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**S Srinivasa Raju**

SMS, Department of  
Horticulture, KVK,

Rastakuntabai ANGRAU, Lam,  
Guntur, Andhra Pradesh, India

**K Uma Jyothi**

Dean of PG Studies Dr. YSRHU,  
VR Gudem, Andhra Pradesh,  
India

**M Paratpara Rao**

Associate Professor, Department  
of Olericulture, Dr. YSRHU, VR  
Gudem, Andhra Pradesh, India

**K Usha Kumari**

Associate Professor, Department  
of Olericulture, Dr. YSRHU, VR  
Gudem, Andhra Pradesh, India

**B Bala Krishna**

Associate Dean, KL University,  
Andhra Pradesh, India

**N Emmanuel**

Professor, Department of  
Entomology, Dr. YSRHU, VR  
Gudem, Andhra Pradesh, India

**S Narasimha Rao**

Associate Professor, Department  
of Pathology, Dr. YSRHU, VR  
Gudem, Andhra Pradesh, India

**G Amrutha Veena**

SMS, Department of Plant  
Protection, ANGRAU, Guntur,  
Andhra Pradesh, India

**Corresponding author**

**S Srinivasa Raju**

SMS, Department of  
Horticulture, KVK,

Rastakuntabai ANGRAU, Lam,  
Guntur, Andhra Pradesh, India

## Genetic parameters for different characters of the brinjal (*Solanum melongena* L.) in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generation of the cross (EC-169089 × Pennada)

**S Srinivasa Raju, K Uma Jyothi, M Paratpara Rao, K Usha Kumari, B  
Bala Krishna, N Emmanuel, S Narasimha Rao and G Amrutha Veena**

### Abstract

The present investigation entitled “Genetic studies in advanced generations for yield and yield contributing traits in brinjal (*Solanum melongena* L.)” was conducted at College of Horticulture, Venkataramannagudem, Andhra Pradesh during *Kharif-2020*, *Rabi-2020* and *Kharif-2021*. The F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations of the cross (EC-169089 × Pennada) were evaluated with the objective of selecting superior genotypes through pedigree method of selection for economically important traits and to assess the various genetic parameters for the brinjal crop improvement. The data from advanced generations were collected and statistically analyzed to compute mean, range, phenotypic and genotypic coefficients of variance, heritability, expected genetic advance, genetic advance as per cent mean, genetic gain.

The pedigree of the cross (EC-169089 × Pennada) recorded the genetic gain from F<sub>4</sub> to F<sub>5</sub> and F<sub>5</sub> to F<sub>6</sub> generation; yield per plant (34.43 and 5.17), number of primary branches (7.90 and 4.34), plant spread N-S (12.84 and 0.82), plant spread E-W (15.36 and 2.14), number of fruits per inflorescence (10.08 and 0.39), fruit length (9.65 and 7.94), number of fruits per plant (20.16 and 10.88), fruit volume (4.98 and 2.31), average fruit weight (5.53 and 7.83), fruit firmness (5.08 and 32.66) respectively. Two promising plants were selected in F<sub>6</sub> generation and selfed for further preliminary yield trials.

**Keywords:** Genetic studies, Mean, Range, PCV, GCV, heritability, genetic advance and genetic gain

### Introduction

Brinjal (*Solanum melongena* L.) is a solanaceous vegetable with chromosome number  $2n=2x=24$ . It is a perennial vegetable but commercially grown as annual crop. Because of its highest production potential and availability to consumers, it is often referred as poor man's vegetable. It is essentially tropical and sub-tropical crop grown extensively in India, Bangladesh, Pakistan, China, Japan and Philippines.

In India, egg plant occupies an area of 7.36 lakh hectares with an annual production of 127.77 lakh tonnes and the productivity stands at 17.36 tonnes per hectare. In Andhra Pradesh, it is grown over an area of 0.69 lakh hectares with annual production of 12.40 lakh tonnes and productivity of 17.97 tonnes per hectare (NHB, 2019-20). In initial days of crop improvement mass selection was practiced by the breeders and resulting varieties were non-uniform in terms of many traits. Consumer demand for uniform, good quality produce is increasing day by day and obviously the farmer should produce market demanded produce and at the same time the cultivated genotypes should be high yielding and resistant to biotic and abiotic stresses.

For achieving uniformity, pure line selection, hybridization followed by pedigree/bulk selection and heterosis breeding (F<sub>1</sub> hybrids) are the best methods. But in often cross-pollinated crops like brinjal, pure lines are mostly preferred by the farmers because of ease of seed production. Hybridization followed by selection is widely followed method for developing high yielding genotypes in solanaceous vegetables. After hybridization, selfing is done to get the variability. Recombination and segregation lead to release of genetic variability in segregating populations. Estimation of nature and magnitude of variability, heritability of yield contributing and other traits is immense importance. The available variability can be partitioned into heritable and non-heritable components.

If greater the available genetic variability more is the chance for getting better genotypes by direct selection (Vavilov, 1951) [19].

