Vegetable Science (2013) 40 (1) : 45-49

Evaluation of indeterminate tomato hybrids for fruit, yield and quality traits under net house and open field conditions

DS Cheema, N Singh and SK Jindal

Received : November, 2012 / Accepted : March, 2013

Abstract: The present investigations were conducted at the vegetable research farm and biochemistry laboratory of Department of Vegetable Crops, Punjab Agricultural University, Ludhiana. Twenty six hybrids of tomato along with Check Naveen were obtained from public and private sectors and grown under net house and open field conditions. These twenty six hybrids of tomato were evaluated for fifteen characters.The analysis of variance showed that genotypes are significantly different in treatments for all character in both the environments except average fruit weight is significantly different in replications in with both environments. The observation recorded for hybrids showed that To ind Hyb/3, TH-12, G-600 were found maximum yielding genotypes under net house. These genotypes yields more because of maximum no. of fruits/ plant were found in these genotypes. It was also observed that genotypes under net house yields more as comparison to open field conditions because of early yield and more number of pickings.The observation recorded for biochemical analysis showed that maximum lycopene content was found in hybrid G-600, in both the environments. Maximum fruit acidity was found in hybrid ARTH-128 and TH-13 in net house in TH-23 in open field conditions. Maximum TSS content was recorded in G-600 in expand net house and Naveen recorded maximum in open field condition. Under net house genotypes performed better than open field condition for yield and biochemical traits because of favourable conditions for proper growth under net house.

Keywords: Tomato, hybrids, net house

Introduction

Tomato is a warm season crop and requires a relatively long growing season and moderately high temperature (20-28°C). It ensures that the optimum fruit setting is at night temperature and the optimum range is 15°-20°C (Anonymous 2010). Recently, to overcome these environmental conditions and pesticide residue problem protected cultivation of vegetables, particularly nethouse cultivation of tomato, brinjal and capsicum has been recommended. Net-house cultivation of tomato offers distinct advantages of earliness, higher productivity and quality particularly pesticide residue free produce, besides higher returns to growers.

The aim of protected cultivation is to achieve independence of climate and weather and to allow crop production in areas where the natural environment limits or prohibits plant growth. The principal vegetable crops, produced under protected conditions in northwestern plains are tomato, cucumber, muskmelon, capsicum, lettuce and cauliflower. Many greenhouses in southern and western states are specialized in the production of vegetable transplants, particularly tomato, lettuce, sweet pepper, eggplant, cabbage, broccoli and cauliflower.

Tomato plants are trained to a single stem and tied up a string or wire by pruning out the lateral shoots and wrapping the stems around the string on wire hanging from an over head wire supported system. Net house tomatoes are generally harvested with more colour than those from the field. Under protected environment the natural environment is modified to the suitable conditions for optimum plant growth which ultimately helps in the production of quality tomatoes suitable for exports and domestic consumption. It has been observed that net house grown tomatoes have potential for better performance and produce higher fruit yield than open field conditions. Tomato can be grown successfully in the off-season in net house for obtaining higher fruit yield. Occurrence of frost coupled with low temperature during the month of December and January cause death of tomato plant when grown in open field conditions, but under protected environment, the yield loss can minimized. The following experiment was planned with the objective of evaluating indeterminate genotypes of tomato in respect of yield and quality under open and protected conditions.

D S Cheema, N Singh and S K Jindal
Department of vegetable crops
PAU, Ludhiana-141004

Materials and Methods

The present investigation was carried out during the months of October to June in 2008-09 under net house and open field facilities of Department of Vegetable crops, Punjab Agricultural University, Ludhiana. Twenty six tomato hybrids obtained from different sources (Public sector as well as private sector) were collected.

