Key words: Genotypic and phenotypic correlation , marketable yield , shoot and fruit borer infestation, ascorbic acid , phenol and protein content

Eggplant is a hardy crop, requiring thorough attention for its improvement. The shoot and fruit borer (*Leucinodes orbonalis* Gn.) causes a serious damage to the tender shoot and fruits making them unfit for consumption. Knowledge of correlation studies help plant breeder to ascertain the real components of yield and provide an effective basis for selection. The characters contributing significantly to yield can be identified, and could be used as an alternate selection criteria in yield improvement programme. Hence, the present study was planned to find out the correlation using 81 genotypes of brinjal.

The experimental material comprised 81 diverse genotypes of brinjal obtained by crossing nine selected parents. The genotypes were planted in randomized block design(RBD) with two replications and studied for 14 different characters. The plants were planted at a spacing of 60 x 60 cm^2 and 50 plants were retained per genotype per replication. The Experiment was conducted in the University Orchard, Horticultural college and Research Institute, TamilNadu Agricultural University, Coimbatore during the year 2001 and 2002. The standard horticultural practices were followed. Ten randomly selected plants were utilized for recording observations. Correlation coefficients of phenotypic and genotypic levels were calculated according to Dewey and Lu (1959) and Johnson *et al*., (1955).

The results of the correlation studies are given in Table 1. The marketable yield per plant had significant positive association both at genotypic and phenotypic level with plant height (0.316; 0.286), number of branches per plant (0.517; 0.328), fruit girth (0.251; 0.223), calyx length (0.213; 0.203), number of fruits per plant (0.797; 0.770), single fruit weight (0.266; 0.262), ascorbic acid content (0.488; 0.478), protein content (0.655; 0.623) and total phenol content (0.745; 0.740). The marketable yield per plant had significant negative association both at genotypic and phenotypic level with shoot borer infestation (-0.030; -0.022) and fruit borer infestation (-0.736; -0.694). It showed negative significant association at genotypic level with earliness (-0.162).

Regarding the inter association of various yield components, the plant height exhibited the maximum significant positive relationship with number of branches per plant (0.556; 0.280). Number of branches per plant recorded positive association at genotypic and phenotypic level with number of fruits per plant (0.470; 0.280). The earliness showed significant and positive association with fruit borer infestation both at genotypic and phenotypic level (0.234; 0.150). The fruit length registered positive significant genotypic and phenotypic correlation with fruit girth (0.304; 0.172).

Fruit girth recorded significant positive genotypic

and phenotypic association with calyx length (0.377; 0.281)which failed to show negative significant association with other characters. It had positive significant association with single fruit weight (0.443; 0.431) and ascorbic acid content (0.261; 0.255). Number of fruits per plant had positive significant association with ascorbic acid content (0.351; 0.342), single fruit weight showed significant positive correlation both at genotypic and phenotypic levels with ascorbic acid content (0.247; 0.241). The fruit borer infestation had significant negative correlation both at genotypic and phenotypic levels with ascorbic acid content (-0.485; -0.462). Ascorbic acid content showed positive significant association with protein content (0.486; 0.463); protein content registered significant positive association with total phenol content (0.801; 0.757) both at genotypic and phenotypic levels.

From the present study it was observed that the genotypic correlation coefficients were higher than that of phenotypic correlation coefficients. The higher level of genotypic correlation is due to the influence of environment in the total expression of the traits. The marketable yield per plant showed positive correlation with plant height, number of branches per plant, fruit girth, calyx length, number of fruits per plant, single fruit weight, ascorbic acid, protein and total phenol content of fruits at vegetable maturity.

Similar significant relationships with fruit yield were reported by Doshi *et al*. (1998) for total phenol content; Mohanty (1999) for plant height and number of fruits per plant; Jansirani (2000) for plant height, number of branches per plant, number of fruits per plant, fruit weight, calyx length and fruit girth; Ananthalakshmi (2001) for plant height, number of branches per plant, fruit weight, and fruits per plant and Singh and Singh (2001) for fruit number per plant.

A negative association of yield was observed with shoot borer infestation, fruit borer infestation and earliness at genotypic level. Early and higher level of infestation of shoot borer would have made a set back on new growth and prevented the production of new sources and there by discouraged the availability of photo assimilates for economic part. Further infestation by fruit borer would have made a drastic reduction in marketable fruit yield. Negative association of fruit yield with shoot and fruit borer infestation was reported by Dhankar and Singh (1978), Singh and Singh (1981) and Sharma and Swaroop (2000). Ananthalakshmi (2001) reported negative association of yield with earliness. The shoot borer infestation showed positive relation with ascorbic acid content, protein content of fruit and total phenol content. The fruit borer infestation showed negative relation with ascorbic acid content, protein content of fruit and total phenol content at vegetable maturity. Similar negative association of shoot and fruit borer infestation with polyphenol content was reported by Darekar *et al*. (1991).

