

THE DYNAMICS OF THE OCCURRENCE OF SOME SPECIFIC PATHOGENIC AGENTS' ATTACK AT TOMATOES, IN THE 2015 PEDOCLIMATIC CONDITIONS OF NORTH-EASTERN BARAGAN (BRAILA COUNTY)

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Abstract

An experiment was set up with different cultivars of tomatoes in 2015 - 5 variants (4 hybrids and one variety). Those cultivars were: V1 - Ace 55 VF (control sample), V2 -SV52215 TD F1, V3 -Chelse F1, V4 - Rosaliesa F1, V5 - Mirsini F1. The experiments had as purpose monitoring the occurrence and evolution of the attack of some specific pathogenic agents at tomatoes, in the conditions of a droughty year. Also, it was monitored the correlation between the attack degree (G.A.%) of the mentioned pathogenic agents, production and the quality of the production. The experiment was placed in randomized blocks, with strict compliance to the experimental technique requirements. During the vegetation period, symptoms produced by viroses had appeared differentially at each experimental variant. Remotely, there were signalled also clear symptoms produced by stolbur (*Mycoplasma*). Other diseases, like those produced by the attack of some bacteria species (for example, *Xanthomonas campestris* p.v. *vesicatoria*) or fungi (for example, *Phytophthora infestans*, *Colletotrichum coccodes* etc) have manifested in the tomatoes crop, but without raising any issues. Production's harvesting was done in stages. Among the results of the production, achieved variant wise, differences insured statistically had been obtained. In the climatic conditions of the year 2015, the most productive cultivar was Mirsini F1. The control sample variety Ace 55 VF has proved to be the least attacked by viroses, but also which achieved the smallest production.

Key words: tomatoes, viruses, mycoplasma, randomized block, *Phytophthora*

The tomatoes (*Lycopersicon esculentum*) are attacked during hot and droughty years by a series of dangerous pathogenic agents, such as: viruses – for example, tomatoes' spotted wilting virus - *Tomato Spotted Wilt Virus*, cucumbers' mosaic virus – *Cucumber Mosaic Virus* which produce the "fern leaves" disease at tomatoes and organisms of mycoplasma type which produce the disease known under the name of stolbur at tomatoes

(Iacob Viorica, Hatman, M., Ulea, E., Puiu, I. 2000). During droughty and hot years, in the Northern Baragan area, the mentioned pathogenic agents are the most damaging ones, especially at sensitive tomatoes cultivars. In 2015, these pathogenic agents have produced damages at the tomatoes cultivated into the field and at the tomatoes cultivated in solaria.

Table 1

Frequency (F.%), intensity (I.%) and the attack degree (G.A.%) of viroses on the tomatoes cultivars which were the subject of the experiment from 2015.

Variant (cultivar)	F. %	I. %	G.A. % = F% x I% / 100
V1-Ace 55 VF(Mt.)	20.7	11.2	2.3
V2-SV52215 TD F1	56.7	16.7	9.5
V3- Chelse F1	53.4	14.8	7.9
V4- Rosaliesa F1	60.7	20.5	12.4
V5-Mirsini F1	60.7	20.5	12.4

Table 2

Results of the tomato crop experiment set up with 1 variety and 4 hybrids

Variant (cultivar)	G.A. %	Prod. t/ha	Relative Prod. %	Dif. against mt.(t/ha)	Significance
V1-Ace 55 VF(Mt.)	2.3	40.7	100.0	-	
V2- SV52215 TD F1	9.5	65.3	160.4	24.6---	X
V3-Chelse F1	7.9	71.6	175.9	30.9-	X
V4- Rosaliesa F1	12.4	68.6	168.6	27.9	X
V5-Mirsini F1	12.4	74.1	182.1	33.4	XX

$Sx^2 = 9.51$

DL 5% = $2.31 \times = 21.97$ t/ha

DL 1% = $3.36 \times 9.51 = 31.90$ t/ha/



Figure 1 Tomatoes experiment set up in Albina locality
(5 variants placed in 3 repetitions – randomized blocks) on the date of July 4th, 2015

MATERIAL AND METHOD

The experiment was placed in Albina locality – Tichilești parish. The locality is situated in the north-eastern part of Braila county, respectively in the north-eastern part of Baragan Plain. The soil is of vermic chernozem type, with medium texture. The climate is characterized through hot and dry springs and summers. The winters are cold and also, poor in rain.

