

## EVALUATION OF DIFFERENT HYBRIDS OF TOMATO UNDER THE CLIMATIC CONDITIONS OF PESHAWAR

WAJID ALI\*, MUHAMMAD SALEEM JILANI\*, NISAR NAEEM\*\*, KASHIF WASEEM\*, JEHANZEB KHAN\*\*, MUHAMMAD JAMIL AHMAD\*\*\*\* and GHAZANFARULLAH\*\*\*\*\*

\* Department of Horticulture, Faculty of Agriculture, Gomal University, D.I. Khan – Pakistan.

\*\* Agricultural Research Institute, Tarnab, Peshawar – Pakistan.

\*\*\*\* Department of Horticulture, University College of Agriculture, Rawalakot, AJK – Pakistan.

\*\*\*\*\* Department of Agronomy, Faculty of Agriculture, Gomal University, D.I. Khan – Pakistan.

### ABSTRACT

Nine exotic tomato hybrids 68F1, T-7030, T-7012, T-7010, T-7001, T-7008, TP-001, TP-002, and PTM-1603, recently received from abroad by PARC (Pakistan Agricultural Research Council) were evaluated at Agriculture Research Institute, Tarnab, Peshawar during 2008. The design used was RCBD (Randomized Complete Block Design) having three replications containing seven plants. Sub plot size was 2 X 3m<sup>2</sup>, where row to row distance 100 cm and plant to plant distance of 60 cm was kept. Different parameters including days to flowering, days to fruiting, leaf length (cm), plant height (cm), fruit length (cm), fruit diameter (cm), average fruit weight (gm), yield per plant (kg), yield per plot (kg) and yield per hectare (kg) were studied in this study. According to parameters studied, it was revealed that maximum stem diameter (1.217 cm), fruit diameter (5.187 cm), yield per plot (1.915 kg) and significantly higher yield (6939 kg) were recorded for hybrid T-7010, where as maximum plant height (72.00 cm), fruit length (7.797 cm) was recorded for hybrid T-7012, while maximum average fruit weight (112 gm) was recorded for hybrid T-7030. On the basis of over all performance and yield the hybrid T-7010 is recommended for agro-climatic conditions of Peshawar.

**Key words:** Tomato, hybrids, evaluation, growth and yield.

**Citation:** Ali, W., M.S. Jilani, N. Naeem, K. Waseem, J. Khan, M.J. Ahmad and Ghazanfarullah. 2012. Evaluation of different hybrids of tomato under the climatic conditions of Peshawar. Sarhad J. Agric. 28(2):207-212

### INTRODUCTION

*Lycopersicon esculentum Mill* 'tomato' is one of the very popular vegetable in Pakistan, belonging to the family "Solanaceae". The cultivated tomato is relatively recent addition to the world's important food crops, with the past century it has become one of the most popular and widely consumed vegetable crop (Tigchelaar, 1986). It ranks next to potato and sweet potato in the world vegetable production (Anonymous, 1997). It is widely used in salad as well as for culinary purposes. Although there has been a progressive increase in its production and area under cultivation in Pakistan (Anonymous, 2006), but its production in Pakistan is far more low as compared to the other countries, as we are only producing the tomatoes to meet our local demands. Amongst many other important factors, non-availability of high yielding cultivars is one of the main constrains. Our farmers are still using the old traditional cultivars, but to enhance tomato production and farmer's income, they have to import some other high yielding tomato cultivars. Chaudary *et al.*, (1999) reported that tomato cultivars namely Rio-Grande, NARC-1 and F.M. 9 yielded 58.5, 55.4 and 54.5, t ha<sup>-1</sup>, respectively during autumn. The cultivars showing promise during spring season were Roma, Chico III and Tanja yielding 30.1, 27.9 and 27.0 t ha<sup>-1</sup>, respectively. Deouk *et al.*, (2000) observed that at harvest, fruit set, fruit fresh weight and fruit yield per plant were highest in cv Arafat and lowest in cv Super Strain-B. Tomato cv. Chico bore the highest number of fruits/plant (52.50), fruit size was maximum in Tanja (6.90 cm) whereas, Roma and Mar-globe produced the highest yield (9218.75) and (9140.75 kg/ha) respectively (Rahman *et al.*, 2000).

