THE DYNAMICS OF OCCURENCE OF SOME SPECIFIC PATHOGENIC AGENTS ATTACK AT WATERMELONS (SOIL FUNGI), UNDER PEDO-CLIMATIC CONDITIONS OF NORTHERN BARAGAN (BRĂILA COUNTY)

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Abstract

An experiment was set up with different cultivars of watermelons in 2013, 3 variants (3 known varieties). These varieties were: V1 – Crimson Sweet, V2 - Dochiţa, V3 – Sugar Baby. The scope of the experiment was to monitor the occurrence and evolution of the attack of some specific pathogenic agents, especially fungi, at watermelons. It was also monitored the correlation between the attack degree (G.A.%) of the mentioned pathogenic agents and the production, as well and the quality of the production. The experiment was set up in a Latin square, with strict compliance with the experimental technique requirements. During the vegetation period, symptoms produced by *Fusarium oxysporum* f. sp. *Niveum* fungus which produces fusarium wilt of watermelons (Velichi E. 2006) have appeared differentially, on each experimental variant. Other diseases, like the ones produced by the attack of *Colletotrichum lagenarium* fungus which produces the anthracnose of curcubitaceae or by the attack of *Sphaerotheca fuliginea* fungus (Iacob Viorica, Hatman, M., Ulea, E., Puiu, I. 2000) which produces the mildew of cucurbitaceae, did not manifest to the crop of watermelons which were subject to the experiment. Production's harvest was done in instalments. Between the results of the production, achieved variant wise, there were obtained differences ensured statistically, as against Sugar Baby control sample. The most productive watermelon variety, in the climatic conditions of the year 2013, was proved to be Crimson Sweet. *Fusaryum oxysporum* f.sp. *niveum* fungus affected relatively uniformly those three varieties studied within the experiment. The degree of attack (G.A.%) of *F. oxysporum* f.sp. *niveum* fungus did not manifest differences ensured statistically, between variants - sample F for G.A% = 16,97 (19,00). It appears the conclusion that no causes of phyto-pathogenous nature stay at the origin of the production differences between those three variants.

Key words: watermelons, *Fusarium oxysporum* f. sp. *niveum*, Latin square

During hot and droughty years, the watermelons (*Colletotrichum lagenarium*) are attacked by a series of dangerous pathogenic agents like different species of phyto-pathogenous fungi, like: *Fusarium oxysporum* f. sp. *niveum*, which produces fusarium wilt of watermelons, *Verticillium dahliae* which produces verticillium wilt, etc (Velichi E. 2012). During these years, in some cases, there have appeared at watermelons, remotely, also symptoms produced by viroses, possible by *Cucumber Mosaic Virus* which usually rarely attacks watermelons (Velichi E. 2006). During droughty and hot years, in Northern Bărăgan area, the mentioned pathogenic agents are the most damaging ones, especially at the sensitive cultivars of watermelons. More affected are the crops set up "without irrigation".

Table 1

Frequency (F.%), intensity (I.%) and degree of attack (G.A.%) of *Fusarium oxysporum* f.sp. *niveum* fungus at watermelons cultivars which were the subject of the experiment in 2013

Variant (cultivar)	F.%	I.%	G.A.% =F%xI%/100
V1 – Crimson Sweet	12,5	12,5	1,6
V2 – Dochiţa	8,4	8,4	0,7
V3 – Sugar Baby (Mt.)	25,0	25,00	6,2

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Table 2

The results of the experiment at watermelon crop, set up with 3 varieties

Variant (cultivar)	G.A.%	Prod. t/ha	Relative Prod. %	Dif. against mt.(t/ha)	Significance
V1 – Cr. Sweet	1,6	31,16	148,17	9,86	**
V2 – Dochiţa	0,7	28,40	135,04	7,10	*
V3 – S. Baby	6,2	21,03	100,00	-	-
Sample F for G.A. %= 16,97 (19,00)		DL 5% for prod. 0,90 x 4,30 = 3,87 DL 1% for prod. 0,90 x 9,93 = 8,93			

