

## Studies on seed production potential of different varieties of tomato

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### ABSTRACT

The present investigation was carried out at Horticultural Research Station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya during Rabi season of 2013-14 and 2014-15. The experiment consisted of four tomato varieties namely Pusa 120, Pant T 3, Arka Vikash and Patharkuchi. The experiment was laid out in Randomized Block Design with three replications. Most of the characters were found to be statistically significant with respect to variety. Only number of locules per fruit and germination percentage of seeds were found non-significant for the interaction of varieties and flower flushes. The variety Pant T 3 had shown maximum seed yield (29.93 g plant<sup>-1</sup>) followed by Pusa 120 under its third flush (22.654 g). So it may be concluded that tomato variety Pant T 3 may be grown with a view to get higher seed yield with particular emphasis to its third flush.

**Keywords:** Germination, locules, seed yield, tomato, variety

Tomato (*Solanum lycopersicum* L. Syn. *Lycopersicon esculentum* Mill.,  $2n = 2x = 24$ ) is one of the most important edible and nutritious vegetable of the world. It belongs to the family Solanaceae and native of Peru Ecuador region (Rick, 1969). As a cash crop, it has great demand in the international market (Solieman *et al.*, 2013). Among all the various factors influencing the productivity of vegetable crops, quality seed is one of the crucial factors. Seed is a key component among all inputs for sustainable crop production. It is estimated that quality of seed accounts for 20-25 per cent increase of productivity. So, selection of promising varieties for seed production is of prime importance for higher seed yield as well as for improvement of overall productivity of tomato. The present investigation was aimed to find out the seed production potential of different varieties of tomato under New Alluvial zone of West Bengal.

### MATERIALS AND METHODS

The investigation was carried out at Horticultural Research Station, Mondouri, BCKV during *rabi* season of 2013-14 and 2014-15. The experiment consisted of four tomato varieties namely Pusa 120, Pant T 3, Arka Vikash and Patharkuchi and five flower flushes of each variety. The experiment was laid out in two factor Randomized Block Design with three replications. Different parameters like number of locules per fruit, number of seeds/fruit, fruit yield (kg plant<sup>-1</sup>), seed yield (g plant<sup>-1</sup>), test weight of seed (g), and germination percentage of seed were studied. Analysis of data was done by using appropriate statistical methods over pooled data of both the years.

### RESULTS AND DISCUSSION

The variety Patharkuchi recorded highest number of locules per fruit (5.03) followed by Arka Vikash (4.90).

Generally, locule number per fruit of tomato cultivars ranged from 2 to 5 (Sarah *et al.*, 1999). Significant influence had been shown by flower flush on number of locules per fruit. The maximum number of locules per fruit (4.95) had shown by third flush followed by second flush (4.70). Fifth flush had shown lowest number (4.45) of locules per fruit, which was statistically *at par* with first flush (4.58) and fourth flush (4.66). Interaction effect due to variety and flower flush was non-significant on number of locules per fruit. The highest number (5.33) of locules per fruit was recorded in the variety ArkaVikash with its third flush followed by Patharkuchi with its third and fourth flush (5.16) of flowering. The lowest number (4.00) of locules per fruit was recorded in the variety Pusa 120 in its fifth flush.

Pant T3 had shown maximum number of seeds per fruit (167.40) followed by the Patharkuchi (163.40). ArkaVikash had shown minimum number (109.06) of seeds per fruit, which was statistically differed from other varieties. The maximum number (144.12) of seeds per fruit had shown by third flush which differed statistically from other flush of flowering. Fifth flush had shown minimum number (136.16) of seeds per fruit. The effect interaction of variety and flower flush on number of seeds per fruit was significant. The maximum number (175.50) of seeds per fruit had been shown by Pant T 3 variety in its third flush, which differed statistically from all other combination of variety and flower flush. Minimum number (106.16) of seeds per fruit had been shown by Pusa 120 variety in its fourth flush.

The variety Patharkuchi had shown highest test weight (3.09g) followed by the variety ArkaVikash (3.07g) whereas the variety Pant T3 had lowest test weight (2.75 g). Maximum test weight (2.99 g) of seed had shown by third flush followed by second flush (2.98g). Fifth flush had shown minimum test weight

(2.84g) of seed. Highest test weight in third flush was due to mobilization of reserved food materials which could have been supplied by the mother plant for proper development of seeds in a sound physiological status (Abdul Baki and Anderson, 1971). According to Demir *et al.*, 2008 temperature during seed filling may affect seed weight. So it can be opined that prevailing temperature during the third flush favourably influenced test weight of seeds. The highest test weight (3.24 g) was recorded in the variety Patharkuchi with its second flush which was followed by ArkaVikash with its second flush (3.18g). The lowest test weight (2.64g) was recorded in the variety Pant T 3 in its fifth flush.