Tomato cv. Tanja produced maximum fruit weight per plant (1.55 kg) and gave the highest yield of 41.45 t/ha, followed by Chico-III and Sorrento (Hussain *et al.*, 2001). Hussain *et al.*, (2002) reported that Marmande (TMV) and Marmande out yielded other cultivars with 64.29 and 62.99 t ha<sup>-1</sup> respectively while poor yield was obtained in S.Marzano (14.90 t ha<sup>-1</sup>). Khokar *et al.*, (2002) found that Parana and Turquesa matured earlier taking 95.25 and 98.75 days, respectively. Turquesa produced maximum fruit weight plant<sup>-1</sup> and exhibited the highest yield of 20.45 kg m<sup>-2</sup>, respectively. Neeraja *et al.*, (2004) reported that DT-39 was the earliest to flower (53.5 days), HYT-1 recorded the highest fruit yield of 41.05 t/ha and RHRT-33-1 recorded the longest shelf life (15 days). Maximum plant height and size of fruit was recorded in Raickoi Naclazdenie, whereas maximum number of flower clusters and fruits per plant were observed in 'Paths'. Ceberckoi Ckorocpelai and Patris gave maximum fruit weight of 4.96 and 4.85 kg/plant. Exotic varieties Patris and Ceberckoi Ckorocpelai are recommended for commercial cultivation due to high production (Hamid *et al.*, 2005). Hazarika and Phookan (2006) found that Yash recorded a maximum yield of

1.76 kg/plant, plant height (152.40 cm), branch number (14.07), flowers per inflorescence (8.00) and fruit setting percentage (83.96 %) and cost benefit ratio of 1:4.04, followed by Arka Ahuti and Arka Ahish, respectively. Zahoor *et al.*, (2006) found minimum days to flowering (51.33), days to ripening (90.33), plant height (81.67 cm) and highest yield (24.17 t/ha) was recorded in TT0302, whereas maximum fruit set cluster (71.62 %) and number of fruit/kg (24.33) were recorded in Swat local. Keeping in view, the importance of different Tomato hybrids and their ability to produce higher yields, the present study was therefore, carried out to evaluate the performance of different exotic tomato hybrid varieties.

## MATERIALS AND METHODS

An experiment was conducted to evaluate the performance of different tomato hybrids under the climatic condition of Agriculture Research Institute, Tarnab, Peshawar, Pakistan, during kharif 2008. The experiment was laid in RCBD (Randomized Complete Block Design) having three replications. Plot size was 168 m<sup>2</sup> with a sub plot size of 6 m<sup>2</sup>. Different nine tomato hybrids including 68F1, T-7030, T-7012, T-7010, T-7001, T-7008, TP-001, TP-002, and PTM-1603 were included in the study. Seeds were placed in lines 10 cm apart and were slightly covered with soil and were immediately irrigated. To protect the seedlings from the ill of frost, the beds were covered with a plastic sheet. Seedlings of same size and proper age were transplanted in beds, where row to row distance 100 cm and plant to plant distance 60 cm was kept.

