

Effect of different transplanting dates on growth and yield of tomato crop under naturally ventilated polyhouse

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ABSTRACT

The experiment was conducted at Plasticulture Farm, College of Technology and Engineering, MPUAT, Udaipur, Rajasthan during May, 2018 to May, 2019 to observe the effect of different transplanting dates on growth and yield of tomato crop. Six different dates of transplanting viz. May 25, June 25, July 25, August 25, September 25 and October 25 were considered. The experiment was laid out in RBD with four replications. Early flowering (37.40 days) as well as early fruit harvesting (78.00 days) was occurred in August 25 transplanting, where transplanting on May 25 resulted in delayed flowering (41.83 days) and fruit harvesting (83.00 days), respectively. Number of fruits per plant was also the highest (40.28) in August 25 transplanting and the lowest (31.75) was in October 25 transplanting. Individual fruit weight was highest in August 25 transplanting whereas lowest in May 25 transplanting. Transplanting on August 25 was found superior in respect of yield (119.11 tha⁻¹) compared to other dates of transplanting.

Key words: Tomato, Date of Transplanting (DAT), Flowering, Fruit Setting and Yield

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the most popular vegetable in India, which is receiving increased of the growers and consumers and made its position within few of the highest cultivated vegetables. It is one of the popular vegetables of great commercial value and is used in various forms of salad, soup, ketchup, sauce, chutney, pickles, powder, paste, juice, puree, and many other products.

The ripened fruit have medicinal properties. It is an important source of vitamin A and C and minerals (Hari, 1997). It is an essential component of human diet for the supply of vitamins, minerals and certain hormone precursors in addition to protein and energy (Kallo, 1993). In India, area under tomato cultivation is 8.80 lakh ha. with a total production of 182.26 MT and productivity of 20.7 MT ha⁻¹ (Anonymous, 2013). The major tomato producing states in the country are Madhya Pradesh, Karnataka,

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Andhra Pradesh, Telangana, Gujarat, Odisha, West Bengal, Bihar, Maharashtra, Chhattisgarh, Tamil Nadu, Uttar Pradesh, Haryana, Himachal Pradesh, Assam, Jharkhand and Punjab. These states account for 97% of the total production of the country. The demand of fresh as well as processed vegetables at Global level is also increasing in order to strengthen the export potential and economy of a country. The increased demand cannot be met through the traditional method of agricultural production. It necessitates improved and new alternative technologies to enhance production under normal as well as adverse climatic conditions and to bridge the gap between demand as well as existing production of vegetables, fruits and flowers. Controlled environment agriculture (CEA) is highly productive, conservative of water, fertilizers and land and also protective of the environment like the temperature, humidity, light (Jensen, 2002).

It is mainly grown in winter season. High temperature decreases flower production and /or to bud and flower drop. The fruit set was abundant only when night temperature was between 15 °C and 20 °C, which might over simplify the issue. The importance of temperature in fruit set was clearly evident Schaible, 1990 reported that fruit set with temperature as low (7.2 °C) and with temperature as high (26.6 °C) had more flexible situation in respect of the temperature. Therefore, the present study was undertaken to find out the effect of transplanting date on plant growth, reproductive and yield and yield attributing parameters tomato(cv. Dev F1 hybrid).

Materials and Methods

The experiment was carried out at the Plasticulture farm of College of Technology and Engineering, Maharana Pratap University of Agriculture and

Technology, Udaipur (Rajasthan state) during May, 2018 to April, 2019. Six different dates of transplanting viz. May 25, June 25, July 25, August 25, September 25 and October 25 were considered. The experiment was laid out in RBD with four replications. The variety cv. Dev F1 hybrid was used for the study. The naturally ventilated polyhouse was used for the above said study. Plant spacing was 0.50 m × 0.50 m, number of plants per row were 32, number of rows in each plot 2 and total number of plants in each plot 64. Fertilizers were applied as per the recommendations of TNAU through the drip irrigation. Thirty days old seedlings were transplanted in the main field according to treatments. Irrigation along with other intercultural operations and plant protection measures were taken as and when required. Data were collected on plant height, flowering, fruit setting and yield contributing characters and analyzed statistically.

Results and Discussion

Effect of transplanting dates on plant growth parameters of tomato crop

There was a significant difference among the different transplanting dates in respect of plant growth parameters (Table 1). The highest average plant height was detected at 25th August (221.25 cm) transplanting followed by 25th September (218.25 cm) planting. Among all the transplanting dates highest mean number of leaves were observed in the 25th August (73.85) planting followed by 25th September (71.50) planting. The earliest initiation of flowering was detected at 25th August (37.75 days) and maximum days required for flower initiation at 25th October planting. Earlier first harvesting observed in the 25th August (77 DAT) transplanted tomato crop followed by 25th July (80 DAT) planted tomato crop

Table 1. Effect of transplanting dates on the plant growth parameters of tomato

Time of transplanting	Plant height, cm	No. of leaves/plant	Time taken to first flower (DAT)	Time to first harvesting (DAT)
25 th May	205.45	69.88	41.75	83.00
25 th June	201.85	51.35	40.50	80.50
25 th July	213.50	70.65	37.75	84.00
25 th August	221.75	73.85	35.75	77.00
25 th September	218.50	71.50	40.75	78.00
25 th October	176.20	49.35	42.75	83.00
SE _m ±	4.47	1.27	1.17	1.33
CD (P = 0.05)	13.46	3.82	3.53	4.02

(Fig.1). More or less similar findings were reported by Sam and Iglesias (1994) in tomato in Cuba who observed that early October proved to be suitable date to planting tomatoes in the field. Peyvast (2001) reported that the early sowing date significantly affected tomato inflorescence initiation. Similar trend was found in case of first harvesting.

