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“Study of genetic variability parameter in eggplant (*Solanum melongena* L)”

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Abstract

The experiment was conducted during 2015-16 with 20 diverse genotypes of eggplant in 3 replications. The analysis of variance revealed that sufficient variability was present in the experimental material. The mean fruit yield plot⁻¹ was found the highest in genotypes/varieties PR 5 followed by VR 2, CHBR 2, Azad Kranti, VR 14, IVBL-9 and pant samrat. Study revealed that the phenotypic coefficient of variation was higher than the corresponding genotypic coefficient of variation for all the traits which might be due to the interaction of genotypes with environment.

Keywords: Eggplant, Mean, Variability, GCV, PCV, Heritability, Yield

Introduction

Eggplant (*Solanum melongena* L.), one of the important vegetable crops, belongs to family Solanaceae and referred by various names in different parts of the country as *baigan* (Hindi), *Badanekai* (Kannada), *Vangi* (Marathi), *Katharikai* (Tamil), *Vankai* (Telugu) *etc.* Internationally, it is referred as Aubergine (France). India is regarded as the primary centre of origin/diversity of brinjal. India is the major producer of brinjal in the world followed by China, Turkey, Japan, Egypt, Italy, Indonesia, Iraq, Syria, Spain and Philippines. Brinjal fruits are widely used in various culinary preparations *viz.*, sliced *bhaji*, stuffed curry, *bharta*, *channi*, *vangibhath*, pickles *etc.* Some medicinal uses of brinjal tissues and extract include treatment of diabetes, asthma, cholera and bronchitis and its fruits and leaves are reported to lower blood cholesterol levels (Singh *et al.* 1963) [6]. In India, eggplant occupies an area of 0.81 million hectares with an estimated annual production of 12.20 million tonnes and the productivity stands at 21.08 tonnes per hectare (FAO STAT, 2004) [2].

The genetic variability is a basic tool for crop improvement. Crop breeding programme depends on the availability of genetic variability. It is essential for plant breeder to assess the genetic variability in his genetic stock. Genetic improvement in dependent can be achieved by selecting a character, which is genetic correlated with the dependent character. Genetic improvement is achieved use of induced through component characters with high heritability is either due to linkage or pleiotropy which helps in deciding the appropriate breeding method for crop improvement.

Materials and Methods

The experiment was conducted at Experimental field (Horticulture) Rajola Farm, MGCGVV, Chitrakoot (M.P.) during *kharif* season, 2015-2016 in 3 replications. Distance between row x plant was kept 90 x 60 cm. and Standard agronomic practices were followed throughout the crop growth period to obtain good harvest. The observation was taken for 12 different characters. The Analysis of variance was estimated as per procedure suggested by Panse and Sukhatme, coefficient of variation (GCV and PCV), Heritability for the grain yield and yield components in rice were worked out in broad sence by adopting formula suggested by Burton.

Result and discussion

The analysis of variance indicated significantly higher amount of variability among the genotypes for all the characters studied *viz.*, days to 50 per cent flowering, days to first picking, plant height, number of branches per plant, number of fruits per plant, Average fruit

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weight, fruit yield per plot, fruit length, fruit girth, Internodal length, fruit span. The variation due to replication was non-significant for all the characters studied.

Highest significant variation was observed in fruit yield per ha. (q.) 340.98 followed by fruit weight 92.78 and plant height 86.55.

The character plant height was ranged from 66.55 to 106.45 cm with mean performance of 86.55. The PCV was slightly higher than GCV with medium heritability and genetic advance. Internodal length was ranged between 3.71 to 10.41 cm with mean performance of 6.91 cm. The genotype Kusumkar recorded for maximum internode length.

Number of branches per plant ranged from 3.75 to 8.99 with a mean value of 6.42. Maximum numbers of branches were recorded in 'Kashicomali' and 'Punjab Barsati' have the lowest number branches. The PCV and GCV observed were 24.25 and 21.61 percent respectively. Moderate heritability coupled with low genetic advance over percentage of mean was recorded. For the trait days to 50% flowering value ranged from 52.53 to 68.36 days with mean 58.5. For days to first picking mean was 61.89 with a range of 51.63 to 71.03. The genotype 'Punjab Barsati' recorded for minimum days to first picking. Moderate heritability coupled with low genetic advance as percent over mean was recorded for this trait.

Table 1: Analysis of variance for different characters in 20 brinjal genotype

| S.No | Characters | Mean | Mean sum of square | | | |
|------|-------------------------|--------|--------------------|--------------------|----------------|-------|
| | | | Replicate D.F - 2 | Genotypes D.F - 19 | Error D.F - 38 | Sem |
| 1 | Plant height | 86.55 | 133.54 | 372.492** | 48.225 | 4.0 |
| 2 | Inter nodal length | 6.91 | 1.718 | 372.492** | 0.3766 | 0.35 |
| 3 | No.of branch/plant | 6.42 | 0.446 | 6.329** | 0.553 | 0.43 |
| 4 | Days to 50% flowering | 58.5 | 5.948 | 6.77 | 22.52 | 2.74 |
| 5 | Days to first picking | 61.89 | 15.41 | 78.215** | 24.65 | 2.87 |
| 6 | Fruit span (days) | 61.12 | 37.41 | 57.70** | 31.40 | 3.24 |
| 7 | Fruit per plant | 22.39 | 19.35 | 39.03** | 6.51 | 1.47 |
| 8 | Fruit length (cm) | 9.09 | 1.64 | 24.13* | 0.890 | 0.54 |
| 9 | Fruit Girth (cm) | 5.05 | 0.211 | 8.51** | 0.266 | 0.30 |
| 10 | Fruit weight (g) | 92.78 | 248.99 | 4951.27** | 59.018 | 4.44 |
| 11 | Fruit yield / plot (Kg) | 32.34 | 2.775 | 256.90** | 1.40 | 0.68 |
| 12 | FruitYield / ha (q.) | 340.98 | 11420.98 | 1997423.81** | 74789.28 | 15.78 |

