HortFlora Research Spectrum, 3(1): 103-105 (March 2014) ISSN : 2250-2823

Research Note :

GENETIC VARIABILITY AND HERITABILITY IN BRINJAL (*Solanum melongena*)

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ABSTRACT : High heritability estimates in narrow sense were observed for length of fruit, width of fruit and weight per fruit in F_1 generation. Other characters showed moderate heritability in both the generation. High genetic advance in weight per fruit and plant height was observed for single cycle of selection in F_1 generation. The probable genetic gain was high for weight per fruit, length of fruit and width of leaf. For fruit yield per plant it was more than 4.5% per cycle of selection. Th e highest coefficient variability was found for number of branches per plant followed by number of fruits per plant, width of leaf, length of fruit in parents, F_1s populations at both genotypic and phenotypic levels. Biparental matting as well as matting among selected plants in early segregating generation would also help in developing population having optimum homozygous and heterozygous balance.

Keywords : *Brinjal, Solanum melongena, GCV, PCV, variability, heritability.*

Brinjal or egg plant (*Solanum melongena* L.), a native of India, is one of the most important vegetable crops grown in India. It belongs to the family Solanaceae and having chromosome number 2n = 24. It is an important commercial crop grown all over the country except on higher altitudes. It has high yielding potential and adaptability to various agro-climatic conditions throughout the country and grows throughout the year. The unripe fruits are used as a cooked vegetable. It has adopted a wider range of climatic condition from north to south and west to east. It is grown as summer crop in hilly region. Brinjal is used in variety culinary preparation, pickles and industrially processed foods are also prepared from brinjal. Brinjal has three main botanical varieties under the species *melongena,* the round or egg shaped cultivars are grouped under var. *esculantum,* the long slender type are under var. *serpentinum* and the dwarf brinjal plants are put under var. depressum. Brinjal has *ayurvedic* medicinal properties. The fruits of brinjal are excellent remedies for those suffering from lever troubles. White brinjal is good for diabetic patients. Brinjal is good source of vitamin A, B and C. The green leaves of brinjal are excellent source of vitamin C. The bitter source of brinjal is due to glycoalkaloids. The knowledge of nature and magnitude of gene action controlling the characters under consideration, general combining ability of the parents and degree of heterosis are helpful in determining the efficient conventional breeding and hybrid breeding procedures. The genetic diversity of the parent influence the performance of hybrids and segregating generations (Lohakare *et al.,* 1) and increase the chance of recovering desirable transgressive segregates and thus enhancing the effectiveness of selections.

A set of 10 varieties/strains namely Azad B-1, Type-3, KS-224, KS-235, DVR-8, Azad Kranti, KS-331, PPL, KS-503 and KS-504, Round and Long genotypes showing wide phenotypic diversity maintained in the germplasm book at the Department of Vegetable Science of Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur, Kanpur, through selfing were collected for the study. These comprised of commercial varieties and indigenous collections from different parts of India. The soil fertility was homogenous in the field in which experiment was conducted. The field was ploughed twice with the soil turning plough followed by four ploughings with the cultivator. Each ploughing was followed by planking for making the soil friable and suitable for sowing. While preparing the land, due precautions were taken to maintain uniform level of the experimental field for proper drainage. Fertilizers @ 120 kg nitrogen, 60 kg phosphorus and 60 kg potash per hectare were given to the crop during the whole crop season. Half quantity of nitrogen, whole of phosphorus and potash were applied through basal dressing in the form of fertilizers at the time of last ploughing. Rest of the nitrogen was applied as top dressing in the form of urea after one month of transplanting. All the homozygous parents were sown at Research Farm of the Department of Vegetable Science, Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur, Kanpur during Kharif 2008. All the possible 45 F_1 hybrids,

Received:29-11-2013 Revised:10-01-2014 Accepted:29-01-2014

excluding reciprocals were made among these ten parents. For building up of the F_2 population of these F_1 hybrids were sown during Kharif 2009. All these F_1 hybrids were selfed for producing the F_2 seeds. All the 45 F_1 hybrids and 45 F_2 populations along with 10 parents shown in Randomized Block Design with three replications in during *Kharif* 2010. Parents and F_1s were sown in single rows while F_2s in two rows, with ten plants in each row. The rows distance of 75cm row to row and the plant to plant spacing was maintained at 60 cm.

