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EVALUATION OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL.) GENOTYPES FOR YIELD ATTRIBUTES

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ABSTRACT

In the present investigation, nineteen tomato cultivars were studied at vegetable programme HRI, NARC, Islamabad to evaluate the performance of these cultivars and data were chronicled on number of fruits per plant, fruit weight per plant (kg), length of fruits (cm), diameter of fruits (cm), pericarp thickness (mm), number of locules per plant and yield (t/h). The experiment was set up in a randomized complete block design with three replicates. Highest number of fruits per plant was recorder in Nagina (40.87) trailed by Punjab Chuhara (27.58) and Ratan (26.29). Avinash II attained top most position with respect to fruit diameter (5.20 cm) followed by Feston (4.86 cm) and Punjab Chuhara (4.32 cm). Significantly highest pericarp thickness was found in Riogrande (0.72 mm) followed by Nagina (6.56 mm) and Avinash II (0.46 mm). The best output regarding yield was obtained by the cultivar Nagina (61.95 t/ha) accompanied by Punjab Chuhara (37.33 t/ha) and Ratan (34.04 t/ha).

Key Words: *Lycopersicon esculentum* Mill, genotypes, fruit weight, pericarp thickness, yield,

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill) is native to the Andes region of South America (Marsic *et al.*, 2005). It is helpful in healing wounds because of antibiotic properties of ripe fruit. It is a good source of vitamin A, B and C (Ahmad *et al*., 2007). Total area of tomato cultivation in Pakistan is 52.30 thousand hectare with an average production of 10.10 t/ha. Per capita consumption of tomato is 0.38 kg while its per capita monthly requirement is 0.114 kg (Anonymous, 2011).

The introduction of promising cultivars, their acclimatization and evaluation in a particular environment plays crucial role in crop improvement. The environment substantially affects the performance of tomato genotypes hence many field trials have been conducted and results of these trials indicated Varietal differences in yield and some fruit characters. Morphological, agronomic, as well as biochemical parameters have been widely used in the evaluation of tomato cultivars for genetic diversity and yield potential of the crop (Fehmida and Ahmad, 2007). Similarly, Muthuvel *et al*., (2000) studied the performance of different tomato genotypes and reported that the genotypes LE 1253, LE 1258, LE1259 and LE 1265 were superior with respect to yield attributing characters at high temperature conditions. Rehman *et al*., (2000) noted the fruit size was maximum in variety Tanja and minimum in local check. In the present investigation, nineteen tomato cultivars were studied at Vegetable Program, HRI, NARC, Islamabad to evaluate the performance of various tomato cultivars.

MATERIAL AND METHODS

The present study was conducted at vegetable crop research program, NARC, Islamabad during 2010-11. In the present study, nineteen tomato cultivars including CLN1555A, CLN 2026D, PT4664B, PT4719A, CLN2468A, CLN2468BDC7, CLN2498D, CLN2498E, CLN2545A, CLN2545B, PT4722A, PT4722B, Ratan, Avinash-II, Nagina, Feston, Punjab Chuhara, Riogrande and Roma were evaluated for various parameters. The experiment was set up in a randomized complete block design with three replications. Row to row distance was 75 cm and plant to plant was 50 cm. The data were documented on following parameters: number of fruits per plant, fruit weight per plant (kg), length of fruits (cm), diameter of fruits (cm), pericarp thickness (mm), number of locules and yield (t/h). Data were analysed using standard ANOVA technique by using statistical software Statistix. Means were separated using Turkey test at $p<0.05$ (Steel and Torrie, 1980) to check the significance of the results.

RESULTS AND DISCUSSION

Number of fruits per plant

The number of fruit per plant in various varieties ranged from (8 to 40) fruits/plant (Table 1). The variety Nagina had the maximum (40.87) number of fruits per plant trailed by Punjab Chuhara (27.58) and Ratan (26.29). The line CLN2026D produced lowest (4.33) number of fruits per plant. Feston and CLN2545A are statistically

similar while PT4664B and PT4719 have non significant difference among each other. Our results are similar to those of Rehman *et al.,* (2000) who found that variety Chico bore the highest number of fruits per plant while FMB9 and local check had the lowest number of fruits/plant. These results also resembled with those of Jaha and Krishi (2001) who documented that among 4 hybrid cultivars of tomato Avinash-II recorded the highest number of fruits per plant (69.07).

