

Original Research Article

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## Effect of Seedlings Age on Growth, Yield Attributes and Yield of Tomato (*Lycopersicon esculentum* Mill.)

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### ABSTRACT

An experiment was conducted on seedling age of tomato (*Lycopersicon esculentum*) at Kanpur (Uttar Pradesh) during *rabi* 2014-15 in sandy loam soil of medium fertility. There were 8 treatments of seedlings age viz. 16, 20, 24, 28, 32, 36, 40 and 44 days old which were tested in RBD replicated thrice. Tomato variety Azad T-5 was used. Seeds were sown in nursery bed from 20.9.2014 at 4 days interval upto 18.10.2014 and seedlings were transplanted in main field on 04.11.2014 in all plots as per treatment. Crop was uniformly manured with 20 t/ha FYM and fertilized with 120 kg N+60 kg P<sub>2</sub>O<sub>5</sub>+40 K<sub>2</sub>O/ha. The results revealed that 24 days old seedlings recorded highest values of plant height (63.19 cm), plant spread from E-W (171.13 cm), number of fruits/plant (31.72), weight/fruit (41.55 g), fruit weight/plant (725 g) and fruit yield (308.63 q/ha), whereas number of primary and secondary branches/plant (7.35 and 9.65, respectively) and fruit diameter (4.41 cm) were found maximum with 28 days old, seedlings. However, 20 days old seedlings performed significantly at par with 24 days old seedlings in most of the crop characters including fruit yield per unit area. It is thus proved that 20-24 days old seedlings are most suitable for transplanting of tomato during *rabi* season to get higher crop yield in central part of Uttar Pradesh.

#### Keywords

Tomato, Seedlings age, Plant growth, Yield attributes, Fruit yield.

#### Article Info

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### Introduction

Tomato (*Lycopersicon esculentum*) is one of the most widely grown vegetable crop due to its wider adoptability and acceptability for fast food, higher value and various processed products. As a processing crop, it ranks first among the vegetables and is a major source of vitamins and minerals. The state of Uttar Pradesh grows tomato on limited area which needs to be expended through making the crop more productive. Right age of seedlings for transplanting is essential for better growth

and development of plants which may yield their potential in a given environment.

Suitable age of seedlings for transplanting varies under different conditions of varieties grown, growing, season and biotic and abiotic stresses. Therefore, determination of ideal transplanting age of seedlings is essential for higher productivity of quality fruits in a particular season and area. Keeping this view in mind, the present study was undertaken.

## Materials and Methods

An experiment was conducted to study the effects of seedlings age on growth, yield attributes and yield of tomato variety Azad T-5 during *rabi* 2014-15 at Horticulture garden of C.S. Azad University of Agriculture and Technology, Kanpur. Soil of the experimental field was sandy loam in texture with 7.7 pH having 0.45% organic carbon, 26 kg/ha available P<sub>2</sub>O<sub>5</sub> and 300 kg/ha available K<sub>2</sub>O. As treatments, 16, 20, 24, 28, 32, 36, 40 and 44 days old seedlings were used for transplanting. All 8 treatments were tested in randomized block design replicated thrice. Transplanting of seedlings in all treatment plots was done on same day *i.e.* 4<sup>th</sup> November, 2014. To get different age seedlings, nursery sowing was started from 20<sup>th</sup> September, 2014 at 4 days interval upto 18<sup>th</sup> October, 2014 in different nursery beds which were nourished similarly with recommended package of practices. Main experimental field was uniformly manured with 20t/ha FYM and fertilized with 120 kg N+60kg P<sub>2</sub>O<sub>5</sub>+40kg K<sub>2</sub>O/ha through urea, single super phosphate and muriate of potash, respectively. The healthy and uniform size seedlings were planted at the distance of 45x45 cm with hand khurpi. Crop was raised with recommended package of practices under irrigated condition. The observations on crop were recorded for growth characters, yield attributes and fruit yield under different treatments. All data collected were processed, tabulated and analyzed statistically as per procedure suggested by Panse and Sukhatme (1957).

## Results and Discussion

### Growth characters

All growth characters of tomato under study were influenced significantly by age of seedlings (Table 1). Plant height and spread

recorded highest values with 24 days old seedlings, but the seedlings of 20 and 28 days also recorded plant height and spread significantly at par with 24 days old seedlings. Number of branches/plant was found significantly maximum in 28 days old seedlings followed by 24 and 32 days old seedlings. Plant height and spread were recorded lowest with 16 days old seedlings followed by 44 days old, while branches/plant were counted minimum with 44 days old seedlings followed by 16 days old seedlings. These results show that too young or too old seedlings reduced the plant growth significantly as compared to normal middle age seedlings. The seedlings of too young age (16 days) might have setback in re-establishment after transplanting perhaps because of their soft and tender roots, thus their growth is retarded in main field after transplanting. On the other hand, plants kept for longer time in nursery bed either get too leggy or become too woody due to check of growth and such old age seedlings do not make a quick start when transplanted in the main field (Thompson and Kelly, 1983).

