Annals of Plant and Soil Research 16(1): 53-56 (2014)

GENOTYPIC AND PHENOTYPIC CORRELATION STUDY IN BRINJAL GENOTYPES

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Received: August, 2013, Revised accepted: January, 2014

ABSTRACT

The study on the 20 genetically diverse genotypes was carried out in kharif season of 2007 at Jobner (Jaipur) for computing genotypic and phenotypic coefficients of correlation in brinjal (Solanum melongena L.) for yield and its contributing characters. In majority of characters, genotypic correlation coefficient was found to be higher in magnitude than phenotypic correlation coefficient. There was strong correlation between plant height and fruit yield. The leaves per plant, fruits per plant and branches per plant had significant and positive correlation with fruit yield. However, it exhibited non significant positive association with days to flowering and days to first picking.

Keywords: Genotypic, phenotypic correlation, brinjal genotypes

INTRODUCTION

Brinjal (*Solanum melongena* L.) is one of the most important vegetable crops grown round the year in India except at higher altitude. It is grown for its immature, unripe fruits which are used in the variety of ways as cooked vegetable in curries. It is popular among people of all social strata and hence, it is rightly called as vegetable of masses (Patel and Sarnaik, 2003). Brinjal belongs to family *solanaceae* is normally a self fertilized annual or week perennial. In terms of production, India ranks second after China in the world (Mittal, 2007). Brinjal fruits are quite high is nutritive value and can justifiably be compared with tomato. Brinjal is a good source of vitamins like A, B and C. Bitterness in brinjal is due to the presence of glycoalkaloides with one of wide occurance in solanaceae family. The correlation coefficient analysis measure the mutual relationship between various plant characters and determines the component characters on which selection can be based for genetic improvement in yield. Correlations although give information about the components of a complex character like yield, they do not provide an exact picture of relative importance of direct and indirect influences of the component traits towards the yield. Therefore, the present investigations were carried out, to generate such information for brinjal.

MATERIALS AND METHODS

The experiment was laid under randomized block design with three replication at Horticulture farm, Department of Horticulture, S.K.N College of Agriculture, Jobner (Jaipur) during *khari*f season of 2007. The experimental material comprised of twenty genotypes : Neelam Long, BR-112, Pusa Purple Long , Pusa Purple Round, Dolly-5, KT-4, Hisar Pragati, Pusa Kranti, Pusa Ankur, HLB-25, Pant Rituraj, Rajendra Brinjal-2, Ram nagar Giant, DBSR-31, Local-1, Hisar Brinjal-1, Rajendra Brinjal-64, Azad Kranti, Punjab Sadabahar and Hisar Shaymal were tested. Thirty days old healthy seedilings of each entry were transplanted during first week of August at a spacing of 75 cm between rows and 60 cm between the plants. Recommended agronomic package of practices and plant protection measures were adopted timely to raise the crop successfully. Five plants were selected at randomly in each plot to recorded the observation on various parameters i.e. plant height, branches per plant, leaves per plant, days to first flowering, days to first picking, number of picking, fruits per plant, average fruit weight, yield per plant and iron content in fruit. The correlation coefficients were computed by the formulae suggested by Johnson *et al*. (1955).

RESULTS AND DISCUSSION

Estimates of different genetic parameters are presented in Table 1. Results showed that the high GCV and PCV were recorded for average weight of fruit, which indicated the presence of high amount of genetic variability for this characters, thus selection may be more effective for this character because the response to selection is directly proportional to the variability present in the experimental material. The results were supported by Singh and Kumar (2005) and Kushwah and Bandhyopadhya (2005). The moderate value of GCV and PCV for yield per plant and number of fruits per plant was observed indicating moderate variability for this character. On the other hand, low value of GCV and PCV were noted for remaining characters which indicated that selection might not be effective for these characters.

