

RESEARCH ON FRUITS QUALITY OF DIFFERENT TOMATO (*Lycopersicon esculentum* Mill.) CULTIVARS IN VIDRA AREA, ILFOV COUNTY

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Abstract

Under field conditions, during 2016, were studied 15 cultivars of tomatoes. When the fruit reached commercial maturity, the following quality indices were determined: water content and total dry substance (gravimetric method), soluble dry substance (refractometric method), titratable acidity (titrimetric method), total carbohydrates (Fehling Soxhlet method) and vitamin C (iodometric method). The best results on the quality of tomato fruits were obtained with the following cultivars: St. Pierre (7.33% total dry substance, 4.2% soluble dry substance, 0.67% acidity, 3.50% carbohydrate and 19.36 mg vitamin C), Caspar F1 (5.98% total dry substance, 3.8% soluble dry substance, 0.60% acidity, 3.20% carbohydrate and 21.12 mg vitamin C), Mirsini F1 (5.68% total dry substance, 4.0% soluble dry substance, 0.64% acidity, 3.30% carbohydrate and 21.12 mg vitamin C), Heintz (5.67% total dry substance, 3.7% soluble dry substance, 0.80% acidity, 3.10% carbohydrate and 24.64 mg vitamin C) and Darsirius (5.21% total dry substance, 3.9% soluble dry substance, 0.69% acidity, 3.20% carbohydrate and 19.36 mg vitamin C).

Key words: cultivars, fruits quality, total dry substance, vitamin C.

INTRODUCTION

In Romania, the tomatoes (*Lycopersicum esculentum* Mill.) are highly appreciated for their pleasant taste and nutrient content (Munteanu, 2003).

Tomato fruits are rich in water, which have a value of 93-94% (Maier, 1969).

According to Mitchell et al. (1991), the fruit water accumulation and fresh fruit yield is reduced by the deficit of irrigation, but was obtained higher concentrations of potassium, hexoses and citric acids. The irrigation with saline water has no influence on total fresh fruit, but the water content was slightly reduced.

Also, there was observed that the fruit diameter is strongly correlated with the water potential gradient of the fruit and stem (Johnson et al., 1992).

The total acidity is expressed in citric acid, and almost half from total acids are free acids.

Soluble sugars contribute to the freshness and pleasant taste of tomato (Munteanu, 2003).

Vitamins in tomato fruits are diverse, but not in very large quantities. In 100 grams fresh matter, there are 0.8-0.9 mg of vitamin A, 0.12-0.13 mg of vitamin B complex, 20-60 mg vitamin C and 0.10-0.25 mg vitamin PP (Stan et al., 2003).

Mandru et al. (2018) determined in laboratory conditions the biochemical composition of tomatoes fruits.

Also, Buzatu et al. (2018) determined in laboratory conditions the biochemical composition in different cultivars belonging to the *Solanaceae* family.

MATERIALS AND METHODS

During period of vegetation, were made observations and determinations on the beginning of flowering, on the formation of the first fruits, the colour of the immature and

mature fruits and the weight of the fruit (Table 1).

When the fruits reached commercial maturity, in laboratory conditions, the following quality indices were determined: water content and

total dry substance (gravimetric method), soluble dry substance (refractometric method), titratable acidity (titrimetric method), total carbohydrates (Fehling Soxhlet method) and vitamin C (iodometric method).

Table 1. Biometric observations on tomatoes cultivars (Vidra, 2016)

Variety/ hybrid	Beginning of flowering	Date of the formation of the first fruits	Color of the immature fruit	Color of the mature fruit	Weight fruit (g)
1. Kristinica	22.06	06.07	green sholder	intense red	90
2. Darsirius	06.07	20.07	green	dark red	74
3. Măriuca	07.07	22.07	green	red	120
4. Caspar F1	22.06	07.07	green	bright red	112
5. Romec 554 J	25.06	12.07	green	bright red	55
6. Chihlimbar	06.07	20.07	whitish	yellow-orange	145
7. Viorica	30.06	18.07	green sholder	dark red	69
8. Vipon	26.06	18.07	green sholder	intense red	71
9. Pontica 102	01.07	20.07	green sholder	intense red	94
10. Perfect Peel F1	20.06	04.07	green	bright red	57
11. Missouri	15.06	28.06	green sholder	dark red	92
12. Heintz	23.06	06.07	green	red	132
13. Marmande	22.06	07.07	green	red	158
14. St. Pierre	19.06	04.07	light green	red	185
15. Mirsini F1	15.06	27.06	green	red	210

RESULTS AND DISCUSSIONS

Climate conditions have influenced the quality of the fruits, especially the vitamin C (Table 2). In Table 3 is presented the biochemical composition of tomato fruits.

The chemical composition of tomato fruits is influenced by variety, by the weather conditions, by the crop technology, by the growing area and by the harvest method (Munteanu, 2003). Analyzing the data presented in the Table 3, it might be noticed an average water content of 94.71%, compared to 93-96% values mentioned in the literature.

The total dry matter content ranged between 7.33 for St. Pierre and 4.28% for Kristinica, the cultivars average being 5.29%.

The cultivars that exceeded the average were Caspar F1, Chihlimbar, Viorica, Heintz, Marmande, St. Pierre and Mirsini F1. The average of varieties and hybrids were 5.29%, compared to the average from the literature, 5.5%.