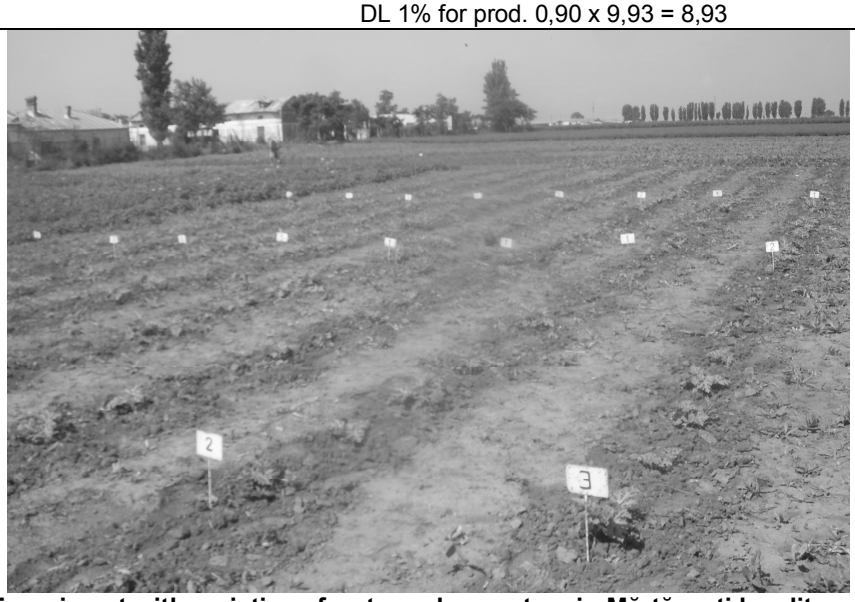

Figure 1 **Experiment with varieties of watermelons set up in Mărtăceşti locality on 23rd May 2013**

Figure 2 **Experiment with varieties of watermelons set up in Mărtăceşti locality on 20th July 2013**

MATERIAL AND METHOD

The experiment was placed in Mărtăceşti locality – Siliştea parish. The locality is situated in the northern part of Brăila county, respectively in the northern part of Bărăgan 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 which would present resistance or tolerance to the attack of some diseases, especially to mycoses that produce wilting. These diseases have been the most damaging to watermelons, during many years. It is well known the fact that, up to the present, the above mentioned diseases are hard to fight against through curative methods.

This experiment was set up through direct seeding, with three varieties: Crimson Sweet – V1, Dochiţa – V2 and Sugar Baby – V3 (Mt.). The control

sample chosen was Sugar Baby variety, which is well known by the local farmers. The seeding was executed manually on the date of 20th April 2013. The distance used between rows was of 1,5 m, and between plants on a row was of 50 cm. The lane between repetitions was of 1,0 m. During the period of vegetation, the crop was maintained according to the technology specific to watermelons. Fighting against weeds was performed only through manual hoeing. Fighting against the diseases which are not subject to this study, such as: anthracnose of curcubitaceae produced by *Colletotrichum lagenarium* fungus was performed through applying treatments with fungicide chemical products, like: Dithane M45 – 0,2%, Folpan 80 WDG – 0,15%. In 2013 it was not signalled, at watermelons, the attack of the pest specific to cucurbitaceae *Aphis* (*Cerosipha*), *gosypii*, probably due to an increased presence of the coccinellid predators from *Coccinella*, *Adalia*, *Hyppodamia* genus*, etc*.

The way of setting up the experiment was the Latin square. Those 3 variants were placed in 3 repetitions. Interpreting the differences was done through the method of limit differences (DL 5%, DL 1%). In order to interpret the limit differences of the degree of attack (GA%), it was used *arcsin√%* transformation.

Also, it was calculated the coefficient of correlation between the value of the degree of attack (G.A.) and the value of the production at each variety (variant) which was the subject of the experiment. (Săulescu N. 1967).

The surface of an experimental plot was of 6 m^2, and the number of plants/experimental plot was of 12.

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

The attack degree (G.A. %) of the attack of the pathogenic agent 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 *Fusarium oxysporum* f. sp. *niveum* was monitored. The number of entire plants, observed on each experimental plot was 8. Each healthy plant observed received grade 0. Each diseased plant observed received grade 6 (I = 100%), due to the fact that each plant attacked by *F. oxysporum* f.sp. *niveum* fungus is affected in proportion of 100%, and usually, it has the production compromised. The value of G.A.% was obtained with the relation G.A.% = Fxl/100. (M.A.I.A- Methods of Prognosis and Warning, 1980).