Table 1: Mean, range, genotypic and phenotypic coefficient of variation, heritability (bs) and genetic advance as percentage of mean for different characters in brinjal

Characters	Mean	Range	SEm±	Variation		Coefficient of Variation		Heritability in broad sense (%)	GA	GA as %age of mean
				Geno-typic	Pheno-typic	Geno-typic	Pheno-typic			
Plant height at harvest (cm)	83.57	70.87-125.17	2.10	191.84	205.11	16.57	17.13	93.53	27.59	33.01
Branches per plant	7.35	5.07-10.08	0.14	1.65	1.71	17.49	17.80	96.56	2.60	35.42
Leaves per plant	31.55	21.37-54.87	1.12	53.85	57.60	23.25	24.05	93.49	14.61	46.33
Days to first flower	69.60	52.47-82.17	1.65	50.30	58.42	10.19	10.98	86.09	13.55	19.47
Days to first picking	89.41	70.17-109.30	1.99	91.17	103.07	10.67	11.35	88.45	18.49	20.69
Number of picking	4.61	2.97-6.10	0.19	0.67	0.78	17.79	19.20	85.87	1.56	33.96
Fruits per plant	10.49	5.42-27.97	0.18	30.88	30.97	52.95	53.03	99.70	11.43	108.92
Average weight of fruit (g)	107.04	41.33-613.70	4.42	14686.18	14744.87	113.21	113.44	99.60	249.14	232.76
Yield per plant (kg)	1.03	0.35-3.03	0.009	0.45	0.48	65.81	67.52	94.98	1.36	132.12
Iron content in fruit (ppm)	70.57	59.0-110.20	1.26	164.18	168.93	18.15	18.41	97.18	26.02	36.87

The estimates of heritability were high for all the characters and ranged from 85.87 per cent (number of picking) to 99.70 per cent (fruits per plant). The high heritability indicates that the characters were less governed by environmental factors. High heritability along with high estimates of GCV, genetic advance and genetic gain was observed for average weight of fruit. Similar results were also reported by Sharma and Swaroop (2000). Expected genetic advance and its estimates as percentage of mean for various characters revealed that average weight of fruit, yield per plant and fruits per plant had high genetic advance, whereas leaves per plant, iron content in fruit, branches per plant, number of picking and plant height showed moderate values of genetic advance. The low values of genetic advance were noted for days to first flower and days to first picking. The estimates of heritability along with genetic advance were more reliable than heritability alone for predicting the effect of selection. High heritability coupled with high genetic advance was recorded for average weight of fruit, fruits per plant and yield per plant which indicated the major role of additive gene action in inheritance of these characters and would be improved through simple selection. This view was supported earlier by Negi *et al*. (2000). The high heritability and low to moderate genetic advance values were observed in other characters namely days to first flower, days to first picking, plant height, branches per plant, leaves per plant, number of picking and iron content in fruit revealed the major role of non-additive gene action in the transmission of these characters from parents to offspring's.

The genotypic and phenotypic correlation coefficients between different characters are presented in Table 2 and 3, respectively. In majority of the characters, genotypic correlation coefficient was found to be higher in magnitude than phenotypic correlation coefficient, indicating a strong inherent association among various characters. Plant height recorded non significant positive correlation with branches per plant, leaves per plant, days to first flower, days to first picking and average weight of fruit and non significant negative correlation with number of picking, fruits per plant and iron content in fruit at both genotypic and phenotypic level. However, strong positive correlation was found between plant height and fruit yield. This indicated that tall plants have favoured synthesis of growth promoting hormones and thus encouraged production of more number of branches and fruits per plant and hence this trait can be used for selection of potential yielders. Positive and significant association of these characters with fruit yield per plant were in accordance with earlier showed non significant positive correlation with leaves per plant, days to first flower, days to first picking, fruits per plant and average weight of fruit and non significant negative correlation with iron content in fruit at both genotypic and phenotypic level. Similar results were observed by Nalini *et al.*, (2009) for average weight of fruit, fruits per plant and fruit yield per plant. Positive and significant association of branches per plant with number of picking and fruit yield at both the levels were also reported by Prabhu and Natarajan (2008) and Prabhu *et al.*, (2008).

