



E-ISSN: 2278-4136

P-ISSN: 2349-8234

[www.phytojournal.com](http://www.phytojournal.com)

JPP 2020; Sp 9(5): 01-03

Received: 19-06-2020

Accepted: 02-08-2020

**Birje PR**Department of Horticulture,  
MPKV, Rahuri, Maharashtra,  
India**DB Kshirsagar**Department of Horticulture,  
MPKV, Rahuri, Maharashtra,  
India**SR Shinde**Department of Horticulture,  
MPKV, Rahuri, Maharashtra,  
India

## Performance study of $F_1$ hybrids of tomato (*Solanum lycopersicum* L.)

Birje PR, DB Kshirsagar and SR Shinde

DOI: <https://doi.org/10.22271/phyto.2020.v9.i5Sa.12298>**Abstract**

An investigation was conducted during *rabi* season 2017-2018 at Tomato Improvement Scheme, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri. The experiment consisted of eight hybrids and two hybrid checks (Abhinav and Phule Raja) were planted in Randomized Block Design in three replications to evaluate the superior hybrid of tomato for yield and quality purpose with disease tolerance. There were significant differences among the hybrids studied for days to 50 per cent flowering. 2 X 7 (32.00 days) was earliest hybrid followed by 3 X 4 (33.00 days) and 3 X 5 (34.00 days). Yield per plant differed significantly among hybrids which may attributed to significantly higher number of fruits per plant and average fruit weight. The highest fruit yield per plant was recorded in hybrid 3 X 5 (2.27 kg plant<sup>-1</sup>) followed by 7 X 8 (2.20 kg plant<sup>-1</sup>). The fruit firmness was highest for 3 X 5 (2.27 N/mm<sup>2</sup>) followed by 7 X 8 (2.16 N/mm<sup>2</sup>). The hybrid 3 X 5 recorded less incidence of Tomato leaf curl virus (5.83%) and Spotted wilt virus (0.83%). While the hybrid 7 X 8 and 6 X 7 also showed less incidence against viral diseases. Considering the yield/plant; firmness of fruits and incidence of viral diseases the hybrids 3 X 5 and 7 X 8 can be exploited commercially.

**Keywords:** Tomato, evaluation, hybrids and firmnesses**Introduction**

Tomato (*Solanum lycopersicum* L.) is native of Peru Ecuador Bolivia Region of Andes. South America. It is self-pollinated crop but a certain extent of cross pollination may take place. Tomato is a warm loving crop so easily tolerate heat and drought stress. In India, The share of tomato in all Vegetable crops is about 11.5%. Occupying and area of about 8.14 lakh hectares with production about 20515 MT (Anon.2018) [2]. Tomato is mainly consumed as salad, cooked or processed into several products like ketchup, juice, puree, sauce and whole canned fruit. Tomato is a rich source of antioxidants (mainly lycopene and 13- carotene), Vitamin A, Vitamin C and minerals like Ca, P, and Fe in diet. It's considered as a nutritional powerhouse compared with other vegetable crops (Chattopadhyay *et al.* 2013) [4]. F1 hybrid breeding is prominent among the methods used in the crop improvement of vegetable crops. Hybrids offer opportunities for improvement in productivity, earliness, uniformity and quality and for the rapid deployment of dominant genes for resistance to diseases and insect pests. The present experiment was carried out to evaluate the superior hybrid of tomato for yield and quality purpose with disease tolerance.

**Materials and Methods**

The investigation was undertaken at Tomato Improvement Scheme, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, central campus, Rahuri, Dist. Ahmednagar during *rabi* 2017-18. Eight tomato hybrids alongwith two checks Abhinav and Phule Raja were evaluated for growth yield and disease resistance incidence.

The experiment was laid out in Randomized Block Design (RBD) with three replications. Healthy, uniform 28 days old seedlings were transplanted on December 2017. The planting spacing was 90 X 30 cm. Observations were recorded in respect of plant height days to 50 per cent flowering, Pericarp thickness fruit firmness (N/mm<sup>2</sup>), number of fruits per plant, average fruit weight (g), total yield per plant (kg), estimated fruit yield per hectare (t/ha) on five randomly selected plants in each entry of each replication. The observation regarding incidence for viral disease such also taken at 15 day interval sterthing from 30,45,60,75 and 90 DAT. The data on various observations were tabulated and subjected to statistical analysis as described by Panse and • Sukhatme (1985) [9].

