

STUDIES ON GROWTH, YIELD AND NUTRITIONAL COMPOSITION OF DIFFERENT TOMATO CULTIVARS IN BATTAL VALLEY OF DISTRICT MANSEHRA, KHYBER PAKHTUNKHWA, PAKISTAN

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ABSTRACT

An experiment was conducted in Battal Valley of District Mansehra, Pakistan during 2003-04, to study growth, yield and nutritional composition of six exotic cultivars of tomatoes. Data on days to flowering and maturity, yield, TSS, ascorbic acid and titratable acidity was subjected to statistical analysis. Cultivar 'Roma' took minimum days to flowering (37.7 days) followed by 'Rio Fuedg' (39.0 days). Cultivar 'Lyreka' matured in 65.0 days followed by 'Roma' which took 67.7 days whereas cultivar 'Yaqui' took 85.0 days. Cultivar 'Yaqui' out-yielded other cultivars with 11.22 followed by 'Avinash' (9.52 tons ha⁻¹). 'Roma' and 'Rio Grand' yielded lowest with 6.46 and 7.96 tons ha⁻¹, respectively. Maximum TSS was observed in cultivar 'Avinash' (5.5) followed by Yaqui (5.4%) whereas it was found minimum in Roma (4.9 %) cultivar. 'Lyreka' have the most abundant ascorbic acid of 16.03 mg/100gm followed by 'Rio Grand' (15.86 mg/100 gm). The highest titratable acidity was found in 'Yaqui' (0.389%) while 'Rio Grand' was the lowest (0.313 %) in this respect.

Key Words: Tomato, yield potential, hilly areas.

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INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is an important crop and is grown throughout the year in different parts of Pakistan. Average yield is 9.6 tones per hectare (Agric. Stat. of Pakistan 2001-02), which is quite low. Commercial varieties grown in Pakistan are low yielding and do not respond well to our growing conditions are the major reasons of low yield. Bulging population demands increase in the production of tomatoes, which can be met by increasing per unit production. Tomato cultivars are much sensitive to hot climate is one of the limitations in optimum production of summer tomato crop in plains of Pakistan (Abdul-Baki, 1991).

Tomato varieties differ in characters like fruit shape, size, firmness, yield and quality (Suwwan and Abu-Baker, 1986; Georgiev *et al.*, 1988; Chaudhary *et al.*, 1999). Tomato varieties 'VFN Bush' and 'Shain' had slightly oblong fleshy fruits with maximum fruit weight in all the entries tested for growth and yield (Gabal *et al.*, 1985). Khokar *et al.*, (1988) observed difference in fruit maturation, plant height, fruits per plant, fruit weight and yield. Hussain *et al.* (2001) reported that cultivar 'Tanja' produced maximum fruit weight per plant and gave the highest yield and cultivar 'Ermolova' has a wider range of adaptation. Production potential of a genotype is the result of its interaction with the environment. This study was, therefore, planned to evaluate six exotic tomato cultivar for growth, yield and other parameters under the temperate agro-climatic conditions of Battal valley in Mansehra.

MATERIALS AND METHODS

This study was conducted at Battal Valley of District Mansehra, Khyber Pakhtunkhwa, Pakistan and chemical analysis was carried out at Potato Research Centre, Abbottabad during 2003-04. Six exotic cultivars namely 'Roma', 'Rio Grand', 'Rio Fuedg', 'Avinash', 'Lyreka' and 'Yaqui' were sown in randomized complete block design (Steel and Torrie, 1980) with a plot size of five rows of ten meters each. Nursery was sown in multi-pots in the month of March. Seedlings were transplanted in the end of April. Row to row and plant to plant distance was kept 75 and 15cm, respectively.

Data was recorded on days to flowering, days to maturity, yield per plant and yield per hectare. Total soluble solids were determined by hand refractometer while titratable acidity and ascorbic acid contents were

determined by the procedure of AOAC (1984). The data was analyzed by MSTAT-C and test of significance was applied at 5% probability level following Duncan's Multiple Ranges Test (Steel & Torrie, 1980).

RESULTS AND DISCUSSION

Days to Flowering

Significant difference was observed in number of days to flowering among the cultivars. It is evident from Table I that cultivars 'Roma' and 'Rio Fuegd' flowered earlier (37.7 and 39.0 days) as compared to 'Yaqui' which took comparatively longer time (47.0 days) followed by cultivar Avinash (46.7 days) without significant differences.

