

Original Research Article

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Upshot of Various Transplanting Date and Nitrogen Doses on Growth and Yield of Tomato over Trichy Region of Tamil Nadu

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ABSTRACT

The current study was carried out to examine the effect of transplanting date on growth and fruit yield of tomato during *rabi*, 2016. The field experiment was conducted at Ponnaniyar, Trichy, Tamil Nadu. The experimental setup included a factorial randomized block design with three replications. The treatments comprised of four transplanting (22nd, 24th, 26th and 28th Meteorological Standard Week), and three N doses [RDN-75kg ha⁻¹, RDN (-25%) and RDN (+25%)]. The experimental results showed that different planting dates showed significant influence on growth and reproductive characters of tomato including fruit yield. The first transplanting date, resulted in improvement of all the attributes including fruit yield per hectare compared to 2nd transplanting date. Therefore, it is suggested that earlier transplanting produced higher fruit yield of tomato.

Keywords

Tomato,
Transplanting time,
Yield

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Introduction

Tomato is very important throughout the world for both the fresh fruit market and processing. Tomato occupied 2.4 million hectares in the world with headship of Europe followed by Asia and America. Every year the production is around 4 million tons, but only 15% is produced in the tropics. This is mainly due to climate and to the production

techniques which are not well developed. In the tropics, tomato is mainly grown during the cool season, because of the adverse conditions during summer which greatly affect productivity and quality. On the other hand, there is increasing evidence that the uses of poor cultural practices (especially the practice of N doses) as well as traditional cultivars and transplanting date are the main yield limiting factors. Yet, the improvement of yield through

manipulation of N doses and ideal transplanting date is possible to achieve higher yield.

Tomato (*Lycopersicon esculentum* L.) is an annual herbaceous vegetable crop that comes under the family Solanaceae. It is believed to be the native of Western South America and often used as a nutritious edible fruit. The consumption of tomato shows an increasing trend over years because of its nutritional qualities. Its production is commonly affected due to adverse environmental conditions. Tomato, being a sensitive crop to moisture and temperature, it is often grown under greenhouse condition. The yield of tomato as an open field crop is found to show a weak positive correlation with the changing weather condition leading to remarkable yield loss. Accordingly, a better understanding is required of the factors that affect the growth and development of tomato. Hence the study is oriented to examine the influence of different planting dates on morphology and yield of tomato with the implementation of agricultural practices, to assess the interaction of weather over tomato productivity.

Materials and Methods

The experiment was carried out at farmer field, Ponnaniyar, of Thiruchirapalli district, Tamil Nadu during *rabi*, 2016. The place is located at 10.51° N latitude and 78.21° E longitude at an altitude of 78.17 m above Mean Sea Level (MSL). The place enjoys a moderate climate and receives a normal rainfall of 850.6 mm in a year with mean maximum and minimum temperature of 37.4° C and 29.2° C respectively. The field soil is taxonomically 'Ustic', sandy loam in texture. The soil of has a pH of 7.98 which is mildly alkaline in with a normal EC (0.24 dSm⁻¹).

The trial was conducted using PKM-1 variety of tomato. The statistical design used for

analysis is factorial concept of Randomized Block Design (RBD) with three replications. The treatment combination comprised of four dates of planting at fifteen days interval [November 1st (D₁), November 15th (D₂), December 1st (D₃) and December 15th (D₄)] and three doses of nitrogen [N₁: Application of N at recommended dose (RDN-75kg ha⁻¹), N₂: -25% RDN and N₃: +25% RDN] The combination of factors comprises of twelve treatments. Dimension of the plot is 4.0 m x 3.0 m². Protray were filled with the mixture of vermicompost and native soil. Each cells were dibbled with two seeds. The field was ploughed thrice with cultivator to obtain a fine tilth and was leveled uniformly and raised beds were formed. Twenty eight days old seedlings were transplanted to the main field with a spacing of 60cm X 40cm. During the research period, irrigation was given to the field using bore well water. The biometric observations on growth attributes was recorded on 45 and 90 DAT and the yield attributes were recorded at the time harvest.

Results and Discussion

As per the results shown in table 1 and 2, the main effects of planting date and nitrogen doses revealed significant variation with respect to growth, yield and yield attributes of tomato, but the interaction effect of different planting dates and nitrogen doses was non-significant.