Heritability can be measured by the genetic relationship between the parent and offspring. Greater the heritable variation, the possibility of fixing the characters by selection methods is higher. Genetic advance is helpful to devise the effect of selection. Heritability and genetic advance studies are of immense use to identify whether the observed variation for a particular character is due to genotype or environment. Hybridization followed by selection in the segregation generations (Pedigree/bulk method of breeding) is one of the widely used breeding methods to develop varieties in self-pollinated as well as often cross-pollinated vegetable crops including brinjal. There are fair chances of isolation of transgressive segregants also in this procedure (Briggs and Allard, 1953 and Singh, 2002) [3, 16]. Many high yielding varieties in brinjal viz., Pusa purple long, Pusa purple cluster, Pusa kranti, Pusa bhairav, Pusa Shymala, Pusa Anmol, Arka shirish, Arka sheel, Arka keshav, Arka Nidhi, Arka Neelkanth, Arka Kusumkar *etc.*, have been developed through hybridization followed by pedigree selection.

### Materials and Methods

In order to develop superior recombinant genotypes in brinjal, hybridization programme was initiated with the cross EC-169089 × Pennada at College of Horticulture, Venkataramannagudem, during *Kharif*, 2016 and selection was exercised in F<sub>2</sub>, F<sub>3</sub> generations during *Kharif*, 2019 and *Rabi*, 2019 respectively. The eight top performing plants selected from F<sub>3</sub> generation were selfed to get F<sub>4</sub> generation for the present study.

### Evaluation of F<sub>4</sub> generation

During *Kharif*, 2020-21, eight progenies of EC-169089 × Pennada were raised with a spacing of 75 cm × 75 cm in a Randomized Block Design with three replications. Each progeny in each replication had 10 individual plants and a total of 30 plants over three replications per progeny were accommodated to exercise selection and four top performing plants were selected and selfed to get F<sub>5</sub> generation for the present study.

### Evaluation of F<sub>5</sub> generation

During *Rabi*, 2020-21, four progenies of EC-169089 × Pennada were raised with a spacing of 75 cm × 75 cm in a Randomized Block Design with three replications. Each progeny in each replication had 10 individual plants and a total of 30 plants over three replications per progeny were accommodated to exercise selection and two top performing plants were selected and selfed to get F<sub>6</sub> generation for the present study.

### Evaluation of F<sub>6</sub> generation

During *kharif*, 2021-22, two progenies of EC-169089 × Pennada were raised with a spacing of 75 cm × 75 cm in a Randomized Block Design with three replications. Each progeny in each replication had 10 individual plants and a total of 30 plants over three replications per progeny were accommodated to exercise selection and two promising plants were selected and selfed to get F<sub>7</sub> seed.

### Results and Discussion

Observations were taken for all the individual plants separately and the data was statistically analyzed to compute

mean, range, phenotypic and genotypic coefficients of variance, heritability, expected genetic advance, genetic advance as per cent mean, genetic gain in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generation for the cross EC-169089 × Pennada was presented as follows.

### Plant height (cm)

The values of plant height ranged from 94.96 to 104.08 with a mean of 99.39 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for plant height ranged from 94.80 to 100.32 with a mean of 97.13. The per cent of genetic gain for plant height was -2.27 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 94.80 to 96.94 with a mean of 96.06. The per cent of genetic gain for plant height was -1.10 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values for plant height were 6.17 and 2.64 respectively. In F<sub>5</sub> generation, the PCV value was 3.35 and GCV value was 1.71 and the values of PCV and GCV were 3.11 and 1.67 respectively in F<sub>6</sub> generation. The heritability for this trait was 18.40, 26.10 and 28.80 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> respectively. Genetic advance for this trait was 2.32 per cent in F<sub>4</sub>, 1.75 per cent in F<sub>5</sub> and 1.77 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 2.33, 1.80 and 1.84 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> respectively.

### Plant spread N-S (cm)

The variation for this character ranged from 50.26 to 87.03 with an average of 73.24 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 77.78 to 88.70 with a mean of 82.65. The per cent of genetic gain for plant spread N-S was 12.84 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 77.78 to 88.70 with a mean of 83.33. The per cent of genetic gain for plant spread N-S was 0.82 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> population, the PCV and GCV values were 20.10 and 18.98. In F<sub>5</sub> generation the PCV value was 6.29 and GCV value was 5.29 and the estimates of PCV and GCV were 7.29 and 6.14 respectively in F<sub>6</sub> generation. The heritability for this trait was 89.20, 70.70 and 71.00 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 27.05 per cent in F<sub>4</sub>, while genetic advance in F<sub>5</sub> was 7.57 per cent and it was 8.89 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 36.93, 9.16 and 10.67 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

### Plant spread E-W (cm)

The variation for this trait ranged from 50.26 to 77.73 with an average of 66.30 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 71.56 to 80.73 with a mean of 76.49. The per cent of genetic gain for plant spread was 15.36 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 76.13 to 80.73 with a mean of 78.13. The per cent of genetic gain for plant spread was 2.14 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 16.20 and 13.59 respectively. In F<sub>5</sub> generation, the PCV value was 5.42 and GCV value was 4.73 and the estimates of PCV and GCV were 3.49 and 2.74 respectively in F<sub>6</sub> generation. The heritability for this trait was 70.40, 76.20 and 61.80 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 15.58 per cent in F<sub>4</sub>, 6.51 per cent in F<sub>5</sub> and it was 3.47 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 23.50, 8.51 and 4.44 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

