Seed Research, Vol. 35(2): 155-158, 2007

Seed Production Studies of Selected Tomato Hybrids under varied Planting Dates

MOHINDER KAUR AND J.S. KANWAR

Directorate of Research, Punjab Agricultural University, Ludhiana 141 004
jskanwar@yahoo.com

ABSTRACT Studies were conducted to assess the seed production potential of three tomato hybrids at Punjab Agricultural University during 2002-2003. Crosses of these tomato hybrids (VFN 8 x Punjab Chhuhara, ACC 8 x ACC2 and, W321 x 1-181), were made under four different planting dates viz. 20th November, 5th December, 20th December and 5th January and were evaluated for hybrid seed yield and its quality. From the investigation, it was concluded that maximum hybrid seed could be obtained from ACC 8 x ACC 2 (TH802) followed by W321 x 1-181 (TH-I) and VFN 8 x Punjab Chhuhara (TH 2312). As per dates of planting, November 20 was found to be the best planting date for obtaining highest hybrid seed yield with better seed quality. Interactions between planting dates and crosses were significant for crossed fruit weight, fruit setting (%), hybrid seed recovery and hybrid seed yield.

Key words: Hybrid seed yield, seed quality, tomato, planting dates

Tomato is an important vegetable crop, which has been exploited for heterosis in India and abroad. In India, first hybrid of tomato was 'Karnataka' developed by Indo-American hybrid Seed Company during 1973. Punjab Agricultural University has developed and released three tomato hybrids viz. TH-2312, TH-802 and TH-I for general cultivation in the state. The detailed information of these hybrids with respect to their seed production potential under different planting dates needs to be studied for maximum exploitation of these hybrids. In view of meager information available, the present investigation was carried out to find out the seed production ability of above mentioned tomato hybrids under different planting dates.

MATERIAL AND METHODS

The experiment comprised of two main parameters viz. four planting dates and three cross combinations. Crosses were carried out at the Seed Technology Farm, Punjab Agricultural University, Ludhiana during 2002-2003. Six parental lines (VFN 8, ACC 8, W 321, Punjab Chhuhara, ACC 2 and 1-181) were planted on four dates of planting viz. 20th November (D_1), 5th December (D_2) 20th December (D_3) and 5th January (D_4). There were two rows of seed parent and one row of pollen parent for each hybrid and each row comprised of 15 plants out of which five plants were selected randomly for making crosses and for recording the observations on hybrid seed yield and its related attributes. For hybrid seed production, first three flowers in each cluster on five randomly selected plants of each female parent in respective planting dates were emasculated and pollinated next day with their respective male parents. Observations were recorded on fruit and seed yield. Twenty five crossed fruits from five plants of each female parent were harvested, weighed and then seed was extracted for determining seed yield and its quality attributes. For estimating seed recovery, two kg red ripe fruits of each cross were taken and the seed was extracted and dried and seed recovery was calculated as

$$\text{Percentage of seed recovery} = \frac{\text{Seed weight}}{\text{Fruit weight}} \times 100$$

Received November 2005 Revised March 2007 Accepted July 2007

RESULTS AND DISCUSSION

Pooled analysis of variance for different characters in crossed tomato revealed significant differences among planting dates as well as crosses in respect of all the characters studied (Table 1). Planting date x cross interaction was significant for crossed fruit weight, fruit yield/plant as well as per hectare (qtls), hybrid seed recovery (%) hybrid seed yield per plant and hybrid seed yield per hectare.

Fruit yield

The highest number of crossed fruits (22.24) was observed on female parent (ACC8) of TH 802 hybrid. Per cent fruit setting of ACC 8 x ACC 2 (15.86) and W 321 x I-181 (15.5%) was at par (Table 2). Gill *et al.* [1] also reported similar results in the seed parents of TH 802 and TH 2312 hybrids. More number of flower buds was available for artificial pollination in ACC 8 as compared to