Genetically pure seeds of indeterminate tomato hybrid were sown on 26th Oct 2008. Twenty five days old tomato seedlings were transplanted on flat seed beds in the net house (E1) and in the open field conditions (E2)on 26th Nov. 2008. A row to row and plant to plant spacing of 90 cm x 30 cm respectively, was adopted during investigation. The tomato seedlings were irrigated immediately after transplanting in the nethouse through family drip irrigation system. The observations were recorded on plant height (cm), number of flowers per cluster, number of clusters per plant, total numbers of fruits per plant, number of fruit per cluster, average fruit weight (g), total fruit yield (kg/plant), number of locules per fruit, pericarp thickness (cm), total soluble solids (TSS), acidity, lycopene content, dry matter (%), ascorbic acid and carotene content. The data was analyzed statistically as per randomized complete block design following Cochran and Cox (1960).

Results and Discussion

Mean sum of square of all treatments were significant for all the characters in both environments. Mean sum of squares were found significant for all treatment because all genotypes are genetically different from each other and showed significant variation among each other. Mean sum of squares of replication was not significant because among replication there is no significant difference within genotypes.

The observations recorded on Plant height in different tomato hybrids grown under net house and open field conditions are presented in. It ranged between 82.50cm to 194.50cm under net house. There were significant differences in Plant height in different tomato hybrids grown under net house and open field conditions because of controlled environmental conditions. The results indicated that under the net house conditions tomato hybrid, G-600(194.50cm) recorded maximum plant height followed by To-Ind-Hyb/5 (182.50 cm), which were significantly superior over the check variety Naveen (162.50cm), whereas, minimum plant height (82.50cm) was recorded in HS-18. However, tomato hybrids grown in open field conditions show ranges in between the 81 to 181cm. TH-13 was attained maximum plant height (181.00cm), while minimum plant height (81.00cm) was recorded in HS-18. Experiments conducted by the, revealed that Avinash-2 attained the maximum plant height (102.7cm) under the net house conditions as compared to other tomato hybrids. Ganesan in 2001 revealed that Pusa Ruby attained maximum plant height (211cm) under Green house conditions.

Similarly for number of clusters per plant (table 1), TAI 687 recorded maximum number of clusters per plant (12.50) followed by G-600 (11.50) and To-Ind-Hyb/3 (11.00), which were significantly superior over check variety Naveen (9.50), whereas, minimum number of cluster per plant (6.00) was recorded in Hyb-3560 and Nayar (6.50). However, TBK-3310 produce maximum number of clusters per plant (7.50), while minimum number of clusters per plant (3.00) were recorded in Hyb-3560, MHTM-401 under open field conditions. Experiment conducted by Singh *et al* in 2005, revealed that Avinash-2 had maximum number of 6.4 clusters per plant.

The range for number of flowers per cluster was 5.00 to 10.00 under net house and 3.50 to 9.00 under open field conditions. There was a significant difference in the number of flowers per cluster in different tomato hybrids grown under net house and open field conditions. The results indicated that under the net house conditions tomato hybrid, To-Ind-Hyb/3 (10.00)recorded maximum number of flowers per cluster followed by TH-12 (9.50) and TH-23(9.50) which was better performance over check variety Naveen having (9.65)flowers per cluster, whereas, hybrid Dev produce maximum number of flowers per cluster (9.00) grown in open field conditions. However tomato crop grown under net house conditions were produced higher number of flowers per cluster than in the open field conditions. Similar results were revealed by Gavrish *et al* (1998) that tomato hybrid Malyshock produced 6-7 flowers per inflorescence under plastic green house.

The observations recorded on number of fruits per cluster in different tomato hybrids grown under net house and open field conditions are presented in Table 1. The results indicated that under the net House conditions tomato hybrid, G-600 and TAI-687 recorded maximum number of fruits per cluster (10.50) followed by To-Ind-Hyb/5 and To-Ind-Hyb/3 (10.00) which were significantly superior over check variety Naveen having (7.50) fruits per cluster, whereas, minimum number of fruits per cluster (3.00) was recorded in Hyb-575. However tomato hybrid grown in open field conditions had ranged from 2.50 to 8.50 fruit per cluster. Naveen produced maximum number of fruits per cluster (8.50), while minimum number of fruits per

Table 1: Mean performance of hybrids for yield traits under nethouse (E_1) and open field conditions (E_2)

