Studies on Genetic Variability, Heritability, Genetic Advance, Correlation Coefficient and Path Analysis in Tomato (*Solanum lycopersicum* L.)

SUMMARY

of

THESIS

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Babasaheb Bhimrao Ambedkar University
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SUMMARY of THESIS

The present investigation entitled **"Studies on Genetic Variability, Heritability, Genetic Advance, Correlation Coefficient and Path Analysis in Tomato (*Solanum lycopersicum* L.)"** was carried out at Horticulture Research Farm- I, Department of Horticulture, School of Agricultural Sciences and Technology, Babasaheb Bhimrao Ambedkar University (A Central University),Vidya Vihar, Rae Bareli Road, Lucknow (U.P.), India, during the rabi season of 2017-18 and 2018-19.The response of genetic variability, heritability, genetic advance, correlation coefficient and path analysis of tomato. The results are discussed in the light of literature available and research works reported by earlier workers on tomato and other allied crops relevant and logical explanation have been given wherever possible.

The following studies were conducted in the present investigation in order to generate additional knowledge on the aforesaid facts.

6.1 Analysis of variance for the design of experiments

6.2 Mean performance of genotypes

6.3 Estimates of variability, heritability and genetic advance in percent of mean

6.4 Genotypic and phenotypic correlation coefficient

6.5 Path coefficient analysis

1. The plant height (cm) ranged from 25.33 to 30.53 (2017-18) & 24.92 to 31.40 (2018-19) and 25.12 to 30.96 (pooled data) correspondingly, according to the data. As a result the genotype Toleu- 32 took shortest plant height.

2. The number of branches per plant ranged between 4.69 to 7.08 (2017-18) & 4.37 to 7.11(2018-19) and 4.53 to 7.09 (pooled data) in the current study. As a result the genotype Toleu- 32 took the minimum number of branches per plant.

3. Days to 50 percent flowering ranged from 29.15 to 41.60 (2017-18) & 30.20 to 42.20 (2018-19) and 29.68 to 41.90 (pooled data) consequently. In genotype Pusa Sadabahar the minimum days to 50 percent flowering were recorded.

4. In the present investigation, it was found that the number of clusters per plant ranged from 15.20 to 20.12 (2017-18) & 15.76 to 20.76 (2018-19) and 15.48 to 20.44 (pooled data) respectively. The genotype Solan Vojr, consequently took minimum number of clusters per plant was observed.

5. The perusal data explicited that the number of flowers per plant varied from 5.67 to 9.78 (2017-18) & 5.71 to 9.84 (2018-19) and 5.69 to 9.81 (pooled data) in the current study. The genotype Toleu- 32, consequently took minimum number of flowers per plant was taken.

6. Number of fruits per cluster ranged from 3.20 to 5.12 (2017-18) & 3.13 to 5.04 (2018-19) and 3.17 to 5.08 (pooled data) consequently. The minimum number of fruits per cluster was observed in genotype Toleu- 32.

7. In the present investigation it was observed that the number of fruits per plant ranged from 13.10 to 18.44 (2017-18) & 13.16 to 18.32 (2018-19) and 13.13 to 18.38 (pooled data) respectively. The genotype Toleu- 32, consequently took minimum number of fruits per plant was observed.

8. Average fruits per plant ranged from 41.88 to 53.20 (2017-18) & 42.02 to 52.88 (2018-19) and 41.95 to 53.04 (pooled data) consequently. The minimum average fruit per plant was observed in genotype Toleu- 32.

9. In the present investigation, it was observed that the number of locules per fruit ranged from 3.09 to 5.87 (2017-18) & 3.54 to 5.12 (2018-19) and 3.52 to 5.50 (pooled data) respectively. The minimum number of locules per fruit was observed in Rio-Grande.

10. The perusal of data revealed that the pericarp thickness ranged from 2.81 to 4.72 (2017-18) & 3.01 to 4.69 (2018-19) and 2.91 to 4.62 mm, (pooled data) respectively. The genotype TLCV-28, consequently took minimum pericarp thickness was observed.

