



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2019; 5(7): 440-443
www.allresearchjournal.com
Received: 01-05-2019
Accepted: 03-06-2019

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Studies on influence of different transplanting dates and different treatment combinations on growth, yield and seed quality parameters in tomato (*Solanum lycopersicon* L.)

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Abstract

The present study was carried out Studies on influence of different transplanting dates and different treatment combinations on growth yield and seed quality parameters in tomato (*Solanum lycopersicon* L.). In plant growth parameters (plant height (cm) and number of primary branches) of tomato crop the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] shown maximum performance in all the plant growth parameters and it was followed by D₂T₇ [5th Dec-36 days old seedlings and Chlorpyrifos + mancozebcombination] and the least performance was given by D₁T₀ [25th Nov-26 days old seedlings and control combination] while compared with the other treatment combinations. Among the days to 1st flowering and days to 50% flowering the treatment combination D₃T₃ [15th Dec-46 days old seedlings and captan + imidacloprid + cypermethrin combination] has shown minimum days to 1st flowering and 50% flowering and it was followed by D₃T₇ [15th Dec-46 days old seedlings and Chlorpyrifos + mancozebcombination] while the maximum days to 1stfloweringand 50% flowering was recorded in D₂T₀ [5th Dec-36 days old seedlings and control combination].

In yield parameters (number of clusters per plant, number of fruits per plant, fruit yield per plot (kg) and seed yield per plot (g)) of tomato crop the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] shown maximum performance in all the yield parameters and it was followed by D₂T₇ [5th Dec-36 days old seedlings and Chlorpyrifos + mancozebcombination] and the least performance was given by D₁T₀ [25th Nov-26 days old seedlings and control combination] while compared with the other treatment combinations.

Keywords: Transplanting dates, Treatment combinations, Tomato crop, Yield and Seed quality parameters

Introduction

Tomato (*Solanum lycopersicon*) belongs to the Solanaceae family along with other economically important crops such as pepper, eggplant and potato. The tomato was classified by Miller (1754) as *Lycopersicon esculentum* and renamed by Child (1990) and Peralta and Spooner (2006) as *Solanum lycopersicum*. Tomato is a diploid species with 2n = 24 chromosomes. Fresh vegetables are rich source of essential vitamins, minerals, dietary fibers and contain fair amount of carbohydrates and proteins. Tomatoes grow best in the dry season under day temperatures of 21-25 °C and night temperatures of 15- 20 °C. Humidity levels higher than 60per cent at the time of fruit maturity will increase disease problems and reduce seed yields. Optimum soil pH for tomato hybrid is 6.0 to 7.0. Vegetables are the ultimate healthy food along with high significant nutritional value. Vegetables are brim and over flow with fiber, low in calories and are also excellent source of vitamins, minerals, antioxidants and phytochemicals.

Materials and Methods

The Research study was conducted at experimental research field, Department of Genetics and Plant Breeding, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during rabi-2018. The source of seed

material was obtained from local seed market and the experiment was conducted in Randomized block design (R.B.D) with three replications. The data was collected on five randomly selected plants from each plot and measurement of different observations was recorded.

Result and discussion

In plant growth parameters (plant height (cm) and number of primary branches) of tomato crop the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] shown maximum performance in all the plant growth parameters and it was followed by D₂T₇ [5th Dec-36 days old seedlings and Chlorpyrifos + mancozebcombination] and the least performance was given by D₁T₀ [25th Nov-26 days old seedlings and control combination] while compared with the other treatment combinations. Among the days to 1st flowering and days to 50% flowering the treatment combination D₃T₃ [15th Dec-46 days old seedlings and captan + imidacloprid + cypermethrin combination] has shown minimum days to 1st flowering and 50% flowering and it was followed by D₃T₇ [15th Dec-46 days old seedlings and Chlorpyrifos + mancozebcombination] while the maximum days to 1st flowering and 50% flowering was recorded in D₂T₀ [5th Dec-36 days old seedlings and control

combination].

In yield parameters (number of clusters per plant, number of fruits per plant, fruit yield per plot (kg) and seed yield per plot (g)) of tomato crop the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] shown maximum performance in all the yield parameters and it was followed by D₂T₇ [5th Dec-36 days old seedlings and Chlorpyrifos + mancozebcombination] and the least performance was given by D₁T₀ [25th Nov-26 days old seedlings and control combination] while compared with the other treatment combinations. In seed quality parameters (germination (%), root length, shoot length, seedling length, seedling dry weight, vigour index-I and vigour index-II) of tomato seeds harvested from different transplanting dates and different seed treatment combinations. The seeds harvested from the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] shown maximum performance in all the seed quality parameters and it was followed by D₂T₇ [5th Dec-36 days old seedlings and Chlorpyrifos + mancozebcombination] and the least performance was given by seeds harvested from D₁T₀ [25th Nov-26 days old seedlings and control combination] while compared with the other treatment combinations.

