

Evaluation of Tomato varieties for growth and yield components in Madhya Pradesh

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ABSTRACT

Different varieties of tomato trail were conducted as the on-farm trail (OFT) in Raisin district of Madhya Pradesh during 2018-19 and 2019-20 to compare the growth development and production potential of three (3) varieties of tomato viz. local check, Arka Rakshak, Arka Samratat farmers field under Krishi Vigyan Kendra, Raisin. Experimental data were collected, i.e. Plant height, total branch plant¹, number of fruits plant¹, average fruit weight, fruit length, fruit breath, Fruit yield Plant¹ (Kg), fruit yield q/ha, production efficiency (Kg/ha/day), Economic efficiency (Rs/ha/day), Gross returns (Rs/ha), Net Returns (Rs/ha) The experiment was laid out in Complete Randomized Block Design. The mean data of all the observations over two years were pooled and statistically analyzed. The result revealed that a maximum number of fruit/plant (26.648), average fruit weight (90.634 gm), Fruit yield/Plant, (2.425kg/ha), fruit yield per hectare (471.5182 q/ha), production efficiency (589.397 kg/ha/day), Gross returns (Rs.235758.9 /ha), Net Returns (Rs.143258.9/ha) and B:C ratio 2.54 were found under Arka Samrat whereas, plant height, fruit length and the number of branches per plant were recorded maximum under Arka Rakshak compared to local check varieties.

Key words : Tomato, Growth and yield of tomato, Madhya Pradesh

Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crops worldwide, because of its wider adaptability, high yielding potential, and suitability for a variety of uses in fresh as well as processed food industries and ranks second after potato in terms of global production and first in terms of yield (FAOSTAT, 2018). Tomato fruit for human health is reflected by its high consumption per capita, and the identification of tomato varieties that accumulate higher levels of primary and secondary

metabolites in their fruit is a priority objective (Hou *et al.*, 2020). The fruits are available year-round and eaten raw or cooked. In large quantities is used to produce soup, juice, ketchup, puree, paste, and powder; it supplies ascorbic acid and adds a variety of colors and flavors to the food.

Moreover, tomatoes are an integral part of the human diet being used fresh or cooked in pizza, ketchup, and tomato paste and provide important nutritional components such as carotenoids, vitamin C (ascorbic acid), phenols, and flavonoids. The carotenoid lycopene plays an especially important role

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for the consumer. Lycopene, which is highly abundant in tomatoes, is believed to provide health-promoting capabilities in the prevention and control of lung, breast, and prostate cancer. The continuous inflow of exotic hybrid varieties and the risk of getting the appropriate variety at the desired time created a dilemma among the farmers when selecting suitable tomato varieties. Uncertainty in the timely availability of hybrid seeds can be reduced by the cultivation of suitable hybrid cultivars developed in the country (Shrestha and Sah, 2014). The development of hybrid tomato varieties having desirable characteristics has proven to be an effective strategy to increase tomato production (Islam *et al.*, 2012). Therefore, research should be oriented towards tomato variety improvement through hybridization, selection, varietal evaluation, and release of disease-resistant, high-yielding, and consumer preferable hybrid varieties of tomato with high productivity. The present investigation was undertaken to study the performance of different tomato genotypes and their hybrids in terms of yield contributing characters.

Materials and Methods

Krishi Vigyan Kendra, Raisen is situated at 22° 47' N Latitude, 77° 21' E Longitude. The soil is generally medium to light black with medium organic carbon, medium to high in available nitrogen, low to medium available phosphorus, and low in available potash. On-Farm testing was conducted in the Raisen district during 2018-19 and 2019-20 to compare the vegetative growth and production potential of three varieties viz. Local (Local check), Arka Rakshak and Arka Samrat under Raisen district of Madhya Pradesh with 5 replications, farmers as replication. Seeds of three varieties were sown in raised nursery beds and after 25-30 days old seedlings were transplanted. Seedlings were transplanted

with a spacing of 45 cm plant to plant and 45 cm row to row. Recommended packages and practices were adopted to raise the crops successfully. Five tomato plants were selected at random in each plot to record the observation of Plant height, Number of fruit/plant, average fruit weight, fruit length, and fruity breath. The yield was noted on a plot basis. The experiment was laid out in Complete Randomized Block Design. The mean data of all the observations over two years were pooled and statistically analyzed using the F-test. The test of significance of the treatment was done on the basis of the t-test. The differences between treatments mean that were higher than the respective CD values were considered as significant difference (LSD) at the 5% level of probability (P=0.05). The difference between the two treatments means which was considered significant.

