THE STUDY IN THE SEEDLING STAGE OF TOMATO VARIETIES CULTIVATED IN ORGANIC AGRICULTURE

STUDIUL ÎN FAZA DE RĂSAD A UNOR SOIURI DE TOMATE CULTIVATE ÎN AGRICULTURĂ ECOLOGICĂ

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Abstract. *The study was performed in Vegetable Research-Development Station Bacau - Romania, during 2015 – 2016 in order to evaluate the tomato varieties resistance at soil-borne diseases attack in seedling stage. The following tomatoes cultivars were cultivated in protected area - variants V2 – Ghittia, V3 – Monymaker, V4 – Ruxandra, V6 - Inima de bou, V8 – Bobalna, V10 – LMV, V12 – TFC had a degree attack (GA%) below 1.5 %. Other tomatoes cultivars V1 - Brandywine black, V2 - Brandywine black real, V3 - Brandywine black red, V5 – Delicios, V6 - Delicios de Podis, V8 - Indigo 'Sun', V9 – Omar's Lebanese, V10 - Pantene Romanesco, V11 – Thesaloniki, V14 – Vilma were tolerant at the soil borne diseases.*
Key words: tomato, soil-borne diseases, seedling

Rezumat. *În perioada 2015 – 2016, la SCDL Bacău a fost studiată rezistența/toleranța la atacul patogenilor de sol, la diferite cultivaruri de tomate în faza de răsad, cultivat în agricultură ecologică în solar: V2 – Ghittia, V3 – Monymaker, V4 – Ruxandra, V6 - Inima de bou, V8 – Bobalna, V10 – LMV, V12 – TFC au avut un grad de atac (GA%) sub 1,5%. Alte soiuri de tomate: V1 - Brandywine black, V2 - Brandywine black real, V3 - Brandywine black red, V5 – Delicios, V6 - Delicios de Podis, V8 - Indigo 'Sun', V9 – Omar's Lebanese, V10 - Pantene Romanesco, V11 – Thesaloniki, V14 – Vilma au fost tolerante la atacul patogenilor de sol.*
Cuvinte cheie: tomate, patogeni de sol, răsad

INTRODUCTION

Important diseases that have occurred in seedling stage of tomato include: *Pythium debaryanum* (Hesse), *Rhizoctonia solani (*Kühn), *Fusarium* spp., *Phytophthora parasitica* (Dast.), Calin, 2015.

The plants wilt and die suddenly, sometimes before emerging from the soil (preemergence damping-off) and sometimes after emerging from the soil (post

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emergence damping-off). Symptoms can include root rot, stem lesions, and general seedling wilt.

Soilborne pathogens often survive for long periods on host plant debris, soil organic matter, or as free-living organisms.

Each vegetable crop may be susceptible to several pathogens. Many soil factors including soil type, texture, pH, moisture, temperature, nutrient levels and ecology affect the activity of soilborne pathogens. Soil-borne pathogens such as *Pythium* and *Phytophthora,* often called water molds, can be particularly destructive if the soil is kept too wet for a long period of time. Although temperature is important, different species of these so-called water molds can infect at different temperatures. *Pythium* is the most common water mold pathogen found on diseased vegetable seedlings and is often associated with excessive nutrition or ammonium toxicity. Damping-off caused by the water molds is less likely to occur during warm dry springs.

The best practice for minimizing the incidence of disease in organic vegetable crops is planting high quality disease-resistant cultivars (Calin, 2015) and other disease management control practices (Baysal *et al*., 2008; Cao *et al.,* 2010; Diab *et al.,* 2003; Jeanine Davis *et al*., 2007; Klein *et al.,* 2011; McKellar and Nelson, 2003). This is even more important, because the number of resistant varieties available to grower increases and the fungicide resistance continues to challenge effective control with permitted fungicide in organic gardening.

The purpose of researches in this paper is the establishment the differences in susceptibility of tomato cultivars at soil-borne diseases for reducing the number of treatments and getting a quality seedling tomatoes grown in organic farming.

MATERIAL AND METHOD

During 2015 – 2016 years, greenhouse experiments were performed in Vegetable Research-Development Station Bacau - Romania, in order to evaluate the behavior of tomato plant cultivars in the seedling stage, to the soil-borne diseases attack.