**Number of primary branches**

The number of primary branches ranged from 6.50 to 9.53 with an average of 7.46 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 7.00 to 9.26 with a mean of 8.05. The per cent of genetic gain for number of primary branches was 7.90 per cent from F<sub>4</sub> to F<sub>5</sub> generation. Whereas in F<sub>6</sub> generation, it ranged from 7.46 to 9.26 with a mean of 8.40. The per cent of genetic gain for number of primary branches was 4.34 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 15.56 and 13.79 respectively. In F<sub>5</sub> generation, the PCV value was 12.67 and GCV value was 12.59 and the estimates of PCV and GCV were 10.79 and 10.70 respectively in F<sub>6</sub> generation. The heritability for this trait was 78.60, 98.60 and 98.40 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 1.88 per cent in F<sub>4</sub>, while genetic advance in F<sub>5</sub> was 2.07 per cent and it was 1.83 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 25.19, 25.76 and 21.87 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Days to 50% flowering**

The days to 50 % flowering ranged from 36.00 to 48.66 with an average of 42.00 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 37.33 to 41.33 with a mean of 39.00. The per cent of genetic gain for number of days to 50 % flowering was -7.14 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 37.33 to 40.00 with a mean of 38.22. The per cent of genetic gain for number of days to 50 % flowering was -2.00 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> population, the PCV and GCV values were 10.95 and 10.01 respectively. In F<sub>5</sub> generation, the PCV value was 5.76 and GCV value was 4.77 and the estimates of PCV and GCV were 4.93 and 3.48 respectively in F<sub>6</sub> generation. The heritability for this trait was 73.60, 68.70 and 50.00 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 7.92 per cent in F<sub>4</sub>, while genetic advance in F<sub>5</sub> was 3.18 per cent and it was 1.94 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 18.86, 8.15 and 5.08 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Number of flowers per inflorescence**

The range of variation observed for this trait was 2.20 to 3.83 with a mean of 2.91 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 2.46 to 3.46 with a mean of 2.88. The per cent of genetic gain for number of flowers per inflorescence was -1.03 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 2.56 to 3.16 with a mean of 2.72. The per cent of genetic gain for number of flowers per inflorescence was -5.55 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 30.48 and 10.31 respectively. In F<sub>5</sub> generation the PCV value was 14.47 and GCV value was 2.85 and the estimates of PCV and GCV were 14.54 and 7.65 respectively in F<sub>6</sub> generation. The heritability for this trait was 11.50, 3.90 and 27.70 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 0.19 per cent in F<sub>4</sub>, 0.03 per cent in F<sub>5</sub> and it was 0.24 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 7.19, 1.16 and 8.29 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Number of fruits per inflorescence**

The range of variation observed for this trait was 1.20 to 3.36 with a mean of 2.28 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the

values for the trait ranged from 1.53 to 3.20 with a mean of 2.51. The per cent of genetic gain for number of fruits per inflorescence was 10.08 per cent from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 1.53 to 2.93 with a mean of 2.52. The per cent of genetic gain for number of fruits per inflorescence was 0.39 per cent from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 30.63 and 3.32 respectively. In F<sub>5</sub> the PCV value was 30.29 and GCV value was 28.65 and the estimates of PCV and GCV were 31.50 and 30.54 respectively in F<sub>6</sub> generation. The heritability for this trait was 1.20, 89.50 and 94.00 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 0.01 per cent in F<sub>4</sub>, 1.40 per cent in F<sub>5</sub> and it was 1.39 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 0.74, 55.83 and 61.01 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Days to first harvest**

The days to first harvest ranged from 48.00 to 58.00 with a mean of 52.04 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 49.00 to 52.00 with a mean of 50.33. The per cent of genetic gain for this trait was -3.28 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 49.00 to 50.33 with a mean of 49.77. The per cent of genetic gain for days to first harvest was -1.11 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> population, the PCV and GCV values were 8.15 and 7.34 respectively. In F<sub>5</sub> the PCV value was 2.99 and GCV value was 2.17 and the estimates of PCV and GCV were 2.22 and 0.67 respectively in F<sub>6</sub> generation. The heritability for this trait was 81.10, 52.40 and 9.10 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 7.08 per cent in F<sub>4</sub>, 1.63 per cent in F<sub>5</sub> and it was 0.20 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 13.62, 3.23 and 0.41 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Days to final harvest**

The days to final harvest ranged from 150.66 to 173.33 with a mean of 160.54 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 158.33 to 168.66 with a mean of 162.55. The per cent of genetic gain for this trait was 1.25 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 159.33 to 165.66 with a mean of 162.85. The per cent of genetic gain for days to final harvest was 0.18 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 4.83 and 4.24 respectively. In F<sub>5</sub> the PCV value was 2.81 and GCV value was 2.68 and the estimates of PCV and GCV were 3.40 and 3.30 respectively in F<sub>6</sub> generation. The heritability for this trait was 77.10, 91.10 and 94.20 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively Genetic advance for this trait was 12.34 per cent in F<sub>4</sub> generation, 8.59 per cent in F<sub>5</sub> and it was 10.72 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 7.68, 5.28 and 6.59 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively

**Fruit length (cm)**

Fruit length ranged from 6.21 to 12.86 with a mean of 9.53 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 9.64 to 13.79 with a mean of 10.45. The per cent of genetic gain for this trait was 9.65 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 10.64 to 11.92 with a mean of 11.28. The per cent of genetic gain for this trait was 7.94 from F<sub>5</sub> to F<sub>6</sub> generation.