Results and Discussion

Growth and yield

The two-year pooled data on the screening of tomato varieties were presented in the Table 1. The result revealed that maximum plant height was found in Arka Rakshak (98.136cm) followed by Arka Samrat (92.82 cm) and minimum in local check (57.904 cm). The number of fruit/plants was found significantly higher in Arka Rakshak (26.648 cm) and lowest in Local check (18.05 cm). Maximum fruit breadth was recorded in Arka Samrat (6.008 cm) followed by Arka Rakshak (5.654 cm) whereas maximum fruit length was found in Arka Rakshak (7.014 cm) and minimum in Local check (4.78 cm) compared to other varieties. Maximum fruit weight was recorded at 90.634g in Arka Rakshak followed by Arka Samrat (88.908 g) compared to other varieties, but these two varieties are at par with each other. Rangnamei *et al.* (2014) also reported that growth and yield attributes were recorded maximum in MT-2 compared to other tomato varieties.

Table 1. Growth and yield of tomato varieties (Pooled two year)

Varieties	Plant height (cm)	No. of branch	Fruits/plant	Fruit breadth (cm)	Fruit length (cm)	Avg. Fruit weight (g)	Fruit yield (kg/plant)	Fruit yield (q/ha)
Arka Rakshak	92.82	10.612	26.648	5.654	7.014	90.634	2.425	471.5182
Arka Samrat	98.136	11.624	25.28	6.008	5.424	88.908	2.2504	437.5654
Local Check	57.904	7.68	18.05	5.01	4.78	69.714	1.2304	239.2386
SEm(+)	5.0685	1.2426	1.7854	0.4842	0.5807	4.7124	0.1775	34.52
CD(P=0.05)	16.529	4.0522	5.8226	1.579	1.8938	15.368	0.579	112.58

Table 2. Production efficiency and economics of tomato varieties (Pooled two year)

Varieties	Production efficiency (Kg/ha/day)	Economic efficiency (Rs/ha/day)	Gross income (Rs/ha)	Net profit (Rs/ha)	B:C ratio
Arka Rakshak	589.40	2947	235758.9	143258.9	2.54
Arka Samrat	546.36	2734.80	218742.4	126242.4	2.36
Local check	299.05	1495.20	119618.8	44618.8	1.59
SEm (+)	43.20	216	-	-	-
CD(P=0.05)	141	704	-	-	-

Tomato fruit yield per plant and per hectare were significantly recorded at 2.425, 2.2504, and 1.2304 kg/plant 471.518, 437.5654, and 239.238 q/ha of the varieties Arka Rakshak, Arka Samrat, and Local check respectively. The trend observed in the results indicates that the higher yield depends on the number of fruits and the weight of fruits per plant. It was apparent, that fruit number and weight per plant showed a positive association with fruit yield of tomatoes. This might be due to the Arka Rakshak variety being best suited to climatic conditions of Raisen and also this variety was developed and recommended by ICAR-IIHR Bengaluru (Karnataka). Maximum production efficiency (kg/ha/day) was recorded 589.397 in the Arka Rakshak followed by Arka Samrat (546.95 kg/ha/day) compared to other variety. The variation in yield may also be due to genetic differences among the varieties since they were grown under the same environmental conditions (Olaniyi and Fagbayide, 1999). Zahedi and Ansari (2012) found significant variation in yield of tomato genotypes

Economics

Maximum gross income net profit and B: C ratio were recorded (Table 2) with Arka Rakshak (Rs.235758.9/ha, Rs.218742.4/ha and 2.54) compared to Arka Rakshak (Rs. 218742.4/ha, Rs. 126242.4/ha and 2.36), and Local check (Rs.119618.8/ha, Rs. 44618.8/ha and 1.59). This might be due to the Arka Rakshak tomato variety recording a higher yield compared to other varieties. Economic efficiency was also recorded highest in Arka Rakshak (Rs. 2946.985 Rs./ha/day) followed by Arka Samrat (Rs 2734.782/ha/day) and minimum in local check (Rs. 1495.28/ha/day).

Conclusion

From the On-farm trial result, it was concluded that tomato cv. Arka Rakshak was found most suitable for the Agro climatic condition of Raisen District, Madhya Pradesh. Therefore, tomato cv. Arka Rakshak can go for large-scale cultivation practices for livelihood improvement of the farmers under the Raisen district of Madhya Pradesh.

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