

Gene Action Studies in Brinjal (*Solanum melongena* L.)

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Abstract

An experiment was carried out entitled gene action in brinjal (*Solanum melongena* L.) during 2009-10. The experiment was laid out in randomized block design with three replications. The experimental materials consisted 15 genotypes of brinjal viz., Aruna, DBL-24, DBR-8, Green Long, JB-7, KS-224, KS-356, Punjab Sadabahar, PB-70, Ram Nagar Giant, Surya, VR-14, Pusa Purple Long, KS-331 and Pusa Purple Cluster. The genetic component of variance for dominance showed higher value than the additive variance for all the characters with value of greater than one except days to first fruit set and plant height degree of dominance. The variance for specific combining ability were found to higher than the general combining ability variance with value of less than one predictability ratio for all the 12 characters except days to first all the 12 characters except day to first fruit set and plant height under study. This indicates the presence of heterosis governed by over dominance type gene action for most of the characters.

Key words : Gene action, Brinjal.

Brinjal or egg plant (*Solanum melongena* L.) of the family Solanaceae is one of the important and popular vegetable crops grown in India and other parts of the world and originated in its wild form in Indo-Burma region and is probably a native of India and has been in cultivation since prehistoric times. Brinjal or egg plant (*Solanum melongena* L.) of the family Solanaceae is one of the important and popular vegetable crops grown in India and other parts of the world and originated in its wild form in Indo-Burma region and is probably a native of India and has been in cultivation since prehistoric times. The combining ability analysis has been used to elucidate the nature and magnitude of gene action and to know the genetic worth of the genotypes (1—5). This helps in choosing the desirable parents for hybridization programme and to chalk out an efficient breeding strategy.

Methods

The experiment on gene action in brinjal (*Solanum melongena* L.) was conducted during 2009-10 at Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University Lucknow, India. The experiment was laid out in randomized block design with three replications. The experimental materials

consisted fifteen genotypes of brinjal viz., Aruna, DBL-24, DBR-8, Green Long, JB-7, KS-224, KS-356, Punjab Sadabahar, PB-70, Ram Nagar Giant, Surya, VR-14, Pusa Purple Long, KS-331 and Pusa Purple Cluster). At first field, ploughing was done with the help of disc harrow and two to four ploughing with the help of cultivator followed by planking. field should be prepared thoroughly with the help of spade and Khurpi. In each treatments distance between row to row and plant to plant was 75 and 60 cm, respectively. The observations were recorded on twelve characters viz., days to 50% flowering, number of flowers per cluster, number of long and medium styled flowers per cluster, number of short styled flowers per cluster, days to first fruit set, plant height, number of primary branches per plant, number of fruits per cluster, length of fruit, diameter of fruit, weight of fruit (g), total yield per plant (kg).

Results and Discussion

Estimation of genetic component of variance (additive and dominance), combining ability variance, general combining ability (GCA) and specific combining ability (SCA), degree of dominance and predictability ratio for 12 characters of brinjal are presented in Table 1.

Table 1. Estimation of genetic components of variance (additive & dominance variance), degree of dominance, combining ability variance (GCA and SCA) and predictability ratio for 12 characters of brinjal. *,** Significant 5 and 1%, level, respectively.

Characters	Genetic components of variance		Degree of dominance	Combining ability variance		Predictability ratio
	Additive	Dominance		GCA variance	SCA variance	
1 Days to 50% flowering	3.985	4.992	1.119	0.996**	1.248**	0.798
2 Number of flowers per cluster	0.151	2.944	4.410	0.038	0.736**	0.051
3 Number of long and medium styled flowers per cluster	Long	1.541	1.883	0.109*	0.385**	0.283
	Medium	0.070	1.340	4.374	0.018	0.335**
4 Number of short styled flowers per cluster	0.133	0.789	2.434	0.033	0.197*	0.167
5 Days to first fruit set	10.413	4.181	0.634	2.603**	3.045**	2.491
6 Plant height (cm)	86.140	3.721	0.208	21.535**	22.930**	23.155
7 Number of primary branches	0.446	6.493	3.813	0.112*	1.623**	0.069
8 Number of fruits per cluster	0.130	0.728	2.369	0.032	0.182*	0.176
9 Length of fruits (cm)	10.158	1.922	0.435	2.539**	3.481**	5.278
10 Diameter of fruits (cm)	0.449	1.446	1.794	0.112*	0.362**	0.309
11 Weight of fruit (g)	2214.407	81.862	0.192	553.601**	596.465**	27.051
12 Total yield per plant (kg)	0.154	0.392	1.597	0.039	0.098	0.398

