

# Heritability and genetic advance of yield and its components in brinjal (*Solanum melongena* L.)

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A field experiment studied in twenty seven crosses using line x tester analysis between twelve parents consisted of nine lines (local genotypes of Chhattisgarh) viz., IGB 35, IGB 43, IGB 44, IGB 52, IGB 54, IGB 55, IGB 65, IC 31, IC35 and three testers (improved varieties) viz., DBR 8, KS 224 and JBR 03 16. The heritability estimates was found higher for all the characters studied from 94.3 per cent to 62.9 per cent indicating that the characters are less influenced by environmental factors. The total fruit yield per plant recorded highest genetic advance as percentage of mean (227.41 %). Genetic advance in general was high for most of the characters studied except days to first flowering, days to first fruiting and plant height, which showed moderate genetic advance as percentage of mean, indicating effectiveness of simple selection for improvement of these characters.

**Key words :** Brinjal, Heritability, Genetic advance

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## INTRODUCTION

Brinjal (*Solanum melongena* L.) is a native of India and important vegetable crop grown throughout the year. Genetic improvement of any character is difficult without having sufficient genetic variability. Therefore, the existence of genetic variability in population is pre-requisite for any crop improvement programme. The knowledge about heritability and genetic advance in brinjal has been recognized as a practical tool in providing the breeder a means of increasing fruit yield and other economic traits. Most of the local varieties which are grown by the farmers of C.G. and India have not been fully utilized in any genetic improvement programs so far, on scientific line. An effective breeding programme in brinjal needs to elucidate the genetic nature and magnitude of quantitatively inherited traits and estimate prepotency of parents in hybrid combinations. Hence, the present study was under taken with an objective of studying the heritability and Genetic advance in different genotypes and its crosses, which will be utilized in future crop improvement programmes.

## RESEARCH METHODOLOGY

The experimental materials comprised of twelve diverse genotypes consisted of nine lines (local genotypes of

Chhattisgarh) viz., IGB 35, IGB 43, IGB 44, IGB 52, IGB 54, IGB 55, IGB 65, IC 31, IC35 and three (National check) viz., DBR 8 (NC), KS 224 (NC) and JBR 03 16. Twenty seven hybrids obtained from line x tester cross along with these twelve diverse genotype parents grown in RBD design with three replications in All India Coordinated Vegetable Improvement Project at Horticulture Research Farm, Deptt. of Horticulture, IGKV, Raipur during *Rabi* 2007. In each replication, each entry was grown in two rows having 10 plants in each row spaced 60 cm between rows and 45 cm between plants. The observation were recorded on five randomly selected plants from each genotype in each replication for characters viz., days to 1<sup>st</sup> fruiting, number of flowers per inflorescence, number of long style flowers per inflorescence, number of medium style flowers per inflorescence, fruit length (cm), fruit girth (cm), plant height (cm), number of primary branches per plant, number of fruits per cluster, total number of fruits per plant, total soluble solids (%), average fruit weight (g), rind thickness (cm), stalk length (cm), total fruit yield per plant (g). Observation on other morphological traits viz., colour of flower, fruit colour, fruit shape, colour of leaves and spines on leaves were also recorded by visual observation. However, heritability estimates (Broad sense) for fruit yield and its components was calculated based on the ratio of genotypic variance to

the phenotypic variance and was expressed in percentage (Hanson *et al.*, 1956). Genetic advance was estimated by using the method suggested by Johnson *et al.* (1955).

