

Short communication

## Stability for fruit yield and yield contributing traits in brinjal (*Solanum melongena* L.)

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Brinjal is one of the most important vegetable crops grown in the country. A number of promising varieties have been released in the country but very little efforts have been made to know the stability of the varieties in different environments. A desirable variety should have stable performance across the environments besides high yield. Therefore, the present investigation was undertaken to identify the varieties suitable for different environments.

The experiment consisting of 17 genotypes of brinjal was laid out at Vegetable research centre of GBPUAT Pantnagar in a Randomized block design with three replications during 2008-2009 (Autumn winter , 2008 and Spring summer, 2008-2009). Each season was splitted into two environments or growing conditions – one was with recommended doses of fertilizers (NPK 100:60:50 kg/ha) and other was with recommended doses of vermicompost (5 tones /hectare). Planting was

done at 75 x 60 cm as inter and intra row spacing. Observations were recorded on five randomly selected plants in each replication for five characters viz., number of primary branches per plant, fruit length, fruit diameter, total number of fruits per plant and yield per hectare . Stability analysis was carried out following Eberhart and Russel model (1966).

Pooled analysis of variance (Table 1) revealed the presence of wide genetic variability among the genotypes and among the testing environments. Significant Variability due to Genotype Environment interactions (G X E) for most of the characters except for total number of fruits per plant indicated the substantial interaction between genotype and environment or the differential response of genotypes across the environments for most of the traits. Similar observations were recorded by Mishra *et al.* (1998) for fruit yield. Partitioning of environment + genotype x environment mean square showed that environments contributed significantly on the performance of genotypes. Similar results were reported by Desai (1990) and Srivastava *et al.* (1997). Variance of Genotype x Environment (linear) when tested against pooled deviation was significant only for fruit diameter however found to be non significant for number of primary branches per plant, fruit length, number of fruits per plant and fruit yield indicated that the genotypes were diverse in their regression response with environmental fluctuations. Rai *et al.* (2000) also found non significance of Genotype environment (linear) for number of fruits per plant and fruit yield. Significant mean square due to pooled deviation for number of primary branches per plant, fruit length and total yield of fruits per hectare showed the contribution of non linear components towards the differences in stability of genotypes across the environments.

**Table 1:** Pooled analysis of variance for different characters.

Source of variation	Mean of Square					
	d. f.	No of primary branches per plant	Fruit length (cm)	Fruit diameter (mm)	No of fruits per plant	Yield of fruits (q/ha)
<b>Genotype</b>	16	2.76*	324.27**	33.18**	332.85**	180014.1**
<b>Environment</b>	3	54.71**	67.66**	9.81**	105.39**	65079.33**
<b>Genotype x Environment</b>	48	1.38**	3.18**	0.61**	4.92	8006.16**
<b>Environment + (G x E)</b>	51	1.50	2.42	0.38	3.01	3787.88
<b>Environment (linear)</b>	1	54.71**	67.66**	9.8**	105.39**	65080.20**
<b>Genotype x Environment (linear)</b>	16	0.57	1.55	0.33*	1.76	1814.09
<b>Pooled deviation</b>	34	0.38*	0.92**	0.13	1.48	2913.95**
<b>Pooled Error</b>	136	0.20	0.34	0.095	1.12	1097.66