Fruit weight per plant (kg)

Data on fruit weight per plant revealed that cultivars Ratan and Punjab Chuhara with 1.28 kg and 1.40 kg fruit weight per plant was significantly higher yielder than other cultivars followed by Roma (0.87 kg) and Riogrande (0.95 kg) (Table 1). CLN2468BDC7 recorded bottommost fruit weight (0.21) trailed by CLN2026D (0.22) and CLN2468A (0.24). Fruit weight is linked with flower production and fruit setting. Our results are in accordance with those of Hamid *et al*., (2005) and Khan *et al*., (2001) who evaluated different tomato varieties and found variation in fruit weight per plant.

Fruit Diameter (cm)

The variety Avinash-II attained top most position among all varieties with 5.2 cm fruit diameter. The least fruit diameter was attained by the cultivars CLN1555A (Table 1). The varieties Feston and Punjab Chuhara attained second and third position with 4.86 cm and 4.32 cm fruit diameter which indicated that these three varieties behaved well in attaining the fruit size. Regarding the shape and size of fruit maximum width and length of fruit was recorded in cv. Nadir and Sorrento (Hussain *et al*., 2001). Similar results have been reported by Rehman *et al.*, (2000).

Length of fruit (cm)

Analysis of variance for fruit length revealed highly significant difference among cultivars of tomato evaluated (Table 2). Avinash-II, Punjab Chuhara and CLN2498D excelled other cultivars with 6.35, 5.4 and 4.49 fruit length respectively. Least fruit length (2.97) was recorded in CLN1555A, CLN2026D and Roma which are statistically at par followed by CLN2468BDC7 (3.99), PT4664B (3.93) and CLN2468A (4.00). Similar results have been reported by Hussain *et al.*, (2001).

Pericarp Thickness (mm)

Data related to pericarp thickness showed highly significant results (Table 1). Significantly higher thickness was found in Riogrande (0.72 mm) followed by Nagina (0.56 mm), Avinash-II (0.46 mm) and CLN2545B (0.46 mm). Cultivar Ratan gave minimum Pericarp thickness (0.20 mm) trailed by PT4664B (0.36 mm) and CLN2545A (0.38 mm). Pericarp thickness is a quality parameter of tomato fruit as a post-harvest handling is concerned in transportation. Hence, it could be an added advantage to have a thicker pericarp when selecting tomato varieties. These findings were in close conformity with Durvesh and Singh (2006), who reported that maximum pericarp thickness was recorded in Sonali (9.0 mm) and the minimum in DTH-6 (3.7 mm) and was related to firmness of the fruit.

Number of locules per fruit

Considerable variability was observed in the number of locules per fruit (Table 1). It was evident from the pooled data illustrated in Table 1 that the genotype Ratan recorded the maximum number of locules per fruit (5.67) which was at par with PT4664B (5.00), Roma (4.33). However, in genotype Nagina & Riogrande, minimum number of locules per fruit was 2.33 recorded showing non significant differences among each other. While the genotypes CLN2545A, PT4722A, CLN2468BDC7, CLN2468A and PT4722B exhibits similar results in respect to number of locule (3.00). Higher locule number increase fruit firmness and variation in the number of locules per fruit was reported by Sharma *et al*. (2009), who observed during evaluation of 48 genotypes of tomato that the range of number of locules per fruit was 2.0 to 6.0.

Yield (t/ha)

Considerable variability was observed for yield (t/ha) between the genotypes (Table 1). The pooled data of mean values of genotypes depicted in Table 1 revealed that Nagina possessed the maximum yield (6.19t/ha) followed by Punjab Chuhara (37.33t/ha), Ratan (34.04t/ha) and Riogrande (25.42t/ha). Minimum yield was produced by PT4722A (5.42t/ha) followed by CLN2468BDC7 (5.51t/ha), CLN2026D (5.91t/ha) and CLN2468A (6.40t/ha) and these genotypes are statistically at par. Genotypes that had maximum fruit weight per plant yielded the highest as shown in Table 1. Rida *et al*. (2002) reported that marketable yield ranged from 76.18 t /ha

(Riogrande) to 37.07 t/ha (Money maker) in thirteen open pollinated cultivars. These results agree with those of Hussain *et al*., (2001) who reported highest yield in those cultivars which had maximum fruit weight in case of Tanja, Chico-III and Riogrande.