Name of hybrids	Plant height		No. of Clusters per plant		No. of flowers per cluster		Number of fruits per cluster		Average fruit weight (gms)		Total number of fruit per plant		Total fruit yield per plant (kg/plant)	
	E_1	E_2	E_1	E_1	E_2	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
TAI 687	92.50	82.00	12.50	5.50	8.15	5.50	10.50	5.50	50.00	37.00	58.40	26.50	2.15	0.92
HS-18	82.50	81.00	10.50	4.50	5.00	3.50	7.50	3.50	49.00	34.50	28.40	24.95	1.19	0.75
Nayar	94.00	84.00	6.50	3.00	6.00	4.00	4.00	3.50	60.00	32.00	9.00	10.00	0.62	0.20
MHTM-401	105.00	99.00	9.00	3.00	9.60	6.50	9.00	3.00	52.50	36.00	29.00	23.00	1.71	0.79
Hyb-432	160.00	152.50	7.50	3.00	6.30	6.50	5.50	3.50	45.00	36.50	17.50	20.10	0.96	0.65
Hyb-3545	142.50	137.50	6.50	4.00	8.00	7.5	4.50	3.00	46.00	40.00	19.00	9.50	0.70	0.22
Hyb-3560	142.50	133.50	6.00	3.00	7.25	5.50	4.00	3.00	46.00	35.00	13.57	16.30	0.61	0.55
Hyb-575	137.50	130.00	6.50	3.50	7.35	7.00	3.00	3.50	50.00	35.00	25.75	10.50	1.02	0.55
ARTH-1001	172.50	150.00	7.00	5.00	7.20	7.50	4.00	3.50	45.00	40.00	19.00	8.50	0.75	0.20
ARTH-734	150.00	160.00	8.00	4.00	5.30	6.50	4.00	3.00	45.00	35.00	20.75	7.50	0.79	0.20
NP-1001	137.50	135.00	8.50	5.00	7.00	7.00	5.50	4.00	35.00	50.00	40.50	12.50	1.11	1.11
Dev	137.50	140.00	8.00	6.00	8.10	9.00	5.00	2.50	52.50	35.00	20.80	10.50	1.04	0.30
Lakshmi	167.50	162.50	8.50	5.00	8.50	7.50	5.50	4.00	45.00	35.00	18.12	10.00	0.72	0.35
G-600	194.50	134.50	11.50	6.00	9.45	5.50	10.50	6.50	50.00	40.50	43.80	17.05	2.09	0.70
TH-13	170.00	181.00	8.50	7.00	5.00	6.50	6.50	4.00	62.00	30.00	18.00	26.30	1.03	0.68
TH-23	175.00	167.00	9.00	4.00	9.50	6.50	9.50	7.00	50.00	50.00	44.50	10.50	2.02	0.47
TH-12	153.50	158.00	9.00	4.00	9.50	4.50	10.00	4.00	52.50	52.50	35.00	13.15	2.17	0.62
TH-16	165.50	161.00	10.00	4.00	6.00	4.50	5.50	6.00	61.00	40.00	27.00	11.50	1.22	0.45
ARTH-2104	157.50	161.50	7.00	6.00	9.00	7.00	7.00	5.50	61.00	30.00	26.75	14.50	1.40	0.44
TBK-3310	170.00	143.50	9.00	7.50	7.50	6.50	8.00	5.00	62.50	34.50	22.75	34.20	1.20	1.00
ARTH-128	175.00	162.50	7.00	4.50	7.00	7.00	7.50	5.00	42.50	35.00	44.50	20.00	1.79	0.60
TO-Ind-Hyb/2	177.00	161.50	7.00	4.50	7.40	8.00	7.50	5.50	55.00	40.00	26.50	30.00	1.24	0.90
TO-Ind-Hyb/4	180.00	170.50	7.00	4.00	6.60	7.00	7.50	4.00	50.00	40.00	38.50	28.25	1.70	0.95
TO-Ind-Hyb/3	175.00	163.00	11.00	5.00	10.00	7.50	10.00	5.00	50.00	40.00	53.00	32.00	2.35	1.05
TO- Ind-Hyb/5	182.50	169.00	11.00	4.00	8.00	7.50	10.00	7.00	72.50	50.00	35.00	20.00	1.78	0.90
Naveen(Check)	162.50	159.50	9.50	7.00	9.65	7.00	7.50	8.50	47.50	35.00	39.00	10.50	1.68	1.65
Grand Mean	152.00	143.23	8.50	4.70	7.62	6.40	6.82	4.53	51.44	38.40	29.69	17.60	0.67	0.63
C.D(p=0.05)	10.86	10.42	0.92	0.71	0.83	2.10	1.32	1.25	3.84	1.69	13.52	3.16	0.67	NS

