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Genetic variability, correlation coefficient and path coefficient analysis in brinjal germplasm

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Abstract
Eggplant (*Solanum melongena* L.), having wide variability, offers a good deal of opportunity for genetic improvement. Wide variation occurred for different quantitative traits. Analysis of variance revealed significant variation for all the quantitative characters. High genotypic coefficient of variation (GCV) was observed in fruit length, fruit diameter, number of fruits/plant, fruit weight and marketable yield/plant. The characters fruit length, fruit diameter, fruit weight and number of fruit/plant shows high heritability, along with high genetic advance as percent over mean which indicated inheritance of those characters is controlled mainly by additive genes, and selection based on phenotypic performance may prove useful. Number of branches/plant, fruit diameter and marketable yield/plant had significantly positive genotypic correlations with total yield/plant. Out of ten yield component traits, marketable yield/plant followed by fruit weight and number of fruits/plant exhibited highly positive direct effects on total yield/plant. These traits should be used to improve fruit yield of brinjal.

Keywords: *Solanum melongena*, genetic variability, heritability, correlation, path coefficient

Introduction
Brijal (*Solanum melongena* L.) is extremely variable in habit and appearance. Extensive use of local landraces, or non-selfed seed of improved varieties, and biotic factors have resulted in reduction in optimum productivity of eggplant in India. Its center of origin was in the India and China is believed to be the secondary centre of origin. Many landraces/varieties having extensive variability are cultivated in different parts of India and some of the variations are so localized that their cultivation beyond the particular zone is completely unknown. Extensive collection, and evaluation of germplasm to identify superior types having desirable horticultural traits, conservation, and utilization of diversity, are important in improvement of this crop. Genotypes of eggplant have been characterized (Chattopadhyay *et al*., 2011 and Begum *et al*., 2013) [6, 3].

Variability is a combined measure of genetic and environmental causes. The heritable variability, and more particularly its genetic component, is clearly the most important aspect of the genetic constitution of the breeding material, which has a close connection on its response to selection. A measure of heritability and genetic advance give an idea about the expected gain in next generation. High yield can be achieved by selection of characters that have high heritability coupled with genetic advance. Selection of one trait invariably affects a number of associated traits which evokes the necessity of determining inter-relationships of various yield components among them and with yield.

Materials and Methods
Thirty eight genotypes of brinjal, collected from different sources, were tested and evaluated at the Vegetable Research Centre, Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, India (29.50° N latitude and 79.30° E longitude at a distance above mean sea level of 243.84 m).

Seed beds were prepared in a sandy loam soil, pH 7.3, and were 20 cm high and 1.0 m wide. Weathered cowdung manure at 4 kg·m^{-2} was mixed into the beds. The soil was drenched with 0.2% chlorothalonil and 0.1% carbendazim to avoid damping off disease.

Seed, after treatment with Thiram® (3.0g kg^{-1} of seed), were sown on 28 June 2016, at a depth 1.0 cm, at a 5.0 cm spacing, and covered with finely sieved well rotted leaf mold (leaves left to decompose for 2 years) to add organic matter and prevent the soil from drying. After sowing, beds were covered with straw until germination which normally takes 5 to 7 days and were hand watered daily up to the 3rd week of July 2016. The beds were covered with 200 µm ultraviolet (UV)-stabilized clear polyethylene film supported by bamboo poles with open sides to protect seedlings from rain and direct sunlight. Seedlings were hardened by withholding water 4 days before transplanting. Thirty-day old seedlings were transplanted to the field on 28 July 2016. Genotypes were arranged in a randomized complete block design with 3 replications at a 75 × 60 cm spacing with 30 plants in each replication in a 3.75 × 3.6 m plot. Fertilizer at the rate of 75N-75P-75K kg·ha^{-1} was applied pre plant to the soil. Nitrogen was from urea, P was from single-super phosphate and K was from muriate of potash. Additional nitrogen at the rate of 37.5 kg·ha^{-1} was applied in 2 equal split doses at 30 and 55 days after transplanting. Standard agronomic practices were followed in time (Chattopadhyay *et al*., 2007) [5].

