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Correlation and path analysis in brinjal (*Solanum melongena*)

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Abstract: Twenty five brinjal genotypes were studied for assessing the association between yield and its component characters. Yield per plant showed high positive correlation with number of harvest, number of fruits per plant and fruit weight, while that with days to first flowering and number of leaves were high but negative. Number of harvests recorded the highest genotypic correlation with yield. The path coefficient analysis revealed that number of harvests, number of fruits per plant and fruit weight had high direct effect as well as indirect effects through other characters on yield per plant.

Key words: Brinjal, Variation, Correlation, Path analysis

Introduction

Brinjal is an important solanaceous vegetable crop which is quite high in nutritive value. The average productivity of brinjal in India is only 20 - 35 t ha^{-1} depending upon the variety (Veeraraghavathatham, 1998). Improvement in yield is possible only through selection for the desired component characters. The knowledge of association between yield and its component characters and among the component characters as well as their direct and indirect contribution towards yield is essential for yield improvement in brinjal.

Materials and Methods

Twenty five brinjal genotypes collected from different parts of the country were grown at a spacing of 60 x 75 cm in randomised block design with three replictions during 2000 - 2001 at College of Agriculture, Vellayani. The genotypes used for the study were Swetha, Surya, CO-2, Nedumangad local-1, Nedumangad local-2, Nedumangad local-3, Neyyattinkara local, Alappuzha local, Thikkodi local, Vellayani local-1, Vellayani local-2, Kalliyoor local, Peringamala local, Poomkulam local, Pachalloor local, Venganoor local, Pusa Kranti, Pusa Purple Cluster, Arka Kusumkar, Kuttalam local, Brinjal Suphal, Palappur local, Brinjal Supriya, Manjarigota local and Pragathy. The cultural and management practices as per the recommendations of the Kerala Agricultural University were followed throughout the experiment. Observations were recorded for each treatment from five randomly selected plants from each replication for yield per plant, days to first flowering, plant height, number of primary branches per plant, number of secondary branches per plant, number of fruits per plant, number of leaves per plant, fruit length, fruit girth, weight of fruit and number of harvests. Genotypic, phenotypic and environmental correlations were computed as per the method suggested by Johnson *et al.* (1955). The path coefficient analysis was done as per the procedure outlined by Wright (1954).

Results and Discussion

Phenotypic and genotypic correlation coefficients between yield and its component characters are presented in Table 1.

In general genotypic correlation was higher than phenotypic correlation, indicating less environmental influence on the characters under study. The characters number of harvests (0.8910), number of fruits per plant (0.8365) and fruit weight (0.3466) showed high positive association with yield at genotypic level. The characters number of harvests and number of fruits per plant also had high phenotypic correlation (0.8213 and 0.8030 respectively) with yield. The positive genotypic correlation of yield with number of fruits per plant was similar to the report of Sharma and Swaroop (2000). Positive genotypic correlation between yield per plant and fruit weight in brinjal was also reported by Mishra and Mishra (1990). Days to first flowering showed high correlation with yield at phenotypic (-0.3138) as well as genotypic level (-0.4035); but were negative.

Table 1. Phenotypic and genotypic correlation coefficients among yield components