cluster (2.50) was recorded in Dev. However, tomato crop grown under net house conditions produced higher number of fruits per cluster than in the open field conditions because, better environmental conditions under net house helped in better pollination which leads to more fruit setting as revealed by Gavrish *et al* (1988).

The observations recorded on average fruit weight in different tomato hybrids grown under net house and open field conditions indicated that under net house conditions tomato hybrid, To-Ind Hyb/5 recorded maximum average fruit weight (72.50g) followed by TBK-3310 (62.50g), where as, TH-12 had the maximum average fruit weight (52.50g) in open field conditions. Chaudhary *et* al reported that tomato hybrid Carmello had the maximum average fruit weight (163.33g) under Plastic tunnel.

As far as number of fruits per plant are concerned, the result indicated that under net house TAI 687 had the potential of setting maximum fruits per plant (58.40) followed by To-Ind-Hyb/3 (53.00), TH-23 (44.50) and G-600 (43.80) which was better performance over check variety Naveen (39.00). Whereas, minimum number of fruits per plant (9.00) was recorded in Nayar. In open field conditions, TBK-3310 variety set maximum number of fruits per plant (34.20) To-Ind Hyb/3 (32.00) and ARTH-734 set the minimum number of fruits per plant at (7.50). Therefore tomato varieties varied in their reaction under net house conditions than in open field conditions, as supported by the experiment conducted by Singh *et al* (2005) which revealed that Avinash-2 had potential of setting maximum fruit per plant (91.9) under net house conditions.

The observations recorded on total fruit yield per plant indicated that under the net house conditions tomato hybrid, To-Ind Hyb/3 recorded maximum fruit yield per plant (2.35kg/plt) followed by TH-12 (2.17), TAI-687 (2.15) and G-600 (2.09) which was better performance over the check variety Naveen (1.68kg/plant). Whereas, minimum fruit yield per plant (0.61kg/plant) was recorded in Hyb-3560 under net house. However, in tomato hybrids grown in open field conditions, Naveen produced maximum fruit yield per plant (1.65kg/plant), while minimum fruit yield (0.20) was recorded in Nayar, ARTH-1001 and ARTH-734. The genotypes yields more because more number of picking were found in net house than open field. Experiments conducted by the Cheema *et* (2003), revealed that Avinash-2 (2.77kg/ plant) and Naveen (2.87kg/plant) showed the maximum

Table 2 : Mean performance of hybrids for fruit and quality traits under nethouse (E_1) and open field conditions (E_2)