Fifteen plants were chosen at random from each plot for recording observations on number of branches/plant, days to 50% flowering, plant height (cm), days to first fruit harvest, fruit length (cm), fruit diameter (mm), number of fruits/plant, fruit weight (g), marketable yield/plant (kg) and total yield/plant (kg). The data were subjected to analysis of variance as per described by Panse and Sukhatme (1967) [17]. Heritability in broad sense and genetic advance (GA), as percent of mean, was estimated (Hanson *et al*., 1956) [10]. Correlation coefficients at genotypic and phenotypic levels were calculated (Johnson *et al*., 1955) [12]. Path coefficient analysis (Dewey and Lu, 1959) [8] was used to partition the genotypic correlation into direct and indirect effects.

Result and Discussion

Mean sum of square due to genotypes was found highly significant for most of the traits (Table 1). The co-efficient of variation was below 15%, for all characters under study confirming the reliability of the experiment. Measurement of variation in this particular environment indicated comparatively lesser influence of environment for expression of characters, which was expected for a self-pollinated crop. The genotypes expressed heritable differences for the characters.

Table 1: Analysis of variance for fruit yield and component characters of brinjal genotypes.

Source of variation	Number of branches/plant	Days to 50% flowering	Plant height (cm)	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (mm)	Number of fruit/plant	Fruit weight (g)	Marketable yield/plant (kg)	Total yield/plant (kg)
Replication (2)	8.55	25.65	1632.83	20.62	4.67	477.34	162.25	194.42	0.77	30951.68
Treatment (37)	1.55 **	64.14**	333.58 **	38.90**	62.15 **	719.01**	339.62**	6355.7**	0.48*	17976.00*
Error (74)	0.75	17.56	43.77	17.31	2.40	31.00	27.33	663.59	0.28	10974.28
CV%	10.68	9.24	11.17	6.37	11.03	12.56	14.15	12.21	13.19	14.90

*, ** significant at P≤0.05 and P≤0.01, respectively

The genotypic coefficient of variation (GCV) measures the range of genetic variability in a character and provides a measure to compare genetic variability present in various characters. Heritable variation cannot be measured using GCV alone. In general, the magnitude of phenotypic coefficient of variation (PCV) was higher than genotypic coefficient of variation (GCV) for all characters under study. For all these traits differences between GCV and PCV was less. This indicates minimum effects of this particular environment on expression of characters. In this experiment high genotypic coefficient of variation (GCV) was observed in fruit length, fruit diameter, number of fruits/plant, fruit weight and marketable yield/plant. Higher phenotypic coefficient of variation occurred for fruit length, fruit diameter, number of fruits/plant, fruit weight, marketable yield/plant, and total yield/plant. High GCV and PCV values for characters under study were reported by Patel *et al.* (2004) [18] utilizing different genotypes and different environmental conditions. Similar results could be drawn from the magnitude of coefficient of variation for the characters.

A high proportion of GCV to PCV is desirable in selection because it indicates traits are under genetic, rather than, environmental control (Kaushik *et al*., 2007) [13]. The proportion of GCV in PCV in this study was generally high for plant height, fruit length, fruit diameter, number of fruits/plant and fruit weight indicating the potential of simple selection for improvement of these characters. Traits whose expressions are environmentally dependent may not be reliable descriptors for morphological characterization (Samaee *et al*., 2003) [19]. In this study the proportion of genetic contribution to overall phenotypic expression of most traits was high. Their use as important discriminatory variables for brinjal classification seems relatively reliable.

Heritability is of interest to plant breeders as a measure of the value of selection for a particular character in various types of progeny, and as an index of transmissibility of characters from parent to offspring (Hayes *et al*., 1955) [11]. The concept of heritability is important to evaluate relative magnitude of effects of genes and environments on total phenotypic variability. For this reason, Burton (1952) [4] stated that genetic variability, along with heritability, should be considered to assess the maximum and accurate effect of selection.

Table 2: Mean of different characters of brinjal genotypes.