Days to Maturity

Cultivar 'Lyreka' (65.0 days) and 'Roma' (67.7 days) matured in significantly minimum time. 'Yaqui' was observed as late maturing cultivar (85 days) followed by 'Avinash' and 'Rio Fuegd' (77.7 days) and 'Rio Grand' (76.0 days) Table I All the other cultivars are mid maturing cultivars.

Table I Growth, yield and nutritional composition of tomato cultivars in Battal Valley of District Mansehra

Cultivars	Days to flowering	Days to maturity	Yield/plant (kg)	Yield/ ha (tone)	T.S.S	Acidity (%)	Ascorbic acid (mg/100g)
Roma (local)	37.7d	67.7c	1.095d	6.46e	4.9	0.323c	15.27d
Rio Grand	39.7c	76.0b	1.208c	7.96d	5.0	0.313c	15.86b
Rio Fuegd	39.0d	77.7b	1.213c	7.97d	5.4	0.315c	15.85b
Avinash	46.7a	77.7b	1.215c	9.53b	5.5	0.366b	15.45c
Lyreka	45.3b	65.0c	1.283b	8.46c	5.2	0.380ab	16.00a
Yaqui	47.0a	85.0a	1.428a	11.22a	5.4	0.389a	15.21d
LSD	1.197	4.493	0.018	0.081	NS	0.018	0.087

Values shown are the means of three replications.

Means followed by same letters in a column don't differ significantly at $P < 0.05$

Yield per Plant

Maximum yield per plant was obtained from cultivar 'Yaqui' (1.428 kg) followed by 'Lyreka' (1.283 kg) and minimum production was obtained from cultivar 'Roma' (1.095kg) (Table I).

Yield per Hectare

'Yaqui' out yielded all other cultivars with 11.22 and followed by 'Avinash' with 9.52 tones ha^{-1} as compared to the lowest yield recorded for 'Roma' (6.46 tones ha^{-1}). 'Rio Grand' is statistically at par with 'Rio Fuegd' in terms of yield with 7.96 and 7.97 tones ha^{-1} , respectively.

Total Soluble Solids Contents (TSS)

Total soluble solid contents of all the cultivar are statistically at par with each other i.e. maximum is 5.5 and minimum is 4.9 (Table I).

Titrateable Acidity

Maximum titrateable acidity (0.389%) was found in 'Yaqui' statistically different from the following 'Lyreka' (0.380%) and 'Avisnash' (0.366%). On the other hand 'Rio Grand', 'Rio Fuegd' and 'Roma' have lowest acidity of 0.313% and 0.313% and 0.323%, respectively (Table I).

Ascorbic Acid Contents

Ascorbic acid content was maximum in cultivar 'Lyreka' (16.00 mg/100g) followed by 'Rio Grand' (15.86 mg/100g) and 'Rio Fuegd' (15.85 mg/100 mg), while it was observed lowest in 'Yaqui' with 15.21 mg/100g and 'Roma' (15.27 mg/100 mg) (Table I).

Nature is gifted with tremendous variation in morphological, yield and nutritional characters within species, and this phenomenon suggests selection of strains for specific character and agro-climatic environments. Introduction and adaptation of new genotypes in different agro-climatic conditions is the most effective method for enhancing productivity of a crop and that is why same cultivars perform differently in different environments. Chaudhary *et al.*, (1999) reported that tomato cultivar 'Ermolova' has a wider range of adaptation under varied environmental conditions. In our study, six different cultivars perform differently under the agro-climatic conditions of Battal valley in District Mansehra. Results of this study indicated that significant difference in cultivars was

observed in number of days to flowering and maturity and yield. Crop stand, general growth and morphology of cultivar 'Yaqui' and 'Avinash' was very good and thereby it out yielded other cultivars. Similar results were reported by Khokar *et al.*, (1988) and Chaudhry *et al.*, (1999) for different tomato cultivars. Variation in growth and yield is the genotypic attribution which even varies from line to line and clone to clone. The results of Hussain *et al.*, (1990), Hussain *et al.*, (2001), Gabal *et al.*, (1985), Khokar *et al.*, (1988) and Chaudhry *et al.*, (1999) are in confirmation with our statement of yield differences for different cultivars. TSS and titratable acidity was found different for each tomato cultivar according to the results of this study. As genotypes indicate the morphological character difference in plants, similarly the nutritional composition is also attributed to the genetic characteristics of a cultivar (Suwwan and Abu-Baker, 1986).

CONCLUSION AND RECOMMENDATIONS

It is concluded from the study that 'Yaqui' and 'Avinash' are the most suitable cultivars in terms of growth, yield and nutritional composition for higher altitudes. This study also suggests that these two cultivars may be considered as candidate varieties for future commercial cultivation.

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