

# Performance of different hybrids of Tomato (*Solanum lycopersicum* L.) for growth and yield under Prayagraj Agro-climatic condition.

## ABSTRACT

The research experiment was carried out at Horticulture Research Field at Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during Rabi season 2022 to investigate the growth and yield of different hybrids of tomato. Design of experiment was RBD with three replications. The purpose of the study is to evaluate the plants in terms of various parameters such as plant height, number of branches, days to first flowering, days to 50% flowering, days to fruit setting, number of flowers cluster per plant, number of fruit set per cluster, number of fruits per plant, polar diameter, equatorial diameter, fruit weight, fruit yield/plant, fruit yield/ha and benefit-cost ratio. The different hybrids (Gagan plus, NS 585, Pukhraj, Hamilton, Beef Steak, Arka Rakshak, Arka Samrat and Shivani) have been taken in the study. The results of the study indicate that Arka Rakshak significantly improved the growth and yield of tomato. The highest fruit weight and fruit yield were observed in the hybrid Arka Rakshak. Overall, the study suggests that the hybrid Arka Rakshak is the best for growth and yield of tomato.

**Key words:** *Solanum lycopersicum*, varieties, growth, fruit yield.

## Introduction

Tomato, botanically known as *Solanum lycopersicum* L. or *Lycopersicon esculentum* Mill. Tomato is horticulture crop belongs to the family *Solanaceae*. It originated from South America (Vavilov, 1935). Tomato is one of the most popular and widely grown vegetable crops throughout the world and treated as “protective food” universally. Tomato known as poor man’s apple (orange) in India and love of apple in England. Tomato is used as soup, salad, pickles, ketchup,

puree, sauces, tomato paste, tomato juice and other products. The pulp and juice of tomato fruit are digestible and a mild aperient, a promoter of gastric secretion and a blood purifier. It also contains a large quantity of water (%), calcium (%) and Niacin all of which are of great importance in the metabolic activities of man (Olaniyi *et al.*, 2010). Tomato is a good source of vitamins A, C and E and minerals that are very good for body and protect the body against diseases (Taylor, 1987). Tomato

ranks second following potato in terms of area cultivated, but first as a processing crop (**Alawathugoda and Dahanayake, 2014; Enujeke, 2013**). India ranks second in tomato production producing 30.26% of world's. Tomato production first being China and is followed by Turkey ranking third in world (**FAOSTAT, 2020**). The area under tomato production in India accounts to 46.72 thousand ha with production of 34.29 million tonnes in year 2019-20. Andhra Pradesh ranks first in area and production of tomato in year 2019-20 followed by Madhya Pradesh and Karnataka. In Uttar Pradesh area under production is 0.20 lakhs hectares while production is estimated to be 5.29 million tonnes for year 2019-20. (Source: NHB, Ministry of Agriculture and Farmers Welfare, Government of India, 2020-21). Productivity of tomato is affected by the several biotic and abiotic factors. For the stable production, testing of new varieties/hybrids must be adopted. Crop growth and yield are usually affected by varietal differences (**Naik et al., 2018**). Development of hybrid tomato varieties having desirable characters has proven to be an effective strategy to increase tomato production. The yield of hybrid tomato is 20 to 25 % more as compared to open pollinated (**Islam et al., 2012 and Devkota et al., 2018**). The growth characters of crops

such as plant height, leaf area, number of leaves or branches and fruit yield were influenced by genetic factors of different varieties (**Majanbu et al., 1996 and Sajjan et al., 2002**).

### **Materials and Methods**

The present investigation conduct at the Horticulture Research Field, SHUATS College of Agriculture, Prayagraj, (U.P) during Rabi season (2022). The experimental material comprised of eight hybrids, which were collected from the market. The hybrids were transplanted after 30 DAS in randomized block design with three replications. Plants of each genotype were planted at a spacing of 60x45 cm. Standard cultural practices (Operations and Protection measures) were adopted to ensure a healthy crop growth. The hybrids were evaluated for some important character *viz.*, plant height (cm), number of branch per plant at final picking, days to flower initiation, days to fruit setting, number of flower clusters per plant, number of fruit set per cluster, number of fruit per plant, average fruit weight (g), fruit yield per plant (kg), fruit yield per hectare (t/ha), polar diameter (mm), equatorial diameter (mm). The data was analysed as per the method given by (**Panse and Sukhatme, 1967**).