Genotype	Number of branches/ plant	Days to 50% flowering	Plant height (cm)	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (mm)	Number of fruits/plant	Fruit weight (g)	Marketable yield/plant (kg)	Total yield/plant (kg)
Pusa Bhairav	6.44	38.67	82.62	59.33	16.08	58.88	19.50	125.67	1.88	2.44
Puas Purple Cluster	5.22	44.00	79.40	64.00	12.44	35.16	42.73	36.83	1.28	1.60
Pusa Purple Round	4.77	54.33	91.67	75.33	10.48	80.99	8.76	194.63	1.09	1.84
PB-70	5.66	45.33	94.07	66.00	11.32	49.52	27.65	149.41	1.52	2.65
SMB-115	6.22	47.33	91.87	67.33	12.36	50.70	36.08	71.57	1.98	2.38
PB-111	6.67	42.67	91.80	65.33	15.19	39.42	20.85	97.67	1.82	2.13
Pusa Uttam	6.22	45.33	74.90	63.33	9.22	68.73	14.09	150.06	1.37	2.10
Pusa Anupam	5.22	47.33	75.73	65.33	14.64	42.48	25.33	69.01	1.26	1.72
Pusa Bindu	4.00	38.00	82.67	60.67	8.49	69.24	17.05	111.29	1.23	1.81
Pusa Shyamla	5.77	43.33	73.07	64.67	15.44	44.52	38.77	61.36	1.96	2.33
Pusa Kaushal	5.44	44.00	71.13	64.00	16.78	48.45	42.87	68.42	2.45	2.87
Arka Shrish	4.89	53.00	97.22	69.33	19.22	27.55	6.01	110.64	0.91	1.13
White-154	6.33	42.00	80.60	64.00	7.16	49.74	31.52	59.20	1.20	1.67
Arka Neelkanth	4.44	47.33	83.44	65.33	18.39	32.14	15.03	62.90	0.83	0.98
Pusa Purple Long	5.89	38.00	59.53	64.00	20.11	34.10	25.60	72.45	1.22	1.80
Pusa Ankur	5.89	39.33	81.47	63.33	9.50	67.88	14.30	110.45	1.11	1.74
Tara BWX	6.55	49.33	92.07	68.67	15.57	38.35	19.03	79.61	1.19	1.61
Muktakeshi	4.78	51.00	92.18	70.00	12.86	76.28	11.00	184.87	1.41	2.07
BRLVAR-11	5.77	44.00	96.67	64.67	10.14	50.68	12.78	146.64	1.50	1.99
KS-331	5.55	43.33	92.13	64.00	16.18	41.06	17.78	99.80	1.23	1.78
PLP1	6.11	47.33	83.00	62.67	9.44	49.93	39.35	54.18	1.71	1.89
Debmallika	5.55	48.67	81.67	61.33	10.80	77.76	13.01	168.48	1.52	2.10
GBL-1	6.00	45.00	74.27	64.00	18.33	40.26	34.14	71.20	1.93	2.30

Table 2: Contd….

