

Short communication

Studies on leaf curl disease infection pressure and fruit yield of tomato as influenced by mulching and different meteorological variables*

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Tomato is an important vegetable crop cultivated in the different parts of the country. In India, 60-70% of the tomato is used as vegetables and the rest in the preparation like puree, ketchup, Jam, jelly, etc. The crop is highly sensitive to pest and disease attack which reduces the productivity to a considerable extent. Growth, yield and disease incidence in tomato are affected by weather conditions. The onset and spread of disease greatly depends on the weather parameters during the growing periods. So, by altering the planting date and application of mulching over soil surface could alter crop microclimate to such extent that might be useful for maximum fruit yield and comparatively lesser leaf curl disease, which appears to be an important disease of the crop. The present study was conducted to evaluate the effects of mulching and dates of transplanting on incidence of leaf curl disease severity and fruit yield of tomato grown in the Gangetic plains of West Bengal.

Experiment was conducted at the Instructional Farm, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, New Alluvial Zone of West Bengal at 22°56' N latitude, 88°32' E longitude and at an altitude of 9.75 m above mean sea level. Season was winter season of 2007-08.

The experimental treatments consisted of three types of mulching viz., rice straw mulch, black plastic mulch and control (farmers' practice) and two dates of transplanting viz., 23 November and 7 December in 2007 and laid out in factorial randomized block design with three replications.

The tomato fruit was harvested from each plot separately on different dates and the weights so recorded were summed up and expressed in kg plot⁻¹, which was lastly converted into q ha⁻¹. Five plants were randomly selected and the total number of fruits was counted and then average number of fruits/plant was calculated. Five fruits were randomly selected in each plot and number of seeds in each fruit was counted and summed up and then average numbers

of seeds/fruit were computed. Numbers of plant infested by leaf curl were counted at weekly interval from all the treatments. Percentage of disease was calculated for each treatment. So, the experiment was conducted to study the influence of mulching and transplanting dates on yield and disease of tomato (*Lycopersicon esculentum*).

Fruit yield

The highest fruit yield (370 q ha⁻¹) was obtained from 23 November, followed by 321.58 q ha⁻¹ in 7 December. Due to application of mulch, fruit yields of tomato significantly increased. On an average, the fruit yield was highest (381.74 q ha⁻¹) under black polythene mulch, followed by 312.01 q ha⁻¹ under without mulch condition. The interaction between dates of transplanting and mulching treatments in respect of total fruit yield (Table 1) was significant. Tewari *et al.* (1998) reported that highest fruit yield (70.28 t ha⁻¹) was recorded under black polythene mulch and when it was grown under rice husk and rice straw mulch, yield declined by 7 and 10 %, respectively. Fruit yield of tomato was highest with silver polythene mulch (76.4 t ha⁻¹) followed by black polythene mulch (73.5 t ha⁻¹). Mulching of tomato with plastic (25 μ thickness) resulted in the highest yield of 12735 kg ha⁻¹ which was 28.4% higher over unmulched condition. According to Gural *et al.* (1992), black polythene mulch of 25 μ thickness increased fruit yield of tomato by 55% as compared to the controlled condition. In another study, it was reported that mulching enhanced growth and yield of tomato compared to bare ground and results further emphasized the need for early and rapid growth of late season tomato before the onset of terminal drought.

Fruit weight

Fruit weight was 54.98 g under 23 November planting and 45.27 g on 7 December. The interaction between dates of transplanting and mulching treatments in respect of average weight/fruit (Table 1) was found to be significant at

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Table 1: Effects of mulching and dates of transplanting on yield and yield components of tomato

Treatment	Fruit yield (q ha ⁻¹)	Average weight (g fruit ⁻¹)	No. of fruits/plant	No. of seeds/fruit
23 Nov. (D ₁)	373.00	54.98	55.5	106.33
7 Dec. (D ₂)	321.58	45.27	47.66	93.08
S. Em±	1.04	0.06	0.11	0.07
C. D. (P=0.05)	3.22*	1.84*	1.91*	1.86*
Control (M ₀)	312.01	45.07	46.5	92.37
Rice straw (M ₁)	348.12	49.47	51.5	99.87
Polythene (M ₂)	381.74	55.84	56.75	106.87
S. Em±	1.27	0.08	0.14	0.09
C. D. (P=0.05)	3.16*	0.20*	0.35*	0.24*
D ₁ x M ₀	329.6	50.09	49.0	97.0
D ₁ x M ₁	374.05	55.2	55.0	107.0
D ₁ x M ₂	415.35	59.67	62.5	115.0
D ₂ x M ₀	294.42	40.05	44.0	87.75
D ₂ x M ₁	322.19	43.75	48.0	92.75
D ₂ x M ₂	348.14	52.02	51.0	98.75
S. Em±	1.80	0.11	0.20	0.13
C. D. (P=0.05)	4.47*	0.28*	0.50*	0.33*