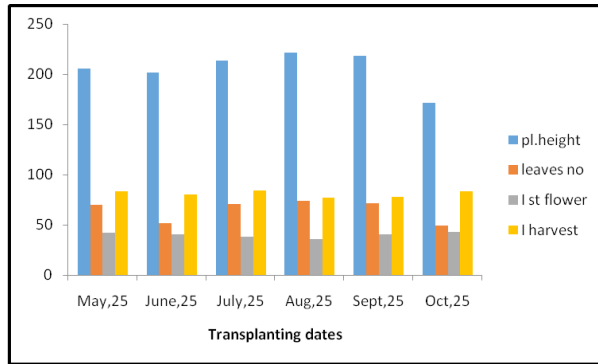


Fig. 1. Effect of transplanting dates on the plant growth parameters of tomato

Effect of transplanting dates on reproductive parameters of tomato crop

There was a significant difference among the transplanting dates in respect of reproductive parameters (Table 2). The highest average number of flowers

per plant detected at 25th August (48.40) transplanting followed by 25th September (27.80) planting. Among all the transplanting dates highest mean leaf area index was observed in the 25th August (3.91) planting while minimum leaf area index was observed in 25th October(1.97) planting. The value for number of fruits per plant observed maximum in at 25th August (40.28) and minimum in 25th May (31.15) (Fig. 2). This result was agreed with the findings of Hossain *et al.* (1986) who reported that early sowing enhanced total number of flowers per plant. Almost similar trend was found in case of fruit setting per cluster.

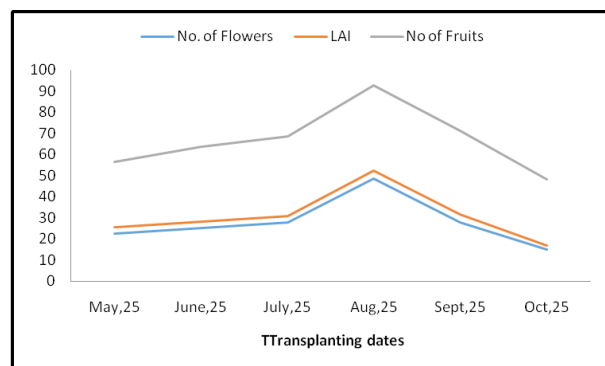


Fig. 2. Effect of transplanting dates on the plant reproductive parameters of tomato

Table 2. Effect of transplanting dates on the reproductive parameters of tomato

Time of transplanting	No of flowers/ plant	Leaf area Index	No of fruits/ plant
25 th May	22.25	3.03	31.15
25 th June	25.05	3.13	35.38
25 th July	27.60	3.24	37.63
25 th August	48.40	3.91	40.28
25 th September	27.80	3.73	39.65
25 th October	14.80	1.97	31.35
SE _m ±	2.00	0.09	1.38
CD (P = 0.05)	6.04	3.28	4.15

Table 3. Effect of transplanting dates on the yield parameters of tomato

Time of transplanting	Individual fruit wt.	Fruit yield/m ²	Fruit Yield , tha ⁻¹
25 th May	63.81	7.96	79.57
25 th June	68.37	9.72	97.17
25 th July	71.58	10.75	107.55
25 th August	74.01	11.91	119.11
25 th September	72.27	11.45	114.46
25 th October	65.17	8.17	81.66
SE _m ±	2.30	0.47	4.71
CD (P = 0.05)	6.92	1.42	14.20

Effect of transplanting dates on yield and yield attributing characters of tomato crop

The effect of yield attributing parameters are affected by the transplanting dates and shown in Table 3 and depicted in Fig. 3. The highest average fruit weight (74.01 g) was found in 25th August transplanting followed by 25th September (72.27) planting. Transplanting date of 25th August (11.95 / m²) recorded highest fruit yield per meter square area and lowest yield per meter square area observed in 25th October (8.17/m²) planting. The crop transplanted on 25th August produced the highest marketable fruit yield (119.11 t/ha) and the lowest (81.66 t/ha) was from 25th October planting. This may be due to better translocation of photosynthesis from source to sink and higher accumulation of photosynthesis in the fruits. Plants of 25th October planting get shorter cold condition at flowering and fruit development stage. On the contrary, other sowing dates get sufficient cold condition at these stages resulted better yield. These results were agreed with the findings of Peyvast (2001) who reported that the earliest sowing date resulted in a significantly higher total fruit yield compared to the later sowing date. Singh and Tripanthy (1995) showed variation in yield of tomato when sown in different dates from June to August at Orissa of India.

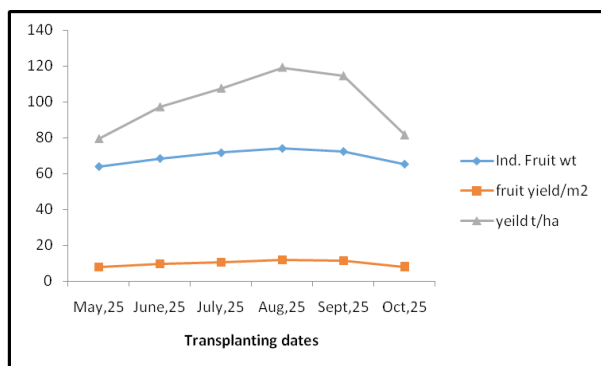


Fig. 3. Effect of transplanting dates on the yield parameters of tomato

Conclusion

The experiment revealed that date of transplanting and growing environment had a significant effect on the morphological, phenological and yield parameters of tomato crop. Transplanting on 25th August was the suitable time for getting maximum yield and monetary benefit from tomato crop in naturally ventilated polyhouse.

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