



Research Note :

GENETIC VARIABILITY FOR SOME METRIC TRAITS IN STRAWBERRY (*Fragaria* × *ananassa* Duch.)

Bijay Kumar, Sanjay Kumar and Yogesh Chandra Yadav

Department of Applied Plant Science (Horticulture)

Babasaheb Bhimrao Ambedkar University, (A Central University) Vidya-Vihar, Rae Bareilly Road, Lucknow-226 025

E-mail-sanjay123bhu@gmail.com

Keywords: *Genetic variability, strawberry.*

The cultivated strawberry (*Fragaria* × *ananassa* Duch.), octaploid in nature, is derived from two North American species, *Fragaria chiloensis* and *Fragaria virginiana*, which were first developed in France in the 17th century. The strawberry belongs to the family Rosaceae. Strawberry is an important fruit crop whose cultivation has ample scope near the cities having fruit preservation factories. Considerable variation exists in various cultivars which can be exploited for the benefit of fruit growers in subtropical/temperate area. The wide variation in climates within these regions and the wide adaptation of the strawberry plant permit harvesting and marketing the fruit during greater part of the year. Strawberry is a delicious fruit taken fresh in several ways. It also makes excellent ice-cream and jam on account of its rich aroma, and is also a good source of vitamin C. It is a soft and a highly perishable fruit, often shipped in frozen condition in Western countries. Fruit may be conical, round and long to conical, conical with constricted base and cylindrical ground depending upon the variety, and immature fruit is consumed in a number of ways. The fruit contains 89.9 per cent moisture, 0.7g protein, 8.4g carbohydrate, 0.5g fat and 59 mg vitamins C per 100g fruit of fresh weight. It is good for people suffering from biliousness and indigestion. The genetic improvement in any crop depends upon the available genetic variability for important quantitative traits and its judicious exploitation through efficient breeding method. Selection of plants plays important role among

various breeding approaches at one or more stages as it acts on available genetic variability to evolve superior genotypes. The nature and amount of genetic variability available in the germplasm indicate the scope of improvement in the character through selection. However, the efficiency of selection in improving the character by exploiting the genetic variability depends mainly upon the extent of transmissibility of the character in question the genotype and phenotypic coefficient of variation and helpful in expressing the nature of variability in the breeding population, whereas, the estimate of heritability provides index of transmissibility of characters.

The present experiment entitled was carried out at Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Lucknow (UP) during the year 2009-2010. The runners of 16 genotypes of strawberry were brought from the Regional Station of Indian Agricultural Research Institute, Amartara Cottage and Shimla (H.P.) in the month of October 2009. The runners were kept for two days in shade for hardening before transplanting in well prepared beds under open field condition plots which were distributed randomly in three replications. The plant to plant and row to row spacing were maintained at 30 x 30 cm, respectively. The sixteen genotypes Pusa Sweet (S-5), Larsan, Red Coat, Himalayan Scarlet (S-1), Katrain Sweet, Sea Scape, Etna, Sweet Charlie, Dana, Torrey, Fern, Addie, Selva, Phenomenal, Chandler, Pajaro were used as experimental

materials. The observations were recorded on height of plant (cm), spread of the plant, number of leaves per plant, number of flowers per plant, number of fruits per plant, fruit yield per plant, length of fruit, fruit diameter, average fruit weight, total soluble solids (T.S.S.) and titrable acidity (%). The analysis of variance, variability for different quantitative characters, were heritability and expected genetic advance were calculated by following standard statistical procedures.

Analysis of variance for twelve characters of parents of strawberry (Table 1) shows that mean sum of square due treatment was highly significant for all the characters under study. The phenotypic coefficient of variation (PCV) was higher than their respective genotypic coefficient of variation (GCV) for all the traits under study (Table 2).

The heritability value for trait was found to be 83.0%. The value of expected genetic advance was noted to be 11.60%. The number of flowers per plant varied between 11.67 to 23.69 with a general mean of 17.62. The phenotypic and genotypic coefficient of variation was observed to be 17.65 to 16.48, respectively. The heritability value for this trait was 87.20%. The expected genetic advance was found to be 7.90 %. The data of experiment showed that the number of fruits per plant recorded between 8.33 to 19.98 with a general mean of 14.15. The phenotypic and genotypic coefficient of

variation was observed to be 21.96 to 21.10, respectively.

The heritability value for this trait was 92.3%. The expected genetic advance was found to be 8.25%. The fruit length varied between 3.06 to 4.26 cm to with a general mean of 3.96. The genotypic coefficient of variability was 11.17 and phenotypic coefficient of variation was 7.62. The heritability value was recorded to be 47.0% (Table 2). The expected genetic advance was recorded to be 0.50%. The fruit diameter was recorded between 18.77 to 33.93 (mm) with a general mean of 26.35 mm. The phenotypic coefficient of variation was 20.32 and genotypic coefficient of variation was 18.65 for this character. The heritability value was recorded to be 84.3%. The expected genetic advance was recorded to be 11.63%. The highest fruit yield per plant was observed 112.70 g, while, lowest to be 32.49 g with a general mean was recorded to be 72.59 g. The phenotypic and genotypic coefficients of variation were recorded to be 32.61 and 31.89, respectively. Findings are in consonance with Asrey and Singh (1), Lal and Seth (3) and Verma *et al.* (5).