11. Data clearly apparent that fruit length ranged from 5.19 to 6.53 (2017-18) & 5.26 to 6.64 (2018-19) and 5.23 to 6.59 cm, (pooled data) respectively. The genotype VRT-50, respectively took minimum fruit length had taken.

12. In the present investigation, it was obvious that the fruit width ranged from 4.36 to 7.98 (2017-18) & 4.72 to 7.91(2018-19) and 4.62 to 7.91 cm, (pooled data) respectively. The minimum fruit width was observed in genotype Kashi Aman.

13. In the present investigation it was observed that the number of ridges on fruit ranged from 1.15 to 2.29 (2017-18) & 1.17 to 2.18 (2018-19) and 1.19 to 2.24 (pooled data) respectively. The minimum number of ridges on fruit was observed in genotype Rio- Grande.

14. The perusal data clearly revealed that the fruit yield ranged from 548.63 to 981.01 (2017-18) & 552.98 to 968.76 (2018-19) and 550.81 to 974.89g, (pooled data) respectively. The minimum fruit yield was observed in Toleu-32.

15. Fruit yield ranged from 8.78 to 15.70 (2017-18) & 8.85 to 15.50 (2018-19) and 8.82 to 15.12kg/plot, (pooled data) respectively. The minimum fruit yield was observed in Toleu-32.

16. The perusal of data revealed that the fruit yield ranged from 203.24 to 363.42 (2017-18) & 204.86 to 358.80 (2018-19) and 204.05 to 361.11 q/ha, (pooled data) respectively. The minimum fruit yield was observed in genotype Toleu-32.

17. In the present investigation, it elucidated that the total soluble solids ranged from 4.02 to 5.61(2017-18) & 4.31 to 5.73 (2018-19) and 4.17 to 5.490Brix, (pooled data) respectively. The minimum total soluble solids were observed in genotype LA-3957.

18. In the current study, it was observed that the vitamin C ranged from 23.71 to 27.79 (2017-18) & 24.19 to 27.74 (2018-19) and 23.95 to 27.77mg/100g, (pooled data) respectively. The minimum vitamin C was observed in genotype LA-3957.

19. The widest range was recorded for fruit yield per plant (15680.66 - 11489.85) followed by fruit yield (2151.40 - 1576.59), Average fruit weight (20.40 - 3.80). While, lowest range were recorded in number of ridges on fruit (0.11 - 0.09), Fruit yield (3.79 - 2.74).

20. The highest phenotypic coefficient of variation was found in the number of ridges on fruit (20.25) followed by fruit width (20.25), and fruit yield per plant (17.07%). The lowest phonotypic coefficient of variation was found in Vitamin C (7.99%) followed by plant height (8.94%).

21. The maximum genotypic coefficient of variation was observed in number of ridges on fruit (18.17) consequently, followed by fruit width (17.20), fruit yield (14.62%). The minimum genotypic coefficient of variation was observed in plant height (1.31%) followed by (4.17%), average fruit weight (4.17%).

22. The high value of broad sense heritability was recorded for all the characters. The highest heritability was recorded for number of ridges on fruit (89.72%) followed by fruit width (87.58%) whereas, the lowest heritability was recorded in plant height (14.62%) followed by vitamin C (42.23%).

23. The maximum genetic advance (%) was recorded for fruit yield per plant (20017.72%) followed by fruit yield (7415.34%), days to 50% flowering (517.61). The minimum genetic advance was observed in fruit length (37.83%) pursued by TSS (0brix) (40.41%) and plant height (42.47%).