Fruit span days ranged from 49.24 to 66.98 with a mean value of 61.12. Maximum fruit spans was recorded in PR 5 and Punjab IVBL-9 showed the minimum number of fruit spans. The PCV and GCV observed were 10.37 and 4.84 percent respectively. Heritability (BS) of 21.82 percent coupled with low genetic advance over percentage of mean 2.85 per cent were noticed.

Number of fruits per plant was ranged from 13.98 to 26.86 with a mean of 22.39. The maximum fruits per plant of was observed in the genotype 'Punjab Sadabahar' Medium heritability of 62.45 was recorded for this trait. Fruit length's mean of 9.09 cm with a range of 4.36cm to 15.24 cm. The genotype showed longest fruit length in the accession Azad Kranti. The GCV and PCV values were 32.33 and 32.62 slightly differed from each other. The heritability estimate was 89.69 percent with high genetic advance over mean of 59.74 percent. Fruit Girth were range of 3.41 cm to 11.25 cm. The mean of fruit diameter was 5.09 cm. The values of GCV

and PCV were 32.57 & 34.12. The estimate of heritability was high (91.16%) with high genetic advance over mean (64.07%). The mean of fruit weight was recorded 92.78 g with a range of 46.41 g to 208.9 g. The genotype green long have the low weight fruit and high fruit weight was recorded in the accession 'PR 5. The value of 43.52 and 44.31 recorded for GCV and PCV respectively. The heritability was 96.91 percent with high genetic advance over mean of 81.72 %. The mean of fruit yield per plot was 32.34 (Kg) with a range of 20.11 (Kg) to 52.27 (Kg). The genotype 'VR 14' showed the low yield fruit and high fruit yield was recorded in the accession 'PR 5. The mean of fruit yield was by 340.9852 (q) with a range of 204.32(q) to 521.0133 (q.). The genotype 'Hisar Shyamla' should the low yield fruit and high fruit yield was recorded in the accession 'PR 5. The heritability estimate was 89.55 percent with high genetic advance over mean of 156.0583 percent recorded.

Table 2: Different genetic parameters for 20 genotypes in brinjal

| S.No | Characters | Range | | Mean | Variance | | PCV (%) | GCV% | h ² (BS) | Genetic advance as % of mean (%) |
|------|-------------------------|--------|--------|--------|--------------|--------------|---------|-------|---------------------|----------------------------------|
| | | Min. | Max | | σ^2_p | σ^2_g | | | | |
| 1. | Plant height (cm) | 66.55 | 106.45 | 86.55 | 156.31 | 108.09 | 14.45 | 12.01 | 69.15 | 20.58 |
| 2. | Inter nodal length (cm) | 3.71 | 10.41 | 6.91 | 3.40 | 3.03 | 26.69 | 25.17 | 88.96 | 48.90 |
| 3. | No. of branches/plant | 3.75 | 8.99 | 6.42 | 2.48 | 1.92 | 24.52 | 21.61 | 77.69 | 39.24 |
| 4. | Days to 50% flowering | 52.35 | 68.36 | 58.5 | 35.27 | 12.75 | 10.15 | 6.10 | 36.15 | 7.56 |
| 5. | Days to first picking | 51.63 | 71.03 | 61.89 | 42.51 | 17.85 | 10.35 | 6.83 | 41.99 | 9.11 |
| 6. | Fruit span days | 49.24 | 66.98 | 61.12 | 40.17 | 8.77 | 10.37 | 4.84 | 21.82 | 4.66 |
| 7. | No. of fruits/plant | 13.98 | 26.86 | 22.39 | 17.36 | 10.84 | 18.61 | 14.71 | 62.45 | 23.94 |
| 8. | Fruit length (cm) | 4.36 | 15.24 | 9.09 | 8.64 | 7.75 | 32.33 | 30.62 | 89.69 | 59.74 |
| 9. | Fruit Girth (cm) | 3.41 | 11.25 | 5.05 | 3.03 | 2.75 | 34.12 | 32.57 | 91.61 | 64.07 |
| 10. | Fruit weight (g) | 46.41 | 208.09 | 92.78 | 1689.77 | 1630.75 | 44.31 | 43.52 | 96.51 | 88.08 |
| 11. | Yield per plot (Kg) | 20.11 | 52.27 | 32.34 | 86.57 | 85.17 | 28.77 | 28.53 | 98.38 | 58.31 |
| 12. | Yield per hectare (q) | 204.32 | 521.01 | 340.98 | 715667.47 | 640878.19 | 0.24 | 0.23 | 0.89 | 0.45 |

Authors contribution: Conceptualization of research work and designing of experiments (PU); Execution of field/lab

experiments and data collection (PU); Analysis of data and interpretation (PU); Preparation of manuscript (PU, TNA).

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