Table 1: Mean performance of plant height, days to 1st flowering, days to 50% flowering in tomato crop during rabi-2018.

Treatments	Plant height (cm)			Days to 1 st flowering			Days to 50% flowering		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
T0	64.96	76.36	69.7	73	73.66	70.33	88.33	88.6	85.33
T1	66.13	79.2	72.53	71.66	65.33	68.66	87.3	80	83
T2	67	77.86	74.4	68.66	66.66	67.66	86.3	81.66	82.66
T3	75.23	85.56	85.33	67	62.33	60.66	82	77.33	76.33
T4	70.16	77.9	77.6	71	69.33	64	83.66	84.33	79.66
T5	69.86	80.5	73.73	70.66	70.33	64.66	85.6	85.66	78.66
T6	71.66	79.53	75.33	70.33	64	64.66	85.3	78.33	79.33
T7	73.76	81.73	81.66	68.66	63.33	62.33	83.3	78.33	77.33
T8	72.3	78.4	73.36	72.33	64.66	65.33	87.3	79.66	80.33
Mean	70.122	78.789	76.848	70.36	66.62	65.36	85.48	81.55	80.29
C.D	0.734	1.272	1.12	0.431	0.747	0.982	0.372	0.644	0.629
S.E d	0.365	0.632	0.557	0.214	0.371	0.489	0.185	0.32	0.313
S.E m	0.258	0.447	0.394	0.152	0.263	0.346	0.131	0.226	0.222
Interaction TxD	Plant height			Days to 1 st flowering			Days to 50% flowering		
C.D	2.203			1.294			1.116		
S.E d	1.095			0.643			0.555		
S.E m	0.774			0.455			0.392		

Table 2: Mean performance of number of primary branches, number of clusters per plant number of fruits per plant in tomato crop during rabi-2018.

Treatments	Number of primary branches			Number of clusters per plant			Number of fruits per plant		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
T0	4.3	5.6	6	10.66	12.6	12.1	34	38.6	38
T1	5	7	7	11.66	15	14.6	37	54.6	52.3
T2	4.6	7	6	10.66	13.6	13.6	46.6	44	44.3
T3	6	9.6	8	14.66	17.66	17.3	62	71.6	62.3
T4	5.6	6.3	6.3	13.33	13	14.3	45.3	45.3	57
T5	5.3	7	7.3	13	16	14.6	40	56.3	52
T6	5	7.3	6.6	13	15.66	12.6	53	66.6	51
T7	5.6	8	7.8	14.3	16.33	16	50	63.3	62
T8	5.3	6.3	6.2	14	15	12.2	43	46.6	42
Mean	5.22	7.14	6.81	12.81	14.99	14.18	45.6	54.14	51.22
C.D	0.56	0.97	0.92	0.465	0.806	0.654	1.44	2.506	1.589
S.E d	0.278	0.482	0.459	0.231	0.4	0.325	0.718	1.246	0.790
S.E m	0.197	0.341	0.327	0.163	0.283	0.232	0.508	0.881	0.564
Interaction T x D	No. of primary branches			No. of clusters per plant			No. of fruits per plant		
C.D	1.68			1.396			4.341		
S.E d	0.835			0.69			2.157		
S.E m	0.59			0.49			1.525		

Table 3: Mean performance of fruit yield per plot, seed yield per plot in tomato crop during rabi-2018.

Treatments	Fruit yield per plot (kg)			Seed yield per plot (g)		
	D1	D2	D3	D1	D2	D3
T0	6.36	10.23	6.93	1.847	2.807	3.107
T1	6.43	11.23	7.16	2.02	4.55	3.83
T2	6.4	10.93	7.36	1.89	4.39	3.62
T3	9.96	13.43	13.1	3.17	5.36	4.92
T4	8.03	10.9	10.73	2.88	3.11	2.80
T5	7.93	12.2	8.36	2.83	4.23	3.45
T6	8.1	12.46	8.53	2.60	4.33	3.42
T7	9.73	12.83	12.46	3.07	4.84	4.55
T8	9.13	11.5	8.13	2.77	4.55	3.37
Mean	8.01	11.74	9.19	2.56	4.24	3.67
C.D	0.203	0.352	0.609	0.112	0.211	0.190
S.E d	0.101	0.175	0.303	0.061	0.105	0.094
S.E m	0.071	0.124	0.214	0.043	0.074	0.067
Interaction TxD	Fruit yield per plot (kg)			Seed yield per plant (g)		
C.D	0.609			0.366		
S.E d	0.303			0.182		
S.E m	0.214			0.129		

Table 4: Mean performance of germination (%), root length, shoot length parameters of a tomato seeds harvested from different transplanting dates and seed treatment combinations.