The trial in tomato seedling were performed at the following cultivars:

- tomatoes in protected area: V1 - Saint Pierre, V2 - Ghittia, V3 - Monymaker, V4 - Ruxandra, V5 - Buzau 1600, V6 - Inima de bou, V7 – Siberian, V8 – Bobalna, V9 – Roman, V10 – LMV, V11 – TN, V12 – TFC, V13 - Prekos F2, V14 - Cherry Bacau;

- tomatoes in protected area – world cultivars: V1 - Brandywine black , V2 - Brandywine black real, V3 - Brandywine black red, V4 - Carbon Neamt, V5 – Delicios, V6 - Delicios de Podis, V7 - Indigo Apple tomato, V8 - Indigo ‘Sun’, V9 – Omar’s Lebanese, V10 - Pantene Romanesco, V11 – Thesaloniki, V12 - Timny Tim, V13 – LM, V14 – Vilma.

The cultivars were sown in the greenhouse on March. At 3 – 6 days after emergence, the young plants were transplanted in cell plastic trays. No preventive chemicals treatments were applied, in order to encourage the development of the natural diseases.

Ratings were based on Pathogenically Rating Scale 0-5 (0 is no disease, 5 is terminally infected). The plants were visually evaluated. The following scale was used:

1 No spots and lesions,

2 1 - 3 spots or lesions present on stem or leaves,
3 4 - 8 spots present on stem, leaves and bracts,
4 Lesions and spots present on stem, bracts, leaves, flowers and stems,
5 Collapse of plant.

The observations were accomplished every 10 days, during a 30 days period, after plantation of young vegetable plants in cell plastic trays.

The attack estimation was determined using the following indicators: frequency of attack (F%), intensity of attack (I%), degree of attack (DA%).

The results obtained will be use in organic agriculture in order to decrease the number of diseases treatments in the organic agriculture practices of vegetable.

RESULTS AND DISCUSSIONS

The suitability of tomato cultivars in organic farming is presented in table 1.

Table 1

The behavior of some cultivars of tomato cultivated in organic farming at seedling stage

Cultivar	Attack			Health plants (%)	Comments
	Frequency (F%)	Intensity (I%)	Degree of attack (DA%)		
1	2	3	4	5	6
Tomatoes in protected area					
Saint Pierre	8.2	100	8.2*	91.8	*Ability for organic agriculture*
Ghittia	0	0	0***	100	*Very good ability for organic agriculture*
Monymaker	0	0	0***	100	*Very good ability for organic agriculture*
Ruxandra	0	0	0***	100	*Very good ability for organic agriculture*
Buzau 1600	4.5	100	4.5**	95.5	*Good ability for organic agriculture*
Inima de bou	0	0	0***	100	*Very good ability for organic agriculture*
Siberian	5.3	100	5.3**	94.7	*Good ability for organic agriculture*
Bobalna	0	0	0***	100	*Very good ability for organic agriculture*
Roman	2.2	100	2.2**	97.8	*Good ability for organic agriculture*
LMV	0	0	0***	100	*Very good ability for organic agriculture*
TN	11.1	100	11.1	88.9	-

1	2	3	4	5	6
TFC	1.1	100	1.1***	98.9	*Very good ability for organic agriculture*
Prekos F2	1.8	100	1.8**	98.2	*Good ability for organic agriculture*
Cherry Bacau	2.7	100	2.7**	97.3	*Very good ability for organic agriculture*
Tomatoes in protected area – world cultivars					
Brandywine black	0	0	0***	100	*Very good ability for organic agriculture*
Brandywine black real	0	0	0***	100	*Very good ability for organic agriculture*
Brandywine black red	0	0	0***	100	*Very good ability for organic agriculture*
Carbon Neamt	20	100	20	80	-
Delicios	0	0	0***	100	*Very good ability for organic agriculture*
Delicios de Podis	0	0	0***	100	*Very good ability for organic agriculture*
Indigo Apple tomato	25	0	25	75	-
Indigo 'Sun'	0	0	0***	100	*Very good ability for organic agriculture*
Omar's Lebanese	0	0	0***	100	*Very good ability for organic agriculture*
Pantene Romanesco	0	0	0***	100	*Very good ability for organic agriculture*
Thesaloniki	0	0	0***	100	*Very good ability for organic agriculture*
Timny Tim	25	100	25	75	-
LM	33.3	100	33.3	66.7	-
Vilma	0	0	0***	100	*Very good ability for organic agriculture*
Control					

LSD 5% - 1.5
LSD 1% - 7.2
LSD 0.1% - 9.4

Tomatoes in protected area

The results regarding the degree of attack (DA%) was:

- Under 1.5% at: Ghittia, Monymaker, Ruxandra, Inima de bou, Bobalna, LMV, TFC. They are distinguished by a very good suitability in organic farming in the seedling stage (fig. 1).
- Under 5.5% at: V5 Buzau 1600, V7 Siberian, V13 Prekos F2, V14 Cherry Bacau with good suitability in organic agriculture.
- Cultivars: Saint Pierre and TN were sensible at pathogen attack. The recommendations of cultivation methods for these cultivars are that disease control practices in seedling stage should be used.

