STUDIES ON GENETIC VARIABILITY, HERITABILITY AND GENETIC ADVANCE IN EGGPLANT (*Solanum melongena* L.)

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Abstract

Twenty eggplant landraces were used to estimate genetic variability, heritability and genetic advance among 12 developmental, growth, yield and yield related attributes during *rabi* 2015. The magnitude of genotypic coefficient of variation were low as compared to phenotypic coefficient of variation indicating the influence of environment in the expression of the observed traits. Highest phenotypic coefficient of variation was recorded for number of fruits per cluster followed by, number of fruits per plant, average weight of fruit and fruit yield per plant suggesting that usefulness of phenotypic selection in improving these traits. The estimates of heritability in broad sense were high for number of fruits per cluster, number of fruits per plant, width of fruit, days to initiation of flowering, length of fruit, fruit yield per plant and days to last picking while the moderate estimates of heritability was recorded for average weight of fruit, days to first picking, plant height and number of primary branches per plant. High heritability coupled with genetic advance was recorded for fruit yield per plant revealed that the presence of lesser environmental influence and prevalence of additive gene action in their expression.

Keywords: landraces, eggplant, genetic advance

Introduction

Eggplant or brinjal (*Solanum melongena* L.) is a herbaceous annual with erect or semi spreading habits. It is a warm season crop, adopted to a wide range of climatic conditions of the country also perennial in nature but cultivated as annual. In India, it is having a production of 134.43 lakh tonnes from an area of 7.22 lakh hectares and with a productivity of 18.6 tonnes per hectare (Anonymous, 2013). In view of very high local preferences for colour, shape, taste, there are specific genotypes suited for specific locality. Although many cultivars and hybrids have been developed and released for cultivation, most of them are not resistant or tolerant to the most important pest of brinjal *viz.*, shoot and fruit borer (*Leucinodes orbonalis* Guenee.) which often cause economic loss of 54 to 60 per cent (Vidhya and Kumar, 2015).

In any crop improvement programme, knowledge of the extent of genetic variability and their heritable nature is essentially important toembark selection based on phenotype (Atta *et al*., 2008). Greater the variability present in the initial material better should be the chances for evolving desired types. A clear understanding of

variability of various quantitative characters of the breeding materials is an asset to the plant breeder for selecting superior genotypes on the basis of their phenotypic expression (Shende *et al*., 2015). Keeping mind on the above mentioned points, the present research was done to figure out the variability parameters of eggplant landraces.

Materials and methods

The experimental material consisted of twenty brinjal land races evaluated in randomized block design with three replications at Plant breeding farm, Department of Genetics and Plant Breeding, Annamalai University, Chidambaram, Tamilnadu during 2015 rabi season. Various brinjal landraces were collected from southern and northern parts of Tamilnadu. Five plants at random were taken from each plot recording the observations on plant height, days to first flowering, number of branches per plant, days to first picking, days to last picking, fruit length (cm), fruit circumference (cm), number of fruits per plant, average fruit weight (g), shoot borer incidence (%), fruit borer incidence (%), fruit yield per plant (kg). The mean over replications for each character was subjected to statistical analysis. Genotypic and phenotypic coefficient of variation was calculated using the formulae suggested by Burton (1952). Broad sense heritability was calculated as per Lush (1949) and genetic advance was estimated by the method suggested by Johnson *et al*. (1955).

Results and discussion

The data obtained from individual plant observations for all characters was utilized for estimating different variability parameters, broad sense heritability and genetic advance. The results pertaining to these aspects are presented in Table 1.

Days to first flower: The genotypes exhibited with a range between 21.33 days to 41.67days. The mean for this trait was 28.76 days. The phenotypic coefficient of variation and genotypic coefficient of variation were 8.32 and 7.02 (low), respectively. Consequently, estimate of heritability was high (72.94) and genetic advance was also high (28.42). Similar result was reported by Sharma and Swaroop (2000).

Plant height: General mean was 96.90cm with a wide range of about 74.93cm to 136cm. The coefficient of variation was 26.32 (Phenotypic) and 23.04 (Genotypic) representing high degree of variation. High values of heritability and genetic advance was recorded 74.35 and 34.21 respectively. The results are in line with the findings of Prabakaran (2010).

Number of branches per plant: This trait exhibited the mean of 10.72 and range from 7.33 to 13.33. The phenotypic co-efficient of variation (20.61) and genotypic co-efficient of variation (18.88) was observed. Number of branches per plant had high to moderate GCV and PCV values. High heritability (82.09) accompanied by high genetic advance (32.06) was noted.