Name of hybrids	Pericarp thickness (cm)		Total Soluble Solids		No. of locules per fruit		Acidity(g acid / 100ml of juice)		Dry Matter percentage		Ascorbic acid/ 100ml of juice		Carotene content		Lycopene content (mg/ 100g of juice)	
	E_1	E_2	E_1	E_1	E_2	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2	E_1	E_2
TAI 687	0.40	0.50	3.96	3.90	2.00	2.00	0.41	0.45	5.40	5.00	14.97	15.05	3.96	3.90	5.50	5.00
HS-18	0.30	0.45	3.82	3.80	2.00	2.00	0.52	0.48	4.85	4.10	13.92	14.25	3.82	3.80	4.35	4.00
Nayar	0.60	0.55	3.71	3.81	2.00	2.00	0.44	0.45	5.55	4.45	15.30	16.25	3.71	3.85	4.55	4.25
MHTM-401	0.65	0.50	3.93	3.95	2.00	2.00	0.42	0.47	6.38	4.85	16.35	16.35	3.93	3.95	3.85	3.65
Hyb-432	0.40	0.50	3.71	3.72	4.00	2.00	0.30	0.35	4.45	4.80	16.00	13.80	3.71	3.71	3.75	3.20
Hyb-3545	0.40	0.40	3.71	3.70	3.00	3.50	0.52	0.48	4.45	4.65	16.50	16.10	3.71	3.70	4.00	3.90
Hyb-3560	0.30	0.45	3.79	3.65	2.00	4.50	0.44	0.50	3.95	4.65	15.25	14.75	3.79	3.65	3.55	3.50
Hyb-575	0.30	0.45	3.38	3.57	3.50	3.00	0.49	0.52	4.00	4.10	15.00	16.25	3.38	3.57	3.60	3.50
ARTH-1001	0.50	0.50	4.15	4.00	2.50	2.00	0.37	0.35	5.60	5.25	15.57	15.75	4.15	4.00	2.75	2.75
ARTH-734	0.40	0.55	3.90	4.00	2.00	2.50	0.49	0.42	5.35	4.95	16.10	16.55	3.90	4.00	3.20	3.20
NP-1001	0.35	0.40	4.13	4.11	3.50	2.50	0.57	0.55	4.45	4.30	16.30	16.60	4.13	4.11	3.40	3.12
Dev	0.45	0.40	3.63	3.60	2.50	3.00	0.58	0.60	5.25	4.45	18.85	18.50	3.63	3.60	4.20	4.00
Lakshmi	0.35	0.45	3.91	3.89	3.50	2.50	0.45	0.45	4.65	5.25	14.50	16.25	3.91	3.90	3.30	3.10
G-600	0.45	0.45	3.80	3.91	3.00	4.00	0.55	0.49	5.10	4.70	18.07	16.25	3.80	3.91	6.40	5.25
TH-13	0.70	0.35	3.85	4.02	2.00	3.00	0.65	0.60	7.10	5.60	19.50	19.25	3.85	4.02	5.15	4.04
TH-23	0.45	0.55	4.12	4.00	2.00	2.00	0.55	0.75	5.05	6.10	13.75	15.15	4.12	4.00	5.35	4.90
TH-12	0.60	0.50	4.05	4.12	3.00	2.00	0.45	0.65	5.95	5.75	15.75	14.60	4.05	4.12	5.50	4.50
TH-16	0.55	0.55	4.10	3.95	2.50	2.50	0.55	0.46	5.30	4.65	19.30	12.50	4.10	3.95	4.80	5.00
ARTH-2104	0.55	0.55	3.72	3.95	3.00	2.50	0.40	0.51	5.55	4.40	17.50	18.60	3.72	3.95	3.70	3.50
TBK-3310	0.40	0.35	4.11	3.83	3.50	2.00	0.41	0.42	4.10	4.40	20.50	20.62	4.11	3.83	4.60	4.50
ARTH-128	0.50	0.40	3.83	3.82	2.00	4.50	0.60	0.48	4.10	4.40	21.25	20.02	3.83	3.82	3.50	3.00
TO-Ind-Hyb/2	0.30	0.40	4.16	3.93	2.50	2.50	0.49	0.48	5.00	3.70	13.50	14.75	4.16	3.93	4.15	4.00
TO-Ind-Hyb/4	0.40	0.45	3.68	3.67	2.00	2.50	0.45	0.52	4.40	5.80	14.57	13.50	3.68	3.67	4.85	4.55
TO-Ind-Hyb/3	0.55	0.50	3.75	4.10	3.00	2.50	0.55	0.56	5.75	5.40	15.55	15.15	3.75	4.10	5.50	4.90
TO- Ind-Hyb/5	0.50	0.55	3.73	3.90	3.00	2.50	0.50	0.53	6.25	6.15	15.75	15.05	3.73	3.90	5.00	5.00
Naveen(Check)	0.60	0.55	4.04	4.09	3.00	2.00	0.55	0.44	6.45	5.75	16.25	15.25	4.04	4.09	5.50	5.10
Grand Mean	0.45	0.46	4.60	4.50	2.67	2.61	0.49	0.49	5.23	4.91	16.59	16.01	3.89	3.88	4.30	4.05
C.D(p=0.05)	0.14	0.01	0.66	0.97	0.85	1.10	0.07	0.07	0.89	1.18	1.18	0.99	0.17	0.13	0.27	0.28

fruit yield under the net house conditions. Similarly, Ganesan (2001). These results are at par with our results.