The parameters included in the study were days to flowering (days from the date of transplanting to first flowering were recorded), days to fruiting (number of days taken by different hybrids to set fruit, after transplantation), leaf length in cm (It was measured with the help of measuring tape and then average was taken and calculated), plant height in cm (When the plants attained the maximum height after which the plant ceased to grow for measurement the plant were selected randomly. The tallest shoot of each plant was measured from the soil surface to the apical top with a measuring tape), fruit length in cm (when the fruit attained certain maturity then the length was measured with the help of measuring tape), fruit diameter in cm (fruit diameter was measured with the help of vernier caliper, when the fruit reached up to certain maturity), average fruit weight in gm (It was measured with the help of balance and their average was taken), yield per plant in kg (It was taken in kg, when all the hybrids of Tomato got maturity and at harvest stage per picking), yield per plot in kg (yield per plot were taken in kg, when all the hybrids tomato were harvested per picking) and yield per hectare in kg (It was calculated by the following formula:

$$\text{Yield (kg ha}^{-1}\text{)} = \frac{\text{Yield (kg ha}^{-1}\text{)} \times 1000}{\text{Plot size (m}^2\text{)}}$$

All the data of all the above mentioned parameters were individually subjected to the analysis of various techniques (Steel *et al.*, 1997), subsequently the significant means were separated by the least significant difference test by using the MSTATC Computer Programme.

## RESULTS AND DISCUSSION

### Days to Flowering

Data regarding days to flowering of different hybrids of tomato is given in Table I. The data showed that maximum days to flowering (56.00) were taken by T-7010, followed by T-7030 with 54.00 days to flowering and both the treatment were at par to each other. Different tomato hybrids including T-7001, TP-001, TP-002 and PTM-1603 produced intermediate results for days to flowering, as they took 51.00, 50.00, 49.00 and 48.00 days, respectively. Hybrid 68F1 took the least days to flowering (42.00). Genetic factor of the hybrids and the environmental conditions prevailing at the experimental site might have caused the earliness in flowering for 68-F1 and PTM-1603. Our result are in agreement with the previous findings of Ahmad *et al.*, (2002) and Neeraja *et al.*, (2004) who also reported that different tomato hybrids showed significant results for days to flowering. Similarly, Zahoor (2006) also stated that the tomato cv. TT0302 took 51.33 days to flower.

### Days to Fruit Set

Maximum days to fruit set were taken by hybrid T-7010 hybrid (91.00), followed by T-7030, T-7012 and T-7008 taking 87.00, 84.00, and 83.00 days to fruit set respectively and all these hybrids showed a non significant behavior for each other. Statistically least number of days to fruit set (66.00 and 68.00) were recorded in PTM-1603 and 68F1 respectively and both the hybrids were statistically alike. The rest of hybrids showed intermediate result for days to fruit set. It was obvious that these two hybrids (68F1 and PTM-1603) might show earliness in fruit setting as they did show earliness in flowering. Our results get support from the previous work done by Khokar *et al.*, (2002), Choudhary *et al.*, (1999) and Hussain *et al.*, (2002) who observed time variation in fruit setting in

various tomato cultivars. Similarly Kehkesahn *et al.*, (2008) also reported least days to fruiting in Nandi and Vegnesh.

**Table I** Days to flowering, days to fruit set, leaf length, plant height and fruit length (cm) of different of tomato hybrids under the climatic conditions of Peshawar Valley

Tomato hybrid	Days to flowering	Days to fruit set	Leaf length (cm)	Plant height (cm)	Fruit length (cm)
68-F1	42.00 g	68.00 f	7.990 cd	56.82 c	5.50 d
T-7030	54.00 ab	87.00 b	10.27 ab	69.74 ab	7.21 b
T-7010	56.00 a	91.00 a	9.317 abc	66.91 ab	7.73 a
T-7012	53.00 bc	84.00 bc	10.24 ab	72.00 a	7.80 a
T-7001	51.00 cde	73.00 e	8.947 bcd	61.34 bc	6.42 c
T-7008	52.00 bcd	83.00 c	10.42 a	66.81 ab	7.43 ab
TP-001	50.00 def	79.00 d	9.490 ab	61.50 bc	6.00 c
TP-002	49.00 ef	72.00 e	9.423 ab	63.00 bc	6.23 c
PTM-1603	48.00 f	66.00 f	7.867 d	58.09 c	5.99 cd
LSD Value at 5 %	2.797	3.094	1.367	8.676	0.51