Days to 1st picking: The range observed was 35.44days to 52.24days with the population mean of48.89days. The PCV and GCV for days to 1st picking were moderate to low (10.71 and 8.28) respectively. The heritability was

59.27, while the genetic advance or gain was 10.93. Both of them showed moderate values which are in accordance with Mohanty and Prusti (2002).

Days to last picking: General mean was 126.76days with a range of about 116.34days to 142.97days. The coefficient of variation was 7.35 (Phenotypic) and 6.12 (Genotypic) representing low degree of variation. High values of heritability with low genetic advance was recorded, 62.65 and 7.60 respectively. Results accordance with Mohanty and Prusti (2002).

Number of fruits per plant: Number of fruits exhibited the mean of 42.93 and ranges of 29.97 to 66.15. The GCV and PCV values were low to moderate all the population (20.72) and (22.25) respectively. High heritability and GA was observed (87.34 and 45.52) respectively. Concurrent results to this effect was also reported by Prabakaran (2010).

Fruit length: The range observed was 6.13cm to 13.20cm with the population mean of 9.17cm. The PCV and GCV for days to 1st picking were high (26.84 and 22.25) respectively. The heritability was high (75.53) , while the genetic advance or gain was high (27.84). This is in conformity with the findings of Pathania et al. (2002).

Fruit circumference: This trait exhibited the mean of 13.85cm and range from 6.33cm to 19.15cm. The phenotypic co-efficient of variation (27.83) and genotypic co-efficient of variation (26.27) was observed. Number of branches per plant had high GCV and PCV values. High heritability (92.24) accompanied by high genetic advance (48.53) was noted.

Average fruit weight: The range observed was 17.11g to 37.85g with the population mean of 28.49g. The PCV and GCV were high (24.52 and 22.88) respectively. The heritability was 94.93, while the genetic advance or gain was 43.97. Both of them showed high values which are in concordance with by Sherly and Shanthi (2009).

Shoot borer incidence: Mean and range of this trait were 2.94% and 10.63% to 29.78%. PCV (15.32) and GCV (15.16) estimates were moderate. The estimates of heritability in broad sense was high (86.53) and also high for GA (31.45). Similar result was reported by Sharma and Swaroop (2000).

Fruit borer incidence: Mean and range of this trait were 25.97% and 12.56% to 31.87%. PCV (10.69) and GCV (9.85) estimates were moderate to low. The estimates of heritability in broad sense was high (88.98) and also high for GA (34.22). Similar result was reported by Sharma and Swaroop (2000).

Fruit yield per plant: Fruit yield exhibited the mean of 1.22kg and ranges of 0.67kg to 3.22kg. The GCV and PCV values were high all the genotypes (26.86) and (28.15) respectively. High heritability and GA was observed (90.00 and 54.11) respectively. Concurrent results to this effect was also reported by by Sherly and Shanthi (2009).

Table 1. Genetic variability, heritability and genetic advance for various quantitative traits in eggplant

Traits	Mean	Range	Phenotypic coefficient of variation (%)	Genotypic coefficient of variation (%)	Heritability (%)	Genetic advance (%)
Days to first flowering	35.76	29.33 – 41.67	8.32	7.05	72.94	28.42
Plant height (cm)	96.90	74.93 – 136.00	26.32	23.04	74.35	34.21
Number of branches per plant	10.72	7.33 – 13.33	20.61	18.88	82.09	32.06
Days to first picking	48.89	35.44 – 52.24	10.71	8.28	59.27	10.93
Days to last picking	126.76	116.34 – 142.97	7.35	6.12	62.65	7.60
Number of fruit per plant	42.93	29.97 – 66.15	22.90	20.72	87.34	45.52
Fruit length (cm)	9.17	6.13 – 13.20	26.84	22.25	75.53	27.84
Fruit circumference (cm)	13.85	6.33 – 19.15	27.83	26.27	92.24	48.53
Average fruit weight (g)	28.49	17.11 - 37.85	24.52	22.88	94.93	43.97
Shoot borer incidence (%)	22.94	10.63 – 29.78	15.32	15.16	86.53	31.45
Fruit borer incidence (%)	25.97	12.56 – 31.87	10.69	9.85	88.98	34.22
Fruit yield per plant (kg)	1.12	0.67 – 3.22	28.15	26.86	90.00	54.11

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