Table 1. Analysis of variance for various F1 seed yield parameters in tomato

Source	d.f.	Fruit setting %	No. of fruits	No. of seeds/ fruit	Seed recovery %	Seed yield/ plant	Seed yield/ ha	1000 seed weight	Germi-nation %	Seed vigour index
Replication	2	1.317	1.466	28.313	.0000301	0.0217	11.388	0.0446	3.395*	2760.00
Planting date (A)	3	157.641	292.708*	252.700*	0.00167*	14.210*	7218.7520	0.0980	147.175*	121744.60*
Error a	6	0.562	3.821	2.283	.0000314	0.116	58.729	0.0386	1.269	1367.7030
Cross (B)	2	52.805	196.000*	397.647*	0.0280*	11.999*	6003.185*	0.0825	7.593*	78760.00*
AB	6	7.124	4.321	13.212	0.000298*	0.330*	167.978*	0.0385	0.644	2663.703
Error b	16	0.831	2.730	8.128	.0000191	0.119	60.672	0.0300	0.982	1122.111

*Significant at 5% level of significance

Table 2. Fruit setting percentage and mean performance of different crosses for number of fruits/plant and number of seeds/fruit in different transplanting dates in tomato

Cross	Fruit setting (%) Date of planting					Number of fruits/plant Date of planting					Number of seeds/fruit Date of planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
VFN 8 x Punjab Chhuhara (TH-2312)	17.49	16.82	7.23	6.7	12.81	22.83	16.66	9.33	8.66	14.37	48.26	50.73	43.76	42.66	46.35
ACC 8 x ACC 2 (TH-802)	19.58	18.07	12.96	12.83	15.86	29.73	24.40	17.50	17.33	22.24	61.53	66.76	53.26	49.90	57.86
W321 x 1-181 (TH-I)	19.21	17.21	12.79	12.79	15.50	25.83	20.83	16.50	16.50	19.91	54.66	57.40	49.73	47.76	52.39
Mean	18.76	17.36	10.99	10.77		26.13	20.63	14.44	14.16		54.82	58.30	48.92	46.77	
CD (P = 0.05)															
Date of planting (D)				=	0.86		=	1.42		=	1.74				
Cross (C)				=	0.78		=	2.25		=	2.46				
Interaction (C x D)				=	1.57		=	NS		=	NS				

other seed parents. The reason for more number of fruits in ACC 8 was relatively higher per cent fruit setting (15.86) than other crosses. The highest number of fruits (26.13) and per cent fruit setting (18.76) were obtained in November 20 transplanted crop. Devi and Singhal [2] had also reported significant differences for fruit yield between different dates of planting and has obtained highest fruit yield per plant (917g) in December planted crop. Interaction of dates of planting and artificial crosses was also significant with respect to fruit setting percentage. The highest per cent fruit setting (19.58) was observed in ACC 8 x ACC 2, when crop was planted on November 20(D_1).

Seed yield

Among crosses, maximum seed number per fruit (57.86), seed weight (0.171 g), seed recovery (0.226%) seed yield per plant (3.92 g) and seed yield per hectare (88.30 kg/ha) was recorded in ACC 8 x ACC 2 (TH-802) followed by W 321 x 1-181 (TH-I) and VFN 8 x Punjab Chhuhara (TH 2312) (Table 3). Similar observations were made by Gill *et al.* [1] in tomato with crosses ACC 8 x ACC 2 and VFN 8 x Punjab Chhuhara. This might be due to the different genetic potential of the seed parents of different hybrids. The highest number of hybrid seeds per fruit (58.30) and seed weight per fruit (0.177 g) were obtained in December 5 (D_2), transplanted crop whereas seed yield per fruit (4.47g) as well as per hectare (100.55 kg) were maximum in November 20 transplanted crop. The reason for more seed yield produced in November 20 planted crop may be due to the favourable conditions for high fruit setting during this period, thereby resulting in more crossed fruits/plant as compared to other planting dates. Devi and Singhal [2] and Bullard and Stevenson [3] also reported similar results. There was also significant interaction between dates of planting and crosses and ACC 8 x ACC 2 (TH-802) produced highest seed yield, 5.71 g/plant and 128.70 kg/ha, under November 20 planting (Table 3).

