COMPARATIVE PERFORMANCE OF SOME LOCAL AND EXOTIC TOMATO CULTIVARS DURING SPRING AND AUTUMN SEASONS

Muhammad Farooq Ch., K. M. Khokhar & Tariq Mahmood
National Agricultural Research Centre, Islamabad

Seven exotic cultivars of tomato namely Tanja, Chico III, F.M.-9, Eva, Riogrande, Savio and NARC-1 including Roma local as check were evaluated to select varieties suitable for autumn and spring season cultivation. For autumn cultivation cultivars Riogrande, NARC-1 and F.M. 9 were found to be the best yielding 58.6, 55.4, and 54.5 t ha^{-1}, respectively. The cultivars showing promise during spring season were Roma, Chico III and Tanja having yields of 30.1, 27.9 and 27.0 t ha^{-1}, respectively.

INTRODUCTION

Two crops of tomato are grown in the Indus plains. The autumn crop constitutes about 72% of the total area where as the remaining 28% falls under spring season crop. Average yield of tomato in our country is 8.86 t ha^{-1} which is quite low because the varieties commercially cultivated are low yielding and do no respond well to our growing conditions. The presently cultivated varieties also lack in fruit firmness which is an important attribute of tomato quality both for fresh market and for processing. Moreover, commercial cultivation of a few cultivars in the country leaves a little option with the consumers. This necessitates that exotic tomato germplasm be tested and evaluated for better quality and high yield under our agroclimatic conditions. There exists a lot of variation in tomato varieties for different characters like fruit shape, size and firmness, yield and quality of fruit (Reynard, 1960; Kanno and Kamimura, 1985; Gabal *et al.*, 1985; Khokhar *et al.*, 1988; Georgiev *et al.*, 1988; Suwwan and Baker, 1988).

The present study was, therefore, undertaken to evaluate exotic as well as local tomato germplasm for identifying high yielding and better quality genotypes during spring and autumn season at Islamabad.

MATERIALS AND METHODS

Seven tomato varieties, namely Tanja, Chico III, F.M. 9, Eva, Riogrande, Savio and NARC-1 with one local check (Roma) were evaluated in a Randomized Complete Block Design (RCBD) with four replications at National Agricultural Research Centre, Islamabad during autumn and spring seasons of 1988 and 1989, respectively.

Five week-old seedlings were transplanted during first week of August, 1988 and second week of March, 1989 for autumn and spring crop, respectively. The seedlings were transplanted 50 cm apart on either side of one meter wide beds. The subplot measured was 6 x 1.5 m (9 m^2). Well rotten farm yard manure was applied at the rate of 25 t ha^{-1}, 50 kg N, 150 kg P_2O_5 and 30 kg of K_2O ha^{-1} was applied through broadcast before planting.

Another dose of 50 kg N and 30 kg K_2O was side dressed at the time of flowering.

The data in respect of number of fruits $plant^{-1}$, fruit weight $plant^{-1}$, fruit size, firmness and yield ha^{-1} were recorded. Fruit size

was measured with Verneer Caliper and fruit firmness with pressure tester. The data were analysed by the analysis of variance technique (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Autumn crop 1988: Maximum number of fruits plant^{-1} (45) were recorded in NARC-1 followed by Savio and Riogrande which produced 41 and 35 fruits plant^{-1}, respectively (Table 1). The fruit weight plant^{-1} recorded in Riogrande, NARC1- and F.M. 9 ranged from 2.9 to 3.1 kg plant^{-1} which was significantly higher than that for rest of the cultivars. Roma did not respond well in autumn season producing minimum fruit weight of 1.4 kg plant^{-1}. The results of the present study are in agreement with the findings of Khokhar *et al.* (1988) who also reported a lot of difference in fruit number and fruit weight plant^{-1} in different tomato cultivars.

stage. The other cultivars showing promise were NARC-1, Riogrande, Tanja and Chico III in which fruit firmness values at mature green stage were 6.8, 6.1, 6.0 and 5.9 lbs, respectively. At turning ripe stage, NARC-1 showed the highest fruit firmness (6.2 lbs) followed by Eva and Riogrande varieties with fruit firmness of 5.8 and 5.1 lbs, respectively. Fruit firmness recorded for Roma at mature green stage was the lowest being 4.2. However, at turning ripe stage, fruit firmness was the lowest (3.1 lbs) in F.M. 9. These results are in agreement with those of Kanno and Kamimura (1985) and Hall (1987).

The cultivar Riogrande, NARC-I and F.M. 9. were found to be of great promise yielding 58.6, 55.4 and 54.5 tonnes ha^{-1}, respectively whereas Roma yielded the minimum (27.4 t ha^{-1}). The results of the present study conform to those of Khokhar *et al.* (1988) and Gabal *et al.* (1985).