Genotype	Number of branches/ plant	Days to 50% flowering	Plant height (cm)	Days to first fruit harvest	Fruit length (cm)	Fruit diameter (mm)	Number of fruits/plant	Fruit weight (g)	Marketable yield/plant (kg)	Total yield/plant (kg)
BARI	5.53	50.67	90.47	70.00	24.95	42.34	15.68	121.31	1.57	1.90
IBWL-2001-1	4.78	41.33	65.07	62.00	12.90	30.46	24.10	50.71	0.69	1.29
PB-6	4.89	43.00	88.87	64.00	19.38	44.53	19.47	104.08	1.38	2.15
PB-4	6.11	45.00	77.33	64.00	18.45	46.95	16.82	98.29	1.16	1.60
WB-1	3.78	54.33	88.07	74.00	8.44	58.72	13.15	146.04	0.96	1.48
PB-72	4.44	56.67	73.93	74.67	7.37	80.85	6.80	190.02	0.77	1.29
Green Cluster	4.87	43.00	74.70	62.67	8.37	71.27	13.32	136.68	0.81	1.85
Lal Teer	5.32	47.33	95.20	64.67	18.56	36.92	17.97	118.17	1.41	2.00
PB71	5.22	47.33	83.53	64.00	12.44	65.74	16.40	146.77	1.40	2.01
BB-85	6.44	45.00	74.07	64.67	13.34	50.55	40.15	49.42	1.23	1.70
Swarna Abhinav	5.00	45.00	79.37	65.33	12.84	36.21	35.60	42.65	1.22	1.55
Niranjan	6.33	41.67	117.73	62.67	24.76	44.57	11.03	183.96	1.08	1.75
DBL-02	5.66	44.00	78.80	62.67	16.35	50.63	15.38	110.42	1.03	1.69
Pusa Kranti	6.00	39.33	87.27	64.00	15.92	59.01	13.87	167.75	1.69	2.40
Pusa Upkar	5.44	39.67	89.03	64.00	9.27	81.32	13.61	156.65	1.30	2.14
LSD ($P \leq 0.05$)	0.95	6.81	15.24	6.77	2.52	10.61	5.23	21.85	0.29	0.52

High heritability in the broad sense indicates less influence by environment in the expression of characters. Broad sense heritability values were higher for fruit length, fruit diameter, plant height, number of fruits/plant and fruit weight which support findings of Ambade *et al.* (2013) [1] and Manpreet *et al.* (2013) [15]. Heritability is the percent of phenotypic variance attributed to genetic variance. High heritability indicates environmental influence is minimal on characters; the characters can be used for selection. Low heritability occurred in days to first fruit harvest, number of primary branches/plant and total yield/plant (Table 3). Days to 50% flowering and marketable yield/plant had moderate heritability. Moderate heritability value in days to 50% flowering was reported by Patel *et al.* (2004) [18]. Low heritability implies characters were under the influence of predominantly non-additive gene action. Days to first fruit harvest, number of branches/plant, total yield/plant was comparatively less reliable for direct selection in crop improvement.

Genetic advance (GA) is the improvement over the base population that can be potentially achieved from selection. It is not necessarily true that high heritability would always exhibit high genetic advance. For this reason, Johnson *et al.* (1955) [12] stated that heritability in combination with genetic advance would be more reliable for predicting effects of selection because genetic advance depends on amount of genetic variability; magnitude of masking effect of genetic expression (environmental influence), and intensity of selection. In the present study, genetic advance was very high for plant height, fruit length, fruit diameter, number of fruits/plant, fruit weight and marketable yield/plant (Table 3). High genetic advance for fruit length, fruit diameter, plant height, number of fruits/plant, and fruit weight have been previously reported by Lokesh *et al.* (2013) [14] and Chaudhary and Kumar (2014) [7]. High heritability, linked with high genetic advance indicates predominance of additive gene effects and effectiveness of direct selection for that trait.

Estimates of heritability with genetic advance are more reliable and meaningful than individual consideration of the parameters. Low heritability, coupled with low genetic advance for days to first fruit harvest and number of branches/plant indicates predominance of environmental effects and selection for corresponding traits would not be successful. High heritability, along with high genetic advance as percent over mean, were recorded for fruit length, fruit diameter, fruit weight and number of fruits/plant which indicated inheritance of those characters is controlled mainly by additive genes, and selection based on phenotypic performance may prove useful.

Correlation of yield and its components, and with other economically important traits, is necessary for making selection in a breeding population. It provides advantages of selection for more than one character at a time. Direct selection for yield may not be effective because it is controlled by polygene and also highly influenced by environment, so it would be necessary to have an adequate knowledge about the correlation between different components as well as correlation of these components with yield. Most correlation coefficients at the genotypic level were greater than corresponding phenotypic ones (Table 4). The higher values of genotypic, than phenotypic, correlation indicated genotypic effects were more important that environmental factors (Falconer, 1988) [9]. In the present investigation only number of branches/plant, fruit diameter and marketable yield/plant had significantly positive genotypic correlations with total yield/plant (Table 4). Phenotypically number of fruits/plant and marketable yield/plant were positively, and significantly, correlated with total yield/plant. This indicates that selection for these traits would be effective to improve total yield/plant in eggplant. This indicated that more branches, number of fruits/plant, and high fruit diameter, high marketable yield/plant helped to improve fruit yield/plant. Positive, significant, correlations of number of fruit/plant and fruit diameter on total yield/plant were obtained with other genotypes and environmental conditions by Muniappan *et al.* (2010) [16], Arunkumar *et al.* (2013) [2] and Samlindsujin *et al.* (2017) [20].