Characters	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11
Fruit yield per plant (X1)	1.0000	*-0.3138	0.1437	-0.1117	0.0427	**0.8030	*-0.2806	0.0768	-0.0268	0.2719	**0.8213
Days to flowering (X2)	*-0.4335	1.0000	0.0750	0.1748	0.0469	*-0.2985	0.2516	0.2669	0.0052	0.0600	*-0.3015
Plant height (X3)	0.2352	0.0958	1.0000	*0.2804	0.0181	0.1746	-0.1174	0.1981	-0.2011	*-0.2775	0.3139
No. of primary branches / plant (X4)	-0.0960	0.1545	*0.3164	1.0000	**0.7058	-0.1752	0.0478	-0.0497	0.1032	0.1692	-0.1216
No. of secondary branches/ plant (X5)	-0.0026	-0.1497	0.0575	**0.8161	1.0000	-0.5121	0.0679	-0.2023	0.2538	0.3450	-0.1231
No. of fruits/plant (X6)	**0.8365	-0.3354	0.2636	-0.0230	-0.2045	1.0000	-0.2587	0.1074	*-0.3596	-0.0233	**0.8019
No. of leaves/plant (X7)	-0.3212	*0.3454	-0.1310	0.0638	0.0638	*-0.2900	1.0000	0.0714	0.0469	0.0415	-0.4226
Fruit length (X8)	0.0898	*.3374	0.2662	-0.0616	-0.2359	0.0944	0.06898	1.0000	-0.1885	*0.3451	0.0821
Fruit girth (X9)	-0.0591	0.0080	-0.2284	0.1507	*0.3032	*-0.4163	0.0453	-0.2306	1.0000	*0.4460	-0.2107
Fruit weight (X10)	*0.3466	-0.0406	-0.3204	0.1533	*0.3518	0.0037	0.0439	*0.3990	0.5104	1.0000	-0.0289
No. of harvests (X11)	**0.8910	*-0.4369	*0.4001	-0.1503	-0.1623	**0.8278	*-0.4678	0.0384	-0.2424	-0.0186	1.000

** - Significant at 1%   * - Significant at 5%

Upper to diagonal - Phenotypic correlation coefficients ; Lower to diagonal - Genotypic correlation coefficients

High positive genotypic and phenotypi correlation of yield with number of harvest and number of fruits per plant implied tha selection for these characters would lead t simultaneous improvement in yield.

Number of harvests and number o fruits per plant showed high genotypic correlation (0.8278). Number of harvest showed high genotypic correlation with plan height also (0.4001). Fruit weight, anothe important yield associated character, was correlated with fruit length (0.3990) and fruit girth (0.5104). The positive association between fruit weight and fruit girth was also reported by Hiremath and Rao (1974). Though plant height, fruit length and fruit girth were not directly associated with yield, these characters could also be used as selection criteria as they are related to number of harvests and number of fruits which showed high correlation with yield.

The direct and indirect effects of yield components on yield are presented in Table 2. The path coefficient analysis revealed that maximum direct effect on yield was shown by number of harvests (0.6908) followed by fruit weight (0.3585) and number of fruits per plant (0.2741). The direct effect of fruit weight on yield is supported by the reports of Sharma and Swaroop (2000). Days to first flowering had negative direct effect on yield (-0.0225), which was similar to the reports by Vijay *et al.* (1978). The direct effect of plant height on yield was the lowest (0.0134).

The direct effect of number of fruits per plant (0.2741) along with the high positive indirect effect through number of harvests (0.5719) had contributed to the high positive total genotypic correlation of number of fruits per plant with yield (0.8365). The direct effect of number of fruits per plant was similar to the reports of Vijay *et al.* (1978).

Number of harvests recorded the highest positive direct effect (0.6908) as well as the highest total correlatin (0.8909). The direct along with the indirect effect *viz.*

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

Characters	X1	X2	X3	X4	X5	X6	Total correlation
Days to first flowering (X1)	**-0.0225**	0.0013	-0.0919	0.0260	-0.0146	-0.3018	-0.4035
Plant height (X2)	-0.0022	**0.0134**	0.0722	-0.0098	-0.1149	0.2764	0.2351
No. of fruits per plant (X3)	0.0075	0.0035	**0.2741**	-0.0218	0.0013	0.5719	0.8365
No. of leaves per plant (X4)	-0.0078	-0.0017	-0.0795	**0.0752**	0.0157	-0.3232	-0.3213
Fruit weight (X5)	-0.0009	-0.0043	0.0010	0.0033	**0.3585**	-0.0128	0.3466
No of harvests (X6)	0.0098	0.0053	0.2269	-0.0352	-0.0067	**0.6908**	0.8909

Residual effect (R) = 0.0655 Figures in **bold** represents direct effect

number of fruits per plant (0.2269) accounted for the high total correlation of number of harvests with yield while indirect effects *viz.* other characters were negligible.

It can be concluded that number of harvests, number of fruits per plant and fruit weight 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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