

Short Communication

Effects of Planting Seasons on Seed Yield and Quality of Tomato Varieties Resistant to Leaf Curl Virus

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Tomato (*Lycopersicon esculentum* Mill.) cultivation has an increasing trend in India, for the last three decades, after the introduction of improved varieties and hybrids resistant to leaf curl disease. However, most of the existing tomato varieties are susceptible to leaf curl disease. Recently, University of Agricultural Sciences, Bangalore has developed three leaf curl resistant varieties viz., Nandi, Sankranthi and Vybhav in collaboration with Asian Vegetable Research and Development Center (AVRDC), Taiwan and Natural Resources Institute, UK [1]. The cost of cultivation of these new varieties is less, compared with the hybrids and other varieties as the expenditure on pesticide for the management of leaf curl transmitting vector can be avoided. Seed yield and quality of tomato is mainly dependent on the season and variety selected for seed production [2]. In view of above facts, the present investigation was planned with an objective to study the effect of different planting seasons and varieties on yield and quality of tomato seed.

Four tomato varieties viz., Nandi, Sankranthi, Vybhav and Arka Vikas were planted in three different seasons (Kharif, rabi and summer) during 2002-03 in a factorial RBD with four replications. The seedlings were transplanted at a spacing of 75 x 60 cm with plot size of 4.80 x 3.75 m² per replicate. Ten plants per treatment per replication were randomly selected for recording various observations such as, plant height, number of fruits/plant, fruit yield/ hectare. Seed were extracted by fermentation method and observations

on seed yield/hectare, seed to fruit ratio and 1000-seed weight were recorded. Germination test was conducted using BP in four replication as per ISTA rules [3] and seedling vigour index was calculated as the product of germination and seedling length [4]. The observation on per cent leaf curl infection was recorded by using following formula.

Per cent leaf curl infection =

$$\frac{\text{Number of plants infected with leaf curl} \times 100}{\text{Number of plants examined}}$$

Planting seasons and varieties significantly influenced the plant height. The crop grown in rabi season recorded higher plant height (90.90 cm) followed by kharif (81.87 cm) and summer (74.40 cm). Among varieties, Vybhav recorded higher plant height (86.07 cm) over Nandi, Sankranthi and Arka Vikas. The higher plant height in rabi was mainly due to warm weather prevailed during growth period. The varietal differences in plant height was also observed due to genotypic make-up [5].

Significant differences with respect of number of fruits, fruit yield per hectare were observed due to planting seasons, varieties and their interactions (Table. 1). More number of fruits/plant (70.06) and fruit yield/ha (71 tons) was obtained in rabi season followed by kharif and summer seasons. There was more than 200 per cent reduction in yield during kharif and summer season. The reduction in fruit yield per hectare in kharif was mainly attributed to infestation of pests like, leaf minor, mites and

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Alternaria disease. In summer season the crop was severely affected with abiotic and biotic stress. The present findings are in conformity with the above results of Muthu Krishnan [6]. Among the varieties, Vybhav recorded more number of fruits/plant (57.72) and fruit yield (49 t/ha) followed by Vybhav (91 t/ha) in rabi season. These differences were mainly due to genetic make up of varieties [7, 8].

Maximum leaf curl infection was noticed in summer at 45 (62.75%) and 90 days (100%) after planting. The higher incidence of leaf curl in

summer was mainly attributed to higher whitefly population. Among the varieties, Sankranthi, Nandi and Vybhav recorded no leaf curl virus disease in all the three seasons, whereas, the Arka Vikas recorded leaf curl infection ranging from 80 to 100 per cent in all the three seasons. This was mainly due to susceptible nature of Arka Vikas to leaf curl viral infection [9].

