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Yield Potential of Some Exotic and Local Tomato Cultivars Grown for Summer Production

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Abstract: Ten cultivars of tomato were evaluated on the basis of days to flowering, fruit setting and maturity period, number and weight of fruit per plant, length and width of fruit, average fruit weight, plant height and yield. The cultivars Nova Mech, Early Mech, Chico III, Nadir, Tanja and Sorrento were early in maturity whereas 'Samarzano' was a late maturing. The cultivar Tanja produced maximum fruit weight per plant (1.55 Kg) and gave the highest yield of 41.45 t /ha . It was followed by Chico-III and Sorrento which exhibited average yields of 40.32 and 39.13 t/ha respectively.

Key words: Tomato, yield potential, maturity period

Introduction

The introduction of crops of a promising nature, has been important to the vegetable industry, throughout the world. As a result of such efforts, new crops and new varieties have enriched and advanced the agriculture of many countries. The productivity in vegetables depends upon plant growth and finally on yield components.

Tomato (*Lycopersicon esculentum* Mill.) is an important vegetable crop of Pakistan. However, the presently cultivated varieties are very much sensitive to hot climate and due to seasonal variations in Pakistan their production and supply is limited almost to early summer. Environmental temperature extremes coinciding with critical stage of plant development often cause a major threat to crop productivity under field conditions. It is fairly well known that temperature has a marked effect on fruit setting in tomato. Fruit set is usually poor, when the temperature is either relatively low or relatively high. Moore and Thomas (1952) found that when the average maximum temperature was above 90 °F fruit set was low. Ivakin (1977) reported that tomato varieties differed in resistance to heat and drought.

There also exists a lot of variation in tomato varieties for different plant characters like height, maturity, fruit shape, weight, yield, colour and quality of fruit. Gabal *et al.* (1985) observed that varieties 'VFN Bush' and 'Shan' had slightly oblong fleshy fruits and mean fruit weight varied considerably from 66.6 g in 'Shain B' to 99.7 in 'VFN Bush'. Khokhar *et al.* (1988), reported that fruit maturation period ranged from 55 to 62 days in different cultivars. They further reported that in various cultivars plant height, number of fruits per plant, single fruit weight, fruit weight per plant and average yield, ranged from 81 to 103 cm, 5.8 to 30.5, 25.74 to 146.93 g, 734 to 1330 g and 21.18 to 35.5 t/ha respectively. Ermolova and Kasymov (1982) observed that 'Oktyabr' a mid late variety of tomato attained height of 65-70 cm and produced fruit with average weight ranging from 300-400g.

Some cultivars have a greater adaptation, while others provide a valuable source of variability in breeding material. It was therefore considered appropriate to make a comparative study of local as well as exotic cultivars of tomatoes for screening high yielding varieties suitable to our agro-climatic conditions.

Materials and Methods

Nine exotic varieties of tomato with one local check were evaluated in a Randomized Complete Block Design with three replications at National Agricultural Research Center, Islamabad during Kharif seasons of 1992 and 1993. Seeds were sown during the last week of January, using multipots containing growth media. Forty days old seedlings were transplanted during the first week of March. Each plot comprised two rows (4.5 m long). The distance between rows and plants was kept 75 cm and 50 cm respectively. The monthly mean maximum and minimum daily air temperatures ranged between 22 to 38EC and 8 to 22EC during both the cropping seasons respectively.

Data were recorded on days to flowering, days to fruit setting, maturity, plant height, total number of fruit, average weight of single fruit and yield per hectare.

Data relating the above aspects were combined and treatment means were subjected to analysis of variance following Duncan's Multiple Range Test (Steel and Torrie, 1980).

Results and Discussion

The data (Table 1) indicated that the variety 'Samarzano' took the maximum time of 20.00 days to bloom after transplanting followed by 'Roma Local' (12.00 days). Rico Grande, Chico II and Sorrento, each took 11.33 days to bloom while the variety 'Tanja' took the minimum time of 7.67 days. Khokhar *et al.* (1998) reported blooming period ranging from 17 to 31.25 days in different cultivars. The difference may be attributed to genetic factors. The differences of means for fruit yield characteristics were highly significant for cultivars. The variation in time may be attributed to genetic make up of cultivars.

The maximum time taken to set fruit was by 'Samarzano' which was 26.67 days followed by 'Chico III' (19.67 days). The minimum time taken was 16.33 days by four varieties (Table 1). Our results differ from those of Chaudhry *et al.* (1999) and Khokhar *et al.* (1988), who reported minimum and maximum time of 25 and 41 days respectively for fruit setting in different cultivars.

The maximum time for fruit maturity was taken by 'Samarzano' which was 78 days followed by 'Roma Local' which took 71 days for the first fruit to mature. The cultivars 'Nova Mech, Early Mech and Sorrento were the earliest in maturity each taking the minimum time of 58 days. Khokhar *et al.* (1988) reported that in various cultivars fruit maturation period ranged from 55 to 62 days.