In  $F_4$  generation, the PCV and GCV values were 28.66 and 25.59 respectively. In  $F_5$  the PCV value was 17.50 and GCV value was 14.62 and the estimates of PCV and GCV were 8.66 and 5.57 respectively in  $F_6$  generation. The heritability for this trait was 79.80, 69.80 and 41.30 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively Genetic advance for this trait was 4.49 per cent in  $F_4$ , 2.84 per cent in  $F_5$  and it was 0.77 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 47.09, 25.16 and 7.38 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively

#### **Fruit girth (cm)**

Fruit girth ranged from 13.00 to 19.93 with a mean of 17.63 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 14.95 to 20.28 with a mean of 16.74. The per cent of genetic gain for this trait was -5.04 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 14.95 to 17.75 with a mean of 16.44. The per cent of genetic gain for this trait was -1.79 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 17.11 and 13.36 respectively. In  $F_5$  the PCV value was 13.74 and GCV value was 11.59 and the estimates of PCV and GCV were 10.20 and 8.83 respectively in  $F_6$  generation. The heritability for this trait was 61.00, 71.10 and 75.10 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively Genetic advance for this trait was 3.56 per cent in  $F_4$ , 3.55 per cent in  $F_5$  and it was 2.64 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 21.59, 20.13 and 15.77 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively

#### **Fruit length to girth ratio**

Fruit length to girth ratio ranged from 0.69 to 0.88 with a mean of 0.74 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 0.61 to 0.68 with a mean of 0.63. The per cent of genetic gain for this trait was -14.86 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 0.61 to 0.64 with a mean of 0.62. The per cent of genetic gain for this trait was -1.58 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 21.48 and 10.04 respectively. In  $F_5$  the PCV value was 9.16 and GCV value was 1.88 and the estimates of PCV and GCV were 7.82 and 4.49 respectively in  $F_6$  generation. The heritability for this trait was 21.90, 4.20 and 33.00 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively Genetic advance for this trait was 0.07 per cent in  $F_4$  generation, whereas genetic advance in  $F_5$  was 0.00 per cent and it was 0.03 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 9.68, 0.79 and 5.32 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively.

#### **Fruit volume (cm<sup>3</sup>)**

The Tait ranged from 286.66 to 380.00 with a mean value of 331.25 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 333.33 to 390.00 with a mean of 347.77. The per cent of genetic gain for this trait was 4.98 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 333.33 to 370.00 with a mean of 355.83. The per cent of genetic gain for this trait was 2.31 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 10.87 and 8.16 respectively. In  $F_5$  the PCV value was 6.99 and GCV value was 6.03 and the estimates of PCV and GCV were 6.50 and 5.11 respectively in  $F_6$  generation. The heritability for this trait was 56.40, 74.40 and 62.00 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively. Genetic advance for this trait was 41.87 per cent in  $F_4$  generation, whereas genetic advance in  $F_5$  was 38.16 per cent and it was 28.85 per cent in  $F_6$  generation.

Genetic advance expressed as per cent of mean was 12.64, 10.72 and 8.29 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively

#### **Number of fruits per plant**

The mean number of fruits per plant was recorded 40.66 and it ranged from 29.26 to 57.83 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 32.90 to 61.16 with a mean of 48.86. The per cent of genetic gain for this trait was 20.16 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 47.86 to 61.16 with a mean of 54.18. The per cent of genetic gain for this trait was 10.88 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 24.40 and 23.24 respectively. In  $F_5$  the PCV value was 24.51 and GCV value was 24.44 and the estimates of PCV and GCV were 12.32 and 12.31 respectively in  $F_6$  generation. The heritability for this trait was 90.70, 99.50 and 99.70 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively Genetic advance for this trait was 18.54 per cent in  $F_4$ , 24.54 per cent in  $F_5$  and it was 13.72 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 45.59, 50.23 and 25.32 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively

#### **Average fruit weight (g)**

The mean average fruit weight was recorded 68.24 and it ranged from 37.66 to 97.50 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 63.23 to 94.60 with a mean of 72.02. The per cent of genetic gain for this trait was 5.53 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 63.23 to 79.53 with a mean of 77.66. The per cent of genetic gain for this trait was 7.83 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 30.00 and 29.57 respectively. In  $F_5$  the PCV value was 16.98 and GCV value was 16.87 and the estimates of PCV and GCV were 11.52 and 11.36 respectively in  $F_6$  generation. The heritability for this trait was 97.10, 98.80 and 97.30 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively Genetic advance for this trait was 40.98 per cent in  $F_4$  generation, whereas genetic advance in  $F_5$  was 26.84 per cent and it was 16.63 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 60.04, 34.56 and 23.09 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively

#### **Number of seeds per fruit**

The mean variation for number of seeds per fruit ranged from 251.33 to 331.00 with a mean of 321.33 in  $F_4$  generation. In  $F_5$  generation, the values for the trait ranged from 294.20 to 324.66 with a mean of 310.22. The per cent of genetic gain for this trait was -3.45 from  $F_4$  to  $F_5$  generation, whereas in  $F_6$  generation, it ranged from 291.00 to 312.66 with a mean of 302.55. The per cent of genetic gain for this trait was -2.47 from  $F_5$  to  $F_6$  generation.

