

RESEARCHES CONCERNING THE BEHAVIOUR OF SOME CULTIVARS OF TOMATOES (*LYCOPERSICON ESCULENTUM* MILL.) IN VIDRA AREA, ILFOV COUNTY

Iuliana MÎNDRU¹, Marcel COSTACHE², Gabriela ȘOVĂREL², Ana-Emilia CENUȘĂ²,
Dorel HOZA¹, Stelica CRISTEA¹

¹University of Agronomic Sciences and Veterinary Medicine of Bucharest,
59 Marasti Blvd., District 1, Bucharest, Romania

²Research and Development Institute for Vegetable and Flower Growing Vidra,
22 Calea Bucharest St., Vidra, Ilfov, Romania

Corresponding author email: mandru_iuliana@yahoo.com

Abstract

During 2016, at the Research and Development Institute for Vegetable and Flower Growing Vidra, a monofactorial experiment was organized, placed in randomized blocks, with 15 experimental variants in 3 replications. The biological material used was constituted by 12 tomato varieties ('Kristinica', 'Darsirius', 'Măriuca', 'Romec' 554J, 'Chihlimbar', 'Viorica', 'Vipon', 'Pontica' 102, 'Missouri', 'Marmande', 'Heintz' and 'St. Pierre') and 3 hybrids ('Caspar' F1, 'Perfect Peel' F1 and 'Mirsini' F1). Under the climatic conditions of 2016, the fruits were attacked by pathogens: *Alternaria porri* f.sp. *solani*, *Phytophthora infestans* and *Phytophthora parasitica*. The frequency of fruits attacked by the mentioned pathogens ranged from 6.2% in the 'Mirsini' F1 hybrid and 27.0% in the 'Heintz' variety. The highest yield was recorded at the hybrids 'Perfect Peel' F1 (5.87 kg/sq. m), 'Caspar' F1 (5.85 kg/sq. m) and the varieties 'Pontica' 102 (5.66 kg/sq. m), 'Missouri' (5.29 kg/sq. m), 'Viorica' (5.24 kg/sq. m).

Key words: cultivars, pathogens, yield.

INTRODUCTION

In field tomato crops (Mandru et al., 2017; 2018) during the vegetation period, the following pathogens may appear on the foliage *Xanthomonas campestris* pv. *vesicatoria*, *Pseudomonas syringae* pv. *tomato*, *Alternaria porri* f. sp. *solani*, *Fulvia fulva*, *Phytophthora infestans* and *Phytophthora parasitica*, *Alternaria porri* f. sp. *solani*, *Colletotrichum coccodes* on the fruits.

Researches on the attack of pathogens *Botrytis cinerea*, *Alternaria porri* f. sp. *solani* were also carried out by the Buzatu et al. (2017) on eggplant crop.

Also, tomato diseases have been reported by Docea et al. (2012).

Drenth et al. (1993) studied the genotypic diversity of *Phytophthora infestans*, the first damage was recorded in potato crop.

In Romania was identified on tomatoes by Tr. Săvulescu et al., in 1940 (Velichi, 2012).

After Meng et al. (2014), *Phytophthora parasitica* is a soil born pathogen with a wide range of host plants that cause damage to crops.

The attack occurs both in the field and in protected areas.

MATERIALS AND METHODS

During 2016, at the Research and Development Institute for Vegetable and Flower Growing Vidra, a monofactorial experience was organized, placed in randomized blocks with 15 experimental variants in 3 replications.

The biological material used was constituted by 12 varieties ('Kristinica', 'Darsirius', 'Măriuca', 'Romec' 554J, 'Chihlimbar', 'Viorica', 'Vipon', 'Pontica' 102, 'Missouri', 'Marmande', 'Heintz' and 'St. Pierre') and 3 hybrids ('Caspar' F1, 'Perfect Peel' F1 and 'Mirsini' F1).

In Table 1 we present data about the cultivars that was used in the experience: variety/hybrid, group of earliness, fruit shape, fruit color, fruit weight, destination of yield, resistance/tolerance to pathogens.

The yield on variants and replications was recorded, the data obtained being processed with the ANOVA program.