Maximum plant height (126.5 cm) was found in 'Samarzano' and minimum plant height (61.6 cm) was observed in 'Nadir' (Table 1). Other cultivars were in between these limits. Khokhar *et al.* (1988) reported plant height ranging from 81.8 to 103.4 cm in different tomato cultivars. Maximum number of primary (4.1) branches were recorded in 'Samarzano' followed by 'Sorranto' (4.0) while minimum branches (3.1) were recorded in 'Chico III' (Table 1).

Cultivar "Sorrento' produced the maximum number of fruits per plant (36.5) followed by 'Chico III' (34.6), while minimum number of fruits per plant (14.3) was produced by cultivar 'Nadir' (Table 2). The differences in means were highly

Table 1: Plant characters of different tomato cultivars

Cultivars	Days to flowering	Days to fruit set	Days to maturity	No. of primary branches/plant	Plant height (cm)
Nova Mech	10.0 b	16.3 b	58.0 b	3.6	67.0 b
Rio Grande	11.3 b	18.0 b	62.0 b	3.9	63.2 b
Early Mech	9.0 b	17.3 b	58.0 b	3.3	62.7 b
Roma Local	12.0 b	18.3 b	71.0 ab	3.7	75.9 b
Chico III	11.3 b	19.7 b	59.7 b	3.1	64.2 b
Nadir	9.7 b	16.3 b	59.3 b	3.3	61.6 b
Tanja	7.7 b	16.3 b	60.3 b	3.6	64.2 b
Sorrento	11.3 b	18.7 b	58.0 b	4.0	64.9 b
Vesuvio	9.3 b	16.3 b	62.3 b	3.4	70.1 b
Samarzano	20.0 a	26.7 a	78.0 a	4.1	126.5 a

Means followed by same letters do not differ significantly at 1% level of probability (DMR).

Table 2: Fruit yield of different tomato cultivars

Cultivars	No. of Fruits /Plant	Weight of single fruit (g)	Width of fruit (g)	Length of fruit (cm)	weight of fruit/ plant (kg)	Average yield (T/ha)
Nova Mech	18.9 bcd	74.7 b	4.9 a	6.0 de	1.05 b	27.87 bc
Rio Grande	15.9 cd	85.0 a	4.9 a	6.3 cd	0.98 b	26.07 c
Early Mech	19.5 bcd	66.7 bcd	4.8 a	5.6 e	1.05 b	27.95 c
Roma Local	34.3 a	55.3 ef	3.9 b	6.5 cd	1.36 ab	36.24 abc
Chico III	34.6 a	61.7 cde	4.0 b	9.0 c	1.51 a	40.32 a
Nadir	14.3 d	88.3 a	5.0 a	5.9 de	1.00 b	26.56 c
Tanja	28.3 ab	70.0 bc	4.1 b	8.5 a	1.55 a	41.45 a
Sorrento	36.5 a	48.7 f	3.2 c	7.7 b	1.47 a	39.13 ab
Vesuvio	33.9 a	52.3 ef	3.4 c	7.6 b	1.28 ab	34.19 abc
Samarzano	26.3 abc	57.7 def	3.9b	6.6 cd	1.05 b	28.11 c

Means followed by same letters do not differ significantly at 1% level of probability (DMR).

significant for cultivars. The high temperature that exceeded 35EC during the month of June resulted in poor fruit set in 'Nadir' and 'Rio Grande'. The average maximum atmospheric temperature during the first and the last picking of mature fruit in all the cultivars ranged between 31 and 38EC. The maximum average number of fruits per plant was observed in the cultivar 'Sorrento' followed by 'Chico III'. It is clear that these cultivars/lines having passed through the period of high temperature are tolerant to high temperature stress. Ivakin (1977) has also reported similar results.

As shown in Table 2, the cultivar 'Nadir' produced the maximum weight of single fruit (88.3 g) whereas minimum weight was recorded in 'Sorrento' (48.7 g). Variation in fruit weight by different cultivars have also been reported by Gabal *et al.* (1985), Ermolova (1984), Horie (1985), Glavinich *et al.* (1982) and Khokhar *et al.* (1988).

Regarding the shape and size of fruit the maximum width of fruit was recorded (5.0 cm) for cultivar 'Nadir'. Maximum length of fruit (7.7 cm) was observed in 'Sorrento' and minimum (5.6 cm) in cultivar 'Early Mech'. Similar results have been reported by Gabal *et al.* (1985).

The cultivars that had the maximum fruit weight per plant produced the highest yield per hectare (Table 2). Maximum fruit weight per plant (1.55 kg) was recorded in cultivar 'Tanja' which resulted in the highest yield (41.45 t/ha) followed by Chico III (40.32 t/ha) with fruit weight per plant (1.51 kg) while minimum per hectare yield was recorded in cultivar 'Rio Grande' (26.07 t/ha). The difference in yield was also reported by Gabal *et al.* (1985) Khokhar, *et al.* (1988). Differences in means were highly significant for cultivars. On the basis of results obtained in these studies, the variety 'Tanja' proved to be high yielding under high temperature conditions and is recommended for cultivation in summer season. Tanja further more, had firm fruits with good keeping quality and seems to be suitable for long distance transportation with minimum post harvest losses.

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