Effect of planting date on growth attributes

Development in growth characters is considered as pre-requisite to increased yield of any crop. The higher plant height of (61.22 cm) and number of branches per plant (8.09) was obtained from 1st November (D₁) planted crops (Table 1), which decreased considerably with each successive delay in planting date. Likewise the maximum dry matter production (45.48g) was observed in D₁ followed by D₂

(15th November). It is therefore marked that early planted crops (D₁ and D₂) performed better with induced normal vegetative growth, whereas the later dates were unfavorable for normal growth.

This is because of the positive climatic conditions that prevailed, particularly the higher temperature and optimum rainfall resulted in greater photosynthesis and higher mobilization of assimilates. The trend of present result is in agreement with the findings Islam *et al.*, (2010) and Hamma *et al.*, (2012) also observed that early planted crops performed better in terms of growth because the crop gets enough duration to complete the vegetative phase fully.

Effect planting dates on yield and yield attributes

The date of planting exhibited marked influence on yield components of tomato fruit. In the present study early planted crops (D₁ & D₂) recorded significant higher number of fruits per plant (18.69, 16.96) similarly, the maximum individual fruit weight (38.03 g, 38.10 g) was also noted in early planted crops (Table 2), with respect to fruit yield D₁ & D₂ significantly out yielded the rest of planting dates. Whereas, yield was recorded lowest in 15th December (D₄), which indicated a deceased trends noticed towards later dates of planting and yield levels were much higher in earlier than later planted crops.