RESULTS AND DISCUSSIONS

The first symptoms of the disease that made the subject of the study have manifested starting with the date of 3rd July at Sugar Baby variety. It then followed Crimson Sweet variety (10th July) and Dochiţa variety, 13th July. These symptoms appeared under the form of some apoplectic wilting, sometimes accompanied by leaves curling, accompanied then by the quick drying of the entire plant. Remotely, the symptoms were reversible during the night, but for a short time. Also, remotely, to all 3 cultivars studied, there appeared also symptoms on the fruit, which were produced by the attack of *Phytophthora capsici* fungus, under the form of some rotting. The symptoms produced by *F. oxysporum* f.sp. *niveum* fungus were, on 29th July, the following: the degree of attack (G.A%) was 1,6% at Crimson Sweet variety, 0,7% at Dochiţa variety and 6,2% at Sugar Baby variety (*tab. 1*). The differences in what concerns the degree of attack (G.A.) as against the control sample (Sugar Baby variety) were not statistically ensured due to the fact that the value of F sample from the experiment for the degree of attack (G.A.%) was 16,97, as against the minimum value 19,00, according to the degrees of freedom for variants and of error of the experiment (GLv = 2, GLe = 2) (Săulescu N. 1967) (*tab. 2*). After 1st August 2013, there no longer appeared symptoms produced by wilting. Between the production results, statistically ensured differences appeared. The production was significantly positive as against the control sample at Dochiţa variety (+7,10t/ha) and distinctly significantly positive at Crimson Sweet variety (+9,86) (*tab. 2*).

The correlation coefficient (r) between the value of the attack degree (G.A.%) of *F. oxysporum* f.sp. *nveum* fungus attack and the production value of each experimental variant was negative, very small, of only r = -0,009 (inconclusive).

CONCLUSIONS

The climatic conditions of the year 2013 have proved to be quite favourable for the watermelon crops. During this year, the diseases that have raised problems for watermelons, only remotely in certain areas, have been especially the mycoses that produce wilting (*F. oxysporum* f. sp. *niveum*, *Verticillium dahliae*). In rare cases, there were signalled also fungi attacks that frequently affect the foliage and sometimes, in some cases also the fruit (*Colletotrichum lagenarium, Sphaerotheca fuliginea, Phythophthora capsici* etc.). Usually, in the area of Bărăgan Plain, the years when the pathogenic agents affect the foliage and the fruit at watermelons were rare (1997, 2004 and 2005). In opposition, every year, there were signalled quite damaging attacks of the so-called soil fungi which produce wilting (*Fusarium and Verticillium* genera). At the experiment with those 3 cultivars of watermelon, set up in 2013, the most productive has proved to be Crimson Sweet variety (31,16 t/ha). It also proved to be less affected by mycotic wilting.

The production achieved by this cultivar, which is a variety, was according to the expectations, due to the fact that the production plus per ha achieved over Sugar Baby control sample, which is also a variety, was distinctly significantly superior (+9,86). A good impression offered also Dochiţa variety, less known by the farmers. It achieved a production significantly higher than the control sample (+7,10 t/ha).

The correlation degree between the degree of attack (G.A.%) and the production level was of only r = -0,009. This fact leads to the conclusion that, in the climatic conditions of the year 2013, the level of production of each of the 3 varieties studied was not influenced by the degree of attack of the diseases studied. This fact is very important for watermelon farmer. It is well known the fact that the price of seeds for hybrids is much higher than for the varieties, especially for the watermelons. One of the arguments of this higher price is a certain resistance to the attack of some physiological breeds of *Fusarium oxysporum* f.sp. *niveum* fungus, besides the larger production potential of these hybrids.

The general conclusion of this experiment, very important for the watermelon farmer, is that there can be obtained economic productions at this culture through using also varieties, and not only hybrids. We underline the fact that the price of one single hybrid seed at watermelons can exceed sometimes 0.20-0.25 ron (2000-2500 rol). In many cases, different, very expensive hybrids have offered results way bellow expectations, for the watermelon crop set up onto 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 pathogenous agents. Unfortunately, at present, comparative studies on comparative crops, set up according to the experimental technique with watermelon varieties/hybrids, are as good as not existent.

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