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RESEARCH ARTICLE

Evaluation of Tomato Hybrids in Open Field Conditions of South Haryana Conditions

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ABSTRACT

A field experiment was conducted to study the performance of six tomato hybrids for growth, yield and yield attributing characters under agro-climatic condition under South Haryana region, during the year 2022–2023 and 2023–2024. The six promising tomato hybrids, namely, H-319, H-419, Tomato 9-1-7, H-162, H-147, and Pusa TOLCV Tomato- 6 were studied under the present experiment. The trial was laid out in randomized block design with having three replications. The results revealed that the maximum fruit yield (609.35 q/ha), fruit yield/plant (2.2 kg/plant), total no. of fruits/plant (39.3), fruit cluster (6), flower/cluster (7.35) was recorded in hybrid tomato 9-1-7 while fruit weight (59.3 g) in hybrid H-319. Therefore, the hybrid tomato 9-1-7 is performing better in terms of yield, total no. fruit/plant, fruit cluster in South Haryana climatic conditions as compared to other hybrids.

Key words: Tomato Hybrid, Evaluation, Plant Height, Yield

INTRODUCTION

Tomato is a warm season crop and requires a relatively long growing season and moderately high temperature (20–28°C). The optimum fruit setting is at night temperature and the optimum temperature range is 15–20°C (Anonymous 2010).[1] Tomatoes crop was introduced in Haryana in the early 20th century and has since become a staple crop in the region. The favorable climate and soil conditions, combined with advances in agricultural practices, have led to increased production. Haryana's farmers have embraced various hybrid varieties, which have improved yield and resistance to diseases. Tomato cultivation in Haryana plays a significant role in the local economy, providing income for farmers and contributing to the state's agricultural diversity. The crop is harvested during the Kharif season, with both open-field and protected cultivation methods being employed. In addition, the popularity of tomatoes in local cuisine and markets has further solidified their importance in the region. Tomato is one of the most important and widely grown vegetable crops in the world ranking second in importance after potato (FAO, 2009). It is very versatile vegetable for culinary purposes. Its fruits are eaten raw or cooked. Tomatoes, asides from being tasty, are very useful for our heath as they are a good source of Vitamins A and C. Cooked tomatoes and tomato products are the best source of lycopene, which is very powerful antioxidant and helpful in preventing the development of many form of cancer (Mahajan and Singh, 2006).[11]

MATERIALS AND METHODS

The research work was carried out during the year 2022–2023 and 2023–2024 in the research farm of

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the Regional Research Center, Raiya (Jhajjar) of Maharana Pratap Horticultural University, Karnal, and Haryana. It is situated between 28033' to 28055' North latitude and 76036' to 76061' East longitude with an elevation of 222 m above the mean sea level. It experiences a typical semi-arid climate characterized by hot and dry summers and extremely cold winters, with an annual rainfall of 456 mm. The experimental site's topography was uniform, the field was leveled flat, and the soil was sandy loam with a medium water retention capacity. Experimental material consists of six tomato hybrids. The experiment was arranged in a factorial randomized block design with three replications. At the time of transplanting, half of the required nitrogen, as well as the entire quantity of the phosphorus and potash, were applied as basal dose. The remaining nitrogen dose was administered in two equal split doses, 30 and 45 days after transplanting (DAT), while farmyard manure was mixed thoroughly mixed in the top 15 cm of soil during field preparation. The transplanted was done in the month of September on ridge beds at a spacing of 60 cm × 45 cm.

The observations were collected on the plant height, primary and secondary branch, number of days to 1st 50% flower, number of days to 1st harvest, flowers/cluster, fruits/cluster, total number of fruits per plant, average fruit weight (g), and fruit yield (kg)/plant for randomly selected five plants per treatment per plot in each replication and the observations recorded for yield parameters were the average weight of fruit (g), yield per plant (kg), and yield per hectare (quintal).

RESULTS AND DISCUSSION

Growth and Flowering Parameters

The plant growth was recorded at 60 DAT and at harvest. The maximum plant height (59.7 cm) was recorded in Tomato 9-1-7 at 60 DAT which was at par with H-319 (58.3 cm) while significant difference was observed in all remaining hybrids. While at final fruit harvest, all the tomato hybrid showed non-significant difference in respect of plant height [Table 1]. Difference in the genetic makeup of the hybrids and the influence of external environment might have resulted in the significant difference among the hybrids for plant height. Variation in plant height of hybrids in different climatic conditions was reported by Muna *et al*. 2019; Kumar and Ch *et al*. (2023)[10,12]. The number of primary branches was recorded at 60 DAT and number of secondary branches was recorded at 90 DAT and at final harvest. The maximum number of primary branches was recorded in Pusa TOLCV Tomato-6 (10.7) which was found at significantly differ with all the tomato hybrids. Whereas in case of secondary branches, the maximum number of secondary branches recorded in Tomato 9-1-7 (13.2) at 90 DAT which was significantly higher than all the hybrids except H-162. Whereas at final harvest, the maximum number of recorded in Tomato 9-1-7 (15.6) was significantly higher than all the hybrids. The minimum was recorded in H-147 (12.6) [Table 1].