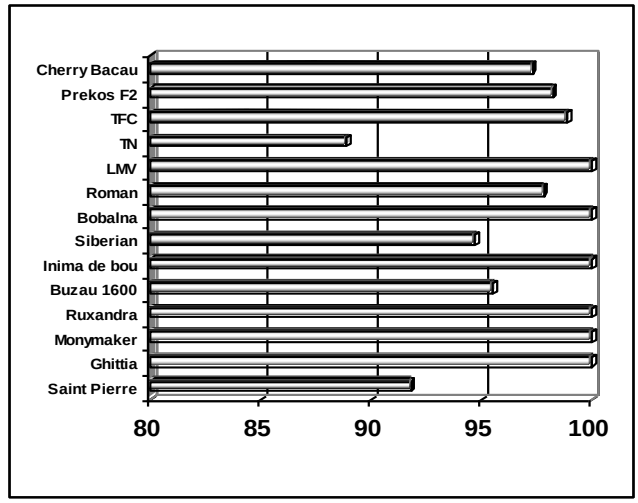

Fig. 1 The suitability of tomato cultivars in protected area at organic farming

Tomatoes in protected area – world cultivars

The data obtained show a very good suitability at organic agriculture in seedling stage for: Brandywine black, Brandywine black real, Brandywine black red, Delicios, Delicios de Podis, Indigo 'Sun', Omar's Lebanese, Pantene Romanesco, Thesaloniki, Vilma (fig. 2). The cultivars: Carbon Neamt (Degree attack – DA% – 20%), Indigo Apple tomato (DA - 25%), Timny Tim (DA – 25%), LM (DA – 33.3%) were sensible at soil borne deseases.

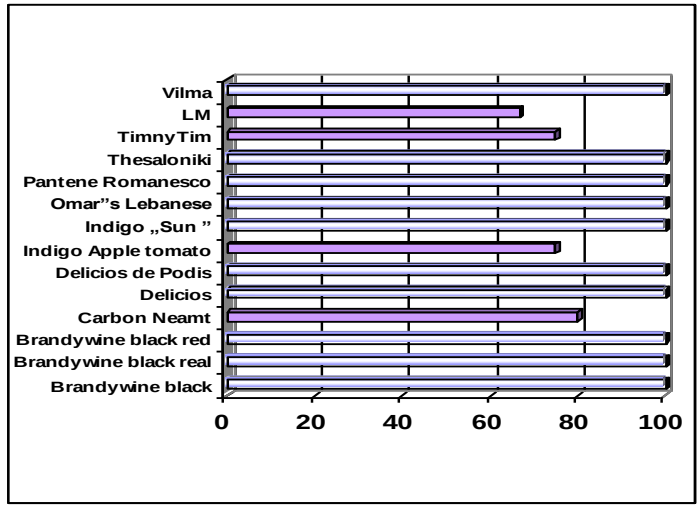

Fig. 2 The suitability of tomato cultivars in protected area - woeld cultivars at organic farming

CONCLUSIONS

Tomatoes in protected area

The attack of soil borne diseases degree was:

- Under 1.5% at: Ghittia, Monymaker, Ruxandra, Inima de bou, Bobalna, LMV, TFC. They are distinguished by a very good suitability in organic farming in the seedling stage.
- Under 5.5% at: V5 Buzau 1600, V7 Siberian, V13 Prekos F2, V14 Cherry Bacau with good suitability in organic agriculture.

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- **Tomatoes in protected area – world cultivars**

The cultivars: Brandywine black, Brandywine black real, Brandywine black red, Delicios, Delicios de Podis, Indigo 'Sun', Omar's Lebanese, Pantene Romanesco, Thesaloniki, Vilma had very good suitability at organic agriculture in seedling stage. The cultivars: Carbon Neamt (DA% – 20%), Indigo Apple tomato (DA - 25%), Timny Tim (DA – 25%), LM (DA – 33.3%) were sensible at soil borne diseases.

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