Seed quality

The 1000 seed weight from various crossed fruits was differed non-significantly, whereas seed germination (79.50%) and seed vigour index (1542.36) was highest in TH-802 (ACC 8 x ACC 2) produced seeds. Both the characters were at par in TH 2312 and TH-I hybrids (Table 4). Among dates of planting, there were nonsignificant differences for 1000 seed weight. First two planting dates (D_1 & D_2) recorded higher germination (%) and seed vigour than the later planting (D_3 & D_4). Less germination percentage and seed vigour index in late plantings may be due to higher temperature

Table 3. Mean performance of crossed fruits with respect to seed recovery (%), seed yield per plant(g) and seed yield per hectare(kg) in different planting dates in tomato

Cross	Seed recovery (%) Date of planting					Seed yield/plant (g) Date of planting					Seeds yield/ha (kg) Date of planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
VFN 8 x Punjab Chhuhara (TH-2312)	0.139	0.140	0.137	0.134	0.137	3.21	2.50	1.13	0.98	1.95	72.20	57.33	25.36	22.00	44.22
ACC 8 x ACC 2 (TH-802)	0.242	0.247	0.215	0.200	0.226	5.71	4.90	2.65	2.42	3.92	128.70	110.26	59.73	54.50	88.30
W321 x 1-181 (TH-I)	0.228	0.230	0.210	0.197	0.216	4.50	3.74	2.43	2.31	3.24	100.76	84.20	54.63	51.93	72.88
Mean	0.203	0.206	0.187	0.177		4.47	3.71	2.07	1.90		100.55	83.93	46.57	42.81	
CD (P = 0.05)															
Date of planting (D)			=	0.006			=	0.39	=	8.84					
Cross (C)			=	0.003			=	0.29	=	6.73					
Interaction (C x D)			=	0.007			=	0.59	=	13.46					

Table 4. Mean performance of crossed fruits with respect to 1000 seed weight (g), germination (%) and seed vigour index in different planting dates in tomato

Cross	1000 seed wright (g) Date of planting					Germination (%) Date of planting					Seeds vigour index Date of planting				
	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean	D_1	D_2	D_3	D_4	Mean
VFNS x Punjab Chhuhara (TH-2312)	2.39	2.85	2.78	2.77	2.83	81.70	80.70	77.63	73.66	78.42	1481.60	1471.23	1368.93	1239.93	1390.42
ACCS x ACC2 (TH-802)	3.14	3.10	2.85	2.80	2.97	83.00	82.66	78.53	73.83	79.50	1667.66	1592.86	1533.63	1375.30	1542.36
W321 x 1-181 (TH-I)	3.20	3.15	2.97	2.92	3.06	81.66	80.50	77.50	72.16	77.95	1483.23	1483.76	1464.76	1238.80	1417.64
Mean	3.09	3.03	2.86	2.82		82.12	81.28	77.88	73.22		1544.16	1515.95	1455.77	1284.67	
CD (P = 0.05)															
Date of planting (D)				= NS			= 1.30			= 42.66					
Cross (C)				= NS			= 0.85			= 28.97					
Interaction (C x D)				= NS			= NS			= NS					

which prevailed during pollination period which might have adverse effect on seed formation and its proper development. Sharma and Thakur [4] and Devi and Singhal [2] also reported similar findings. The interaction between dates of planting and crosses was also non significant for 1000 seed weight and germination percentage as well as seed vigour index.

From this investigation, it has been concluded that highest hybrid seed yield with better quality can be obtained in ACC 8 x ACC 2 (TH-802) cross followed by W 321 x 1-181 (TH-I) and VFN8 x Punjab Chhuhara (TH 2312), respectively. November 20 transplanting time is the best for higher hybrid seed yield with seed quality.

REFERENCES

1. Gill B.S., J.S. Kanwar & S.S. Gill (2002). Economic viability of tomato hybrid seed production in Punjab. *Seed Res.*, **20**: 239-42.
2. Devi L.C. & N.C. Singal (2002). Seed production studies in tomato under different planting dates. *Seed Tech News*, **32**: 67-70.
3. Bullard E.T. & E.C. Stevenson (1953). Pollination of hybrid tomato seed. *Proc. Amer Soc. Hort Sci.*, **61**: 451-58.
4. Sharma S.K. & M.C. Thakur (1995). Quality and seed yield of tomato as influenced by different transplanting dates. *Veg. Sci.*, **22**: 33-35.