SHORT COMMUNICATION

GENETIC ANALYSIS OF YIELD AND ITS CONTRIBUTING TRAITS IN BRINJAL (*SOLANUM MELONGENA* L.)

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Abstract: The estimated value of additive genetic component $(\hat{D})$ was significant for all characters- days to flowering, height of plant, number of branches per plant, length of leaf, width of leaf, length of fruit, width of fruit, number of fruit per plant, width of fruit, number of fruit per plant, weight of fruit and fruit yield per plant. The value of $(\hat{H}_1)$ was observed higher than the $(\hat{H}_2)$ and additive genetic component $(\hat{D})$ for all the traits. The estimates of dominant component $(\hat{H}_2)$ was also higher than additive genetic component $(\hat{D})$ for all the traits except width of fruit. The estimated value of $(\hat{h}^2)$ was found positive and significant all the characters except four characters plant height, number of branches per plant, length of fruit and fruit yield per plant. The estimated value of $(\hat{F})$ was found to be positive and significant for all the characters except for days to flowering number of branch per plant, length of leaf, length of fruit, and width of fruit. The estimated value of $(\hat{E})$ was found to be non significant for all the characters except of dominance $(\hat{H}_1/\hat{D})^{0.5}$ reflected over dominance for all the characters. The computed ratio of $\hat{h}_2/\hat{H}_2$ being less than unity for all characters except days to flowering, length of leaf, width of leaf, width of fruit.

Keywords : Brinjal, Yield, Genetic analysis

INTRODUCTION

Brinjal or egg plant (*Solanum melongena* L.) belonging to the family Solanaceae is one of the most important vegetable crop grown in India and other part of world. It is a perennial plant but grown as annual brinjal all over country and main vegetable of plains. Where it is available round the year it is grown throughout year under tropical and sub tropical conditions and usually finds it place in common men's kitchen. Brinjal is native of India, one of the most popular vegetable grown throughout country espcilly in north east region there are wild relative of brinjal and are being grown in their in kitchen garden. The unripe fruit are used as a cooked vegetable. Brinjal has three main botanical varieties under the species *melongena*, the round or egg shaped cultivars group under var. *Esculantum*, the long selnder type are under var. *Serpentinum*, and the dwarf brinjal plant 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 . In India, annual production of vegetables comprised of 133.73 million tones from the from the 7.98 million hectare during the period of 2009-2010. Brinjal occupies 10.56 million tones of production from the area of 0.61 million hector along with the productivity of 17.2 (metric tones per hectare) in the year 2009-2010. The knowledge of nature and magnitude of gene action controlling the characters under consideration, specific 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 and increase the chance of recovering desirable transgressive segregants and the thus enhancing the effectiveness of selections. The study of heterosis reveals the possibility of commercial exploitation of hybrid vigour. It also helps the breeder in eliminating less productive F_1 hybrids and thereby enabling him to concentrates his attention to the few but more productive crosses. The success of the breeding programme depends upon the promising parent from the gene pool, clear understand of component of variation, general and specific combing ability, heritability and genetic advance of the character should be under consideration and will help the breeder in deciding the appropriate breeding method to improve the genetic makeup as well as to make a dent in productivity.

MATERIAL AND METHOD

The experiment was carried out at Research farm, Department of Vegetable Science, Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur Kanpur (U.P.) The experimental material for research work comprised of ten varsities

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germplasme 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 showing wide spectrum of variation for different characters. These varieties were crossed in (non reciprocal) diallel fashion to generate a set of forty five crosses. The distinguishing characters are given bellow. Thirty days old healthy and uniform seedlings of different parents and hybrids were transplanted on 20/07/2009 in the afternoon at the distance of 75cm row to row and 60cm plant to plant. Gap filling was done after 5days of transplanting. Observation in respect to 10 plant characters were recorded on 5 randomly selected competitive plant from each plot. The following characters were studied. Days to flowering, Height of plant (cm), Number of branches per plant, Length of leaves (cm),Width of leaves (cm), Length of fruit (cm), Width of fruit (cm), Number of fruit per plant, Weight of per fruit (g), Fruit yield per plant (kg).

RESULT AND DISCUTION

The estimates of all the genetic components of variance namely $\hat{D},\hat{H}_1,\hat{H}_2,\hat{F},\hat{h}^2$ and $\hat{E}$ along with standard error and related statistics are presented in (table- 4) revealed the fallowing result. The estimates of additive genetic component ($\hat{D}$) was significant for days to flowering, height of plant, number of branches per plant. length of leaf (cm), width of leaf (cm), length of fruit (cm), width of fruit (cm), number of fruit per plant, weight of per fruit (g) and fruit yield per plant (kg). The dominance component ($\hat{H}_1$) was found to be highly significant for all characters-Days to flowering, height of plant, number of branches per plant, length of leaf (cm), width of leaf (cm), length of fruit (cm), width of fruit (cm), number of fruit per plant, weight of per fruit (g), fruit yield per plant (kg). The value of ($\hat{H}_1$) was observed higher than the ($\hat{H}_2$) and additive genetic component ($\hat{D}$) for all the traits. The estimates of dominant component ($\hat{H}_2$) was also higher than additive genetic component ($\hat{D}$) for all the traits except width of fruit (17.58).

