

Influence of Planting Date and Cultivars on Fruit Yield and Economics of *kharif* Tomato

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ABSTRACT

Economics of crop mainly depends on the marketable fruit yield during crop growing season. So field investigation was under taken during *kharif* 2019 with an objective to find out the planting window and cultivar to realize the higher productivity with high net returns and B:C ratio of tomato. The experiment was carried out with dates of planting (02 Jul, 12 Jul, 22 Jul, 02 Aug, 11 Aug, 23 Aug, 03 Sep and 13 Sep) as main plot treatments and cultivars US 440 and TO-3251 (Saaho) as sub plot treatments. The study revealed that 02 Jul planting recorded significantly higher fruit yield (69.5 t ha⁻¹) and net

returns (Rs 6,15,527 ha⁻¹) with B:C ratio of 8.75 with more planting time efficiency and this was on par with 13 Sep and 12 Jul plantings over rest of the dates of planting. Even though cultivars did not differ significantly cultivar US 440 recorded more net returns (Rs 3,81,612 ha⁻¹) with B : C ratio of 6.01, over TO-3251 (Rs 3,26,655 ha⁻¹).

Keywords Tomato, Dates of planting, Cultivars, Planting time efficiency, Economics.

INTRODUCTION

Tomato (*Solanum lycopersicum* L.) belongs to the family of *Solanaceae* and is one of the most popular and nutritious vegetable crop after potato but top the lists of canned vegetables and has good demand in market. It is a popular and nutritious vegetable rich in vitamin A and C (Ahammad *et al.* 2009). Apart from these, it is good source of minerals like potassium (114 mg), phosphorus (36 mg), magnesium (15 mg) and others in smaller amounts (Chaudhary 2006).

India ranks second in the area as well as production of tomato next to China. In India tomato crop occupies an area of 0.63 million ha with an annual production of 12.43 million tones and productivity of 19.60 t ha⁻¹ (Cheena *et al.* 2018). In Telangana it occupies an area of 47,070 hectares primarily under irrigated conditions with a productivity of 26.09 t ha⁻¹ (Horticultural statistics at a glance 2016).

Vegetable crops production during the wet/

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Table 1. Fruit yield of tomato under different dates of planting and cultivars.

Treatments	Fruit yield (t ha ⁻¹)
Date of planting	
02 Jul	69.5 ^a
12 Jul	61.5 ^{ab}
22 Jul	34.2 ^c
02 Aug	12.3 ^d
11 Aug	16.8 ^d
23 Aug	32.3 ^c
03 Sep	53.5 ^b
13 Sep	66.8 ^a
SEm±	3.9
CD (p=0.05)	11.8
Cultivars	
US 440	45.8
TO-3251	41.0
SEm±	2.2
CD (p=0.05)	NS
Interaction (D × V)	
Factor (V) at same level of D	
SEm±	5.4
CD (p=0.05)	NS
Factor (D) at same level of V	
SEm±	5.9
CD (p=0.05)	NS

rainy season is becoming increasingly attractive for cash generation for farmers, but the productivity of tomato is low due to various constraints. Under open field condition it is very difficult to grow vegetables successfully in the rainy season due to very high incidence of viruses, insects/pests, fungal diseases. Similarly, several abiotic stresses caused by extreme temperature, high humidity and high rainfall also do not permit successful vegetable cultivation under open environment during the rainy and post rainy season. Fruit yield and quality of tomato is mainly dependent on the planting season and cultivars selected for production (Kanwar 1989).

Keeping the above points in view the present study was conducted to evaluate the optimum date of planting to get high fruit yield, net returns and B : C ratio of tomato.

MATERIALS AND METHODS

The field experiment was conducted at Agricultural Research Institute, Rajendranagar, Hyderabad

Table 2. Planting time efficiency (%) of tomato under different dates of planting.

Date of planting	Planting time efficiency (%)
02 Jul	159
12 Jul	142
22 Jul	81
02 Aug	29
11 Aug	41
23 Aug	78
03 Sep	119
13 Sep	151

having 17019'N Latitude, 78023' E Longitude and 542.3 m above mean sea level. The experiment was laid out in split plot design with eight dates of planting (02 Jul, 12 Jul, 22 Jul, 02 Aug, 11 Aug, 23 Aug, 03 Sep and 13 Sep) as main treatment and two cultivars (US 440 and TO-3251) as sub treatments, replicated thrice. The soil of the experimental site was sandy loam in texture, neutral in reaction, low in available nitrogen, phosphorus and high in available potassium. The other package of practices used recommended for raising the crop.