*Significant at P=0.05 level.

Table 2: Leaf curl disease percentage during different times during season

Days after transplanting	Disease severity (%)							
	23 November (D ₁)				7 December (D ₂)			
	Control (M ₀)	Rice straw (M ₁)	Polythene (M ₂)	Mean	Control (M ₀)	Rice straw (M ₁)	Polythene (M ₂)	Mean
30	3.33	3.33	0.00	2.2	0.00	3.33	0.00	1.1
37	3.33	3.33	0.00	2.2	0.00	6.67	0.00	2.2
44	10.00	3.33	3.33	5.6	3.33	6.67	0.00	3.3
51	10.00	6.67	3.33	6.7	3.33	10.00	0.00	4.4
58	10.00	6.67	6.67	7.8	6.67	10.00	0.00	5.6
65	10.00	6.67	6.67	7.8	6.67	13.34	6.67	8.9
72	13.34	6.67	6.67	8.9	10.00	13.34	6.67	10.0
79	16.66	10.00	10.00	12.2	13.34	13.34	6.67	11.1
86	16.66	10.00	10.00	12.2	16.66	16.66	6.67	13.3
93	20.00	16.66	10.00	15.6	16.66	20.00	10.00	15.6
100	20.00	16.66	10.00	15.6	20.00	20.00	10.00	16.7
107	20.00	16.66	10.00	15.6	23.33	20.00	10.00	17.8
Mean	12.8	8.9	6.4	9.4	10.00	12.8	4.7	9.2

5% level of significance and the crop transplanted on 23 November and covered with black polythene mulch enabled to obtain the highest weight of fruit (59.67 g/fruit).

Number of fruits/plant

The crop transplanted on 23 November produced

greater number of fruits/plant (55.5) than the crop transplanted on 7 December (47.7). On the other hand, the interaction between dates of transplanting and mulching treatments in respect of number of fruits/plant (Table 1) appeared to be significant and the crop transplanted on 23 November and covered with black polythene mulch produced highest number of fruits per plant (62.5 fruits per plant).

Number of seeds/fruit

It is evident that both varied dates of transplanting and mulching treatments significantly influenced the number of seeds per fruit. The crop transplanted on 23 November and covered with black polythene mulch produced the highest number of seeds per fruit (115 fruits per plant). In case of interaction between dates of transplanting and mulching treatments, the mean number of seeds/fruit (Table 1) was significant at 5% level and the crop transplanted on 23 November and covered with black polythene mulch produced the highest number of seeds per fruit (115 seeds per fruit).

Leaf curl diseases incidence

Severity (%) of leaf curl disease infestation as influenced by different treatments and recorded on different dates starting from 30 to 107 DAT has been presented in Table 2. It is apparent from the results that due to variation in dates of transplanting there were no remarkable variations in leaf curl disease incidence. However, the disease severity was, on an average, lesser in late transplanted crop (7 December) than in early transplanted crop (23 November). The crops grown under mulching had lesser disease severity than those grown under no mulch treatment. Tomato yellow leaf curl virus (TYLCV) incidence was reduced by 5-20% depending on the colour of the mulch. Less number of white fly (*Bemisia tabaci*) adults/leaf was observed in mulched

plots (Muquit *et al.*, 2006). Suwan *et al.* (1998) reported that TYLC virus was reduced by the application of plastic mulch.

It is concluded that higher production of tomato can be obtained when the crop is transplanted on 23 November and grown with plastic mulch in the New Alluvial Zone of West Bengal. Larger yield and yield components in crops using black plastic mulch were associated with higher soil temperature and GDD and lesser canopy temperature and leaf curl disease severity.

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