The probable genetic gain was high for weight per fruit, length of fruit and width of leaf. For fruit yield per plant it was more than 4.5% per cycle of selection. The heritability estimates of these characters were moderate in nature indicating that these characters might under control of both additive and non-additive genetic effects. Similarly high genetic gain was observed in the time of 66.456 per cent in F_1 and 67.107 per cent in F_2, weight per fruit, followed by 61.358 per cent in F_1 and 63.56 per cent in F_2 for length of fruit and 58.450 per cent in F_1 and 60.31 per cent in F_2 for width of fruit was realized from single cycle of selection. High genetic advance in weight per fruit and plant height was observed for single cycle of selection in F_1 generation confirming to reports of Mandal and Dane (2). Heritability in narrow sense in F_1 and F_2 generation was observed as high length of fruit in both the generations and width of fruit only in F_1 generation, which might be due to more contribution of additive genetic component responsible for the inheritance of these traits and these traits can be improved through mass selection or any other selection scheme aimed to exploiting fixable (additive) genetic variance resulting a widely adopted genotype/strains could be developed which might be passes good quality and productivity. Other characters showed moderate heritability which involve both additive and non additive genetic components. It is obvious to note here that most of the characters showed high estimates of heritability numerically in F_2 in comparison of F_1s except number of branches per plant, length of leaf, width of leaf, length of fruit, width of fruit and weight of per fruit. High heritability and high percentage of genetic advance in various crops hard also been reported by Manna and Paul (3), Mishra and Mishra (4) and Prabhu and Natranjan (5). These higher estimates could be due to presence of additive × additive gene interaction in segregating generation. Under such conditions intensive selection pressure during selection breeding programme might be given in early segregating generations and might be carried out in advancement of generations for direct effective selection. Heritability estimates alone could not be given the real picture of improvement which could be realized during selection. It is only reliable when accomplishment of genetic advance under selection. In present study the genetic advance based on F_1 and F_2 generation, high genetic advance in the tune of 79.318 g for weight per fruit and plant height (16.66 cm) based on F_1 and 75.314 g and 17.039 cm for F_2 generation was observed, from single cycle of selection, Other characters showed moderate to low genetic advance.

Table 1: Estimation of variability, heritability and genetic advance for the different character under study in brinjal.

Characters	Phenotypic coefficient of variability (%)			Genotypic coefficient of variability (%)			Heritability in narrow sense (%)		Genetic advance in per cent of mean	
	Parent	F_1	F_2	Parent	F_1	F_2	F_1	F_2	F_1	F_2
Days to flowering	37.10	36.392	37.067	36.10	35.15	38.12	20.4	25.4	16.246	9.670
Plant height (cm)	77.16	76.954	75.191	73.01	74.15	76.50	17.0	19.4	20.878	22.661
Number of branches per plant	4.51	5.865	5.144	4.50	5.25	5.10	16.1	15.8	32.530	26.692
Length of leaf (cm)	13.60	14.601	13.401	13.10	15.60	13.67	20.3	5.9	37.432	45.515
Width of leaf (cm)	8.98	9.788	9.559	8.61	9.10	10.15	9.5	7.3	58.400	60.311
Length of fruit (cm)	10.12	11.026	10.825	11.10	12.15	11.16	49.8	28.7	61.358	63.560
Width of fruit (cm)	10.12	9.750	9.184	9.22	8.75	9.02	51.6	9.5	57.756	60.980
Number of fruit per plant	14.43	15.434	13.814	14.10	15.35	14.05	8.2	20.1	33.982	41.754
Weight of per fruit (g)	110.1	119.355	112.229	110.5	118.50	110.12	63.1	22.9	66.456	67.107
Fruit yield per plant (kg)	3.10	3.608	3.358	2.91	3.16	2.98	10.1	18.2	32.473	45.636

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Citation : Singh M.K., Yadav J.R. and Singh B.M. (2014). Genetic variability and heritability in brinjal (*Solanum melongena* L.). *HortFlora Res. Spectrum,* 3(1): 103-105.