In  $F_4$  generation, the PCV and GCV values were 11.97 and 5.15 respectively. In  $F_5$  the PCV value was 7.69 and GCV value was 6.99 and the estimates of PCV and GCV were 3.96 and 1.71 respectively in  $F_6$  generation. The heritability for this trait was 18.50, 82.60 and 18.80 per cent in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively. Genetic advance for this trait was 13.81 per cent in  $F_4$  generation, whereas genetic advance in  $F_5$  was 42.07 per cent and it was 4.76 per cent in  $F_6$  generation. Genetic advance expressed as per cent of mean was 4.57, 13.09 and 1.53 in  $F_4$ ,  $F_5$  and  $F_6$  generations respectively.

**Seed weight per fruit (g):** The variation for seed weight per fruit ranged from 3.50 to 4.78 with a mean value of 4.43 in  $F_4$

generation. In F<sub>5</sub> generation, the values for the trait ranged from 3.76 to 4.68 with a mean of 4.35. The per cent of genetic gain for this trait was -1.80 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 4.06 to 4.45 with a mean of 4.19. The per cent of genetic gain for this trait was -3.67 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 17.80 and 5.09 respectively. In F<sub>5</sub> the PCV value was 6.28 and GCV value was 2.42 and the estimates of PCV and GCV were 6.23 and 3.51 respectively in F<sub>6</sub> generation. The heritability for this trait was 18.70, 14.90 and 31.80 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 0.19 per cent in F<sub>4</sub> generation, whereas genetic advance in F<sub>5</sub> was 0.08 per cent and it was 0.17 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 4.53, 1.92 and 4.08 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

#### **Firmness of the fruit (kg/cm<sup>2</sup>)**

The firmness of the fruit ranged from 1.95 to 2.87 with a mean of 2.36 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 2.12 to 2.75 with a mean of 2.48. The per cent of genetic gain for this trait was 5.08 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 2.82 to 3.43 with a mean of 3.29. The per cent of genetic gain for this trait was 32.66 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 15.32 and 8.15 respectively. In F<sub>5</sub> the PCV value was 8.42 and GCV value was 7.52 and the estimates of PCV and GCV were 7.42 and 6.71 respectively in F<sub>6</sub> generation. The heritability for this trait was 28.30, 79.60 and 81.80 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 0.22 per cent in F<sub>4</sub> generation, whereas genetic advance in F<sub>5</sub> was 0.32 per cent and it was 0.28 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 8.93, 13.82 and 12.51 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

#### **Phenols (mg 100 g<sup>-1</sup>)**

The phenols ranged from 4.65 to 5.13 with a mean of 4.86 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 4.37 to 5.13 with a mean of 4.73. The per cent of genetic gain for this trait was -2.67 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 3.90 to 4.97 with a mean of 4.56. The per cent of genetic gain for this trait was -3.59 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 15.40 and 5.44 respectively. In F<sub>5</sub> the PCV value was 6.99 and GCV value was 9.54 and the estimates of PCV and GCV were 5.58 and 4.78 respectively in F<sub>6</sub> generation. The heritability for this trait was 12.50, 87.50 and 73.40 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 0.18 per cent in F<sub>4</sub> generation, whereas genetic advance in F<sub>5</sub> was 0.59 per cent and it was 0.41 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 3.97, 12.61 and 8.44 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

#### **Yield per plant (Kg)**

The mean yield per plant was recorded 2.73 and it ranged from 1.32 to 3.86 in F<sub>4</sub> generation. In F<sub>5</sub> generation, the values for the trait ranged from 3.11 to 3.92 with a mean of 3.67. The per cent of genetic gain for this trait was 34.43 from F<sub>4</sub> to F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, it ranged from 3.80 to 3.92 with a mean of 3.86. The per cent of genetic gain for this trait was 5.17 from F<sub>5</sub> to F<sub>6</sub> generation.

In F<sub>4</sub> generation, the PCV and GCV values were 33.12 and 31.14 respectively. In F<sub>5</sub> the PCV value was 10.63 and GCV

value was 10.21 and the estimates of PCV and GCV were 2.15 and 1.04 respectively in F<sub>6</sub> generation. The heritability for this trait was 88.40, 92.30 and 23.40 per cent in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively. Genetic advance for this trait was 1.64 per cent in F<sub>4</sub> generation, whereas genetic advance in F<sub>5</sub> was 0.74 per cent and it was 0.04 per cent in F<sub>6</sub> generation. Genetic advance expressed as per cent of mean was 60.30, 20.21 and 1.04 in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generations respectively.

In the present study, high PCV and moderate to high GCV values were observed for yield per plant, plant spread N-S, number of flowers per inflorescence, average fruit weight, fruit length and fruit length to girth ratio in F<sub>4</sub> generation, number of fruits per inflorescence and number of fruits per plant in F<sub>5</sub> generation whereas number of fruits per inflorescence in F<sub>6</sub> generation. High PCV and GCV was observed for the characters indicating large amount of variation and consequently more scope for their improvement through selection. These results are in consonance with finding of earlier workers, Vidya and Kumar (2015) <sup>[20]</sup> for yield per plant, Ravali *et al.* (2017) <sup>[13]</sup> for number of flowers per inflorescence, Jyothi *et al.* (2019) <sup>[8]</sup> for number of fruits per inflorescence and Balasubramaniam *et al.* (2021) <sup>[2]</sup> for number of flowers per inflorescence.