To find out the best planting date for tomato cultivation the efficiency of planting treatments was computed in terms of fruit yield within the season by using below formula.

$$\text{Planting time efficiency} = \frac{\text{Yield (kg ha}^{-1}\text{) from individual planting date}}{\text{Mean yield (kg ha}^{-1}\text{) of eight planting dates}} \times 100$$

Gross monetary returns (GMR) were calculated by multiplying the fruit yield with their respective prevailing market price. Net returns were calculated by subtracting the cost of cultivation from gross returns for each treatment and Benefit cost ratio was calculated by dividing gross returns with cost of cultivation for each treatment. Data on different characters viz., fruit yield, gross returns and net returns were subjected to analysis of variance procedures as outlined for split plot design (Gomez and Gomez 1984). Statistical significance was tested by F-value at

Table 3. Gross returns, net returns and B : C ratio of tomato under different dates of planting and cultivars.

Treatments	Cost of cultivation (Rs ha ⁻¹)	Gross returns (Rs ha ⁻¹)	Net returns (Rs ha ⁻¹)	B : C ratio
Date of planting				
D ₁ (02 Jul)	79,656	6,95,183 ^a	6,15,527 ^a	8.75
D ₂ (12 Jul)	79,656	6,15,006 ^{ab}	5,35,350 ^{ab}	7.77
D ₃ (22 Jul)	79,656	3,42,175 ^c	2,62,519 ^c	4.33
D ₄ (02 Aug)	79,656	1,23,568 ^d	43,912 ^d	1.57
D ₅ (11 Aug)	79,656	1,68,389 ^d	88,733 ^d	2.13
D ₆ (23 Aug)	79,656	3,22,492 ^c	2,42,836 ^c	4.07
D ₇ (03 Sep)	79,656	5,35,115 ^b	4,55,459 ^b	6.73
D ₈ (13 Sep)	79,656	6,68,386 ^a	5,88,730 ^a	8.40
SEm±	–	38502	38,502	–
CD (p=0.05)	–	1,17,914	1,17,915	–
Cultivars				
V ₁ (US 440)	76,200	4,57,812	3,81,612	6.01
V ₂ (TO-3251)	83,112	4,09,767	3,26,655	4.93
SEm±	–	22,514	22,514	–
CD (p=0.05)	–	NS	NS	–
Interaction (D × V)				
Factor (V) at same level of D				
SEm±	–	54,449	54,450	–
CD (p=0.05)	–	NS	NS	–
Factor (D) at same level of V				
SEm±	–	59,244	59,244	–
CD (p=0.05)	–	NS	NS	–

0.05 level of probability and critical difference was worked out where ever the effects were significant.

RESULTS AND DISCUSSION

Fruit yield (t ha⁻¹)

Based on the analysis of variance (Table 1) dates of planting had a significant effect on fruit yield of tomato. Significantly more fruit yield (t ha⁻¹) (Table 1) was observed in 02 Jul planting and was on par with 13 Sep and 12 Jul plantings, in turn 12 Jul planting was on par with 03 Sep planting and were significantly superior over the rest of dates of planting and significantly lowest fruit yield was recorded in 02 Aug planting. The increased fruit yield from the current experiment was due to positively correlated growth and yield attributes with fruit yield of tomato. This result confirmed the earlier findings of Mohanthy (2003), Srivastava *et al.* (2013). Cultivars did not differ significantly with regarding fruit yield of tomato.

Planting time efficiency

Planting time efficiency was calculated to identify the best date of planting of tomato (Table 2). It was noticed that among the different dates of planting 02 Jul planting recorded highest planting time efficiency of 159% and was followed by 13 Sep and 12 Jul plantings with planting time efficiency of 151% and 142% respectively and the lowest planting efficiency was observed in 02 Aug planting.

Economics

Significantly the highest gross returns (Rs 6,95,183 ha⁻¹), net returns (Rs 6,15,527 ha⁻¹) and B : C ratio (8.75) was recorded in 02 Jul planting and was on par with 13 Sep and 12 Jul plantings, in turn 12 Jul was on par with 03 Sep planting and were significantly superior over rest of the dates of planting. Significantly lowest gross returns (Rs 1,23,568 ha⁻¹) net returns (Rs 43,912 ha⁻¹) and B : C ratio (1.57) was recorded in 02 Aug planting (Table 3).

The increased net returns and B : C ratio might due to highest fruit yields in respective dates. Singh *et al.* (2014) reported during *kharif* tomato recorded gross returns of Rs 10,80,000 ha⁻¹ with net returns of Rs 7, 54, 475 ha⁻¹. Murkute *et al.* (2017) also reported that *kharif* tomato recorded gross returns of Rs 9,88,480 ha⁻¹ and net returns of Rs 8,62,124 ha⁻¹ with B : C ratio of 6.82 : 1. Cultivars did not differ significantly regarding net returns. Even though cultivars did not differ significantly cultivar US 440 recoded more net returns (Rs 3,81,612 ha⁻¹) with B : C ratio of 6.01, over TO-3251 (Rs 3,26,655 ha⁻¹).

CONCLUSION

Based on research results, it is concluded that, to obtain higher fruit yield (69.5 t ha⁻¹) and net returns (Rs 6,15,527 ha⁻¹) with B : C ratio of 8.75, optimum planting time for tomato would be from 02 Jul to 12 Jul and 13 Sep with higher planting date efficiency in Semi-Arid environment.

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