Table 1. Description of the cultivars used in the experience (authors description) (Vidra, 2016)

Variety/hybrid	Group of earliness	Fruit shape	Fruit Colour	Fruit weight (g)	Destination of yield	Resistance/tolerance
1. 'Kristinica'	early (95 days)	round	intense red	100	industry and fresh consumption	Fol; Vd; Pi; Pst
2. 'Darsirius'	midseason (100-120 days)	pear-shaped	dark red	80	industry and fresh consumption	Fol; Vd; TMV
3. 'Măriuca'	mediumlate (130 days)	ovoid	dark red (intense)	120-150	fresh consumption	Fol; Pst; TMV; TSWV
4. 'Caspar' F1	early (110-115 days)	elongate	bright red	90-120	industry and fresh consumption	Fol; Vd
5. 'Romec' 554 J	mediumlate (120-125 days)	ovoid	bright red	50-60	industry and fresh consumption	Vd; Pst
6. 'Chihlimbar'	early (105-110 days)	round	orange yellow	185	fresh consumption	Pst
7. 'Viorica'	mediumlate (126 days)	round-ovoid	dark red	55-75	industry	As
8. 'Vipon'	midseason (110-112days)	ovoid	dark red	70-80	industry	Pst
9. 'Pontica' 102	mediumlate (110-120 days)	spherical-flattened	dark red	90-150	industry and fresh consumption	Vd; Pst
10. 'Perfect Peel' F1	early (110-115 days)	oval	dark red	55-65	industry	Fol; Vd; Sbl; As
11. 'Missouri'	early (75-80 days)	oval elongated	dark red	90-110	industry	Fol; Vd
12. 'Heintz'	midseason (110-115 days)	round	Red	120-150	industry and fresh consumption	Fol; Vd; TSWV
13. 'Marmade'	early (95 zile)	round costly	Red	150-180	fresh consumption	Fol
14. 'St. Pierre'	early (75-90 days)	round	Red	180-200	fresh consumption	Fol; Vd
15. 'Mirsini' F1	very early (64 days)	globular	bright red	210-230	fresh consumption	Fol; Vd; Sbl; Ff; TYLCV

Legend: TMV (*Tabacco mosaic virus*), TSWV (*Tomato spotted wilt virus*), As (*Alternaria solani*), Ff (*Fulvia fulva*), Fol (*Fusarium oxysporum* f. sp. *lycopersici*), Pi (*Phytophthora infestans*), Sbl (*Stemphylium botryosum* f. sp. *lycopersici*), Vd (*Verticillium dahliae*) (<https://www.worldseed.org/>).

RESULTS AND DISCUSSIONS

In Table 2 are presented the climatic data recorded in the Vidra area, in 2016 and in Table 3 the environmental factors which are favorable for the attack of pathogens on tomato crops.

For the attack evolution of pathogens, the abiotic factors (Mardare et al., 2015) have an important role (temperature, relative air humidity and rainfall mm).

Due to climatic conditions on eggplant crops was manifested the attack of *Alternaria porri* f. sp. *solani* and *Phytophthora parasitica* (Buzatu et al., 2018).

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

Month	Temperature ($^{\circ}$ 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. Environmental factors that are favorable for the appearance the attack of pathogens in tomato crops (Costache et al., 2018)

Pathogens	Conditions of manifestation		
	Temperature ($^{\circ}$ C)	Relative air humidity (%)	Water on foliage
<i>Alternaria porri</i> f. sp. <i>solani</i>	25-28	>95	+
<i>Phytophthora infestans</i>	15-18	100	+
<i>Phytophthora parasitica</i>	20-25	-	water film

Under the climatic conditions of 2016 year, the tomato fruits was attacked by pathogens *Alternaria porri* f. sp. *solani*, *Phytophthora infestans* and *Phytophthora parasitica* (Table 4).

The frequency of attacked fruits on the studied varieties and hybrids, was between 1.8% for ‘Mirsini’ F1 hybrid and 8.3% for ‘Chihlimbar’ variety, for the pathogen *Alternaria porri* f.sp. *solani*. The frequency of attacking fruits for

Phytophthora infestans pathogen, ranged between 0.3% for ‘Mirsini’ F1 hybrid and 2.7% for ‘Pontica’ 102 variety.

For *Phytophthora parasitica* pathogen the attack on fruits was between 4.1% for ‘Mirsini’ F1 and 20,4% for Haintz variety.

The total frequency of the attacked fruits was between 6.2% for ‘Mirsini’ F1 hybrid and 27.0% for Haintz variety.