Means followed by different letters show significant result at 5 % level of probability

### Leaf Length (cm)

Different tomato hybrids showed significant behavior for leaf length (cm) amongst each other. Highly significant data showed maximum leaf length was recorded in T-7008 (10.42 cm), closely followed by T-7030, T-7012, TP-001, TP-002, and T-7010 with 10.27, 10.24, 9.490, 9.423 and 9.317 cm long leaves respectively, as shown in Table I. All these treatments were statistically at par to each other. The minimum leaf length (7.867 and 7.990 cm) was recorded in PTM-1603 and 68-F1. The more possible reason for low leaf length in PTM-1603 and 68F1 might be due to less food assimilation, as they were earlier flowering and fruit setting tomato hybrids and got less time for their vegetative growth. Our results are in agreement with the previous finding of Deouk *et al.*, (2000) reported that at the full blooming stage cv. Arafat exhibit good number of leaves per plant and total leaf area per plant.

### Plant Height (cm)

The analyzed data showed that hybrid T-7012 gave highest plant height (72.00 cm) closely followed by T-7030, T-7010 and T-7008 with 69.74, 66.91 and 66.81 cm tall plant respectively and all these hybrids were statistically alike as shown in Table I. Statistically similar plant height (63.00, 61.50 and 61.34 cm) was observed in TP-002, TP-001 and T-7001, respectively. Least response for plant height (56.82 cm) was recorded in hybrid 68F1. More food assimilation might have encouraged the vegetative growth of the tomato hybrids including T-7012, T-7030 and T-7010, which in turns produced taller plants as compared to the other hybrids and vice versa. Our results are in agreement with the previous findings of Ahmad *et al.*, (2003) who also reported that cultivar Local Round showed maximum plant height (110.50 cm). Similarly Hamid *et al.*, (2005) also reported maximum plant height in variety Rickoi Naclazdenie.

### Fruit Length (cm)

The analyzed data regarding fruit length showed significantly different behavior for different tomato hybrids. Maximum fruit length (7.80 cm) was observed in T-7012 closely followed by T-7010 (7.73cm) and T-7008 (7.43 cm) long fruits, respectively and all these three hybrids showed a non- significant behavior against each other. Tomato hybrids including T-7001, TP-002, TP-001 and PTM-1603 showed statistically similar results as they produced 6.42, 6.23, 6.00 and 5.99 cm long fruits, accordingly. While, hybrid 68F1 got minimum fruit length (5.50 cm). Due to more concentration of food assimilates and higher plant height (vegetative growth) the hybrids including T-7012, T-7010 and T-7008 showed a remarkable increase in fruit size as they got maximum fruit length, as compared to the other hybrids. Our results get support from the previous findings of Rehman *et al.*, (2000) who also reported variation in different tomato cultivars for fruit length as maximum fruit length was observed in Tanja (6.90 cm) while minimum (3.08 cm) in Local Check. Similarly, Hamid *et al.*, (2005) who also reported variation in fruit size for different tomato cultivars and stated that maximum fruit size was found in tomato cultivar Raickoi Naclazdenie.

### Fruit Diameter (cm)

Highly significant data regarding fruit diameter revealed that tomato hybrid T-7010 produced maximum fruit diameter (5.19 cm) very closely followed by T-7030, T-7012, TP-002, T-7008 and TP-001 with 5.16, 5.16, 5.14, 5.10 and 5.10 cm fruit diameter respectively and all these hybrids were statistically at par with each other, as shown in Table II. Whereas the least response was reported in PTM-1603 and 68-F1 with 4.50 and 4.63 cm fruit

diameter accordingly. Our results regarding fruit diameter are in agreement with the previous findings of Vincent (2000) who reported that Florida 47 and Floralina stood out as good commercial cultivars because of their uniform size and shape. Similarly Hamid *et al.*, (2005) also reported maximum fruit diameter in tomato cultivar Raickoi Naclazdenie.