The value of heritability for fruit yield was noted 96.0% and expected genetic advance was 53.56%. Average fruit weight of edible ripe fruit for 16 genotypes ranged from 3.97 to 10.15 g with a general mean of 7.06. The phenotypic and genotypic coefficient of variation was recorded to

Table 1: Analysis of variance for sixteen genotypes of Strawberry.

| S. No. | Source of variation | D. F. | Characters | | | | | | | | | | | |
|--------|---------------------|-------|----------------------|----------------------|-------------------------|--------------------------|-------------------------|-------------------|---------------------|---------------------------|--------------------------|----------|----------------------|--------------------------------|
| | | | Height of plant (cm) | Spread of plant (cm) | No. of leaves per plant | No. of flowers per plant | No. of fruits per plant | Fruit length (cm) | Fruit diameter (mm) | Fruit yield per plant (g) | Average fruit weight (g) | T.S.S °B | Titrable acidity (%) | Ascorbic acid (mg/100 g fruit) |
| 1. | Replication | 2 | 0.59 | 13.00 | 7.30 | 13.20 | 12.33 | 0.21 | 0.37 | 107.64 | 0.11 | 1.05 | 0.001 | 2.54 |
| 2. | Treatments | 15 | 0.82* * | 24.93 ** | 97.94 ** | 32.31 ** | 32.65 ** | 0.33* * | 73.3** | 1410.65** | 9.87* * | 12.17 | 0.02* * | 157.58** |
| 3. | Error | 30 | 0.31 | 7.20 | 13.14 | 1.50 | 0.88 | 0.09 | 4.29 | 21.21 | 0.12 | 0.04 | 00002 | 0.40 |

** Significant at 1%; *Significant at 5% level of significance.

Table 2: Estimation of the range, coefficient of variation, genotypic and phenotypic coefficient of variation, heritability and genetic advance for 12 characters in strawberry.

| Sl. No. | Characters | Range | | Phenotypic variation | Genotypic variation | PCV (%) | GCV (%) | Heritability (%) | Genetic advance |
|---------|--------------------------------|---------|---------|----------------------|---------------------|---------|---------|------------------|-----------------|
| | | Minimum | Maximum | | | | | | |
| 1. | Height of plant(cm) | 8.67 | 10.16 | 0.48 | 0.17 | 7.54 | 4.48 | 35.3 | 7.01 |
| 2. | Spread of plant(cm) | 21.47 | 32.35 | 13.11 | 5.91 | 13.87 | 9.32 | 45.1 | 16.51 |
| 3. | No. of leaves per plant | 25.78 | 43.70 | 41.40 | 28.27 | 19.82 | 16.37 | 68.3 | 35.71 |
| 4. | No. of flowers per plant | 11.68 | 23.69 | 11.77 | 10.27 | 17.65 | 16.48 | 87.2 | 40.64 |
| 5. | No. of fruits per plant | 8.34 | 19.98 | 11.47 | 10.59 | 21.96 | 21.1 | 92.3 | 53.53 |
| 6. | Fruit length (cm) | 3.06 | 4.26 | 0.17 | 0.08 | 11.17 | 7.62 | 46.6 | 13.73 |
| 7. | Fruit diameter (mm) | 18.78 | 33.93 | 27.29 | 23.00 | 20.32 | 18.65 | 84.3 | 45.21 |
| 8. | Fruit yield per plant (g) | 32.49 | 112.70 | 484.35 | 463.15 | 32.61 | 31.89 | 95.6 | 82.32 |
| 9. | Average fruit weight (g) | 3.97 | 10.15 | 3.36 | 3.25 | 28.10 | 27.61 | 96.5 | 71.60 |
| 10. | T.S.S °B | 5.06 | 12.03 | 4.08 | 4.04 | 25.90 | 25.78 | 99.1 | 67.75 |
| 11. | Titration acidity (%) | 0.57 | 0.75 | 0.005 | 0.01 | 12.25 | 11.98 | 95.7 | 30.92 |
| 12. | Ascorbic acid (mg/100 g fruit) | 61.80 | 81.19 | 52.76 | 52.37 | 10.06 | 10.03 | 99.3 | 26.37 |

be 28.10 and 27.61, respectively. The heritability value was noted be 97.0% and expected genetic advance was 4.68%. The T.S.S. varied between 5.06 to 12.03% with general mean 8.54%.

The phenotypic coefficient of variation was 25.90 and genotypic coefficient of variation was 25.78. The heritability value was recorded to be 99.0%. The expected genetic advance was recorded to be 5.28 %.The data of experiment showed that the titration acidity ranged from 0.57 to 0.75% with a general mean was 0.66%. Phenotypic and genotypic variation for this trait were 12.25 to 11.98, respectively. The heritability value for this trait was 96.5%. The value of expected genetic advance was noted to be 0.19%.The data recorded reveals that the ascorbic acid content varied from 61.8 to 81.19 mg with a general mean of 71.49 mg. Phenotypic coefficient of variation was 10.06 and genotypic coefficient of variation was 10.03 for this trait. The heritability value was 99.0% and the expected genetic advance was 19.03%. Findings of present study are in line of Das (2), Lal and Seth (3) and Sharma et al. (4).

REFERENCES

1. Asrey, R. and Singh, R (2004). Evaluation of strawberry cultivars under semi arid irrigated region of Punjab. *Indian J. Hort.*, **61**(2): 122-124.
2. Das, A.K., Singh, B. and Sahoo, K. (2006). Correlation and path analysis in strawberry (*Fragaria x ananassa* Duch). *Indian J. Hort.*, **63**(1): 83-85.
3. Lal, S.D. and Seth, J.N. (1979). Studies on genetic variability in strawberry (*Fragaria x ananassa* Duch). *Prog. Hort.* **11** : 49-53.
4. Sharma, G., Suman, D.K., and Sharma, O.C. (2002). Studies on genetic variability for various horticultural traits in strawberry (*Fragaria x ananassa* Duch). *Plant Genetic Resour.*, **15**: 64-66.
5. Verma, S.K., Singh, R.K. and Arya, R.R. (2003). Variability and correlation studies in strawberry germplasm for quantitative traits. *Indian J. Hort.*, **59**(1): 39-43.