The higher magnitude of positive, direct effects, for number of fruits/plant, fruit weight and marketable yield/plant on total yield/plant indicates true, positive, and significant association (Table 4). Direct selection for these traits would be useful for improving yield. High direct effects of number of fruits/plant, fruit weight on total yield/plant were obtained with dissimilar genotypes and variable climate by Muniappan *et al.* (2010) [16] and Samlindsujin *et al.* (2017) [20]. The residual effect was low indicating inclusion of maximum total yield/plant influencing characters in the analysis.

Table 3: Estimation of different genetic parameters of different characters.

Character	Mean	GCV[a] (%)	PCV[b] (%)	GCV:PCV[c]	Heritability (%) in broad sense	Genetic advance as (%) over mean
Number of branches/plant	5.50	9.33	18.37	50.62	25.80	9.75
Days to 50% flowering	45.32	8.69	12.69	68.47	46.91	12.26
Plant height (cm)	83.86	11.72	14.12	83.00	68.81	20.02
Days to first fruit harvest	65.26	4.11	7.58	54.22	29.35	4.58
Fruit length (cm)	14.04	31.78	33.65	94.44	89.24	61.82
Fruit diameter (mm)	51.94	29.15	31.06	93.85	88.09	56.36
Number of fruits/plant	21.23	48.06	54.01	88.98	79.20	88.12
Fruit weight (g)	109.98	39.60	46.01	86.06	74.08	70.22
Marketable yield/plant (kg)	1.35	21.65	38.08	56.85	32.33	25.35
Total yield/plant (kg)	1.89	13.69	31.14	43.96	19.32	12.36

[a] GCV = Genotypic coefficient of variation
[b] PCV = Phenotypic coefficient of variation
[c] GCV: PCV = Ratio of genotypic coefficient of variation and phenotypic coefficient of variation

Table 4: Genotypic and phenotypic correlations and direct effects of characters at phenotypic level on total yield/plant.

Characters	rg with total yield/plant[a]	rp with total yield/plant[b]	Direct effect on total yield/plant[c]
Number of branches/plant	0.604**	0.304	-0.027
Days to 50% flowering	-0.322	-0.325*	-0.186
Plant height (cm)	-0.191	0.230	0.076
Days to first fruit harvest	-0.347*	-0.237	-0.038
Fruit length (cm)	-0.034	0.072	0.030
Fruit diameter(mm)	0.347*	0.177	0.096
Number of fruits/plant	0.273	0.374*	0.382
Fruit weight (g)	0.154	0.185	0.421
Marketable yield/plant (kg)	0.918**	0.834**	0.625

*, ** significant at P≤0.05 and P≤0.01, respectively.
[a] rg = Genotypic correlation coefficient.
[b] rp = Phenotypic correlation coefficient.
[c] Residual effect: 0.06

Conclusion

Significant variability and diversity are present in the brinjal germplasm for yield and yield related characters. Emphasis should be given on characters number of fruits/plant, fruit weight, fruit diameter and marketable yield/plant for selecting high yielding genotypes in brinjal. Based on overall performance more importantly for total yield per plant as well as days to 50% flowering and days to first fruit harvest, Pusa Kaushal, Pusa Bhairav, Pusa shyamla, PB-70 and Debmallika are expected to perform better if used in brinjal breeding programme for development of early and high yielding variety for *tarai* region of Uttrakhand. Hence, such genotypes can be used in hybridization programme for further improvement of yield and related characters in brinjal.