## **Results and Discussion**

Data recorded on growth parameter observations and response of eight hybrids is presented in Table 1 and 2.

### **Plant height (at 30, 60 and 90 DAT)**

The plant height increased with the plant aged. The plant height at 30 DAT varied from 40.12 to 56.23 cm. H8 (Shivani) had lowest plant height (43.21), while H6 (Arka Rakshak) recorded maximum plant height (56.23).

The plant height at 60 DAT varied from 80.56 to 91.45 cm. H8 (Shivani) had lowest plant height (80.56 cm), while H6 (Arka Rakshak) recorded maximum plant height (91.45 cm).

The plant height at 90 DAT varied from 125.45 to 142.32 cm. H8 (Shivani) had lowest plant height (125.45 cm), while H6 (Arka Rakshak) recorded maximum plant height (142.32 cm).

### **Number of primary branches per plant at final picking**

Among the eight hybrids the maximum number of primary branches (10.9) was observed in H6 (Arka Rakshak) and the minimum number of primary branches (6.8) was observed in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Days to flower initiation**

Among the eight hybrids the maximum days to flower initiation (49.43) was recorded in H8 (Shivani) and the minimum (38.56) was recorded in H6 (Arka Rakshak), while the remaining hybrids are moderate in their growth habitat.

### **Days to 50 % flowering**

Among the eight hybrids the maximum days to 50 % flowering (64.67) was recorded in H8 (Shivani) and the minimum (53.56) was recorded in H6 (Arka Rakshak), while the remaining hybrids are moderate in their growth habitat.

### **Days to fruit setting**

Among the eight hybrids the maximum days to fruit setting (61.23) was observed in H8 (Shivani) and the minimum (48.78) was recorded in H6 (Arka Rakshak), while the remaining hybrids are moderate in their growth habitat.

### **Number of flower clusters per plant**

Among the eight hybrids the maximum number of flower clusters per plant (5.6) was recorded in H6 (Arka Rakshak) and the minimum (3.5) was recorded in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Number of fruit set per cluster**

Among the eight hybrids the maximum number of fruit set per cluster (5.21) was observed in H6 (Arka Rakshak) and minimum (4.5) was recorded in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Number of fruits per plant**

Among the eight hybrids the maximum number of fruits per plant (33.34) was recorded in H6 (Arka Rakshak) and minimum (24.75) was recorded in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Average fruit weight (g)**

Among the eight hybrids the maximum fruit weight (72.45 g) was observed in H6 (Arka Rakshak) and minimum fruit weight (69.87 g) was observed in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Fruit yield per plant (kg)**

Among the eight hybrids the maximum fruit yield per plant (2.42 kg) was recorded in H6 (Arka Rakshak) and minimum fruit yield per plant (1.73 kg) was recorded in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Fruit yield per hectare (t/ha)**

Among the eight hybrids the maximum fruit yield per hectare (89.63 t/ha) was recorded in H6 (Arka Rakshak) and minimum fruit yield per hectare (64.07 t/ha) was recorded in H8 (Shivani), while the remaining hybrids are moderate in their growth habitat.

### **Polar diameter (mm)**

Among the eight hybrids the maximum polar diameter (59.23 mm) was recorded in H7 (Arka Samrat) and minimum polar diameter (44.23) was recorded in H1 (Gagan Plus), while the remaining hybrids are moderate in their growth habitat.

### **Equatorial diameter (mm)**

Among the eight hybrids the maximum equatorial diameter (58.45 mm) was recorded in H3 (Pukhraj) and minimum equatorial diameter (47.23 mm) was recorded in H2 (NS 585), while the remaining hybrids are moderate in their growth habitat.