The value of ($\hat{F}$) component were positive and significant for all the characters except for days to flowering, number of branches per plant, Length of leaf (cm), Length of fruit (cm), and Weight of per fruit (g). The positive value indicated the frequent involvement of dominant gene for its expression. The value of ($\hat{h}^2$) was observed to be positive and significant for all the characters except height of plant (cm) and number of branches per plants. The estimates of environmental component ($\hat{E}$) was found non significant for all the characters except height of plant (cm), weight of per fruit (g) and fruit yield par plant (kg). The average degree of dominance $\left[\hat{H}_1/\hat{D}^{0.5}\right]$ was more than unity for all the characters showing over dominance. The ratio of positive and negative genes $\left[\hat{H}_2/4\hat{H}_1\right]$ was less than is the theoretical value (0.25) for all the characters which emphasized the asymmetrical distribution of positive and negative alleles among parents. The Proportion of dominance and recessive genes. $\left[4\hat{D}\hat{H}_1^{0.5}+\hat{F}/(4\hat{D}\hat{H}_1)^{0.5}-F\right]$ Was more than unity for all the characters; it means dominant gene were more frequent than

Recessive gene for all characters. The estimated value of $\hat{h}^2/\hat{H}_2$ was observed less than one for all characters except days to flowering, length of leaf (cm), width of leaf (cm), width of fruit (cm), and number of fruit par plant it indicated that at least one major gene group is responsible for inheritance of these characters.

Table 1. Estimates of the variance components and related statistics for 10 characters in a 10- parent- diallel-cross of F_1 in Brinjal

Characters	D	H_1	H_2	F	h_2	E	$(H_1/D)^{0.5}$	$H_2/4H_1$	KD/KR	h_2/H_2	r	KD/KR	h_2/H_2	r
Days to flowering	1.38** 1.44	23.42** 3.07	22.67** 2.61	-1.00 3.33	37.88** 1.75	0.40 0.43	4.12	0.24	0.84	1.67	0.61	0.84	1.67	0.61
Height of plant(cm)	14.14** 2.26	339.11** 55.89	175.30** 47.50	54.79** 60.58	2.07 31.79	2.46* 7.92	4.11	0.18	2.78	0.01	0.21	2.78	0.01	0.21
No. of branches/plant	0.30* 0.37	4.37* 0.80	3.41* 0.68	0.94 0.86	1.26 0.45	0.28 0.11	3.83	0.20	2.39	0.37	0.25	2.39	0.37	0.25
Length of leaf(cm)	1.87** 2.30	32.37** 4.90	30.70* 4.16	0.93 5.31	115.67** 2.79	0.75 0.69	4.16	0.24	1.13	3.77	0.76	1.13	3.77	0.76
Width of leaf(cm)	4.73** 1.04	24.02** 2.22	20.98** 1.88	6.71* 2.40	114.30** 1.26	0.28 0.31	2.25	0.22	1.92	5.45	0.96	1.92	5.45	0.96
Length of fruit(cm)	7.56** 2.20	24.54** 4.68	23.46** 3.98	-2.93 5.07	6.12* 2.66	0.29 0.66	1.80	0.24	0.81	0.26	0.91	0.81	0.26	0.91

Width of fruit(cm)	17.58** 1.79	16.32** 3.80	13.54** 3.23	11.87* 4.12	30.39** 2.16	0.21 0.54	0.96	0.21	2.08	2.25	0.72	2.08	2.25	0.72
No. of fruit/plant	7.82** 3.34	38.75** 7.11	33.56** 6.04	10.40* 7.70	34.29** 4.04	0.35 1.01	2.23	8.22	1.85	1.02	0.61	1.85	1.02	0.61
Weight of per fruit(g)	1279.44** 545.34	4283.43** 1160.80	3841.48** 986.56	-1387.25 1258.26	753.47** 660.36	91.97** 164.43	1.83	0.22	0.54	0.02	0.91	0.54	0.02	0.91
Fruit yield/plant(kg)	0.38* 0.28	3.97* 0.59	2.68* 0.50	0.73* 0.64	0.69* 0.33	0.03* 0.08	3.23	0.17	1.84	0.26	0.15	1.84	0.26	0.15

*Significant at 5 per cent
**Significant at 1 per cent

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