It has been revealed that the variety Pusa 120 recorded highest fruit yield (2.10 kg plant<sup>-1</sup>) which was statistically *at par* with Pant T 3 (1.61 kg) and Arka Vikash (1.61 kg) whereas the variety Patharkuchi was resulted lowest fruit yield plant<sup>-1</sup> (1.23 kg). The considerably higher fruit yield plant<sup>-1</sup> produced by Pusa 120 might be due to higher number of fruits per plant, higher number of flower clusters plant<sup>-1</sup>. It might be also due to agro-climatic conditions of the experimental location which might have suited to this variety as compared to the other ones, with respect to fruit production. This result was confirmed with the findings of Sing and Sahu (1998) ; Mishra and Lal (1998). The interaction effect of flower flush on fruit yield plant<sup>-1</sup> was also significant. The third flush among the varieties had shown maximum fruit yield (2.96 kg) plant<sup>-1</sup> followed by second flush (2.50 kg plant<sup>-1</sup>). The fifth flush produced lowest fruit yield (0.44 kg ha<sup>-1</sup>). The highest fruit yield (4.23 kg plant<sup>-1</sup>) was recorded in the variety Pusa 120 with its third flush which was statistically significant from all other combinations of variety and flower flush except the second flush of Pusa 120 (3.49 kg). The lowest fruit yield (0.34 kg ha<sup>-1</sup>) was recorded in the variety Arka Vikash in its fifth flush. The result clearly indicated that in all the varieties, higher fruit yield per plant were under third flushes followed by second flushes. Flowers from fourth and fifth flushes produced considerably meager fruit yield per plant in all the varieties.

Among the varieties Pant T3 produced maximum seed yield plant<sup>-1</sup> (15.18 g) and the lowest seed yield (10.00 g plant<sup>-1</sup>) was obtained from ArkaVikash, though it was statistically *at par* with that of Patharkuchi and Pusa 120, produced seed yield of 10.38 and 10.89 g plant<sup>-1</sup>, respectively. High seed yield produced by Pant T3 might be reasoned to the fact that the agro-climatic conditions of the experimental location were suitable for this variety as compared to the other varieties tested.. The result also might be due to higher number of flowers per cluster, higher number of seeds fruit<sup>-1</sup> and genetic potential of the variety. Among all the flushes of flowering, the flowers retained from third flush (F3), produced the highest average seed yield per plant of 22.18g which differed statistically from all the other

flushes of flower. Among the flushes, fifth flush (F5) clinched the lowest seed yield (3.80 g plant<sup>-1</sup>). The favourable fruit growth and development and fruit retention under third and second flush might have attributed to the higher seed yield plant<sup>-1</sup> under these cases. Similarly, less fruit retention and fruit growth from very early flowers as well as from very late flowers, might produce relatively lower seed production plant<sup>-1</sup> from first, fourth and fifth flushes of flowers. Influence interaction of variety and flower flush was significant on seed yield. The highest seed yield (29.92 g) plant<sup>-1</sup> was recorded from the variety Pant T3 with its third flush . It was statistically significant from all the other treatments except that of Pusa 120 under third flush of flowering. The lower seed yield (2.22 g plant<sup>-1</sup>) in fifth flush of 120 was statistically *at par* with Pusa 120 with fourth flush, fifth flush of Pant T3, fourth and fifth flush of Arka Vikash and fifth flush of Patharkuchi but significantly differed from all other treatments. The result broadly revealed that higher seed yield per plant from all the varieties was recorded under third and second flush, whereas flowers from fourth and fifth flush produced considerably meager seed yield for all the varieties.

The variety Patharkuchi had shown highest germination percentage (90.00) of seed which was statistically *at par* with ArkaVikash (87.33). The variety Pusa 120 had shown lowest germination percentage (78.66) of seed, which differed significantly from other varieties. Significant influence had been shown by flower flush on germination percentage of seed. The highest germination percentage (93.75) of seed had shown by first flush followed by second flush (89.16). Fifth flush had shown lowest germination percentage (74.16) of seed, which statistically differed from other flushes. The higher germination percentage of seeds in first flush might be due to the fact that seed induced by the better period of seed formation and early vigour of mother plant (Gowda *et al.*, 2000). In addition to above proper development of embryo, hardness of seed coat, proper development of other essential parts of seed and maximum accumulation on nutrients were the reasons for better germination in the earlier flushes (Yureva and Polumorduinova, 1974). Interaction of variety and flower flush had shown non-significant effect on germination percentage of seed. The highest germination percentage (98.33) of seed was recorded in the variety Patharkuchi with its first flush which was followed by its second flush and first flush of Arka Vikash (95.00). The lowest germination percentage (68.33) of seed was recorded in the variety Pusa 120 in its fifth flush of flowering.

It has been unveiled from the above study that the tomato variety Pant T3 has the potentiality to grow in the New Alluvial Zone of West Bengal successfully to have high seed yield.