## RESEARCH FINDINGS AND ANALYSIS

Mean performances for characters analyzed are

exhibited in Table 1. The broad sense heritability estimates have been presented in Table 2. All the characters showed high broad sense heritability. Among the characters studied, highest heritability estimate was recorded for average fruit weight (94.3 per cent) followed by total fruit yield per plant (93.7 per cent), fruit girth (93.0 per cent), number of long

Parents	Characters															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>Lines</b>																
IGB-35	64.72	80.35	4.21	1.40	1.41	13.22	9.92	68.65	5.54	1.23	9.55	3.43	175.37	0.48	4.53	594.72
IGB-43	63.39	79.49	3.78	1.33	1.22	11.95	8.74	57.72	7.14	1.07	9.38	4.30	193.21	0.43	5.55	715.76
IGB-44	67.52	83.49	3.07	1.25	1.10	11.09	23.30	72.4	7.40	1.08	7.43	4.32	96.90	0.53	4.72	382.51
IGB-52	64.13	81.41	4.30	2.18	2.32	19.53	23.54	65.3	6.37	1.23	8.66	3.62	162.15	0.48	4.68	557.17
IGB-54	62.49	78.62	2.82	1.11	1.08	10.49	22.10	81.2	7.34	1.07	7.69	4.80	145.87	0.56	3.94	425.84
IGB-55	62.56	77.69	3.47	1.24	1.27	6.53	15.02	77.8	6.16	1.26	8.23	3.54	88.50	0.46	3.33	495.62
IGB-65	59.61	79.44	3.40	1.06	1.06	12.72	11.24	49.1	6.92	1.23	9.48	3.40	166.85	0.52	4.76	699.04
IC-31	61.65	75.28	2.37	1.17	1.25	11.75	22.99	48.25	6.56	1.01	5.63	3.21	164.90	0.54	3.64	409.92
IC-35	60.14	76.86	3.23	1.31	1.34	13.19	16.68	68.74	5.41	1.25	11.25	4.40	85.04	0.63	6.39	532.53
Av. of lines	62.91	79.18	3.41	1.34	1.34	12.27	17.06	65.46	6.54	1.16	8.59	3.89	142.09	0.51	4.62	534.79
<b>Testers</b>																
KS-224	55.36	70.87	4.25	2.13	2.17	12.48	25.39	69.58	9.98	1.323	15.39	4.35	180.80	0.54	5.74	633.20
DBR 8	57.46	73.01	4.93	2.43	2.33	13.03	26.65	65.10	11.31	1.01	16.28	4.54	199.12	0.56	5.37	784.38
JBR-03-16	58.38	75.63	3.45	1.84	1.87	12.19	21.69	74.81	7.50	1.097	12.46	3.59	194.70	0.56	4.58	805.46
Av. of male parents	57.07	73.17	4.21	2.13	2.12	12.57	24.58	69.83	9.60	1.14	14.71	4.16	191.54	0.55	5.23	741.01
PH-6 (Cheack)	55.18	71.71	4.55	3.87	3.87	9.63	29.66	92.85	11.30	2.39	18.20	4.29	199.06	0.55	3.91	853.36
C.D. (P=0.05)	2.43	2.60	0.17	0.11	0.13	0.43	0.62	2.71	0.40	0.05	0.21	0.09	19.85	0.03	0.12	26.86
C.V.	5.05	4.27	6.01	8.24	9.66	4.51	4.02	5.02	6.76	6.04	2.55	3.00	15.94	8.27	3.47	5.61

1. Days to first Flowering  
 2 Days to first fruiting  
 3. No. of flowers/ inflorescence  
 4. No. of long style flowers/ inflorescence  
 5. No. of medium style flowers/ inflorescence  
 6. Fruit length (cm)  
 7. Fruit girth (cm)  
 8. Plant Height (cm)  
 9. No. of Primary branches/ plant  
 10. No. of fruits/ cluster  
 11. Total no. of fruits/ plant  
 12. Total Soluble Solids (%)  
 13. Average fruit weight (g)  
 14. Rind thickness (cm)  
 15. Stalk length (cm)  
 16. Total fruit yield/ plant (g)