Data recorded on Pericarp thickness of different tomato hybrids grown under net house and open field conditions indicated that under the net House conditions tomato hybrid, TH-13 recorded maximum Pericarp thickness (0.70cm) followed by MHTM-1001 which was statistically at par with check variety Naveen (0.60cm), whereas, tomato hybrid To-Ind-Hyb/5, TH-16, ARTH-734, Naveen and Nayar had maximum Pericarp thickness (0.55cm) grown in open field conditions.

The observations recorded on TSS content revealed that under the net house conditions tomato hybrid To-Ind Hyb/5 recorded maximum TSS (6.25%) followed by G-600 (6.00%) and which were at par with the check variety Naveen (6.00%), whereas, minimum TSS (3.00%) was recorded in TH-23. However, in tomato hybrids grown in open field conditions, Naveen recorded maximum TSS (5.80%) followed by To-Ind-Hyb/3 (5.50%), while minimum TSS content (3.25%) was recorded in HS-18. Singh et al (2005) revealed that maximum TSS was present in Sel-11(5.02%) and in Sel-26 (4.98%) under Net house conditions. Similar results were revealed by Zhu- *et al* (2003) that tomato cultivar Puhong 909 had maximum TSS content (4.5%) under the multispan greenhouse.

There was a significant difference in number of locules per fruit in different tomato hybrids grown under net house than in open field conditions because of controlled environmental conditions. Under net house minimum number of locules per fruit (2.00) was recorded in To-Ind Hyb/4 which was statistically at par with TAI-687, HS-18 and Nayar which was desirable and of locules in check variety Naveen was (3.00), whereas maximum number of locules were showed in Hyb-432. In open field conditions, TAI-687 showed minimum number of locules (2.00) per fruit which was at par with HS-18, Nayar and, ARTH-128 showed maximum number of locules (4.50) per fruit.

The observations recorded on fruit acidity showed that under the net house conditions tomato hybrid TH-13 recorded maximum fruit acidity (0.65 g acid/100ml of fruit acidity) followed by ARTH-128 (0.60 g acid/100ml of fruit juice) which were better over the check variety Naveen (0.55 g acid/100ml of fruit juice), whereas, TH-23 produced maximum fruit acidity (0.75g acid/100ml of fruit juice) in open field conditions. Experiments conducted by the Singh *et* al (2005), revealed that Sel-

4 had maximum fruit acidity (0.35g/100ml of juice) under net.

There was a significant difference in the dry matter content in different tomato hybrids grown under net house and open field conditions The results indicated that under the net house conditions tomato hybrid TH-13 recorded maximum dry matter content (7.10 %) which was significantly superior over check variety Naveen having (6.45%), whereas, To-ind-hyb/5 produced maximum number of fruits per cluster (6.15%) which is at par with check variety Naveen (6.10%) grown in open field conditions.

For ascorbic acid content, the results indicated that under the net house conditions tomato hybrid ARTH-128 recorded maximum ascorbic acid content (21.25mg/ 100ml of fruit juice) followed by TBK-3310 (20.50mg/ 100ml of fruit juice) which was better performance over the check variety Naveen (16.25mg/100ml of fruit juice), whereas, minimum ascorbic acid content (13.50mg/ 100ml of fruit juice) was recorded in To-Ind-Hyb/2 followed by TH-23 (13.75mg/100ml of fruit juice). However, in tomato hybrids grown in open field conditions, TBK-3310 produced maximum ascorbic acid content (20.62mg/100ml of fruit juice), while minimum ascorbic content (12.50mg /100ml of fruit juice) was recorded in TH-16. Experiments conducted by the Singh *et* al in 2005, revealed that Sel-4 had maximum vitamin C i.e Ascorbic acid 35.204 mg/100ml of juice under net/poly tunnel.

