AJH
eISSN- 0976-724X

THE ASIAN JOURNAL OF HORTICULTURE
Volume **11** | Issue 1 | June, 2016 | 44-46
Visit us -*www.researchjournal.co.in*

RESEARCH PAPER

DOI : 10.15740/HAS/TAJH/11.1/44-46

Article history **:**
Received : 06.12.2015
Revised : 10.04.2016
Accepted : 22.04.2016

Genetic analysis of yield and its contributing traits in brinjal (*Solanum melongena* L.)

■ **MANOJ KUMAR SINGH**

Author for correspondence :
MANOJ KUMAR SINGH
Krishi Vigyan Kendra, Pampoli, EAST KAMENG (ARUNACHAL PRADESH) INDIA
Email : mr.mksingh2008@rediffmail.coM

ABSTRACT : Analysis of variance showed highly significant differences for all the characters among the treatments. The orthogonal partitioning of treatment of parents, F_1s, F_2s, parents *vs* F_1s, parents *vs* F_2s and F_1s *vs* F_2s were also highly significant for all the characters except for parents *vs* F_2s (Number of branches per plant) and significant for parents *vs* F_2s (fruit yield per plant).Wide range of variability was observed for all the characters for parents, F_1s and F_2s population. The analysis of variance showed highly significant differences among genotypes for all the ten characters, *viz.*, 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, weight of per fruit and fruit yield per plant, indicating sufficient variability for undertaking the present investigation.

KEY WORDS : Analysis of variance, (ANOVA), Analysis of the variance for combining ability

HOW TO CITE THIS ARTICLE : Singh, Manoj Kumar (2016). Genetic analysis of yield and its contributing traits in brinjal (*Solanum melongena* L.). *Asian J. Hort.*, **11**(1) : 44-46, **DOI : 10.15740/HAS/TAJH/11.1/44-46.**

Brinjal or egg plant (*Solanum melongena* L.) is one of the most important vegetable crops grown in India. It's 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. Brinjal is native of India, one of the most popular vegetable grown throughout the country especially in north east region, there are wild relative of brinjal and are being grown in their kitchen garden. The unripe fruit are used as a cooked vegetable. It is adopted 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 food are also produced from brinjal. Brinjal has three main botanical varieties under the species *melongena*, the round or egg shaped cultivars group under var. *Esculantum*, the long selender 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. The National share of brinjal in overall total production of vegetables is 8 per cent during 2009-2010. In India, overall ranking wise production of brinjal, West Bengal possesses the top rank from the production of 2.99 million tones and area 1.56 million hectare followed by Orissa and Bihar. 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 and increase the chance of recovering desirable transgressive segregates and thus enhancing the effectiveness of selections.

RESEARCH METHODS

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 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 ploughing 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. Fertilizer @ 120 kg nitrogen, 60 kg phosphorus and 60 kg potash per hectare in nutrients 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 of Chandra Shekhar Azad University of Agriculture and Technology, Kalyanpur, Kanpur during *Kharif* 2008. All the possible 45 F_1 hybrids, 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_1's were sown in single rows while F_2's in two rows, with ten plants in each row. The distance of 75cm row to row and the plant to plant spacing was maintained at 60 cm.

RESEARCH FINDINGS AND DISCUSSION

Among the various matting designs employed for evaluating the genetic makeup of the parental material,

Table 1 : Analysis of variance (ANOVA) for the characters under study in brinjal (*Solanum melongena* L.)

Source of variation	Degree of freedom	Mean sum of squares for different characters								
		Days to flowering	Plant height	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 fruit (g)	Fruit yield per plant (g)
Replications	2	0.47	0.17	0.04	0.06	0.09	0.17	0.30	0.04	92.86	0.02
Treatments	99	23.84***	195.13***	4.02***	23.89***	18.13***	36.20***	21.04***	27.35***	3746.30***	2.80***
Parents	9	31.073**	117.080**	3.020**	12.800**	12.359**	27.947**	52.862**	21.450**	6356.554**	1.531**
F_1 (hybrids)	44	22.910**	180.733**	4.381**	17792.**	6.805**	36.350**	16.379**	22.334**	3251.735**	2.387**
Parents vs F_1s	1	262.765**	1078.556**	23.836**	463.974**	1001.197**	51.000**	180.072**	36.210**	54400.339**	9.574**
F_2 (populations)	44	17.98***	190.800**	2.679**	14.035**	5.200**	27.787**	13.681**	28.778**	2137.647**	3.327**
Parents vs F_2s	1	116.65***	1893.831**	0.267	837.721**	1090.667**	69.905**	283.739**	14.385**	76388.782**	2.492**
F1s vs F_2s	1	5361.326**	112648.232**	1.023**	507.67**	432.034**	48.09**	18.023**	75.42**	78632.392**	302.876**
Error	198	1.14	1.07	0.60	0.96	0.76	0.86	0.84	0.95	60.22	0.54
Total	299	8.65	65.32	1.73	8.55	6.51	12.56	7.52	9.69	1280.91	1.28