Treatments	Germination (%)			Root length (cm)			Shoot length (cm)		
	D1	D2	D3	D1	D2	D3	D1	D2	D3
T0	60	63	61.5	6.1	6.2	7.6	9.03	9.13	9.25
T1	70.6	73.6	67	6.9	8.1	6.6	9.23	10.93	9.7
T2	69.3	73	66.3	7.6	7.2	6.4	9.7	9.76	9.8
T3	78.3	80.3	76.6	8.06	8.3	7.8	10.9	11.73	10.93
T4	67.3	73.6	70.6	6.6	7.8	7.3	9.7	10.26	9.43
T5	73.6	67.6	66.6	7.2	8.03	7.1	10.2	10.76	9.73
T6	63	67	67.3	7.3	7.86	6.9	9.4	10.93	10.5
T7	74.6	76.6	70.6	7.9	8.06	7.8	10.4	11.13	10.26
T8	67.3	75	65.3	7.4	8	7.5	9.4	10.6	9.43
Mean	69.37	70.74	69.33	7.26	7.73	7.25	9.78	10.59	9.89
C.D	3.260	3.979	2.927	0.225	0.39	0.516	0.246	0.426	0.319
S.E d	1.622	1.986	1.456	0.112	0.194	0.257	0.122	0.212	0.159
S.E m	1.147	1.404	1.03	0.079	0.137	0.183	0.086	0.15	0.113
Interaction T x D	Germination (%)			Root length (cm)			Shoot length (cm)		
C.D	6.923			0.676			0.737		
S.E d	3.44			0.336			0.366		
S.E m	2.43			0.238			0.259		

Table 5: Mean performance of seedling length, seedling dry weight of a tomato seeds harvested from different transplanting dates and seed treatment combinations

Treatments	Seedling length (cm)			Seedling dry weight (mg)		
	D1	D2	D3	D1	D2	D3
T0	15.23	15.3	16.8	2.96	2.98	3.09
T1	16	19.03	16.4	3.45	3.81	3.28
T2	17.36	17	16.2	3.28	3.15	3.10
T3	18.99	20.1	18.79	4.07	4.32	3.71
T4	16.39	18.06	16.73	3.09	3.45	3.04
T5	17.46	18.8	16.86	3.49	3.7	3.49
T6	16.73	18.79	17.46	3.047	3.96	3.45
T7	18.36	19.19	18.06	3.96	4.22	3.45
T8	16.86	18.66	16.93	3.67	3.45	3.14
Mean	17.43	18.30	17.14	3.448	3.67	3.309
C.D	0.451	0.247	0.56	0.368	0.302	0.735
S.E d	0.224	0.388	0.278	0.183	0.15	0.366
S.E m	0.158	0.274	0.197	0.130	0.106	0.259
Interaction TxD	Seedling length (cm)			Seedling dry weight (mg)		
C.D	1.353			0.524		
S.E d	0.672			0.26		
S.E m	0.475			0.184		

Table 6: Mean performance of vigour index-I and vigour index-II of a tomato seeds harvested from different transplanting dates and seed treatment combinations.

Treatments	Vigour index-I			Vigour index-II		
	D1	D2	D3	D1	D2	D3
T0	913.98	965.98	1012.9	177.6	186.48	185.82
T1	1130.6	1401.83	1098.8	244.01	281.18	219.76
T2	1203.62	1241	1074.5	227.41	230.46	206.09
T3	1487.54	1614.69	1440.98	318.81	347.60	284.40
T4	1103.79	1330.9	1182.47	208.53	254.15	215.32
T5	1286.74	1272.1	1124.41	257.31	250.36	233.13
T6	1054.18	1258.9	1175.63	191.96	265.32	232.29
T7	1370.76	1471.11	1276.74	295.65	323.50	244.01
T8	1135.44	1400	1106.28	247.11	258.75	205.60
Mean	1187.41	1328.52	1165.88	240.93	266.42	225.16
C.D	66.56	62.145	89.324	13.726	23.774	22.364
S.E d	33.057	30.91	44.43	6.821	11.814	11.126
S.E m	23.388	22.08	31.51	4.823	8.354	7.947
Interaction T x D	Vigour index-I			Vigour index-II		
C.D	199.68			41.178		
S.E d	99.225			20.462		
S.E m	70.163			14.469		

Conclusion

Based on experiment conducted the treatment combination D₂T₃ [5th Dec-36 days old seedlings and captan + imidacloprid + cypermethrin combination] is recommended as the best treatment combination for obtaining the better growth, yield and quality seed in tomato crop.

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