The scope of the experiment was to identify some varieties or hybrids which would present resistance or tolerance to the attack of some diseases, especially to viroses and mycoplasmoses. These diseases have been the most damaging to tomatoes – onto the field, for many years. It is well known the fact that, up to present, the above mentioned diseases cannot be fought against in what concerns the plants, in production conditions, through curative methods.

This experiment was set up through seedling planting, with 5 tomato cultivars, 1 variety (Ace 55 VF) and 4 hybrids (SV52215 TD F1, Chelse F1, Rosalies F1 and Mirsini F1). The control sample selected was Ace 55 VF variety, an older variety. The planting was done on May 17th 2015. The distance used between rows was of 1 m, while between plants on one row of 25 cm. The lane between repetitions was of 50 cm. During the period of vegetation, the crop was maintained according to the technology specific to field tomatoes, with determined behaviour. The irrigation of the experiment was done by dripping. Fighting against weeds was performed only through manual hoeing. Fighting against the diseases which are not subject to this study, such as: leaves spotting and fruit blistering produced by *X. campestris* pv. *vesicatoria* bacteria or the blight produced by *Ph. Infestans* fungus, was done by applying treatments with fungicide homologated chemical products, such

as: Funguran OH WP – 0,2% and Dithane M45– 0,2%. At each treatment, an insecticide product was also added into the fungicide solution (Novadim Progress – 0.2%, Coragen - 150 ml/ha), for preventing the fructifications caterpillar's attack - *Helicoverpa armigera*, which, in the respective area, produces high damages at tomatoes and pepper.

The way of setting up the experiment was the randomised block. Those 5 variants were placed in 3 repetitions. Interpreting the differences was done through the method of limit differences (DL 5%, DL 1%). (Săulescu N. 1967).

The surface of an experimental plot was of 6 m², and the number of plants/experimental plot was of 25.

The harvesting was done in stages, separately on each experimental plot.

The attack degree (G.A. %) of the attack of the pathogenic agents mentioned was calculated through the previous calculation of the frequency (F.%) and of the intensity (I.%) of the attack. It was worked with entire plants, at which the percentage of being affected by the symptoms produced by viroses, sometimes by mycoplasmoses was monitored. The number of entire plants, observed on each experimental plot was 10. Each plant observed received grades from 0 to 6, proportional to the affecting percentage, in order to find the value of the attack's intensity. For example, grade 0 corresponds to 0% attack symptoms, grade 1 to 1 - 3% attack symptoms, grade 2 to 4 - 10% attack symptoms, grade 3 to 11 - 25% attack symptoms, grade 4 to 26 - 50% attack symptoms, grade 5 to 50 - 75% attack symptoms and grade 6 to 75 - 100% attack symptoms etc. G.A.% value was obtained with the relation $G.A.\% = F \times I / 100$. (M.A.I.A – Methods of Prognosis and Warning, 1980).

RESULTS AND DISCUSSIONS

The first symptoms of the diseases that are subject of this study had manifested starting with the date of June 25th, at Mirsini F1 hybrid. It followed then the SV52215 TD F1 hybrid (July 1st), Rosaliesa F1 and Chelse F1 hybrids (July 6th) and finally, Ace 55 VF variety (July 11th). These symptoms appeared under the form of some discolouring of the leaves, accompanied by slight cockling and curling of leaves' foliolium. Also, foliolium atrophy symptoms ("fern leaves") had occurred. Remotely, the symptoms evolved also towards violet colouring of the foliolium. Also, remotely, clear symptoms produced by stolbur (*Mycoplasma*) also appeared at all 5 cultivars studied, under the form of some green colouring of the petals (virescens) (Velichi E. 2012). The symptoms had constantly evolved during July and up to the middle of August, up to the date of August 13th. The viroses attack degree was smaller at the control sample (Ace 55 VF variety) as against all hybrids experimented: SV52215 TD F1, Chelse F1, Rosaliesa F1, Mirsini F1 (*table 1*). After the date of August 20th 2015, the evolution of the symptoms of the respective diseases has known a relative standstill. SV52215 TD F1, Chelse F1 and Rosaliesa F1 hybrids have achieved a production significantly higher than the control sample (Ace 55 VF). Mirsini F1 hybrid has clearly achieved a production distinctly higher than the control sample (Ace 55 VF) (*table 2*).