*, ** and *** indicate significance of values at P=0.05, 0.01 and 0.10, respectively

Table 2 : Analysis of the variance for combining ability for the different character under study in Brinjal

Source of variation	Generation	Degree of freedom	Mean sum of squares for different characters								
			Days to flowering	Plant height (cm)	Number of branches per plant	Length of leaf (cm)	Width of leaf (cm)	Length of fruit (cm)	Widths of fruit (cm)	Number of fruit per plant	Weight of per fruit (g)	Fruit yield per plant (kg)
GCA	F_1	9	12.401**	44.227**	1.501**	10.061**	4.440**	36.891**	28.288**	3.653**	5574.033**	0.520**
	F_2	9	9.105**	32.327**	0.389*	4.732**	3.358**	38.346**	24.835**	11.581**	3667.399**	0.990**
SCA	F_1	45	9.005**	65.855**	1.506**	8.121**	9.570**	6.710**	4.539**	8.247**	771.754**	0.847**
	F_2	45	10.417**	77.555**	0.999**	10.687**	9.926**	7.027**	5.118**	8.600**	952.848**	1.007**
Error	F_1	108	0.362	0.361	0.216	0.388	0.272	0.250	0.275	0.270	23.137	0.181
	F_2	108	3.137	0.406	0.161	0.245	0.267	0.287	0.272	0.341	17.646	0.153
σ^2 GCA	F_1	9	1.003	3.656	0.107	0.806	0.347	3.053	2.334	0.282	462.575	0.028
	F_2	9	0.497	2.660	0.019	0.374	0.258	3.172	2.047	0.937	304.146	0.070
σ^2 SCA	F_1	45	8.643	65.494	1.290	7.733	9.299	6.460	4.264	7.977	748.617	0.666
	F_2	45	7.280	77.149	0.837	10.442	9.659	6.740	4.846	8.259	935.202	0.854
$\sigma^2 g/\sigma^2 s$	F_1		0.116	0.056	0.083	0.104	0.037	0.473	0.548	0.035	0.618	0.042
	F_2		0.068	0.034	0.023	0.036	0.027	0.471	0.422	0.113	0.325	0.082
$(\sigma^2 s/\sigma^2 g)^2$	F_1		2.936	4.226	3.471	3.101	5.198	1.454	1.351	5.345	1.272	4.879
	F_2		3.834	3.423	6.594	5.270	6.086	1.457	1.539	2.975	1.754	3.492

* and ** indicate significance of value at P=0.05 and 0.01, respectively

diallel cross analysis has been extensively used in many self and cross pollinated crops. In the present study this technique was employed to investigate the nature and magnitude of gene action along with related parameters through component and combining ability analysis. The estimated help in the selection of suitable parents for their use in hybridization programmed and appropriate breeding procedure for further improvement. Analysis of variance showed highly significant differences for all the characters among the treatments. The orthogonal partitioning of treatment of parents, F_1s, F_2s, parents *vs* F_1s, parents *vs* F_2s and F_1s *vs* F_2s were also highly significant for all the characters except for parents *vs* F_2s (number of branches per plant) and significant for parents *vs* F_2s (fruit yield per plant).Wide range of variability was observed for all the characters for parents, F_1s and F_2s population. Analysis of variance for combining ability showed significant values both for GCA and SCA variances is based on both the generation. Additive gene action was observed for days to flowering and number of branches per plant. Other characters showed the preponderance role of non-additive gene for controlling the traits in both the generations. Hayman (1954), combining ability analysis by Griffing (1956) method II and model I. Analysis of variance showed highly significant differences for all the characters among the treatments (Table 1 and 2).

REFERENCES

Aswani, R.C. and Khandelwal, R.C. (2005). Combining ability studies in brinjal. *Indian J. Hort.*, **62** (1) : 37-40.

Bisht, G.S., Singh, M.C., Singh, Major, Singh, S.K. and Rai, M. (2006). Combining ability analysis in brinjal (*Solanum melongena* L.). *Veg. Sci.*, **33** (1): 68-70.

Griffin, B. (1956). A generalized treatment of the use of diallel cross in quantitative inheritance. *Heredity,* **10**: 31-50.

Hayman, B.I. (1954). The analysis of variance of tables diallel. *Biometrics,* **10** : 235-244.

Hay Joshi, A.K. and Chadha, M.L. (1991). Combining ability analysis in brinjal. *Indian J. Hort.*, **48** (1) : 42-47.

Kailash, Ram and Singh, P. (2008). Status of combining ability in relation to other genetic parameters in egg plant. *Internat. J. Plant Sci.*, **3** (2) :577-581

Patel, J.A., Godhani, P.R. and Fougat, R.S. (1994). Combing ability analysis in brinjal (*Solanum melongena* L.). *Gujarat Agric., Univ. Res. J.*, **19** (2):72-77.