Table 4. Frequency of attacked fruit (FA%) on the experimental cultivars (Vidra, 2016)

Variety/hybrid	Frequency of attacked fruit (%)			
	<i>Alternaria porri</i> f. sp. <i>solani</i>	<i>Phytophthora infestans</i>	<i>Phytophthora parasitica</i>	Total frequency of the attack (%)
1. ‘Kristinica’	4.7	1.7	8.1	14.5
2. ‘Darsirius’	2.7	0.7	17.9	21.3
3. ‘Măriuca’	5.3	1.3	8.5	15.1
4. ‘Caspar’ F1	6.3	0.3	14.8	21.4
5. ‘Romec’ 554 J	6.7	0.7	19.3	26.7
6. ‘Chihlimbar’	8.3	1.3	6.9	16.5
7. ‘Viorica’	4.7	0.9	15.1	20.7
8. ‘Vipon’	4.3	1.3	11.8	17.4
9. ‘Pontica’ 102	7.7	2.7	11.3	21.7
10. ‘Perfect Peel’ F1	5.7	1.6	12.3	19.6
11. ‘Missouri’	5.3	1.3	9.2	15.8
12. ‘Heintz’	5.3	1.3	20.4	27.0
13. ‘Marmande’	2.5	0.9	11.2	14.2
14. ‘St. Pierre’	2.7	1.7	10.2	14.6
15. ‘Mirsini’ F1	1.8	0.3	4.1	6.2
Avarage	4.9	1.2	12.1	18.2

In the Table 5 are presented the yield data obtained at the varieties and hybrids studied. It can be seen that the highest yield was obtained at ‘Perfect Peel’ F1 hybrids (5.87 kg/sq. m) and ‘Caspar’ F1 (5.85 kg/sq. m). By the varieties were ‘Pontica’ 102 (5.66 kg/sq. m), ‘Missouri’ (5.29 kg/sq. m) and ‘Viorica’ (5.24 kg/sq. m) in comparison with varieties

‘Kristinica’, ‘Darsirius’, ‘Măriuca’, ‘Romec’ 554 J, ‘Chihlimbar’, ‘Vipon’, ‘Heintz’, ‘Marmande’ and ‘St. Pierre’, where yield ranged between 4.02 kg/sq. m to 4.92 kg/sq. m. The average yield of cultivars was 4.93 kg/sq. m. In the Figures 1 and 2 are presented aspects from the experience.

Table 5. Yield obtained from the tomatoes cultivars (Vidra, 2016)

Variety/hybrid	Yield		Difference from the average (kg/sq. m)	Signification
	kg/sq. m	relative yield %		
1. ‘Kristinica’	4.73	95.9	-0.20	-
2. ‘Darsirius’	4.76	96.5	-0.17	-
3. ‘Măriuca’	4.92	99.67	-0.01	-
4. ‘Caspar’ F1	5.85	118.7	+0.92	***
5. ‘Romec’ 554 J	4.92	99.8	-0.01	-
6. ‘Chihlimbar’	3.71	75.2	-1.22	-
7. ‘Viorica’	5.24	106.3	+0.31	***
8. ‘Vipon’	4.81	97.5	-0.12	-
9. ‘Pontica’ 102	5.66	114.8	+0.73	***
10. ‘Perfect Peel’ F1	5.87	119.0	+0.94	***

11. 'Missouri'	5.29	107.3	+0.36	***
12. 'Heintz'	4.59	93.1	-0.34	-
13. 'Marmande'	4.37	88.6	-0.56	-
14. 'St. Pierre'	4.02	81.5	-0.91	-
15. 'Mirsini' F1	5.24	106.2	+0.31	**
Avarage of cultivars	4.93	-	-	-
LD 5% = 0.175; LD 1% = 0.234; LD 0.1% = 0.306				



Figure 1. 'Măriuca' variety (original photo)



Figure 2. 'Caspar' F1 hybrid (original photo)

CONCLUSIONS

In the climatic conditions of 2016 year, on the fruits, at the tested cultivars was presented the attack of pathogens *Alternaria porri* f. sp. *solani* (early blight), *Phytophthora infestans* (late blight) and *Phytophthora parasitica* (fruit rot). The total frequency of fruit attacked fruits by mentioned pathogens, on the cultivars studied, was between 6.2% for the 'Mirsini' F1 hybrid and 27.0% for the 'Heintz' variety. From the yield point of view, was mentioned 'Perfect Peel' F1 (5.87 kg/sq. m) and 'Caspar' F1 hybrids (5.85 kg/sq. m), the varieties 'Pontica' 102 (5.66 kg/sq. m), 'Missouri' (5.29 kg/sq. m) and 'Viorica' (5.24 kg/sq. m).

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