**Table II** Fruit diameter(cm), fruit weight (g), yield per plant(kg), Yield per plot(kg) and yield per hectare(kg) of different tomato hybrids under the climatic conditions of Peshawar valley

Tomato hybrid	Fruit diameter (cm)	Fruit weight (g)	Yield per plant (kg)	Yield per plot (kg)	Yield per hectare (kg)
68-F1	4.63 c	73 g	0.54de	3.79 de	3006.6 de
T-7030	5.16 ab	112 a	1.25 abcd	8.71 abcd	6121.7 bc
T-7010	5.19 a	116 a	1.92 a	13.41 a	9639.3 a
T-7012	5.16 ab	110 a	1.44 abc	10.10 abc	8002.7 ab
T-7001	4.96 b	88 e	1.10 bcd	7.71 bcd	3139.8 de
T-7008	5.10 ab	102 b	1.64 ab	11.46 ab	7897.9 ab
TP-001	5.10 ab	92 d	0.85 cde	5.93 cde	4700.5 cd
TP-002	5.14 ab	90 d	0.99 bcd	6.90 bcd	5473.5 bcd
PTM-1603	4.50 c	76 f	0.25 e	1.73 e	1375.7 e
LSD Value at 5 %	0.22	16.6	0.72	5.06	2530.9

Means followed by different letters show significant result at 5 % level of probability

#### **Fruit Weight (g)**

Highly significant data depicted that significantly maximum fruit weight were found in hybrid T-7010, T-7030 and T-7012 with 116, 112 and 110 g respectively and all three hybrids were statistically at par to each other, as given in Table II. Statistically similar result for fruit weight was recorded in TP-001 and TP-002 with 92 and 90 g respectively. While the hybrid 68-F1 showed minimum fruit weight (73 g) followed by PTM-1603 with 76 g fruit weight respectively. As the fruit weight is very closely associated to the food assimilation and the overall fruit size, thus T-7010, T-7012 and T-7030 have gained maximum fruit weight amongst all the other hybrids. Our results get support from the previous findings of Chaudary *et al.*, (1995) who also reported that tomato cv. Carmello gave the highest average fruit weight of 163.33 g while the lowest (75.67 g/fruit) in Polifemo. Similarly Balaraj *et al.*, (2005) also recorded average fruit weight of 70.0 g in tomato cv. DT-7. Gardner *et al.*, (2006) also reported that average fruit weight (361 g) of tomato cv. Mountain Spring was higher than that of Mountain Fresh and Mountain Crest giving average fruit weight of 317 and 294 g, respectively.

#### **Yield per Plant (kg)**

The data shown in Table II, revealed highly significant results for yield per plant (kg) amongst the different tomato hybrids. T-7010 showed maximum yield per plant (1.92 kg) very closely followed by T-7008, T-7012 and T-7030 producing 1.64, 1.44 and 1.25 kg per plant respectively and all these hybrids produced a non significant result against each other. Statistically similar result for the yield was recorded for T-7001 and TP-002 with 1.10 and 0.99 kg/plant respectively. Whereas, hybrid PTM-1603 showed minimum yield per plant (0.25 kg) followed by 68-F1 scoring 0.54 kg tomato fruit yield per plant. Once again, tomato hybrids viz, T-7010, T-7008, T-7012 and T-7030 showed better performance in fruit yield per plant as they got maximum food assimilation, fruit size and average fruit weight, as compared to the other hybrids. This also shows that these hybrids are much more suitable to the local environmental, as they are showing consistence performance regarding better tomato yields. Our results get support from the previous work done by Hussain *et al.*, (2001), Khokar *et al.*, (2002) and Ahmad *et al.*, (2003) who also reported significant variation for fruit weight per plant in different tomato cultivars. Similarly, Hazarika and Phookan (2006) also reported that Yash and Arka Ashish recorded maximum yield of 1.76 and 1.40 kg respectively. Hamid *et al.*, (2005) also reported that tomato cvs. Ceberckoi Ckorocpelai and Patris gave maximum fruit weight as compared to local check and Novichock.