The value of genetic component of variance for dominance (4.992) was recorded higher than the additive variance (3.985) along with degree of dominance greater than one (1.119). Specific combining ability variance (1.248) was also found to be greater than the general combining ability variance (0.996) along with predictability ratio of less than one (0.798) for days to fifty percent flowering. For number of flowers per cluster, the estimated dominance variance (2.944) was recorded higher than the additive variance (0.151) along with degree of dominance greater than one (4.410). Specific combining ability variance (0.736) was exhibited less than general combining ability variance (0.038) along with predictability ratio less than one (0.051). The estimated genetic component of variance for dominance exhibited higher value (1.541) as compared to the additive variance (0.435) along with degree of dominance greater than one (1.883). The variance for specific combining ability (0.385) was also showed higher value than the general combining ability variance (0.109) with predictability ratio of less than one (0.283) for long styled flowers per cluster.

The value of genetic component of variance for dominance result in higher value of (1.340) as compared to be additive variance (0.070) followed by degree of dominance greater than one (4.374). marked increase was found by specific combining ability variance

(0.335) over the general combining ability variance (0.018) with predictability ratio less than one (0.054) for number of medium styled flowers per cluster. The estimated genetic component of variance for dominance (0.789) was recorded higher than the additive variance (0.133) along with degree of dominance greater than one (2.434). specific combining ability variance (0.197) was also found to be greater than the general combining ability variance (0.033) along with predictability ratio of less than one (0.167) for number of short styled flowers per cluster. The value of genetic component of variance for additive resulted in higher value of (10.413) as compared to is dominance variance (4.181) followed by degree of dominance less than one (0.634). Significant increase was showed by specific combining ability variance (1.045) over the general combining ability variance (2.603) with predictability ratio greater than one (2.491) for days to first fruit set. The value of additive variance (86.140) was showed higher than the dominance variance (3.721) along with degree of dominance less than one (0.208), general combining ability variance (21.535) was found to be greater than specific combining ability variance (0.930) along with predictability ratio greater than one (23.155) for plant height.

The estimation of genetic component of variance for dominance resulted in higher value of (6.493) as

compared to be additive variance (0.446) followed by degree of dominance greater than one (3.813). Significant increase was showed by specific combining ability variance (1.623) over the general combining ability variance (0.112) with predictability ratio of less than one (0.069) for number of primary branches per plant. For number of fruits per cluster, the estimated dominance variance (0.728) was recorded higher than the additive variance (0.130) along with degree of dominance greater than one (2.369). Specific combining ability variance (0.182) was showed greater than general combining ability variance (0.032) along with predictability ratio of less than one (0.176). The estimated additive variance (10.158) was found higher than the dominance variance (1.922) along with degree of dominance less than one (0.435). General combining ability variance (2.539) was found to greater than specific combining ability variance (0.481) along with predictability ratio greater than one (5.278) for length of fruit. The value of genetic component of variance for dominance resulted in higher value of (1.446) as compared to be additive variance (0.449) with greater than one (1.794) degree of dominance. The variance for specific combining ability (0.362) was also reflected higher value than the general combining ability variance (0.112) with predictability ratio of less than one (0.309) for diameter of fruit. The estimated of genetic component of variance for additive exhibited higher value (2214.407) than the corresponding dominance variance (81.862) with less than one (0.192) degree of dominance. The variance for general combining ability (553.601) was also reflected higher value the specific combining ability variance (20.465) with predictability ratio greater than one (27.051) for weight of fruit (g).

For total yield per plant, the estimated dominance variance (0.392) was recorded higher than the additive

variance (0.154) along with degree of dominance greater than one (1.597), specific combining ability (0.098) was found greater than general combining ability variance (0.039) along with predictability ratio of less than one (0.398).

On the basis of above information it can be concluded that the genetic component of variance for dominance showed higher value than the additive variance for all the characters with value of greater than one (>1) except days to first fruit set and plant high degree of dominance. The variance for specific combining ability were found to higher than the general combining ability variance with value of less than one (<1) predictability ratio for all the twelve characters except days to first all the twelve characters except day to first fruit set and plant height under study. This indicates the presence of heterosis governed by over dominance type gene action for most of the characters.

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