References

1. Ambade RL, Sahu M, Sahu KK, Mehta N. Heritability and genetic advance of yield and its components in brinjal (*Solanum melongena* L.). Asian J Bio. Sci. 2013; 8(2):234-236.
2. Arunnkumar B, Kumar SV, Prakash CG. Genetic variability and divergence studies in brinjal (*Solanum melongena* L.). Bioinfolet. 2013; 10(2B):739-744.
3. Begum F, Islam AA, Rasull GM, Mian, KM, Hossain MM. Morphological diversity of eggplant (*Solanum melongena* L.) in Bangladesh. Electronic J Food Agric. 2013; 25(1):45-51.
4. Burton, GW, Devane EM. Estimating heritability in tall Fescue (*Festuca arunidinacea*) from replicated clonal material. Agron. J. 1953; 45:478-481.
5. Chattopadhyay A, Dutta S, Bhattacharya I, Karmakar K, Hazra, P. Dolichos bean, In: *Technology for Vegetable Crop Production*, Published by All India Coordinated Research Project on Vegetable Crops. BCKV, Nadia, West Bengal, India, 2007; 218-230.
6. Chattopadhyay A, Dutta S, Hazra P. Characterization of genetic resources and identification of selection indices of brinjal (*Solanum melongena* L.) grown in eastern India. Veg. Crops Rsch. Bull. 2011; 74:39-49.
7. Chaudhary P, Kumar S. Variability, heritability and genetic advance studies in egg-plant (*Solanun melongena* L.). Plant Archives. 2014; 14(1):483-486.
8. Dewey DR, Lu KH. A correlation and path coefficient analysis of components of wheat grass seed production. Agron. J. 1957; 51:515-518.
9. Falconer DS. Introduction to quantitative Genetics 2nd Ed. Oliver and Boyd, Edinburg, London, 1981; 164-176.
10. Hanson CH, Robinson HF, Comstock RE. Biometrical studies of yield in segregating population of Korean lespedeza. Agron. J. 1956; 48:268-271.
11. Hayes HK, Immer FR, Smith DC. Methods of plant breeding. 2nd Ed. McGraw Hill, New York, 1955.
12. Johnson HW, Robinson HF, Comstock RE. Genotypic and phenotypic correlation in soybean and their implication in selection. Argon. J. 1955; 47:477-483.
13. Kaushik N, Kumar K, Kumar S, Kaushik N, Roy S. Genetic variability and divergence studies in seed traits and oil content of Jatropha (*Jathropha curcas* L.) accessions. Biomass Bioenerg. 2007; 31:497-502.
14. Lokesh B, Reddy PS, Reddy RVSK, Sivaraj N. Variability, heritability and genetic advance studies in brinjal (*Solanum melongena* L.). Electronic J Pl. Breed. 2013; 4(1): 1097-1100.
15. Manpreet, Dhatt AS, Singh B. Variability, heritability and genetic advance in eggplant (*Solanum melongena* L.) during summer and rainy season. Asian J Bio Sci. 2013; 8(2):200-204.
16. Muniappan S, Saravanan K, Ramya B. Studies on genetic divergence and variability for certain economic characters in eggplant (*Solanum melongena* L.). Electronic J Plant Breed. 2010; 1(4):462-465.
17. Panse VG, Sukhatme PV. Statistical Methods for Agricultural Workers. 2nd Ed. Indian Council of Agricultural Research, New Delhi, 1967, 381.
18. Patel KK, Sarnai, DA, Asati, BS, Trikey T. Studies on variability, heritability and genetic advance in brinjal (*Solanum melongena* L.). Agril. Sci. Digest. 2004; 24(4): 256-259.
19. Samaee SM, Shobbar ZS, Ashrafi H, Hosseini-Mazinani M. Molecular Characterization of olive germplasm in Iran by use of random amplified polymorphic DNA (RAPD): Correlation with phenotypic studies. Acta Hort. 2003; 623:169-175.
20. Samlindsujin G, Karuppaiah P, Manivannan K. Genetic variability and correlation studies in brinjal (*Solanum melongena* L.). Internat. J Plant Sci. 2017; 12 (1):21-27.