The results of present investigation suggest that fruit yield per plant can be improved by selecting genotypes recording higher values for plant height, number of branches per plant, fruit girth, calyx length, number of fruits per plant, single fruit weight, ascorbic acid content, protein content and total phenol content of fruits at vegetable maturity and low shoot and fruit borer infestation percentage and late bearing habit. Selection based on these traits may help in improving resistance against borer infestation without compromising on fruit yield.

For correlation studies 81 genotypes (9 parents ands 82 hybrids) were evaluated for 14 characters. Marketable yield per plant was taken as dependant variable and the other traits were used as independent variables. The correlation studies showed that the mrketable yield per plant had significant positive association both at genotypic and phenotypic level with all the characters studied *viz.,* plant height, number of branches per plant, fruit girth, calyx length, number of fruits per plant, single fruit weight, protein content and total phenol content. This trait had significant negative association both at genotypic and phenotypic level with shoot and fruit borer infestation and it also showed negative significant association at phenotypic level with earliness. No positive and negative significant correlation was registered by shoot borer infestation with other characters.

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Table 1. Genotypic (G) and phenotypic (P) correlation coefficients between yield and yield components

Characters		Number of branches per plant	Earliness	Fruit length (cm)	Fruit girth (cm)	Calyx length (cm)	Number of fruits per plant	Single fruit weight (g)	Shoot borer infestation (%)	Fruit borer Infestation (%)	Ascorbic acid content (mg/100g)	Protein content (mg/100g)	Total phenol content (mg/100g)	Marketable yield per plant (kg)
Plant height (g)	G	0.556**	0.156*	0.139	0.202**	0.190*	0.243**	0.230**	0.024	-0.131	0.304**	0..108	0.179*	0.316**
	P	0.280**	0.101	0.117	0.170*	0.163*	0.211**	0.215**	-0.006	-0.114	0.281**	0.104	0.161*	0.286**
Number of branches/plant	G		-0.354**	0.214**	0.215**	0.102	0.470**	0.204**	0.073	-0.282**	0.365	0.266	0.517**	0.517**
	P		-0.200**	0.046	0.114	0.051	0.280**	0.100	0.045	-0.186*	0.199**	0.160*	0.316**	0.328**
Earliness	G			-0.001	0.017	0.151*	-0.207**	0.105	0.136	0.234**	-0..198**	-0.142	-0.151*	-0.162*
	P			0.015	-0.035	0.144	-0.165*	0.075	0.100	0.150*	-0.160**	-0.098	-0.126	-0.141
Fruit length (cm)	G				0.304**0	0.512**	-0.013	0.268**	0.202**	-0.114	0.052	0.129	0.210**	0.100
	P				.172*	0.370*	-0.032	0.227**	0.130	-0.101	0.039	0.133	0.166	0.083
Fruit girth (cm)	G					0.337**	0.164*	0.455**	0.160**	-0.135	0.256**	0.050	0.141	0.251**
	P					0.281**	0.144	0.401**	0.067	-0.093	0.215**	0.037	0.125	0.223**
Calyx length (cm)	G						-0.049	0.443**	0.081	-0.127	0.261**	0.099	0.138	0.213**
	P						-0.042	0.431**	0.069	-0.127	0.255**	0.084	0.135	0.203**
Number of fruits/ plant	G							-0.052	0.143	-0.537**	0.351**	0.594**	0.628**	0.797**
	P							-0.058	0.113	-0.522**	0.342**	0.554**	0.612**	0.770**
Single fruit weight (g)	G								-0.216**	-0.033	0.247**	0.081	0.106	0.266**
	P								-0.174**	-0.025	0.241**	0.074	0.105	0.262**
Shoot borer Infestation (%)	G									0.032	-0.130	-0.048	-0.073	-0.030**
	P									0.047	-0.098	-0.020	-0.060	-0.022**
Fruit borer Infestation (%)	G										-0.485**	-0.866**	-0.853**	-0.736**
	P										-0.462**	-0.778**	-0.812**	-0.694**
Ascorbic acid Content (mg/100g)	G											0.486**	0.461**	0.488**
	P											0.463**	0.457**	0.478**
Protein content (mg/100g)	G												0.801**	0.655**
	P												0.757**	0.623**
Total phenol Content (mg/100g)	G													0.745**
	P													0.740**

*,** Significant at 5 and 1 per cent level