### **Conclusion**

From the above experimental finding, it may be concluded that the hybrid H6 (Arka Rakshak) was found to be best in terms of growth and yield.

**Table. 1 Plant height (cm), number of primary branches per plant at final picking, days to flower initiation, days to fruit setting, and number of flower clusters per plant.**

S. NO.	Hybrids		Plant height (cm) at 30 DAT	Plant height (cm) at 60 DAT	Plant height (cm) at 90 DAT	Number of primary branches per plant at final picking	Days to flower initiation	Days to fruit setting	Number of flower clusters per plant
1	H1	GAGAN PLUS	43.21	84.32	130.6	7.7	46.45	58.45	5.7
2	H2	NS-585	50.54	88.56	138	9.1	42.38	52.23	6.2
3	H3	PUKHRAJ	52.43	89.43	139.9	10.3	40.23	50.43	6.3
4	H4	HAMILTON	47.43	86.54	135.2	8.6	44.78	54.45	5.9
5	H5	BEEFSTEAK	42.65	82.87	128.7	6.9	47.23	59.43	5.6
6	H6	ARKA RAKSHAK	<b>56.23</b>	<b>91.45</b>	<b>142.32</b>	<b>10.9</b>	<b>38.56</b>	<b>48.78</b>	<b>6.4</b>
7	H7	ARKA SAMRAT	45.32	85.76	133.21	8.2	45.54	55.45	5.8
8	H8	SHIVANI	<b>40.12</b>	<b>80.56</b>	<b>125.45</b>	<b>6.8</b>	<b>49.43</b>	<b>61.32</b>	<b>5.5</b>
		S <sub>Ed</sub> ±	<b>1.04</b>	<b>1.72</b>	<b>1.23</b>	<b>0.41</b>	<b>0.42</b>	<b>1.34</b>	<b>0.07</b>
		CD at 5 %	<b>2.21</b>	<b>3.79</b>	<b>4.43</b>	<b>0.95</b>	<b>1.23</b>	<b>0.67</b>	<b>0.25</b>

**Table. 2 Number of fruit set per cluster, number of fruits per plant, average fruit weight (g), fruit yield per plant (kg), fruit yield per hectare (t/ha), polar diameter (mm), equatorial diameter (mm)**

S. NO.	Hybrids		Number of fruit set per cluster	Number of fruits per plant	Fruit weight (g)	Fruit yield per plant (kg)	Fruit yield per ha (t/ha)	Polar diameter (mm)	Equatorial diameter (mm)
1	H1	GAGAN PLUS	4.82	27.474	69.99	1.92	71.11	<b>43.23</b>	53.87
2	H2	NS-585	5.01	31.062	72.11	2.24	82.96	55.46	<b>47.43</b>
3	H3	PUKHRAJ	5.11	32.193	72.33	2.33	86.3	47.23	<b>58.45</b>
4	H4	HAMILTON	5	29.5	71.99	2.12	78.52	51.23	55.32
5	H5	BEEFSTEAK	4.76	26.656	69.89	1.86	68.89	54.32	53.54
6	H6	ARKA RAKSHAK	<b>5.21</b>	<b>33.344</b>	<b>72.45</b>	<b>2.42</b>	<b>89.63</b>	49.51	51.32
7	H7	ARKA SAMRAT	4.99	28.942	70.99	2.05	75.93	<b>59.23</b>	54.32
8	H8	SHIVANI	<b>4.5</b>	<b>24.75</b>	<b>69.87</b>	<b>1.73</b>	<b>64.07</b>	54.21	48.65
		S <sub>Ed</sub> ±	<b>0.13</b>	<b>0.67</b>	<b>0.46</b>	<b>0.13</b>	<b>0.67</b>	<b>1.32</b>	<b>0.76</b>
		CD at 5 %	<b>0.38</b>	<b>1.34</b>	<b>1.39</b>	<b>1.38</b>	<b>1.34</b>	<b>2.71</b>	<b>1.76</b>

Number in bold represent maximum and minimum value.

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