Due to abundant rainfall in August and September (Table 2), the soluble dry substance content ranged from to 4.2% to St. Pierre and

2.5% Pontica 102, with an average of 3.43%. The literature specify a quantity of dry matter soluble in tomatoes greater than 5.0%.

All cultivars studied had a lower content of soluble dry matter.

The acidity of tomato fruit, of Missouri variety, expressed in g of citric acid/100g of fresh substance, was 0.47%, being close to the value indicated in the literature 0.45 g citric acid/100 g s.p.

The highest value was recorded to the Pontica 102 variety (1.0 g citric acid/100 g s.p.), but also a low content of soluble dry substance (2.5%). Thus, the Missouri variety has the closest value (0.47 g citric acid/100 g s.p.).

The carbohydrate content was below the average indicated by the literature (3.8%).

The highest value was recorded in the St. Pierre (3.50%), and lowest value in the Pontica 102 (2.10%).

The rainfall from August and September also influenced this parameter.

The fruit content of vitamin C was between 16.72 mg/100 g of fresh substance (Chihlimbar variety) and 24.64 mg/100 g fresh substance

(Heintz variety), the average being 20.36 mg. The mean value in the literature is 24 mg. The cultivars Romec 554 J, Caspar F1, Vipon, Perfect Peel F1, Marmande and Mirsini F1 had higher values compared to the average.

Although it is a character of the variety, vitamin C content can be strongly influenced by climatic conditions (Lee & Kader, 2000). In Figures 1, 2, 3 and 4 are presented the fruits of the experimented cultivars.

Table 2. Climate data in the field (Vidra, 2016)

Month	Temperature (^o C)			Relative air humidity (%)			Rainfall (mm)
	minimum	maximum	medium	minimum	maximum	medium	
June	16.1	28.4	21.9	56.8	89.5	71.3	33.5
July	17.0	31.0	23.7	48.1	78.3	59.7	2.0
August	17.5	30.6	23.4	49.5	77.2	60.6	110.0
September	13.1	26.3	18.9	50.9	80.2	62.8	43.5

Table 3. The biochemical composition of tomato fruits (Vidra, 2016)

No.	Variety/hybrid	Water content (%)	Total dry substance (%)	Soluble dry substance (%)	Acidity (g citric acid at 100 g s.p.).	Carbohydrate (%)	Vitamin C (mg/100g s.p.)
1	KRISTINICA	95.72	4.28	3.4	0.72	2.80	18.48
2	DARSIRIUS	94.79	5.21	3.9	0.69	3.20	19.36
3	MĂRIUCA	95.71	4.29	3.5	0.55	2.90	20.24
4	CASPAR F1	94.02	5.98	3.8	0.60	3.20	21.12
5	ROMECS 554J	95.06	4.94	3.0	0.77	2.50	22.88
6	CHIHLIMBAR	94.27	5.73	3.6	0.93	3.00	16.72
7	VIORICA	94.30	5.70	3.4	0.54	2.80	20.24
8	VIPON	95.71	4.29	3.4	0.51	2.83	21.12
9	PONTICA 102	95.65	4.35	2.5	1.00	2.10	17.60
10	PERFECT PEEL F1	94.76	5.24	2.8	0.70	2.30	22.88
11	MISSOURI	95.09	4.91	3.0	0.47	2.49	18.48
12	HEINTZ	94.33	5.67	3.7	0.80	3.10	24.64
13	MARMANDE	94.20	5.80	3.2	0.77	2.70	21.12
14	ST. PIERRE	92.67	7.33	4.2	0.67	3.50	19.36
15	MIRSINI F1	94.32	5.68	4.0	0.64	3.30	21.12
Average		94.71	5.29	3.43	0.69	2.85	20.36
Values in the literature		93-96 (94.5)	4 – 7 (5.5)	5.0	0.45	3.8 (1.8-4.3)	24



Figure 1. Caspar F1 hybrid (original photo)



Figure 2. Heintz variety (original photo)



Figure 3. St. Pierre variety (original photo)



Figure 4. Mirsini F1 hybrid (original photo)

CONCLUSIONS

Values obtained at the water content of tomato fruits were in the limits stipulated in the literature, for all tested varieties and hybrids, the water content was an average of 94.71%, and in the literature it is in a range of 93- 96%. Under the climatic conditions of 2016, the most favourable values for fruits quality were obtained in the following cultivars:

- St. Pierre variety (7.33% total dry substance, 4.2% soluble dry substance, 0.67% acidity, 3.50% carbohydrate and 19.36 mg vitamin C);
- Caspar F1 hybrid (5.98% total dry substance, 3.8% soluble dry substance, 0.60% acidity, 3.20% carbohydrate and 21.12 mg vitamin C);
- Mirsini F1 hybrid (5.68% total dry substance, 4.0% soluble dry substance, 0.64% acidity, 3.30% carbohydrate and 21.12 mg vitamin C);
- Heintz variety (5.67% total dry substance, 3.7% soluble dry substance, 0.80% acidity, 3.10% carbohydrate and 24.64 mg vitamin C);
- Darsirius variety (5.21% total dry substance, 3.9% soluble dry substance, 0.69% acidity, 3.20% carbohydrate and 19.36 mg vitamin C);
- Romec 554 J variety and Heintz variety have high levels of vitamin C (24.64 mg) and the Perfect Peel F1 hybrid has recorded high vitamin C levels - 22.88 mg.

- The Pontica variety recorded the highest value of citric acid/100 g s.p. - 1.0 g and a lower content of soluble dry substance (2.5%), compared to the limits set in the literature.

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