The observations recorded on carotene content indicated that under the net house conditions tomato hybrid To-Ind-Hyb/2 recorded maximum carotene content (4.16%) followed by ARTH-1001(4.15%),NP-1001(4.13%) and TH-23(4.12%) which were show good performance over the check variety Naveen (4.04%), whereas, minimum carotene content (3.63%) was recorded in Dev. However, in tomato hybrids grown in open field conditions, TH-12 recorded maximum carotene content (4.12mg/100ml) followed by NP-1001(4.11%), while minimum carotene content (3.60mg/100ml) was recorded in Dev.

The results indicated that under the net house conditions tomato hybrid G-600 recorded maximum Lycopene content(6.40gm/100g of edile portion of fruit) followed by To-Ind Hyb/3 (5.50 mg/100g of edible portion of fruit) which was better performance over the check variety Naveen (5.50 mg/100g of edible portion of fruit), whereas, minimum Lycopene content (2.75 mg/100g of edible portion of fruit) was recorded in ARTH-1001, whereas tomato hybrids grown in open field conditions, G-600 produced maximum lycopene content (5.25 mg/ 100g of edible portion of fruit), while minimum lycopene content (2.75 mg/100g of edible portion of fruit) was recorded in ARTH-1001. Experiments conducted by the Singh *et* al (2005), revealed that Punjab Kesri recorded maximum Lycopene content (2.491mg/100g of mg/100g of edible portion of fruit) under net/poly tunnel; followed by Sel-47 (2.423 mg/100g of edible portion of fruit).

Under net house, genotypes performed better than open field condition for yield and biochemical traits because of favourable conditions for proper growth was available under net house. Punjab Agricultural University, Ludhiana has recommended Naveen F_1 hybrid for net-house/ poly-house cultivation of tomatoes. It is concluded that hybrids showed that To ind Hyb/3, TH-12, G-600 were found maximum yielding genotypes under net house have the potential to be cultivated as an alternative of Naveen F_1 hybrid.

References

Anonymous (2010) *Package of Practices of Cultivation of Vegetables.* Punjab Agricultural University, Ludhiana.

Chaudhary MF, Khokhar KM, Ashraf M and Tariq Mehamood (1993) Performance of six tomato hybrids under plastic tunnels during winter. *Sarhad Journal of Agriculture* **11**(3) : 325-29.

Cheema DS, Kaur P, Dhunna OS, Singh P, Kaur S, Sundeep K and Haliwal MS (2003) *Haryana J Hort Sci* **32** (3 & 4) : 288-89.

Ganesan M (2001) Performance of tomato varieties under organic farming in greenhouse and open field conditions during winter season of Tamil Nadu. *Madras Agriculture Journal* **88** : 10-12.

Singh DK and Ram HH (2005) Breeding tomato suitable for polyhouse cultivation. Abstract published in "International Conference on plastic culture and Precision Farming" held at the Ashok, Chanakyapuri, New Delhi (17th Nov. to 21st Nov., 2005) Book of Abstract, Abstract No. ICPPF/011/ GH/01 pp. 19.

Singh R and Asrey R (2005) Performance of tomato and Sweet pepper under untreated greenhouse. *Haryana J Hort Science* **34** (1-2) : 174-75.

Gavrish SF, Sysina EA, Amcheslavskaya EV and Shanorgunav GT (1988) New varieties for plastic greenhouse. *Kartofeli Ovoschchi* **6** : 45-46.

Zhu W, Zhu Long, Yang J, Tiwei Xu, Zhu WM, Zhu LY, Yang ZJ and Xu TW (2003) Breeding of tomato variety Pohong 909 for multispan plastic greenhouse. *Acta Agriculturae Shanghai* **19** (3) : 33-35.