#### **Yield Plot<sup>-1</sup> (kg)**

A similar trend of result was observed for yield plot<sup>-1</sup> as was observed in yield/plant, as shown in Table II. An examination of the analyzed data revealed that hybrid T-7010 showed maximum yield of 13.41 kg per plot, followed by T-7008 and T-7012 with 11.46 and 10.10 kg yield plot<sup>-1</sup>, respectively. Statistically similar results were recorded in T-7001 and TP-002 with 7.71 and 6.90 kg yield plot<sup>-1</sup>. Minimum yield per plot (1.73 kg) was observed in PTM-1603 followed by 68-F1 having 3.79 kg yield per plot. Our results get support from the previous findings of Chaudary *et al.*, (1995) who also reported that tomato cv. Carmello gave the highest yield of 18.07 kg/m<sup>2</sup> followed by Sarras and Samar yielding 13.57 and 13.26 kg/m<sup>2</sup>, respectively. Similarly, Khokar *et al.*, (2002) also stated

significant behavior for yield/m<sup>2</sup> amongst different tomato cultivars as Turquesa produced highest yield of 20.45 kg m<sup>-2</sup>.

### **Yield (kg) per Hectare**

Highly significant data revealed that maximum yield (9639.3 kg ha<sup>-1</sup>) was obtained in T-7010, closely followed by T-7012 and T-7008 with 8002.7 and 7897.9 kg ha<sup>-1</sup>, respectively and all these hybrids showed a non significant behavior against each other. Statistical alike results were reported for T-7030 and TP-002 with 6121.7 and 5473.5 kg ha<sup>-1</sup>. PTM-1603 showed minimum yield per hectare of 1375.7 kg followed by 68-F1 producing (3006.6 kg/ha). Being much better fertilizer and environmental responsive hybrids, these hybrids including T-7010, T-7012 and T-7008 produced better yield. Similar results were quoted by Khan *et al.*, (2001) and Rehman *et al.*, (2000) stating significant differences amongst different tomato cultivars, regarding yield kg hectare<sup>-1</sup>. Ameer *et al.*, (2008) also reported maximum yield kg ha<sup>-1</sup> in Vegnesh and 131 with 3885 and 3696 kg ha<sup>-1</sup> of yield respectively.

### **CONCLUSION AND RECOMMENDATIONS**

It can be concluded from the present research work that four tomato hybrids including T-7010, T-7012, T-7008 and T-7030 were highly fertilizer and environmental responsive and performed very well for their growth and yield under the agro-climatic condition of Peshawar.

PS: It is need to check by native reviewer in terms of English language grammatical of all manuscript.