Higher seed yield (287.389 kg/ha) was recorded in rabi planted crop and was followed by kharif and summer season (Table 1). The increased seed

Table 1. Effect of planting seasons on plant height, number of fruits, fruit yield and seed yield in tomato varieties

Treatment	Pl height (cm)	No. of fruits/plant	Fruit yield t/ha	Seed yield kg/ha	Seed to fruit ratio (%)	Leaf curl infection (90DFS)	1000-seed weight (g)	Germination (%)	Seedling vigour index
Varieties									
Sankranthi (V ₁)	84.52	44.32	43	142.94	0.32	0	2.18	88.58	1348
Nandi (V ₂)	80.54	50.55	42	210.43	0.46	0	2.34	86.33	1292
Vybhav (V ₃)	86.07	57.72	49	95.40	0.18	0	2.45	87.16	1289
Arka Vikas (V ₄)	78.43	27.35	22	138.42	0.56	88.6	2.31	81.00	1310
CD 5%	2.73	2.47	3.7	15.56	0.03	-	0.03	1.45	37.92
Seasons									
Kharif (S ₁)	81.87	28.14	22	95.04	0.44	0	2.37	90.06	1395
Rabi (S ₂)	90.90	70.06	71	287.38	0.45	0	2.35	89.75	1343
Summer (S ₃)	74.40	36.98	24	58.48	0.24	29.5	2.24	82.00	1191
CD 5%	2.36	2.14	3.1	13.47	0.03	-	0.02	1.26	3284
Interaction									
V ₁ S ₁	84.32	26.32	17	68.87	0.39	0	2.23	91.25	1408
V ₁ S ₂	91.14	67.70	82	293.10	0.35	0	2.18	89.50	1368
V ₁ S ₃	78.10	38.95	30	66.87	0.21	0	2.14	85.00	1267
V ₂ S ₁	83.37	29.97	24	131.32	0.54	0	2.37	88.00	1367
V ₂ S ₂	88.25	80.77	76	424.87	0.55	0	2.36	89.50	1322
V ₂ S ₃	70.00	41.80	26	75.10	0.29	0	2.29	81.50	1188
V ₃ S ₁	85.42	33.11	27	56.23	0.20	0	2.50	90.00	1392
V ₃ S ₂	92.02	93.47	91	184.43	0.20	0	2.48	90.00	1315
V ₃ S ₃	80.77	46.57	29	45.50	0.15	0	2.38	80.50	1160
V ₄ S ₁	74.37	23.15	19	123.76	0.65	86	2.38	90.00	1414
V ₄ S ₂	92.20	38.32	35	247.10	0.69	80	2.38	90.00	1368
V ₄ S ₃	68.72	20.60	13	44.41	0.32	100	2.16	81.00	1149
CD 5%	4.73	2.14	6.3	26.95	0.06	-	0.02	2.52	NS
CV%	4.00	6.62	11.19	12.79	10.92	-	1.55	2.01	3.49

NS: Non-significant

yield may be attributed to moderate climatic conditions and crop free from infestations of pests and diseases. Among the varieties, Nandi recorded significantly higher seed yield (210.43 kg/ha) than Sankranthi (142.94 kg) and Arka Vikas (138.42 kg). Eventhough the fruit yield was highest in Vybhav, its seed yield was lowest (94.50 kg/ha) and it was due to its lower seed to fruit ratio (0.18%). In rabi, Nandi showed higher seed yield (44.87 kg/ha). Difference in seed yield due to genetic difference and its interaction with environment [8].

Higher 1000-seed weight (2.37g), germination (90.06%) and vigour index (1395) were recorded in both kharif and rabi (2.35 g, 89.75% and 1343), whereas, the lowest seed quality parameters were recorded in summer. Difference in seed quality parameter is due to seasonal differences [10, 11]. Among the varieties, Vybhav recorded significantly higher 1000-seed weight (2.45 g) followed by Nandi, Arka Vikas and Sankranthi. The variety Sankranthi recorded significantly higher germination (88.58 %), seedling vigour index (1348), which was closely followed by Nandi and Vybhav. The varietal difference for seed quality parameters was mainly due to genetic makeup of varieties and differences in test weight [8, 12]. In this study rabi season was found to be better for production of quality seeds of new varieties viz., Nandi, Sankranthi and Vybhav under Bangalore condition.

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