Table 2 Genotypic correlation coefficients between different characters in brinjal

Characters	Plant height at harvest	Branches per plant	Leaves per plant	Days to first flower	Days to first picking	Number of pickings	Fruits per plant	Average weight of fruit	Yield per plant	Iron content in fruit
Plant height at harvest	1.000	0.048	0.210	0.141	0.018	-0.043	-0.038	0.707	0.612**	-0.277
Branches per plant		1.000	0.725	0.228	0.244	0.759**	0.116	0.026	0.223**	-0.084
Leaves per plant			1.000	0.261	0.295	0.623**	0.408**	0.150	0.463**	-0.255
Days to first flower				1.000	1.026	0.134	-0.094	0.045	0.023	0.026
Days to first picking					1.000	0.140	-0.050	0.007	0.042	0.031
Number of pickings						1.000	0.494**	-0.222	0.153**	-0.014
Fruits per plant							1.000	-0.218	0.409**	-0.063
Average weight of fruit								1.000	0.746**	-0.099
Yield per plant									1.000	-0.064
Iron content in fruit										1.000

*** Significant at P = 0.05 level of significance*

Leaves per plant had significantly higher correlation with number of pickings, fruits per plant and yield per plant and non significant positive correlation with days to first flower, days to first picking and average weight of fruit at genotypic and phenotypic level. On the other hand, the correlation was non significantly negative between leaves per plant and iron content in fruit at both the levels. Days to first flowering showed non significant negative relationship with fruits per plant at genotypic and phenotypic level. Similar observations have been reported by Prabhu *et al.,* (2008) and Nalini *et al.,* (2009). The same trend was observed for days to first picking. On the other hand, days to first flowering had non significant correlation with days to first picking, number of picking, average weight of fruit, yield per plant and iron content in fruit at both levels. Early flowering has affected the vegetative growth and thereby the branches per plant. This indicates that early maturity has no added advantage in increasing fruit yield. Number of picking had significantly high correlation with fruits per plant and fruit yield at genotypic level but was non significant at phenotypic level, while with average weight of fruit and iron content in fruit showed non significant negative relationship at both the levels. Fruits per plant and average weight of fruits were positive and strongly correlated with the yield per plant at both the levels. This indicating that more number of fruits per plant have utilized the available photosynthetic and increased mean fruit weight results in increased yield. These results are in accordance with Shinde *et al.,* (2012).

Table 3: Phenotypic correlation coefficients between different characters in brinjal

Characters	Plant height at harvest	Branches per plant	Leaves per plant	Days to first flower	Days to first picking	Number of pickings	Fruits per plant	Average weight of fruit	Yield per plant	Iron content in fruit
Plant height at harvest	1.000	0.050	0.189	0.088	0.035	-0.024	-0.037	0.686	0.573**	-0.263
Branches per plant		1.000	0.698	0.191	0.236	0.680**	0.113	0.025	0.208**	-0.092
Leaves per plant			1.000	0.235	0.281	0.538**	0.396**	0.145	0.422**	-0.244
Days to first flower				1.000	0.861	0.128	-0.086	0.047	0.022	0.031
Days to first picking					1.000	0.097	-0.042	0.003	0.024	0.031
Number of pickings						1.000	0.458	-0.205	0.150	-0.003
Fruits per plant							1.000	-0.217	0.399**	-0.062
Average weight of fruit								1.000	0.727**	-0.096
Yield per plant									1.000	-0.063
Iron content in fruit										1.000

** *Significant at P = 0.05 level of significance*

Fruit yield per plant showed significant positive correlation with average weight of fruit (0.746 and 0.727) followed by plant height (0.612 and 0.573), leaves per plant (0.463 and 0.422), fruits per plant (0.409 and 0.399) and branches per plant (0.223 and 0.208) at genotypic and phenotypic level, respectively and number of picking (0.153) was significant only at genotypic level. However, it exhibited non significant positive association with days to flowering (0.023 and 0.022) and days to first picking (0.042 and 0.024) at both the levels, respectively. On the other hand, number of picking (0.150) exhibited weak association at phenotypic level. The present findings are in conformity with

those of Lokhare *et al.,* (2008) and Bansal and Mehta (2008). Study of Nalini *et al.,* (2009) showed fruit the yield was significantly positively correlated with branches per plant fruits per plant and fruit weight. Yield per plant has significant positive correlated with average fruit weight and plant height as reported by Shinde *et al.,* (2012).

It can be concluded that Ram Nagar Giant produced tallest plants at harvest and higher fruit weight and yield of fruita. Besides these characters are of great importance and must be considered for selection of superior Segregants in further breeding programme.

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