In F<sub>4</sub> generation, moderate PCV and GCV were observed for plant spread E-W, number of primary branches, days to 50 % flowering, fruit girth and number of seeds per fruit, whereas in F<sub>5</sub> the characters like number of primary branches, fruit length, fruit girth, average fruit weight and yield per plant recorded moderate PCV and GCV. In F<sub>6</sub> generation, number of primary branches, average fruit weight and number of fruits per plant recorded moderate variability. The results are in line with Nilakh *et al.* (2017) <sup>[11]</sup> for number of primary branches, days to 50 % flowering and fruit length in F<sub>5</sub> generation of brinjal, Shilpa *et al.* (2018) <sup>[15]</sup> for number fruits per inflorescence, Sureshkumara *et al.* (2018) <sup>[18]</sup> for fruit firmness in tomato, Neelambika *et al.* (2020) <sup>[8]</sup> for yield per plant in F<sub>4</sub> generation for yield per plant.

Low GCV and PCV values were observed for the characters like for plant height, days to first harvest, days to final harvest, fruit volume, seed weight per fruit, firmness of the fruit and phenols in F<sub>4</sub> generation, whereas in F<sub>5</sub>, the characters like plant height, days to 50% flowering, days to first harvest, plant spread, number of flowers per inflorescence, fruit volume, days to final harvest, fruit length to girth ratio, fruit volume, number of seeds per fruit, seed weight per fruit, phenols and firmness of the fruit were observed low variability. In F<sub>6</sub> generation, yield per plant, plant height, plant spread, days to 50% flowering, number of flowers per inflorescence, days to first harvest, days to final harvest, fruit length, fruit length to girth ratio, fruit volume, number of seeds per fruit, seed weight per fruit, firmness of the fruit and phenols recorded low variability. These results are in consonance with findings of earlier workers, Prabhu *et al.* (2009) <sup>[12]</sup> for plant height, number of primary branches, fruit length, fruit girth, fruit weight, number of fruits per plant and yield per plant in F<sub>5</sub> and F<sub>6</sub> generation, Nilakh *et al.* (2017) <sup>[11]</sup> for days to 50% flowering, days to first harvest in F<sub>5</sub> generation, Neelambika *et al.* (2020) <sup>[8]</sup> for fruit length, plant height, fruit girth and days to 50% flowering in F<sub>4</sub> generation for plant height.

With the genotypic coefficient of variation alone, it is difficult to determine the relative amount of heritable and non-heritable components of variations present in the population. Estimates of heritability and genetic advance would supplement this parameter.

High heritability coupled with high genetic advance as per cent of mean was observed for fruit length, fruit girth, number of primary branches, plant spread and yield per plant in F<sub>4</sub> generation. High heritability coupled with high genetic advance as per cent of mean was observed for number of fruits per inflorescence, fruit length, fruit girth and yield per plant in F<sub>5</sub> generation. In F<sub>6</sub> generation, number of primary branches and number of fruits per inflorescence were recorded high heritability and high genetic advance as per cent of mean indicating the predominance of additive gene action and hence, direct phenotypic selection may be useful with respect to these traits. These findings are in agreement with the findings of Reshmika *et al.* (2014) [14] for fruit length to girth ratio, Neha *et al.* (2016) for fruit length to girth ratio, Jyothi *et al.* (2019) [8] for fruit length, fruit girth and average fruit weight, Neelambika *et al.* (2020) [8] for yield per plant in F<sub>4</sub> generation, Balasubramaniyam *et al.* (2021) [2] for fruit length, Surabhi *et al.* (2020) [17] for average fruit weight and for fruit girth and fruit length..

High heritability coupled with moderate genetic advance as per cent of mean was observed for days to 50 % flowering and days to first harvest in F<sub>4</sub> generation and fruit volume in F<sub>5</sub> generation, whereas the traits like plant spread N-S and fruit girth in F<sub>6</sub> generation exhibited high heritability coupled with moderate genetic advance as per cent of mean revealing the role of additive and non-additive gene action. Further improvement of these traits would be possible through cyclic hybridization, diallel selective mating and biparental mating. These findings are in accordance with different workers *viz.*, Prabhu *et al.* (2009) [12] for plant height, number of primary branches, fruit length, number of fruits per plant and yield per plant in F<sub>5</sub> and F<sub>6</sub> generation, Madhavi *et al.* (2015) [6] for days to first harvest and days to final harvest, Nilakh *et al.* (2017) [11] for yield per plant in F<sub>5</sub> generation, Ravali *et al.* (2017) [13] for plant height, Muktilata *et al.* (2018) [7] for number of primary branches, Shipla *et al.* (2018) for number of fruits per plant, Surabhi *et al.* (2020) [17] for plant height for days to 50% flowering.

The high heritability coupled with low GAM values were observed for the characters days to final harvest in F<sub>4</sub> generation and plant spread N-S, plant spread E-W, days to 50 % flowering and days to final harvest in F<sub>5</sub> generation, whereas in F<sub>6</sub> generation, plant spread, days to final harvest, fruit volume and phenols recorded high heritability coupled with low GAM indicating that a little improvement would be possible by selection for these characters. Similar results are reported by Prabhu *et al.* (2009) [12] for plant height, fruit length and number of fruits in F<sub>5</sub> and F<sub>6</sub> generation, Madhavi *et al.* (2015) [6] for fruit length, Balas *et al.* (2019) for days to final harvest and Surabhi *et al.* (2020) [17] for plant spread.