24. The correlation coefficient at genotypic level in fruit yield (q/ha) had positive significant correlation with number of fruits per plant (0.996) followed by number of branches per plant (0.831). However, negatively and significantly correlation with day to 50 percent flowering (0.835). fruit yield (kg/plot) had observed that positive and significant correlation with number of cluster per plant (0.975) followed by plant height (0.937) and negative and significant correlation with days to 50 percent flowering (0.835) followed by (0.350). fruit yield per plant was positive and significant correlation with number of fruits per plant (0.996) followed by number of cluster per plant (0.975), however negatively and significantly correlation with day to 50 percent flowering

(0.835). fruit width has showed positive and significantly correlation with day to 50 percent flowering (0.267) and negative and significant correlation with average fruit width (0.397). fruit length was observed positively and significantly correlation with average fruit weight (0.959) followed by (0.445). pericarp thickness had showed positive and significantly correlation with average fruit weight (0.667) followed by number of fruits per cluster (0.298). number of locules per fruit had showed positively and significantly correlation with average fruit weight (0.846) followed by plant height (0.340). Average fruit had taken positive and significantly correlation with number of flower per cluster (0.945) However, negatively and significantly correlation with day to 50 percent flowering (0.592).

25. At the phenotypic correlation coefficient of tomato, it was observed that fruit yield (q/ha) found positive and significant correlation with average fruit weight (0.977) followed by (0.893) and negatively and significantly correlated with day to 50 percent flowering (0.178). fruit yield (kg/plot) had taken significant correlation with number of clusters per plant (0.893) followed by number of fruits per cluster (0.816). Fruit yield per plant was observed that positive and significant correlation with average fruit weight (0.976) and negative and significant correlation with day to 50 percent flowering (0.178). number of ridges on fruit showed positive and significant correlation with days to 50 percent flowering (0.252). However, negatively and significantly correlated with average fruit weight (0.340) fruit width had positive and significant correlation with days to 50 percent flowering (0.463). fruit length show positive and significant correlation with average fruit weigth (0.944) followed by number of clusters per plant (0.784). pericarp thickness had positive and significant correlation with number of fruits per cluster (0.587) and negatively significantly correlated with number of branches per plant (0.117). Number of locules per fruit showed positive and significant correlation with average fruit weight (0.903) followed by number of clusters per plant (0.677).

26. Fruit yield (kg/plot) (1.430) fruit yield per plant (g) (0.057), number of ridges on fruit (0.051), number of fruits per plant (0.038), number of fruits per cluster (0.031) and number of locules per fruit all had the most positive (direct and

indirect) effect on fruit production (q/ha) (0.027). Number of branches per plant (-0.199), day to 50 percent flowering (-0.079), number of cluster per plant (-0.050), fruit length (-0.044), TSS (-0.037), vitamin c (-0.034) and number of flower per cluster (-0.033) had the most unfavorable (direct and indirect) effects on fruit yield (q/ha) (-0.033).

27. Fruit yield (kg/plot) (0.531), fruit yield per plant (g) (0.049), number of fruits per plant (0.018), pericarp thickness (0.010), number of locules per fruit (0.007) and fruit breadth (0.007) had the highest phenotypic path coefficient analysis (direct and indirect) effect on fruit yield (q/ha) (0.004). Number of flowers per cluster (-0.050), fruit length (-0.008), days to 50 percent flowering (-0.003) and number of fruits per cluster had the most negative (direct and indirect) effects on fruit yield (q/ha) (-0.001).

CONCLUSION

On the basis of above results obtained in the present investigation, consisting twenty genotypes of tomato namely, LA-3957, Rio-Grande, Punjab Barkha Bahar-2, Kashi Aman, Solan Vojr, IIHR-2202, VRT-103-6-1, Kalyanpur typ-1, Switizar Land, Pusa Sadabahar, VRT-02 (Pe), TLCV-16, VRT-50, Selection-7, Toleu-32, VRT-01, H-86, KT-8, TLCV-28 and VRT-51. It can be concluded that the maximum phenotypic genotypic variance and genetic advance were observed for fruit yield per plant (g). The highest of PCV and GCV were recorded in number of ridges on fruit. Similarly, the maximum correlation coefficient at genotype level and phenotypic level were observed in fruit yield (q/ha). The results of path coefficient for parents were recorded the highest positive direct effect towards fruit yield (q/ha) was elucidated by fruit yield (kg/plot).