Fruit length in Tanja was the maximum

Table 1. Comparative performance of some local and exotic tomato cultivars during autumn (1988)

Cultivar	Fruits plant^{-1}	Fruit weight plant^{-1} (kg)	Fruit size (cm)		Fruit firmness (lbs)		Yield (t ha^{-1})
			Length	Diameter	Mature green	Turning ripe	
Tanja	32 bc	2.1 c	7.8 a	4.6 e	6.0 c	4.4 e	39.7 c
Chico III	28 c	2.1 c	6.6 b	4.7 e	5.9 c	4.7 d	40.0 c
Roma VF	30 bc	1.4 d	6.1 c	4.3 f	4.2 e	4.0 f	27.4 dF
F.M. 9	16 d	2.9 a	5.9 d	7.6 a	4.8 b	3.1 g	54.5 a
Eva	30 bc	2.3 bc	5.1 f	5.2 c	7. a	5.8 b	44.1 bc
Riogrande	35 abc	3.1 a	6.5 b	5.6 b	6.1 c	5.1 c	58.6 a
Savio	41 ab	2.5 b	5.4 e	5.2 c	4.9 d	4.7 d	47.2 b
NARC I	45 a	2.9 a	5.3 ef	4.9 d	6.8 b	6.2 a	55. a

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

The cultivar Eva exhibited maximum fruit firmness of 7.3 lbs at mature green (7.8 cm) followed by Chico III and Riogrande (6.6 and 6.5 cm, respectively). Fruit

diameter was maximum (7.6 cm) in F.M. 9. and minimum in Roma VF (4.3 cm). Fruits with comparatively greater length and diameter are oblong in shape whereas those with smaller length and greater diameter are round in shape. Gabal *et al.* (1985) and Georgiev *et al* (1988) also reported varying shape and size of tomato fruit in different cultivars.

on fruit number and fruit weight plant^{-1} in different tomato cultivars.

As shown in Table 2, Tanja produced fruits with maximum length (7.7 cm), whereas fruit length in Chico III, Riogrande and Roma VF was 6.7, 6.6 and 6.2 cm, respectively. Fruit length recorded in NARC-I and F.M. 9 was 5.3 and 5.1 cm, respectively. Fruit diameter in F.M. 9, Ri-

Table 2. Comparative performance of some local and exotic tomato cultivars during spring (1989)

Cultivar	Fruits plant^{-1}	Fruit weight plant^{-1} (kg)	Fruit size (cm)		Fruit firmness (lbs)		Yield (t ha^{-1})
			Length	Diameter	Mature green	Turning ripe	
Tanja	45.3 abc	1.4 a	7.7 a	4.7 d	8.0 abc	7.3 c	27.0 a
Chico III	53.9 a	1.5 a	6.7 b	4.7 d	5.5 bc	4.7 d	27.9 a
Roma VF	49.9 ab	1.6 a	6.2 c	4.4 e	3.1 c	3.4 e	30.1 a
F.M. 9	16.6 d	0.5 b	5.1 f	6.2 a	5.3 bc	1.9 f	9.0 b
Eva	33.5 bcd	0.9 ab	5.7 d	5.7 b	11.8 ab	7.9 b	16.3 ab
riogrande	28.3 cd	1.0 ab	6.6 b	5.7 b	13.7 a	7.1 c	19.7 ab
Savio	30.4 cd	1.1 ab	5.5 e	5.3 c	13.9 a	7.3 c	20.8 ab
NARC I	39.9 bc	1.1 ab	5.3 f	4.6 de	10.6 ab	8.3 a	20.4 ab

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

Spring crop 1989: The cultivar Chico III, Roma VF and Tanja are statistically at par bearing 53.9, 49.9 and 45.3 fruits plant^{-1}, respectively (Table 2). The variety F.M. 9 produced minimum number of fruits plant^{-1} (16.6). In other cultivars, number of fruits plant^{-1} ranged from 28.3 to 34.9. Fruit weight in Roma VF, Chico III and Tanja was recorded 1.6, 1.5 and 1.4 kg plant^{-1}, respectively which was statistically similar. Fruit weight plant^{-1} recorded in F.M. 9 was the lowest (0.5 kg). The other cultivars produced fruit weight ranging from 0.9 to 1.1 kg plant^{-1}. Khokhar *et al.* (1988) observed that season of production had a great influence

ogrande and Eva was 6.2, 5.7 and 5.7 cm, respectively whereas in Roma VF it was minimum being 4.4 cm. The slight variation in length and diameter of fruit in different tomato cultivars during Autumn and spring season might be due to varying climatic conditions of the season in which the crop was produced.

At mature green stage maximum fruit firmness was observed in Savio (13.9 lbs) followed by Riogrande (13.7 lbs). In Eva, NARC-I and Tanja, fruit firmness at mature green stage was 11.8, 10.6 and 8.0 lbs, respectively. The cultivar Roma VF showed minimum value of fruit firmness (3.1 lbs).

The variety NARC-I showed maximum fruit firmness of 8.3 lbs at turning ripe stage whereas in Eva, Tanja, Savio and Riogrande the fruit firmness values were 7.9, 7.3, 7.3 and 7.1 lbs, respectively. The lowest value of fruit firmness at turning ripe stage was recorded in F.M. 9 (1.9 lbs) whereas in Roma VF it was 3.4 lbs. Our results are in agreement with those reported by Kanno and Kamimura (1985) and Hall (1987) who observed significant differences in fruit firmness in different cultivars of tomato. The fruit firmness values of cultivars differed in both seasons. This might be due to varying climatic conditions provided during the season of production.

The spring cultivated varieties with top yields were Roma VF, Chico III and Tanja, yielding 30.1, 27.9 and 27 t ha^{-1}. F.M. 9 showed poor performance yielding 9.0 t ha^{-1}. The yield recorded in other cultivars grown during ranged from 16.3 to 20.8 t ha^{-1}. During spring season, the yield in most of the tomato cultivars was lower as compared with that of autumn season. Because most of the tomato cultivars do not set fruit at high temperature during summer season. These results agree with those reported by Khokhar *et al.* (1988).

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