The moderate heritability and moderate GAM values were observed for the fruit volume in F<sub>4</sub> generation indicating that, this character was governed by non-additive gene actions or due to the presence of high genotypic environmental

interactions and simple selection will not be effective for improvement of this character. Similar results are reported by Prabhu *et al.* (2009) [12] for yield per plant in F<sub>5</sub> and F<sub>6</sub> generation, Nilakh *et al.* (2017) [11] for plant height, primary branches, days to 50 % flowering, fruit length and number of fruits per plant in F<sub>5</sub> generation, Shilpa *et al.* (2018) [15] for number of fruits per plant and Surabhi *et al.* (2020) [17] for plant spread N-S.

Moderate heritability and low genetic advance as per cent of mean was recorded for days to first harvest in F<sub>5</sub> generation and days to 50% flowering, fruit length, fruit length to girth ratio and seed weight per fruit in F<sub>6</sub> generation indicating the operation of non-additive gene action. These characters are governed by non-additive gene action which need to be exploited by heterosis breeding or population improvement through various forms of recurrent selection. These findings are in accordance with Prabhu *et al.* (2009) [12] for plant height, primary branches, fruit length, fruit weight, fruit girth, number of fruits and yield per plant in F<sub>5</sub> and F<sub>6</sub> generation, Nilakh *et al.* (2017) [11] for days to first harvest in F<sub>5</sub> generation, Ravali *et al.* (2017) [13] for days to first harvest, Shilpa *et al.* (2018) [15] for number of primary branches and Neelambika *et al.* (2020) [8] for plant height, fruit girth and days to 50% flowering in F<sub>4</sub> generation.



**Conclusion**

The pedigree of the cross (EC-169089 × Pennada) recorded the genetic gain from F<sub>4</sub> to F<sub>5</sub> and F<sub>5</sub> to F<sub>6</sub> generation; yield per plant (34.43 and 5.17), number of primary branches (7.90 and 4.34), plant spread N-S (12.84 and 0.82), plant spread E-W (15.36 and 2.14), number of fruits per inflorescence (10.08 and 0.39), fruit length (9.65 and 7.94), number of fruits per plant (20.16 and 10.88), fruit volume (4.98 and 2.31), average fruit weight (5.53 and 7.83), fruit firmness (5.08 and 32.66) respectively. Two promising plants were selected in F<sub>6</sub> generation as given below and selfed for further preliminary yield trials.

**Salient features of two promising lines in F<sub>6</sub> for further evaluation in Preliminary yield trials**

1. Light purple fruits with green calyx borne in clusters and tolerant to little leaf.
2. Round to oval dull purple fruits borne in cluster and early maturing with dwarf plant stature.

**Table 1:** Mean, variability and heritability parameters for different characters in F<sub>4</sub>, F<sub>5</sub> and F<sub>6</sub> generation of cross T<sub>4</sub> (EC-169089× Pennada).

Character	Generation	Mean	Range	PCV	GCV	Heritability (%)	GA at 5%	GAM at 5%	% GG
Plant height (cm)	F <sub>4</sub>	99.39	94.96-104.08	6.17	2.64	18.40	2.32	2.33	
	F <sub>5</sub>	97.13	94.80-100.32	3.35	1.71	26.10	1.75	1.80	-2.27
	F <sub>6</sub>	96.06	94.80-96.94	3.11	1.67	28.80	1.77	1.84	-1.10
Plant spread N-S (cm)	F <sub>4</sub>	73.24	50.26-87.03	20.10	18.98	89.20	27.05	36.93	
	F <sub>5</sub>	82.65	77.78-88.70	6.29	5.29	70.70	7.57	9.16	12.84
	F <sub>6</sub>	83.33	77.78-88.70	7.29	6.14	71.00	8.89	10.67	0.82
Plant spread E-W (cm)	F <sub>4</sub>	66.30	50.26-77.73	16.20	13.59	70.40	15.58	23.50	
	F <sub>5</sub>	76.49	71.56-80.73	5.42	4.73	76.20	6.51	8.51	15.36
	F <sub>6</sub>	78.13	76.13-80.73	3.49	2.74	61.80	3.47	4.44	2.14

Number of primary branches	F <sub>4</sub>	7.46	6.50-9.53	15.56	13.79	78.60	1.88	25.19	
	F <sub>5</sub>	8.05	7.00-9.26	12.67	12.59	98.60	2.07	25.76	7.90
	F <sub>6</sub>	8.40	7.46-9.26	10.79	10.70	98.40	1.83	21.87	4.34
Days to 50 % flowering	F <sub>4</sub>	42.00	36.00-48.66	10.95	10.01	73.60	7.92	18.86	
	F <sub>5</sub>	39.00	37.33-41.33	5.76	4.77	68.70	3.18	8.15	-7.14
	F <sub>6</sub>	38.22	37.33-40.00	4.93	3.48	50.00	1.94	5.08	-2.00
Number of flowers per inflorescence	F <sub>4</sub>	2.91	2.20-3.83	30.48	10.31	11.50	0.19	7.19	
	F <sub>5</sub>	2.88	2.46-3.46	14.47	2.85	3.90	0.03	1.16	-1.03
	F <sub>6</sub>	2.72	2.56-3.16	14.54	7.65	27.70	0.24	8.29	-5.55
Number of fruits per inflorescence	F <sub>4</sub>	2.28	1.20-3.36	30.63	3.32	1.20	0.01	0.74	
	F <sub>5</sub>	2.51	1.53-3.20	30.29	28.65	89.50	1.40	55.83	10.08
	F <sub>6</sub>	2.52	1.53-2.93	31.50	30.54	94.00	1.39	61.01	0.39

Table Cont....