It must be observed also the fact that, in the second half of June and in the first half of July there was a strong attack of aphids (Order: *Homoptera*) and thrips (Order: *Thysanoptera*). These bugs are known as being the main vectors of spreading some dangerous viruses species, such as *Cucumber Mosaic Virus*, which produces the "fern leaves" disease at tomatoes, or *Tomato Spotted Wilt Virus* which produces the spotted wilting at tomatoes (quarantine disease).

CONCLUSIONS

The climatic conditions of the year 2015 have proved to be difficult ones for the vegetable crops from the field. Accordingly, starting with May, the temperatures have been peculiarly high, while the rainfalls have been very low from quantity point of view. During this year, the diseases that have raised problems for tomatoes have been especially the viroses and, in some cases, mycoplasmoses. Other diseases specific to tomatoes, produced by some species of bacteria and by some species of fungi, did not raise any problems. Usually, in Baragan Plain area, the years

when *X. campestris* pv. *vesicatoria* bacteria and *Ph. infestans* fungus raised very big problems at tomatoes had been rare (1997, 2004 and 2005).

Due to the dry and droughty climate, strong attacks of some species of pests take place in Bărăgan Plain area, pests that are vectors of severe viroses and mycoplasmoses. We mention here different genera of aphids (*Macrosiphum* sp), different species of cicadas (*Hyalesthes* sp.), thrips (*Thrips* sp, *Frankliniella* sp) (Velichi E. 2014).

In what concerns the behavior at viroses, the least attacked variety was surprisingly Ace 55 VF. The balance of cultivars has proved more affected by viroses than the control sample which is a variety. Ace 55 VF is a long standing tomatoes variety which proves quite resistant at viroses, under the conditions of a very droughty and hot year.

At the experiment with those 5 tomato cultivars set up in year 2015, the most productive has proved to be Mirsini F1 hybrid. But it proved to be quite affected by the viroses. The other three hybrids have followed (SV52215 TD F1, Chelse F1 and Rosaliesa F1) which have achieved productions significantly higher than the control sample.

Ace 55 VF variety, even though it achieved the smallest production, had proved to be a variety with a very good behavior at viroses and mycoplasmoses.

The general conclusion of this experiment, very important for the farmer, is that choosing the variety or hybrid that follows to be cultivated must be done with great care. For Baragan Plain area, the most important for tomatoes is the resistance at viroses and mycoplasmoses. In many cases, different hybrids, very expensive, have offered, in production conditions, results which were far below expectations at the tomatoes crop set up into the field, both from the point of view of production's level and from the point of view of the resistance to the attack of some dangerous pathogenic agents. Some long standing tomato varieties (for example, Ace 55 VF) prove to be quite valuable at present. However, one of the sensitivities of this variety is a relatively low resistance at cracking of the fruit. At this variety, a part of the production is lost by fruit depreciation due to this sensitivity.

In the tomato crops, it is required to perform treatments with insecticide chemical products for fighting against specific pests, especially those which are virus vectors (aphids, thrips) and mycoplasma (cicade) vectors. However, we underline that in case of viruses with non-persistent transfer, fighting against vectors (aphids) has proved to be inefficient. We mention here

Cucumber Mosaic Virus, which produces the disease known under the name of “fern leaves” at tomatoes. In this case, the only efficient measure of prevention is cultivating tomato varieties / hybrids which have proved to be resistant.

Under the conditions of applying treatments for fighting against thrips (*Thrips* sp. *Frankliniella* sp), the tomatoes spotted wilting produced by *Tomato Spotted Wilt Virus* has not raised any problems at the tomatoes cultivated both on the field and in protected spaces.

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