Table 1. Evaluation of Tomato cultivars on basis of quality and yield parameter.

Genotypes	Number of fruits /plant	Fruit weight (Kg)	Length of fruits (cm)	Diameter of fruits (cm)
CLN 1555 A	13.2def	0.65bc	2.96f	2.73j
CLN 2026 D	4.33f	0.22e	3.07f	2.95ij
PT 4664 B	8.16def	0.716bc	3.93d	3.75def
PT 4719 A	8.06def	0.41cde	3.81de	3.65efg
CLN 2468 A	6.47ef	0.24e	4.00d	4.00cd
CLN 2468 BDC	6.80ef	0.21e	3.99d	3.85de
CLN 2498 D	13.38def	0.88b	4.48c	3.87de
CLN 2498 E	13.85def	0.62bcd	3.99d	3.61efg
CLN 2545 A	14.87cdef	0.47cde	3.41ef	2.94ij
CLN 2545 B	10.60def	0.30de	3.75de	3.46fgh
PT 4722 A	5.20f	0.20e	3.93d	3.66efg
PT 4722 B	9.37def	0.28de	3.86de	3.40gh
Ratan	26.29bc	1.27a	3.94d	4.01cd
Avinash-II	20.58bcd	0.93b	6.35a	5.20a
Nagina	40.87a	0.66bc	4.90c	4.03cd
Feston	15.62cdef	0.66bc	4.66c	4.86b
Punjab Chuhara	27.58b	1.40a	5.40b	4.32c
Riogrande	13.33def	0.95b	3.58de	3.17hi
Roma	18.37bcde	0.87b	3.05f	2.78j
CV Value	0.30	1.58	20	0.32
$LSD_{0.05}$	0.022	0.014	0.075	0.104

Genotypes	Number of locules/ fruit	Pericarp thickness (mm)	Yield (t/ha)
CLN 1555 A	3.67cd	0.36e	17.33def
CLN 2026 D	2.67de	0.40cd	5.91f
PT 4664 B	5.00ab	0.36e	16.44def
PT 4719 A	2.67de	0.41cde	10.84f
CLN 2468 A	3.00de	0.42cd	6.40f
CLN 2468 BDC7	3.00de	0.42cd	5.51f
CLN 2498 D	3.33cde	0.44cd	23.46cde
CLN 2498 E	3.33cde	0.43cd	16.71def
CLN 2545 A	3.00de	0.38de	12.62ef
CLN 2545 B	2.66de	0.46c	7.99f
PT 4722 A	3.00de	0.42cde	5.42f
PT 4722 B	3.00de	0.42cd	7.64f
Ratan	5.66a	0.21f	34.04bc
Avinash-II	3.33cde	0.46c	24.89cde
Nagina	2.33e	0.56b	61.95a
Feston	4.33be	0.38de	17.77def
Punjab Chuhara	2.66de	0.41cde	37.33b
Riogrande	2.33e	0.71a	25.42cd
Roma	4.33bc	0.39de	23.20cde
CV Value	0.77	4.31	0.29
$LSD_{0.05}$	0.061	0.045	0.186

Table 2. Analysis of Variance for different parameter of tomato cultivars.

Source of Variance	D.F	Number of fruits /plant	Fruit weight per plant (kg)	Length of fruit (cm)	Diameter of fruit (cm)	Number of locules	Pericarp Thickness (mm)	Yield (tons/ hectare)
Replication	2	0.005	0.006	0.001	0.019	0.10	0.001	0.008
Genotypes	18	0.864**	0.256**	0.0195NS	0.066*	1.267**	0.0195**	397.5**
Error	32	0.001	0.001	0.003	0.002	0.006	0.003	0.003

** Highly significant, *Significant, NS non significant

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