**Table 1 : Effect of variety and flower flush on number of locules fruit<sup>-1</sup>, number of seeds fruit<sup>-1</sup>**

| Variety | Number of locules fruit <sup>-1</sup> |      |            |      |       |      | Number of seeds fruit <sup>-1</sup> |        |            |        |        |        |
|---------|---------------------------------------|------|------------|------|-------|------|-------------------------------------|--------|------------|--------|--------|--------|
|         | F1                                    | F2   | F3         | F4   | F5    | Mean | F1                                  | F2     | F3         | F4     | F5     | Mean   |
| V1      | 4.33                                  | 4.16 | 4.33       | 4.50 | 4.00  | 4.26 | 110.66                              | 110.33 | 108.50     | 106.16 | 109.66 | 109.06 |
| V2      | 4.33                                  | 4.66 | 5.00       | 4.33 | 4.16  | 4.50 | 164.83                              | 167.00 | 175.50     | 168.33 | 161.33 | 167.40 |
| V3      | 4.83                                  | 5.00 | 5.33       | 4.66 | 4.66  | 4.90 | 124.50                              | 114.50 | 124.50     | 115.00 | 112.66 | 118.23 |
| V4      | 4.83                                  | 5.00 | 5.16       | 5.16 | 5.00  | 5.03 | 159.33                              | 166.33 | 168.00     | 162.33 | 161.00 | 163.40 |
|         | Factor (V)                            |      | Factor (F) |      | V X F |      | Factor (V)                          |        | Factor (F) |        | V X F  |        |
|         | SEm(±)                                |      | 0.086      |      | 0.097 |      | 0.193                               |        | 0.721      |        | 0.806  |        |
|         | LSD (0.05)                            |      | 0.248      |      | 0.278 |      | NS                                  |        | 2.073      |        | 2.317  |        |
|         |                                       |      |            |      |       |      |                                     |        |            |        | 4.634  |        |

**Table 2 : Effect of variety and flower flush on fruit yield plant<sup>-1</sup> and seed yield plant<sup>-1</sup> (g plant<sup>-1</sup>)**

| Variety | Fruit yield plant <sup>-1</sup> (kg) |      |            |      |       |      | Seed yield plant <sup>-1</sup> (g) |       |            |       |       |       |
|---------|--------------------------------------|------|------------|------|-------|------|------------------------------------|-------|------------|-------|-------|-------|
|         | F1                                   | F2   | F3         | F4   | F5    | Mean | F1                                 | F2    | F3         | F4    | F5    | Mean  |
| V1      | 1.43                                 | 3.49 | 4.23       | 0.96 | 0.37  | 2.10 | 7.66                               | 17.13 | 22.65      | 4.78  | 2.22  | 10.89 |
| V2      | 1.59                                 | 1.92 | 2.92       | 1.13 | 0.51  | 1.61 | 12.78                              | 16.34 | 29.92      | 11.29 | 5.55  | 15.18 |
| V3      | 1.42                                 | 2.78 | 2.75       | 0.77 | 0.34  | 1.61 | 8.83                               | 14.39 | 19.14      | 5.20  | 2.40  | 10.00 |
| V4      | 1.15                                 | 1.83 | 1.95       | 0.70 | 0.53  | 1.23 | 7.94                               | 15.57 | 16.99      | 6.37  | 5.03  | 10.38 |
|         | Factor (V)                           |      | Factor (F) |      | V X F |      | Factor (V)                         |       | Factor (F) |       | V X F |       |
|         | SEm(±)                               |      | 0.095      |      | 0.106 |      | 0.211                              |       | 0.718      |       | 0.803 |       |
|         | LSD (0.05)                           |      | 0.272      |      | 0.304 |      | 0.608                              |       | 2.063      |       | 2.307 |       |
|         |                                      |      |            |      |       |      |                                    |       |            |       | 4.613 |       |

**Table 3 : Effect of variety and flower flush on test weight of seed and germination of seed**

| Variety | Test weight of seed (g) |      |            |      |       |      | Germination % of seed |        |            |        |        |        |
|---------|-------------------------|------|------------|------|-------|------|-----------------------|--------|------------|--------|--------|--------|
|         | F1                      | F2   | F3         | F4   | F5    | Mean | F1                    | F2     | F3         | F4     | F5     | Mean   |
| V1      | 2.80                    | 2.83 | 3.03       | 2.82 | 2.66  | 2.83 | 110.66                | 110.33 | 108.50     | 106.16 | 109.66 | 109.06 |
| V2      | 2.75                    | 2.66 | 2.83       | 2.88 | 2.64  | 2.75 | 164.83                | 167.00 | 175.50     | 168.33 | 161.33 | 167.40 |
| V3      | 3.10                    | 3.18 | 3.05       | 3.05 | 3.00  | 3.07 | 124.50                | 114.50 | 124.50     | 115.00 | 112.66 | 118.23 |
| V4      | 3.10                    | 3.24 | 3.05       | 3.02 | 3.06  | 3.09 | 159.33                | 166.33 | 168.00     | 162.33 | 161.00 | 163.40 |
|         | Factor (V)              |      | Factor (F) |      | V X F |      | Factor (V)            |        | Factor (F) |        | V X F  |        |
|         | SEm(±)                  |      | 0.021      |      | 0.023 |      | 0.046                 |        | 1.024      |        | 1.145  |        |
|         | LSD (0.05)              |      | 0.059      |      | 0.066 |      | 0.132                 |        | 2.943      |        | 3.290  |        |
|         |                         |      |            |      |       |      |                       |        |            |        | NS     |        |

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