Characters	Mean	Range		Treatment mean sum of square	Heritability (%)	Genetic advance as % of mean
		Minimum	Maximum			
Days to first flowering	60.66	55.18	67.52	21.95**	62.9	4.04
Days to first fruiting	76.72	70.87	83.49	26.68**	63.4	4.48
Number of flowers per inflorescence	3.53	1.60	4.93	1.66**	70.3	1.21
No. of long style flowers/ inflorescence	1.85	1.06	3.87	2.37**	92.9	1.74
No. of medium style flowers/ inflorescence	2.00	1.00	3.87	1.71**	83.4	1.38
Fruit length (cm)	12.71	6.53	19.98	37.43**	86.2	6.58
Fruit girth (cm)	22.99	8.74	38.69	129.02**	93.0	12.87
Plant height (cm)	63.06	47.49	92.85	289.3**	89.2	18.73
Number of primary branches per plant	6.32	3.71	11.31	8.61**	85.3	3.14
Number of fruits per cluster	1.58	1.011	3.08	1.32**	86.0	1.23
Total number of fruits per plant	12.56	7.43	18.90	39.30**	87.9	6.84
Total soluble solids (%)	4.29	3.21	5.33	0.91**	78.2	0.96
Average fruit weight (g)	195.89	85.04	304.26	9391.7**	94.3	110.82
Rind thickness (cm)	0.73	0.43	1.32	0.16**	79.8	0.42
Stalk length (cm)	5.41	3.61	7.18	3.14**	70.8	1.66
Total fruit yield per plant (g)	665.83	382.51	838.63	39881.1**	93.7	227.41

\*\* Indicate significance of value at P=0.01

style flowers per inflorescence (92.9 per cent), plant height (89.2 per cent), total number of fruits per plant (87.9 per cent), fruit length (86.2 per cent), number of fruits per cluster (86.0 per cent), number of primary branches per plant (85.3 per cent), number of medium style flowers per inflorescence (83.4 per cent), rind thickness (79.8 per cent), total soluble solids (78.2 per cent), stalk length (70.8 per cent), number of flowers per inflorescence (70.3 per cent), days to 1<sup>st</sup> fruiting (63.4 per cent) and days to 1<sup>st</sup> flowering (62.9 per cent).

The heritability estimates was found higher for all the characters days to 1<sup>st</sup> flowering, days to 1<sup>st</sup> fruiting, number of flowers per inflorescence, number of long style flowers per inflorescence, number of medium style flowers per inflorescence, fruit length, fruit girth, plant height, number of primary branches per plant, number of fruits per cluster, total number of fruits per plant, total soluble solids, average fruit weight, rind thickness, stalk length, total fruit yield per plant. Observation studied from 94.3 per cent to 62.9 per cent indicating that the characters are less influenced by environmental factors, this closely follows the findings of Rai *et al.* (1998), Patel *et al.* (1999), Sharma and Swaroop (2000), Mohanty (2001), Baswana *et al.* (2002), Das *et al.*

(2002) and Singh *et al.* (2003).

Genetic advance expressed as percentage of mean is presented in Table 1. The total fruit yield per plant recorded highest genetic advance as percentage of mean (227.41 per cent) followed by average fruit weight (110.82 per cent), plant height (18.73 per cent) and fruit girth (12.87 per cent). Genetic advance in general was high for the characters total fruit yield and average fruit weight, moderate genetic advance for the characters fruit girth and plant height and for the characters days to first flowering, days to first fruiting, number of flowers per inflorescence, number of long style flowers per inflorescence, number of medium style flowers per inflorescence, fruit length, number of primary branches per plant, number of fruits per cluster, total number of fruits per plant, total soluble solids, rind thickness and stalk length which showed less genetic advance studied as percentage of mean. These findings are in close association with the study of Rai *et al.* (1998), Kumar *et al.* (1998), Patel *et al.* (1999), Sharma and Swaroop (2000), Mohanty (2001), Baswana *et al.* (2002), Das *et al.* (2002), Mohanty and Prusti (2002) and Singh *et al.* (2003).

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