**Corresponding Author:****Birje PR**Department of Horticulture,  
MPKV, Rahuri, Maharashtra,  
India

## Result and Discussion

It is evident from Table 1 that significant differences were recorded in plant height by tomato hybrids. The Maximum plant height was found in the check hybrid Phule Raja (119.06 cm). It was significantly superior to those recorded under the rest of the hybrids. It was followed by hybrids viz. 2x9 and 3x4 which was recorded more than 100 cm of plant height. Whereas the minimum plant height was found in the hybrid 3x6 (84.73 cm)

The more food assimilation might have encouraged the vegetative growth of the tomato hybrids which in turns produced taller plants as compared to the other hybrids and vice versa. Ahmed *et al.* (2010) <sup>[1]</sup> reported that maximum height was found in cultivar Mini Anindyo Red (116 cm). Wajjid *et al.* (2012) <sup>[11]</sup> also reported tomato plant height 72 cm. More or less result was reported by Mahender (2017) <sup>[8]</sup>.

The data in Table 1 indicate that the hybrids differed significantly from each other with regard to the days required for 50 per cent flowering from the date of transplanting. The period varied widely from 32 to 37.33 days. The minimum period of 32 days for the days to 50 per cent flowering was recorded by the hybrid 2 X 7. However, it was at par with those recorded by all the hybrids except Phule Raja (37.33).

The pericarp thickness varied from 0.65 to 0.82 cm. The hybrid 3 X 5 was found to have maximum pericarp thickness i.e. 0.82 cm. However it was at par with all except 3 X 6 (0.65) and Abhinav (0.70). It was observed that the genotype having thicker pericarp has longer shelf life, higher fruit firmness and high transportation ability. A similar result was reported by Dhaliwal *et al.* (2014) <sup>[5]</sup> and Bharath kumar *et al.* (2017) <sup>[3]</sup> in the tomato.

The hybrids differed significantly in fruits count per plant. The count varied widely from 16.90 to 28. The hybrids 3.X 4, 3 X 5 and 7 X 8 produced maximum number of fruits per plant (28). The minimum fruits per plant were produced by the hybrid check 2 X 9 (16.90) fruits per plant. The average fruit weight of fruit of the hybrids ranged between 74.64 to 95.26 g. The hybrid 2 X 9 recorded the highest average fruit weight of 95.26 g. The hybrid 3 X 4 recorded the lowest fruit weight of 74.64 g. Average fruit weight and number of fruits per plant both the parameters were correlated with each other

as the weight at the fruit is more which had comparatively less number at fruit per plant thus resulting higher accumulation of assimilates. On an average 80-90 g weight fruit is derived as it gives more no. of fruits and optimum weight of fruit. Similar results were reported by Shivanand *et al.* (2011), Dhaliwal *et al.* (2015) <sup>[6]</sup> and Mamatha *et al.* (2017) in the tomato.

The yield by weight of fruits varied very widely between 1.61 and 2.27 kg/plant. The hybrid 3 X 5 gave the highest yield of 2.27 kg/plant. The lowest yield per plant of 1.61 Kg/plant was recorded in hybrids 2 X 9. Similarly the hybrid 3 X 5 gave the highest yield of 68.84 t/ha. However, it was at par with those recorded by the hybrids viz. 7 X 8, 6 X 7 and 3 X 6. The lowest yield of 48.78 t/ha was given by the hybrid 2 X 9. The highest fruit yield per plant was recorded in hybrid 3 X 5 which is attributed to comparatively higher number of fruits per plant and relatively higher average fruit weight. A similar result was reported by Shivanand *et al.* (2011) and Renuka *et al.* (2014) <sup>[10]</sup> yield per plant directly contributed towards increase in the total yield of crop.

Among quality parameters, the hybrid 3 X 5 was significantly superior to all of the hybrids with the highest fruit firmness 2.27 N/mm<sup>2</sup>. However, it was at par with the all hybrids except 3 X 6 and 3 X 7. The lowest fruit firmness was recorded in hybrid 3 X 6 which is 1.18 N/mm<sup>2</sup>. The oval/oblong fruits should comparatively thick pericarp; less number of locules and fruit become more firm. A similar result was reported by Shivanand *et al.* (2011) and Bharathkumar *et al.* (2017) <sup>[3]</sup>.

The data from Table 2 revealed that the hybrids differed significantly. The per cent values for the Tomato leaf curl virus varied widely from 5.83 to 30.83% (90 DAT). The hybrid 3 X 5 found to be less affected by Tomato leaf curl virus i. e. 5.83%. However, it was followed by the hybrids viz. 7 X 8 and 6 X 7. The hybrid 2x9 showed the highest 30.83% per cent of tomato leaf curl virus affected plant. 5.83 to 80.83% The hybrid 3 X 5 found to be less affected by Tomato spotted wilt i.e. 5.83 percent disease incidence of spotted wilt. However, it was followed by the hybrids viz. 7x8 and 6x7. The hybrids 2x9 showed the highest 30.83 per cent disease incidence of tomato spotted wilt.