**Table 2:** Mean values in four environments and stability parameters for yield (q/ha).

Genotypes	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	E <sub>4</sub>	Xi	bi	S <sup>2</sup> di
White Long Green	314.81	401.48	311.84	366.66	348.70	1.10	-709.16
PB-66	365.92	414.07	343.70	426.66	387.59	0.71	126.10
Punjab Sadabahar	441.48	485.92	345.18	405.92	419.63	1.41	253.43
PB-70	149.63	205.92	128.89	150.37	158.70	0.92	-1181.6
PB-71	186.66	199.26	145.18	191.85	180.74	0.48	-768.7
PB-67	565.92	668.88	489.62	560.07	571.12	1.99	-659.98
Pant Rituraj	492.59	568.88	338.52	435.55	458.88	2.33	2460.97**
PB-72	287.40	311.85	302.96	309.63	302.96	0.16	-1068.07
PB-60	372.59	411.11	391.11	332.59	376.85	0.44	107.45
PB-4	390.37	491.85	374.07	398.51	413.70	1.48	-1166.43
SMB-115	270.37	347.40	268.15	276.29	290.55	1.04	-1112.10
Pusa Upkar	168.15	222.96	127.41	185.92	176.11	1.02	-857.74
KS-331	350.37	379.26	459.99	392.59	395.55	-0.54	1463.44*
Pant Samrat	435.55	518.51	390.96	330.37	418.85	1.64	3006.35**
PB-69	226.66	394.07	438.51	231.85	322.77	0.57	16161.97**
Male Unicorn	485.18	471.85	305.92	531.85	448.70	1.15	10841.52**
BARI	501.48	639.25	581.48	617.77	584.99	1.02	2298.21**
<b>Mean</b>	<b>353.24</b>	<b>419.56</b>	<b>337.85</b>	<b>361.43</b>	<b>368.02</b>	<b>1.00</b>	
<b>S.E.+</b>	<b>0.14</b>	<b>34.70</b>	<b>47.05</b>	<b>31.44</b>	<b>971.31</b>	<b>0.87</b>	
<b>CD at 5%</b>	<b>90.58</b>	<b>83.40</b>	<b>108.64</b>	<b>99.79</b>			

The mean value of number of primary branches ranged from 3.87 (PB -70) to 6.00 (PB-72) with the general mean of 4.62. Eleven out of seventeen genotypes expressed non significant deviation from regression, hence classified as stable. Only four genotypes namely White long green, Punjab Sadabahar, PB-71 and PB-60 expressed regression coefficient approximately to unity, deviation from regression near to zero along with above average mean performance and hence could be suggested for general cultivation.

Fruit length varied from 7.58 cm (Male Unicorn) to 27.00 cm (BARI) with general mean of 13.55 cm. The deviations from regression were non significant for nine genotypes indicating the stability of these genotypes

across the environments .Only four genotypes (White Long Green, PB-67, PB-4 and Pant Samrat ) displayed average regression on environmental index accompanied with above average mean performance and hence found average responsive to all the environments.

Fruit diameter ranged from 34.50 mm (BARI) to 80.40 mm (Pant Rituraj) with the general mean of 54.70 mm. Fourteen genotypes expressed least deviation from regression and therefore, were stable across the environments .Five genotypes namely PB-69, SMB-115, Pusa Upkar Pant Rituraj and Male Unicorn expressed above average mean performance along with average regression to environmental index and hence adjudged suitable for all the environments.

The total number of fruits per plant were found in the range of 3.17 (Pusa Upkar) to 21.13 (SMB-115) with general mean of 12.80. Six genotypes namely BARI, PB-4, PB-67, PB-71, PB-66 and White Long Green displayed non significant regression coefficient, deviation from regression near to zero with above average mean performance and hence advocated for both the seasons and growing conditions.

Performance of genotypes (Table 2) with respect to yield was higher in autumn winter crop (419.56 q/ha) with recommended doses of NPK followed by spring summer crop (361.43 q/ha) with recommended doses of NPK than in autumn winter crop (353.24 q/ha) with recommended doses of vermicompost and poor performance was observed in the spring summer season (337.85q/ha) with recommended doses of vermicompost. In general most of the varieties have performed well in each environment while PB-67 Environment I and Environment II, BARI in environment III and IV gave the highest fruit yield. The magnitudes of  $S^2_{di}$  were, however, significant in Pant Samrat, Pant Rituraj, KS-331, PB-69, Male Unicorn and BARI. Thus on account of existence of non linear component of  $G \times E$ , the performances of these genotypes were unpredictable. PB-67 was the top performing genotype in all the four environments. Fruit yield averaged on four environment ranged from 158.70 q/ha (PB-70) to 584.99 q/ha (BARI) with the general mean of 368.02 q/ha. Eleven genotypes showed non significant deviation from regression and therefore, classified as stable. Only five genotypes (PB-4, PB-60, PB-67, PB-66 and Punjab

Sadabahar) expressed regression coefficient approximately to unity, deviation from regression near to zero with above average mean performance could be suggested for general cultivation across the environments.

Characters viz., number of primary branches per plant and yield per hectare might be led to adaptability in the Punjab Sadabahar and PB-60. Stability in fruit length, total number of fruits per plant and yield per hectare led to adaptability in PB-67 and PB-4 and Stability in total number of fruits per plant and yield per hectare led to adaptability in PB-66 alone. Hence varieties PB-4, PB-60, PB-67, PB-66 and Punjab Sadabahar may be recommended for general cultivation

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