In terms of number of days to 50% flowering all the tomato hybrids showed non-significant results in comparison to each other. The flower per cluster was recorded in maximum in Tomato 9-1-7 (7.3) which was found significant to all other hybrids. The minimum were observed in H-419 (4.4) [Table 1]. Earliness could be due to higher capacity of plants to make assimilates available to the apex during the sensitive phase before flower initiation (Dielmen and Heuvelink, 1992).[7] Similar findings for days to flowering on different hybrids of tomato were reported by Singh *et al*. (2014).[13]

Yield and Yield Attributing Parameters

In Table 2, the result revealed that the earliest harvest was recorded in hybrid Pusa TOLCV-6 (68.55 days) followed by Tomato 9-1-7 (69.7 days) which was significantly higher than H-162 (76.5 days) and H-147 (74.9 days). Earliness in fruit production and marketable yield is influenced by days to first harvest. Hence, minimum days to first harvest is preferred in tomato (Bamaniya *et al.,* 2019; Athulya and Anitha, 2022)[3,4] also reported similar variations for days to first harvest in tomato hybrids.

The fruit per cluster showed significant difference in all tomato hybrids. The maximum fruit/cluster was recorded in tomato 9-1-7 (6.0) followed by Pusa TOLCV Tomato-6 (5.7) and minimum recorded in H-419 (2.35). In case of total number of fruits

Table 1: Performance evaluation of tomato hybrids for growth parameter (pooled data)

Hybrids	Plant height (cm)		Primary branches	Secondary branches		Number of days to 50% flowering	Flower/ cluster
	60 DAT	At final harvest	60	90	At harvest		
H-319	58.3	105.6	9.9	10.2	13.2	35.8	6.2
H-419	57.3	83.7	9.4	10.8	13.2	37.3	4.4
Tomato 9-1-7	59.7	110.2	10.0	13.2	15.6	32.5	7.3
H-162	48.8	99.5	10.0	12.6	14.4	38.4	5.3
H-147	48.7	105.2	7.3	9.6	12.6	39.2	4.5
Pusa TOLCV Tomato-6	50.6	112.9	10.7	11.3	12.8	32.2	6.0
CD at 5%	2.3	NA	0.6	1.1	1.1	NA	0.8

DAT: Days after transplanting

Table 2: Performance evaluation of tomato hybrids for fruit and yield parameter (pooled data)

Hybrids	No. of days to 1st harvest	Fruit/ Cluster	Total no. of fruits/plant	Fruit weight (g)	Fruit Yield/ plant (kg)	Yield (q/ha)
H-319	71.6	4.2	29.3	59.3	1.7	486.9
H-419	74.0	2.3	32.6	47.7	1.5	431.2
Tomato 9-1-7	69.7	6.0	39.3	56.3	2.2	609.3
H-162	76.5	4.6	29.3	47.2	1.3	422.0
H-147	74.9	3.1	27.0	45.7	1.2	339.3
Pusa TOLCV Tomato-6	68.5	5.7	36.6	50.5	1.8	496.9
CD at 5%	5.0	0.3	3.9	2.0	0.3	76.7

per plant, the results revealed that total number of fruits per plant recorded highest in Tomato 9-1-7 (39.3) followed by Pusa TOLCV-6 (36.6) whereas minimum were found in H-147 (27.0) [Table 2].

The Table 2 showed that the average fruit was recorded maximum in H-319 (59.3g) which was significant to all the hybrids and lowest in H-147 (45.7 g). Average fruit weight can affect the consumer preference and yield of a hybrid. This in confirmation with the findings of (Cheema *et al*., 2013; Ashok *et al*., 2020; Kumar *et al*., 2022; Basumatary *et al*., 2022) for average fruit weight in Tomato.[2,5,6,9] The yield per plant recorded highest in Tomato 9-1-7 (2.2 kg) which was significantly higher than all the hybrids sown in open field conditions. The minimum yield per plant was recorded in H-147 (1.2 kg). Fruit yield of a hybrid is the prime factor influencing adoption of a hybrid by farmers. Fruit yield per plant varied significantly among the evaluated hybrids. Similar variation in yield of tomato hybrids under different environmental conditions was reported by (Ashok *et al*., 2020; Kumar *et al*., 2022; Basumatary *et al*., 2022; Singh *et al*., 2022) [Table 2].[2,5,9,14]

Similar trends were also reported in case of yield q/ha. The hybrid Tomato 9-1-7 recorded highest yield (609.3 q/ha) which was superior to all the hybrids of tomato evaluated during the investigation while the lowest was recorded in H-147 (339.3 q/ha). The variation in yield per plant between hybrids may be due to genetic makeup of the plant, vigorous and health plants, higher flower, higher number of flower per plant, and more fruit set percentage. Agro-climatic conditions might have also suited to this variety as compared to other with respect to fruit production. Similar observation on genetic differences for marketable fruit yield and other plant character in tomato hybrids had also been reported by Jindal *et. al.*, 2018.

CONCLUSION

It was revealed from the experiment that the maximum fruit yield (609.35 q/ha), fruit yield/plant (2.2 kg), total number of fruit/plant (39.3), flower/ cluster (7.3), fruit/cluster (6.0) was recorded in hybrid Tomato 9-1-7 while fruit weight (59.3 g) in hybrid H-319. Therefore, the hybrid Tomato 9-1-7 is promising better in term of growth, yield, and yield attributes parameter of tomato hybrid in Southern Haryana conditions.

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