**Table 1:** Evaluation of tomato hybrids for growth and yield.

Name of the hybrid	Plant Height (cm)	Days to 50% flowering	Pericarp thickness (cm)	Average weight of fruit (g)	Number of fruits per plant	Yield plant (Kg)	Yield per hectare (t)	Fruit firmness (N/mm <sup>2</sup> )	PDI of leaf Curl 90 DAT (%)	PDI of Spotted wilt 90 DAT (%)
2 X 7	91.66	32.00	0.71	84.81	20.28	1.72	52.12	1.44	29.17 (32.69)	5.00 (12.92)
2 X 9	102.53	34.00	0.76	95.26	16.90	1.61	48.78	1.62	30.83 (33.73)	6.67 (14.97)
3 X 4	100.26	33.00	0.71	74.64	28.00	2.09	61.74	1.39	15.83 (23.45)	3.33 (10.51)
3 X 5	98.80	34.00	0.82	81.07	28.00	2.27	68.84	2.27	5.83 (13.97)	0.83 (5.23)
3 X 6	84.73	33.00	0.65	87.50	24.00	2.10	63.78	1.18	16.67 (24.10)	4.17 (11.78)
3 X 7	95.53	35.00	0.73	87.95	18.75	1.65	49.99	1.29	27.50 (31.63)	5.00 (12.92)
6 X 7	90.73	34.33	0.78	75.71	24.00	2.12	64.34	1.55	15.00 (22.79)	2.50 (9.10)
7 X 8	87.33	33.66	0.81	91.66	28.00	2.20	66.79	2.16	11.67 (19.98)	2.50 (9.10)
Abhinav	90.13	35.00	0.70	79.20	25.00	1.98	60.17	1.56	16.67 (24.10)	4.17 (11.78)
Phule Raja	119.06	37.33	0.74	81.25	24.00	1.95	59.13	1.49	16.67 (24.10)	4.21 (11.78)
S.E.+	2.59	1.32	0.03	5.85	1.17	0.17	1.91	0.32	4.49	2.26
C.D. 5%	7.96	3.93	0.11	17.38	3.49	0.53	5.69	0.97	13.26	6.55

## Reference

- Ahmed Al- Busaidi, Salim A, Al-Rawahy, Mushtaque Ahmed. A monograph on management of Salt-affected Soils and Water for Sustainable Agriculture, 2010, 25-33.
- Anonymous. Horticultural Statics at a Galance, 2018.
- Bharathkumar MV, Sadashiva AT, Pradeep Kumar J. Performance of a set of tomato parental lines and their

hybrids for quality and yield under conditions of Bengaluni. India. Int. J Curr. Microbiol. App. Sci. 2017; 6(5):786-793.

- Chattopadhyay A, Chakraborty, Wasim S. Characterization of determinate tomato hybrids: Search for better processing qualities. J Food Process Technol. 2013; 4:4.

5. Dhaliwal MS, Surjan Singh, Cheema DS, Neena Chawla. Development of tomato hybrids suitable for fresh market and processing. Can. Int. Dev. Agency (CIDA) Proc. XXVI IHC — Advances in Vegetable Breeding, ActaHort, 2014, 637.
6. Dhaliwal MS, Jindal SK, Chawla N. Comparative performance of different tomato hybrids under naturally ventilated polyhouse. International Journal of Horticulture. 2015; 5(14):112.
7. Mamatha NCM, Lingaiah HB, Jyoti HK. Performance of parents and hybrids for yield and other economic traits in tomato. Int. J Pure App. Biosci. 2017; 5(3):1080-1083.
8. Mahender B, Ashwini D, Sreeja K. Performance of tomato hybrids suitable during Kharif for northern Telangana Zone. Agric. Update, 12(TECHSEAR-1) 2017; 18:22. DOI: 10.15740/HAS/AU/12. TECHSEAR (1)2017/18-22.
9. Panse VG, Sukhatme PV. Statistical methods for Agricultural Workers that is Randomized Block Design ICAR Publication, 1985, 87-89.
10. Renuka DM, Sadashiva AT, Kavita BT, Vijendrakumar RC. Evaluation of cherry tomato lines for growth, yield and quality traits., IIHR Bengaluru. 2014; 14 (1):151154.
11. Wajid A, Muhammad SJ, Nisar N, Kashif M, Jehanzeb K. Evaluation of different hybrids of tomato under the climatic conditions of Peshawar Sarhad J Agric. 2012; 28(2):207-212.