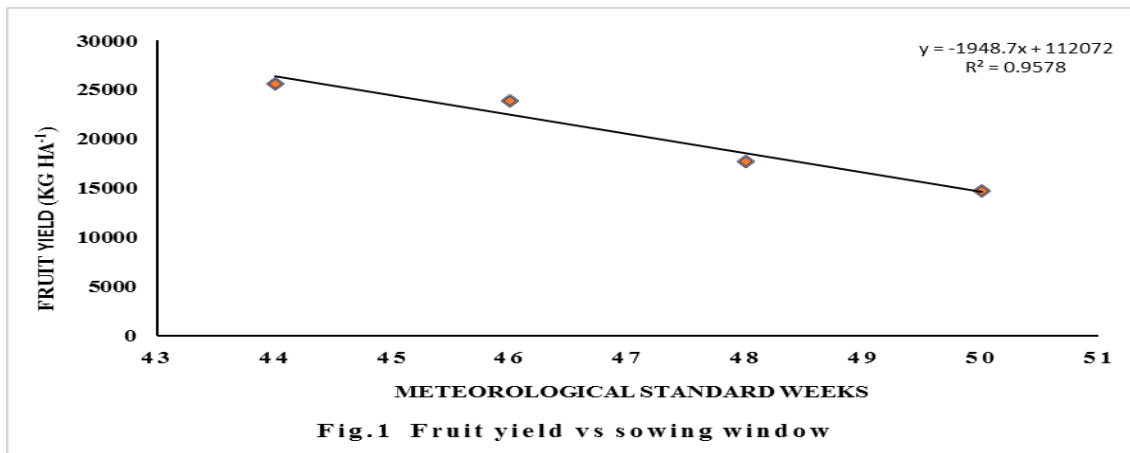


Fig.1 Fruit yield vs sowing window

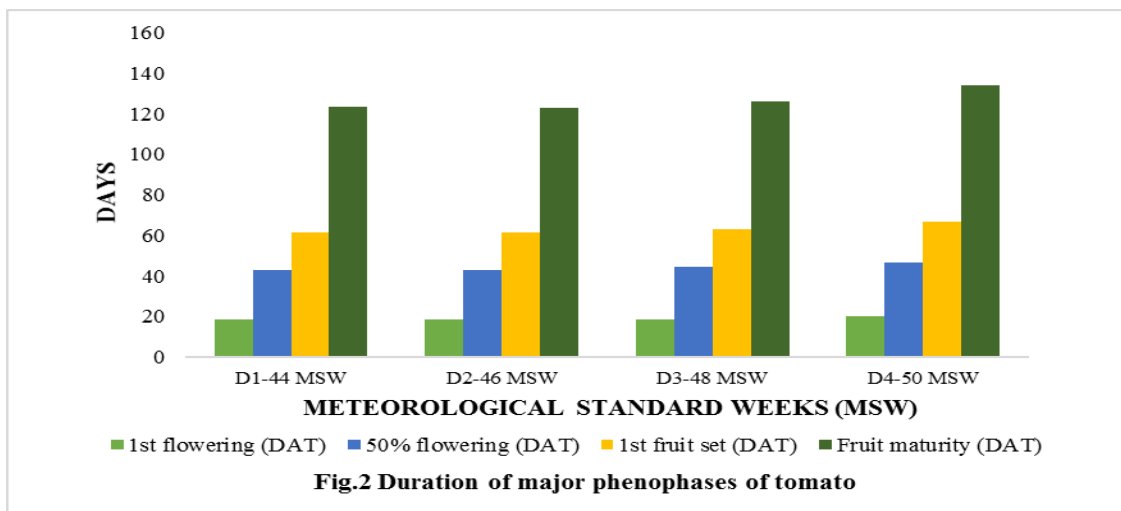


Fig.2 Duration of major phenophases of tomato

Table.1 Influence of transplanting dates and N doses on crop growth

Treatments	Plant height (cm)				No. of branches (No./plant ⁻¹)				DMP (g plant ⁻¹)			
	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean
D₁	63.09	49.72	70.85	61.22	8.73	6.00	9.53	8.09	49.42	32.52	54.80	45.58
D₂	55.18	45.30	68.33	56.27	7.53	4.27	8.60	6.80	41.89	33.54	50.83	42.08
D₃	61.07	44.03	68.43	57.84	3.93	4.73	4.60	4.42	39.73	32.74	50.19	40.89
D₄	52.98	50.91	57.73	53.88	3.80	3.60	5.07	4.16	43.49	27.01	44.98	38.49
Mean	58.08	47.49	66.33		6.00	4.65	6.95		43.63	31.45	50.20	
	S Ed		CD (P = 0.05)		S Ed		CD (P = 0.05)		S Ed		CD (P = 0.05)	
D	3.01		6.25		0.44		0.91		1.66		3.45	
N	2.61		NS		0.38		0.79		1.44		2.99	
D X N	5.22		NS		0.76		NS		2.88		NS	

Table.2 Impact of transplanting dates and N doses on yield attributes and yield

Treatments	Fruit number (No.Plant ⁻¹)				Fruit weight (g fruit ⁻¹)				Fruit yield (kg ha ⁻¹)			
	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean	N ₁	N ₂	N ₃	Mean
D₁	17.13	14.93	24.00	18.69	46.84	35.01	32.23	38.03	29816	19181	27827	25608
D₂	16.87	13.80	20.20	16.96	44.87	33.75	35.67	38.10	27934	17287	26526	23916
D₃	12.53	8.93	15.53	12.33	45.53	27.65	29.54	34.24	21163	15075	16997	17745
D₄	11.00	10.27	14.00	11.76	39.28	26.25	34.20	33.24	16236	9967	17818	14674
Mean	14.38	11.98	18.43		44.13	30.66	32.91		23787	15378	22292	
	S Ed		CD (P = 0.05)		S Ed		CD (P = 0.05)		S Ed		CD (P = 0.05)	
D	1.08		2.24		1.51		3.12		1576		3269	
N	0.94		1.94		1.30		2.70		1365		2831	
D X N	1.87		NS		2.61		NS		2730		NS	

The production of fruit yield is controlled by various physiological and biochemical process that are involved in growth and development of crop. The potential yield of the crop is decided by appropriate sowing window as opined Singh *et al.*, (1995). From the present investigation it was observed that crop transplanted on 1st November resulted in increased fruit yield of 43 per cent higher over the crop planted on December 15th (Fig. 1). It was also found that 7 per cent yield reduction was faced by the crop raised on 15th November just a couple of week behind 1st November, similarly 31 per cent yield reduction was faced by the crop raised on 1st

December. Further the per cent yield reduction still increases with delayed transplanting. Comparable results were evidenced by Tongova and Zhelev, 1975.

Effect of transplanting dates on phenology

The rate of crop development was stated to govern crop duration, which is of considerable importance in determining crop yields (Ellis *et al.*, 1990). The phenophase results revealed that though much variation could not be observed, a slight increase in duration of early raised crops could be noticed (Fig. 2). Early planted crops attained the first

flowering and 50 per cent flowering a little prior to the late planted crops. The instance was reverse in case of fruit set and maturity, where the late planted crops attained maturity before the early planted crops. Though it matured early, the fruit size and weight is much reduced with respect to late planted crops comparatively. Thereby the fruits produced from the late planted crops were not fit for marketable quality. Hence a mere shifting of transplanting date results in greater realization of higher remuneration by the farming community.

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