



## Evaluation of some quantitative and qualitative characteristics of 5 cultivars of tomato (*Lycopersicum esculentum*) grown in Hormozgan Province

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### Abstract

The goal of this investigation was to evaluate some qualitative and quantitative traits in fruits of five tomato (*Lycopersicum esculentum*) cultivars. These traits were vitamin C content, pH, total soluble solids (TSS), titrable acidity, fruit diameter, fruit volume, fruit firmness, fresh weight and dry weight. Studied cultivars were Matin F1, Yaghoot, Sunseed, Sadeen and Raha. The results showed that there were significant differences in evaluated parameters among cultivars. The highest contents of vitamin C (36.32 mg. 100 g<sup>-1</sup>), diameter (6.77 cm), volume (221.25 cm<sup>3</sup>), firmness (2.45 Kg. cm<sup>-2</sup>), fresh weight (194.29 g) and dry weight (11.3 g) were belonged to the cultivar Sunseed. The highest pH (4.3) and TSS (2.49 %) were belonged to the cultivars Yaghoot and Matin F1, respectively. The cultivar Yaghoot also showed the lowest contents of vitamin C (21.37 mg. 100 g<sup>-1</sup>), TSS ( 1.65 %), titrable acidity (0.274 %), diameter (5.3 cm), volume (158. 75 cm<sup>3</sup>), firmness (1.825 Kg. cm<sup>-2</sup>), fresh weight (102.55 g) and dry weight (6.19 g) in compare with other cultivars. Thus based on the results, the cultivar Sunseed can be as a valuable cultivar among other cultivars, because the highest contents of vitamin C, diameter, volume, firmness, fresh weight and dry weight were belonged to this cultivar. The findings of this study may provide suitable information about nutritional value of studied cultivars for food experts and other researchers.

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## Introduction

Tomato (*Lycopersicum esculentum*) belonging to Solanaceae is one of the most popular vegetables that widely is used worldwide (Aboutalebi *et al.*, 2012). This vegetable is a major source of vitamins such as B and C and also minerals such as P (Benton Jones 2008) and its World production in 2010 was around 146 million tons (Zahedi and Alemzadeh Ansari 2012).

Some breeding goals for tomato can be disease resistance, shelf life, nutritional quality and taste. Ascorbic acid (vitamin C) is an important antioxidant, therefore is as a protective against many of diseases produced by reactive oxygen such as superoxide (Ness and Powles, 1997). Cultivar selection is one of the critical decisions for economical production and introduction of superior cultivars for each region is very important because can save costs and avoid from wasting of soil and water resources. The cultivars with high firmness have better shelf life and high transportation ability and thus can be proper for exportation. Mivechi-Langroodi (2000) evaluated 15 tomato cultivars and introduced the cultivars Koral and Calji Hyb 579 for yield and fruit desirable traits. Mansour *et al.* (2009) also evaluated 11 tomato cultivars. Zahedi and Alemzadeh Ansari (2012) compared qualitative characters of 10 tomato genotypes in south of Iran. Gerrie and Victoria (2008) evaluated 16 tomato cultivars for earliness, yield and flavor.

Therefore in this study we compared some qualitative and quantitative traits of fruit in 5 tomato cultivars grown in Hormozgan province located in south of Iran. Superior cultivars can be used by user and agriculture researchers.

## Materials and methods

### *The study area*

In this study the fruits of five tomato (*Lycopersicum esculentum*) cultivars provided from Hormozgan province located in south of Iran.

### *Design of experiment*

This experiment was conducted in randomized completely design with 5 tomato cultivars and 4 replications.

### *Plant tissues analysis*

The cultivars were Matin F1, Yaghoot, Sunseed, Sadeen and Raha. All fruits harvested in maturity stage and the parameters vitamin C, pH, total soluble solids (TSS), titrable acidity, diameter, volume, firmness, fresh weight and dry weight were determined. Ascorbic acid also determined by CuSO<sub>4</sub> titration (Barakat *et al.*, 1973) and stated as mg.100 ml extract<sup>-1</sup>. Determination of pH and TSS were carried by pH meter and refractometer (Model AR10, Germany), respectively. Titrable acidity also determined by 0.1 N NaOH titration (Gould 1983). For determination of the diameter and fruit volume we used from caliper and water displacement technique, respectively. Firmness measured by a hand penetrometer. In order to determination of dry weight, the fruits located in oven at 70 °C to reached constant weight.

### *Statistical analysis*

Data analysis carried out by SPSS software and the means compared by Duncan's test.

## Results

### *Analysis of variance of studied parameters*

Results of variance analysis of evaluated parameters are shown in table 1. Based on the results, tomato cultivars had significant differences in the parameters vitamin C, pH, TSS, total acidity, fruit diameter, fresh and dry weight ( $P \leq 0.01$ ), and in the parameter firmness at 0.05 level, but there was not significant difference in case of fruit volume.