Therefore, from proper growth point of view, 20-28 days old seedlings seem to be suitable for transplanting. These results corroborate with the findings of Sharma and Tiwari (1992). Number of days taken to flower initiation and fruit ripening after transplanting was found significantly maximum in 16 days old transplants and minimum in oldest transplants of 44 days. It might be influenced due to the time of seedlings passed in nursery bed before transplanting. These findings are in agreement with the findings of Rahman *et al.*, (1994).

### Yield attributes and yield

Number of flowers/fruits per plant was recorded maximum on 24 days old transplants and minimum on 16 days old transplants

(Table 2) which might be attributed to number of branches/plant because of more space availability for flowering and fruiting. Fruit diameter was recorded maximum on 28 days old transplants and minimum on 44 days old transplants while weight per fruit was found maximum on 24 days old transplants and

minimum on 16 days old transplants. It might be associated with development of fruits in different ways because of variations in weather conditions during fruit development and ripening stages under different treatments. These results support the findings of Sharma and Tiwari (1992).

**Table.1** Effect of seedlings age on plant growth, anthesis and fruit ripening of tomato

Treatments (seedling age in days)	Plant growth					No. of days to	
	Plant height (cm)	Plant Spread (cm)		No. of branches/ plant		Flower initiation	Fruit ripening
		N-S	E-W	Primary	Secondary		
16	52.10	105.10	161.78	5.60	7.35	62.15	71.65
20	61.23	114.23	164.26	5.73	7.52	52.48	60.49
24	63.19	116.18	171.13	6.21	8.15	48.46	58.56
28	60.34	113.44	168.35	7.35	9.65	47.33	57.56
32	56.09	112.39	169.23	6.01	7.89	50.85	55.85
36	59.36	109.19	167.36	5.82	7.64	49.22	54.57
40	57.27	110.28	165.41	5.52	7.25	46.71	53.84
44	54.16	107.32	161.12	5.37	7.05	45.45	52.84
S.Ed.±	1.58	2.90	1.20	0.45	0.39	1.21	2.32
C.D. (p=0.05)	3.43	6.28	2.57	0.96	0.83	2.59	4.97

**Table.2** Effect of seedlings age on yield attributes and yield of tomato

Treatments (Seedlings age in days)	Yield attributes					Fruit yield (q/ha)
	No. of flowers per plant	No. of fruits per plant	Fruit diameter (cm)	Weight per fruit (g)	Fruit weight per plant (g)	
16	50.72	21.36	3.36	33.31	542	273.08
20	60.16	29.97	3.44	38.45	592	292.34
24	69.64	31.72	3.72	41.55	725	308.63
28	67.12	29.08	4.41	35.28	568	280.49
32	63.92	27.88	3.60	33.98	553	274.58
36	65.88	29.05	3.55	35.01	562	277.53
40	64.51	28.45	3.31	37.55	576	284.44
44	61.97	25.96	3.22	36.48	558	275.55
S.Ed.±	2.72	1.34	0.23	1.71	24	8.64
C.D. (p=0.05)	5.90	2.91	0.51	3.71	52	18.71

Fruit yield per unit area was produced highest of 308.63 q/ha with 24 days old transplants (Table 2). It was found at par with 292.34 q/ha yield of 20 days old transplants, but significantly higher than all other treatments by the margins from 16.29 q/ha or 5.57% to 35.55 q/ha or 13.02 per cent under different treatments. These yields might be attributed to number of fruits/plant and fruit weight per plant. Transplants of normal age seedlings of 20-28 days might have availed weather conditions and environment properly through improved upper ground plant and below ground root development. Better root development of 20-28 days old transplants might has utilized plant nutrients and soil moisture in sufficient amount throughout life period, thus improved plant growth, yield attributes and finally produced higher fruit yield per unit area. These results corroborate with the Findings of Shukla *et al.*, (2013).

The results of present study may be concluded that for higher yield of good quality fruits of tomato variety Azad T-5 under central U.P. condition, transplanting of 20-28 days old seedlings proved to be the optimum stage for tomato transplanting during November month.

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