Character	Generation	Mean	Range	PCV	GCV	Heritability (%)	GA at 5%	GAM at 5%	% GG
Days to first harvest	F <sub>4</sub>	52.04	48.00-58.00	8.15	7.34	81.10	7.08	13.62	
	F <sub>5</sub>	50.33	49.00-52.00	2.99	2.17	52.40	1.63	3.23	-3.28
	F <sub>6</sub>	49.77	49.00-50.33	2.22	0.67	9.10	0.20	0.41	-1.11
Days to final harvest	F <sub>4</sub>	160.54	150.66-173.33	4.83	4.24	77.10	12.34	7.68	
	F <sub>5</sub>	162.55	158.33-168.66	2.81	2.68	91.10	8.59	5.28	1.25
	F <sub>6</sub>	162.85	159.33-165.66	3.40	3.30	94.20	10.72	6.59	0.18
Fruit length (cm)	F <sub>4</sub>	9.53	6.21-12.86	28.66	25.59	79.80	4.49	47.09	
	F <sub>5</sub>	10.45	9.64-13.79	17.50	14.62	69.80	2.84	25.16	9.65
	F <sub>6</sub>	11.28	10.64-11.92	8.66	5.57	41.30	0.77	7.38	7.94
Fruit girth (cm)	F <sub>4</sub>	17.63	13.00-19.93	17.11	13.36	61.00	3.56	21.59	
	F <sub>5</sub>	16.74	14.95-20.28	13.74	11.59	71.10	3.55	20.13	-5.04
	F <sub>6</sub>	16.44	14.95-17.75	10.20	8.83	75.10	2.64	15.77	-1.79
Fruit length to girth ratio	F <sub>4</sub>	0.74	0.69-0.88	21.48	10.04	21.90	0.07	9.68	
	F <sub>5</sub>	0.63	0.61-0.68	9.16	1.88	4.20	0.00	0.79	-14.86
	F <sub>6</sub>	0.62	0.61-0.64	7.82	4.49	33.00	0.03	5.32	-1.58
Fruit volume (cm <sup>3</sup> )	F <sub>4</sub>	331.25	286.66-380.00	10.87	8.16	56.40	41.87	12.64	
	F <sub>5</sub>	347.77	333.33-390.00	6.99	6.03	74.40	38.16	10.72	4.98
	F <sub>6</sub>	355.83	333.33-370.00	6.50	5.11	62.00	28.85	8.29	2.31
Number of fruits per plant	F <sub>4</sub>	40.66	29.26-57.83	24.40	23.24	90.70	18.54	45.59	
	F <sub>5</sub>	48.86	32.90-61.16	24.51	24.44	99.50	24.54	50.23	20.16
	F <sub>6</sub>	54.18	47.86-61.16	12.32	12.31	99.70	13.72	25.32	10.88

Table Cont....

Character	Generation	Mean	Range	PCV	GCV	Heritability (%)	GA at 5%	GAM at 5%	% GG
Average fruit weight (g)	F <sub>4</sub>	68.24	37.66-97.50	30.00	29.57	97.10	40.98	60.04	
	F <sub>5</sub>	72.02	63.23-94.60	16.98	16.87	98.80	26.84	34.56	5.53
	F <sub>6</sub>	77.66	63.23-79.53	11.52	11.36	97.30	16.63	23.09	7.83
Number of seeds per fruit	F <sub>4</sub>	321.33	251.33-331.00	11.97	5.15	18.50	13.81	4.57	
	F <sub>5</sub>	310.22	294.20-324.66	7.69	6.99	82.60	42.07	13.09	-3.45
	F <sub>6</sub>	302.55	291.00-312.66	3.96	1.71	18.80	4.76	1.53	-2.47
Seed weight per fruit (g)	F <sub>4</sub>	4.43	3.50-4.78	17.80	5.09	18.70	0.19	4.53	
	F <sub>5</sub>	4.35	3.76-4.68	6.28	2.42	14.90	0.08	1.92	-1.80
	F <sub>6</sub>	4.19	4.06-4.45	6.23	3.51	31.80	0.17	4.08	-3.67
Firmness of the fruit (Kg/cm <sup>2</sup> )	F <sub>4</sub>	2.36	1.95-2.87	15.32	8.15	28.30	0.22	8.93	
	F <sub>5</sub>	2.48	2.12-2.75	8.42	7.52	79.60	0.32	13.82	5.08
	F <sub>6</sub>	3.29	2.82-3.43	7.42	6.71	81.80	0.28	12.51	32.66
Phenols (mg 100 g <sup>-1</sup> )	F <sub>4</sub>	4.86	4.65-5.13	15.40	5.44	12.50	0.18	3.97	
	F <sub>5</sub>	4.73	4.37-5.13	6.99	9.54	87.50	0.59	12.61	-2.67
	F <sub>6</sub>	4.56	3.90-4.97	5.58	4.78	73.40	0.41	8.44	-3.59
Yield per plant (Kg)	F <sub>4</sub>	2.73	1.32-3.86	33.12	31.14	88.40	1.64	60.30	
	F <sub>5</sub>	3.67	3.11-3.92	10.63	10.21	92.30	0.74	20.21	34.43
	F <sub>6</sub>	3.86	3.80-3.92	2.15	1.04	23.40	0.04	1.04	5.17

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