### *Comparison of cultivars in point of view of studied parameters*

Comparison of means of studied parameters are shown in table 2. The highest and the lowest amounts of vitamin C were obtained in the cultivars Sunseed (36.32 mg. 100 g<sup>-1</sup>) and Yaghoot (21.37 mg. 100 g<sup>-1</sup>) respectively. Cultivar of Sunseed had significant difference with other cultivars.

The highest and the lowest pH were found in Yaghoot (4.3) and Sadeen (3.95), respectively and both cultivars had significant difference with other cultivars. The highest and the lowest TSS were obtained in the cultivars Matin F1 (2.49 %) and Yaghoot (1.65 %), respectively. From the view point of total acidity was observed significant difference among all cultivars. The highest and the lowest total acidity were obtained in the cultivars Sadeen (0.518

%) and Yaghoot (0.274%), respectively. The highest contents of fruit diameter (6.77 cm), fruit volume (221.25 cm<sup>3</sup>), fruit firmness (2.45 Kg. cm<sup>-2</sup>), fresh weight (194.29 g) and dry weight (11.3 g) were belonged to the cultivar Sunseed. The Lowest mean of fruit diameter (5.3 cm), fruit volume (158.75 cm<sup>3</sup>), firmness (1.825 Kg. cm<sup>-2</sup>), fresh weight (102.55 g) and dry weight (6.19 g) also were obtained in Yaghoot cultivar.

**Table 1.** Analysis of variance of some parameters in 5 tomato cultivars.

Source of variation	df	Mean Square								
		Vitamin C	pH	TSS	Titration acidity	Fruit Diameter	Fruit Volume	Fruit Firmness	Fresh Weight	Dry Weight
Cultivar	4	141.454**	0.067**	0.476**	0.034**	1.331**	2786.25 <sup>ns</sup>	0.256*	4782.55**	16.01**

ns, \* and \*\* are insignificant, significant at 0.05 and 0.01 level, respectively.

## Discussion

The results showed that there were significant differences in measured parameters among studied cultivars. Based on the results, the cultivar Sunseed showed valuable properties compare to other cultivars, because the highest contents of vitamin C, diameter, volume, firmness, fresh weight and dry weight were belonged to this cultivar. Cultivar selection is one of the critical decisions for economical production and that is a dynamic process because some cultivars may be suitable of one region for many years but replaced by newer cultivars after a few years (McAvoy and Ozores-Hampton 2010). There are many reports about evaluation of tomato cultivars. Aboutalebi *et al* (2012) reported the highest contents of vitamin C in fruits of 16 tomato cultivars

was 41.36 mg. 100 g<sup>-1</sup> that was higher than maximum obtained from our research (36.32 mg. 100 g<sup>-1</sup>). The results of evaluation of Edalatian *et al.* (2005) on four tomato cultivars showed that the cultivars Early Orban 111 and Peto early CH had the highest TSS and acidity during one year storage in room condition. In the report of Aboutalebi *et al.* (2012) on 16 tomato cultivars, the lowest fruit juice pH was 4.17 that was higher than our report (3.95). They also reported the highest TSS and total acidity were 5.4% and 0.434 mg, respectively. These contents were higher than our report as shown table 2. In report of Mansour *et al.* (2009) the highest average of fresh weight of fruit recorded 100.64 g that was less than cultivar of Sunseed in our research (194.29 g).

**Table 2.** Comparison of some qualitative and quantitative traits among five tomato cultivars (*Lycopersicon esculentum*).

Cultivar	Vitamin C	pH	TSS (%)	Titration acidity (%)	Diameter (cm)	Volume (cm <sup>3</sup> )	Tightness (Kg. cm <sup>-2</sup> )	Fresh weight (g)	Dry weight (g)
Matin	23.97 c	4.2 b	2.49 a	0.348 c	5.72 b	168.75 a	2.25 ab	125.17 b	7.38 b
Yaghoot	21.37 d	4.3 a	1.65 c	0.274 d	5.3 b	158.75 a	1.82 c	102.55 b	6.19 b
Sunseed	36.32 a	4.12 c	2.37 a	2.37 a	6.77 a	221.25 a	2.45 a	194.29 a	11.3 a
Sadeen	22.94 cd	3.95 d	2.36 a	2.36 a	5.45 b	161.25 a	2.25 ab	125.7 b	6.8 b
Raha	26.29 b	4.17 bc	2.01 b	2.01 b	5.75 b	192.5 a	1.9 bc	144.52 b	7.99 b

Significant differences within the same column are indicated by different letters (P = 0.05, Duncan test).

## Conclusion

Thus based on the results, the cultivar Sunseed can be as a valuable cultivar among other cultivars, because

the highest contents of vitamin C, diameter, volume, firmness, fresh weight and dry weight were belonged to this cultivar. The cultivar Yaghoot also showed the

lowest vitamin C, titrable acidity, fruit diameter, fruit volume, fruit firmness, fresh weight and dry weight in compare with others. The findings of this study may provide suitable information about nutritional value of studied cultivars for food experts and other researchers.

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