### **REFERENCES**

- Ahmad, Z., M. Sajid, S. Haq, S. Ahmad and F. Ali. 2002. Performance of tomato lines under the climatic conditions of Mingora Swat. *Sarhad J. Agric.* 22(2):221-224.
- Ahmad, F., O. Khan, S. Sarwar, A. Hussain and S. Ahmad. 2007. Performance evaluation of tomato cultivars at high altitude. *Sarhad J. Agric.* 23(3):581-585.
- Ameer, K., M.S. Jilani, A.A. Alizia and K. Waseem. 2008. Performance of different exotic tomato (*Lycopersicon esculentum*) cultivars under the agro-climatic conditions of Dera Ismail Khan. M.Sc. (Hons) Thesis, Deptt. of Hort. Fac. of Agric. Gomal Univ. Dera Ismail Khan, Pakistan.
- Anonymous. 1997. FAO production years books. Basis Data Unit. Statist Div, FAO, Rome, Italy. 51:125-127.
- Anonymous. 2006. Fruit, vegetables and condiments statistics of Pakistan 2005-2006. Govt. of Pakistan, Ministry of Food, Agric. & Livest. (Econ. Wing), Islamabad, Pakistan.
- Arshad, M. and A. Rashid. 1999. Yield comparison between two varieties of Tomato (*Lycopersicon esculentum* Mill) under the influence of NPK. *Pak. J. Biol. Sci.* 2(3):635-636.
- Chaudary, M.F., K.M. Khokar, S.I. Hussain, T. Mahmood and S.M. Iqbal. 1999. Comparative performance of some local exotic tomato cultivars during spring and autumn seasons. *Pak. J. Arid Agric.* 2(2): 7-10.
- Duman, I., M. Gümüş and S. Erkan 1981. The determination of agronomical and technological properties of processing tomato varieties to be introduced to the production in Marmara region (Turkey) and their reactions to infections by the agents of diseases. *ACTA Hort.* 376. V. Int'l: Symp. on the processing tomato.
- Deouk, E.S.A., E.L.E. Fathy and S. Farid. 2000. High temperature tolerability in tomato: evaluation of some genotypes for late summer plantings. *Ann. Agric. Sci. Moshtohor.* 38(1):179-197.
- Gardner, R.G. 2006. "Mountain Crest" hybride tomato and its parents, NC 1 rinEC. *Hort. Sci.* 2006; 41(1):261-262.
- Hamid, A., M. Ahmed, F. Kayani and A. Farooq. 2005. Performance of tomato varieties for growth and yield under Rawalakot conditions. *Sarhad J. Agric.* 21(2):201-203.
- Hazarika, T.K. and D.B. Phookan. 2006. Studies on the off season Performance of different tomato cultivars under plastic rain shelter. *Res. on Crops.* 7(2):489-492.
- Hussain, S.I., K.M. Khokar, T. Mahmood, M.M. Mahmud and M.H. Lagari. 2001. Yield Potential of Some Exotic and Local Tomato Cultivars Grown for Summer Production. *Pak. J. Biol. Sci.* 10:1215-1216.
- Hussain, S.I., K.M. Khokar, T. Mahmood, Hidayatullah and M.H. Lagari. 2002. Varietal differences in Tomato crop grown in Islamabad conditions. *Asian J. Plant Sci.* 6:661-662.
- Khan, A., N. Muhammad, F. Wahab and J. Iqbal. 2001. Valuation of four tomato cultivars grown at Chitral for yield and quality. *Sarhad. J. Agric.* V(17) 353- .

- Khokar, K.M., S.I. Hussain, T. Mahmood, Hidayatullah and M.H. Laghari. 2002. Winter Production of Tomato under Plastic Tunnel. *Asian J. Plant Sci.* 6: 659-660.
- Neeraja, G., I.P. Reddy and C. Chiranjeevi. 2004. Performance of some promising tomato varieties (determinate type) under Southern Telangana conditions of Andhra Pradesh. *J. Res. Angrau.* 4:44-47.
- Rahman, F., S. Khan, Faridullah and Shafiullah. 2000. Performance of different tomato cultivars under the climatic conditions of Northern Areas (GILGIT). *Pak. J. Biol. Sci.* 3(5):833-835.
- Steel, R.G.D., J.H. Torrie and D.A. Dickie. 1997. Principles and procedures of statistics - a biometric approach. 3<sup>rd</sup> ed. McGraw-Hill Publish. Co. Toronto, Canada.
- Tigchelaar, E.C. 1986. Tomato Breeding. *Breeding Vegetable Crop.* The AVI Publish. Co. Inc. Westport, USA.
- Vincent, F. 2000. Tomato cultivar trial and pruning observation. Iowa State Univ. Muscatine Island Research Farm, Fruitland, IA.
- Zahoor, A., M. Sajid, S. Haq, S. Ahmed and F. Ali. 2006. Performance of tomato lines under the climatic conditions of Mingora, Swat. *Sarhad J. Agric.* 22(2):221-224.