

RESULTS CONCERNING THE ATTACK OF THE FUNGUS *FUSARIUM GRAMINEARUM* IN ALMAJULUI DEPRESSION

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Abstract: Research aim was to test the tolerance of a range of maize hybrids to infectious pressure of the pathogen *Fusarium graminearum* in climatic conditions of Almaj Depression. Stage of research is being characteristic for partial interpretation of experimental data after the first experimental year, in preparation the doctoral thesis. Materials and methods. Experimental field was located in climatic conditions Almaj Depression. Technology was the standard applied to this area. The experience was bifactorial. First factor was the hybrid grown with six graduations, provenance hybrids was Monsanto with different vegetation periods, (DKC 3511, DKC 4626, DKC 4964, DKC 4983, DKC 5783 and DKC 5170). Factor B was the plant density with two graduations (N_0 , N_{100} and N_{200}) all three doses were applied on a constant background elements of P_{80} K_{80} . The novelty is relatively high, work providing important data for agricultural practice in the experimental area, taking in consideration the implications of fungus *Fusarium* in yield preservation during winter in normal farm

conditions. Achievements stage in this field. In this work were carried out research including one of authors, known as the reference and possible reactions of the pathogen depending on local biocoenosis factors. Limits of the research are that data from the fungus *Ustilago maydis* are just after one year bonitation. Practical implications of the research consisted of playing a part of a complex study of strategy in the protection of maize reference experience. The originality of the work comes from the fact that data are relevant in view of uniformity of hybrid origin, these data are only part of the data submitted for interpretation in the preparation of the doctoral experience of the author. Importance of the paper became from bringing in front of the specialists of one of the topics in the experiences of the author's doctoral preparing, to evaluate the accuracy of techniques addressed. The relevant data, experimental results give an overview of pathogen behavior in relation to hybrids experienced by groups of precocity.

Key words: *Fusarium graminearum*., maize cob rot, fertilizers

INTRODUCTION

Between July and August 2009 we have made a number of observations in the maize experimental of field from city region Bozovici from Almaj Valley. It was very interesting to see the differences between hybrids to the attack of fungus *Fusarium graminearum* and, as a part of a larger study concern the main pathogens of maize behavior in the climate conditions from the region.

MATERIAL AND METHOD

Experimental conditions where those from the city region Bozovici from Almaj Valley. In the figures below are described temperature (figure 1) and rain (figure2) between 2009 and the multiannual average for this two whether parameters available for the experimental field.

The soil from the experimental field was a luvisol moderately gleyed with weak acid reaction, moderate humus content, eubasic. Weather conditions during the vegetation period in the year 2009 comparing with average (figure1 and figure 2) was favorable both, for the maize because almost all values of month temperatures and rain water was very close to long term

values. From the pathogen point of view, the weather was favorable between July and August. The second part of August and September was characterized by the lack of rains, and this have as effect a real cut of the pathogen attack on corn cobs.

The purpose of this study was to see the behavior of a large assortment of hybrids to infection with *Fusarium graminearum* under natural conditions from the hilly part of southern Banat of Romania. The field observations consist from readings of the frequency of attack, intensity of attack at corn cobs. On the base of those data it was calculated the attack degree as synthetic indicator and also it was performed statistic interpretation after the method for one factor experiments.

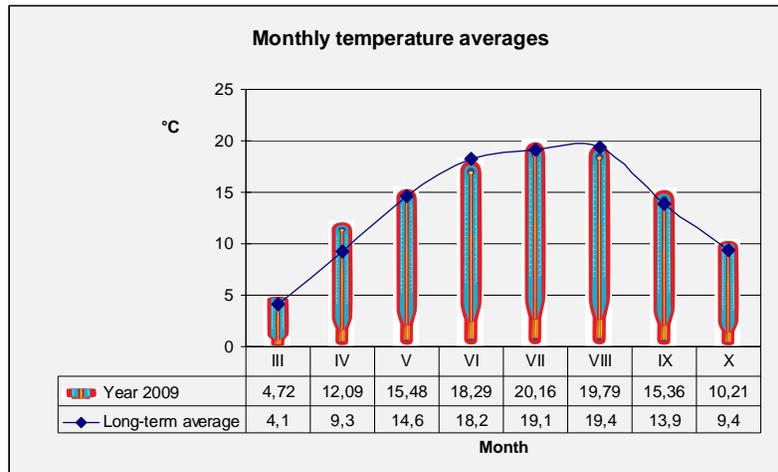


Figure 1. Monthly temperature averages, compared with long term averages recorded at Bozovici Meteorological Station

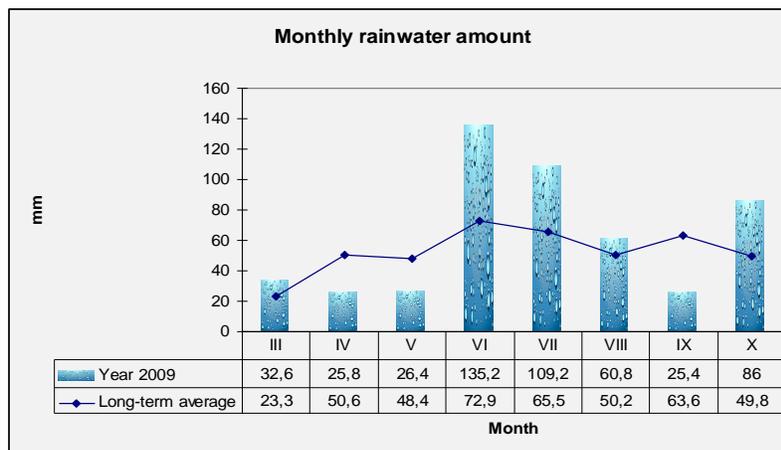


Figure 2. Monthly rainfall water amount, compared with long term averages recorded at Bozovici Meteorological Station

Biological material consist from the following hybrids DKC 3511, 4626 DKC, DKC 4964, DKC 4983, DKC 5783 and DKC 5170 and we chose to take as witness for hybrids the experimental average. The second factor was the fertilizer sort with three graduations: N₁₀₀ P₈₀ K₈₀, N₁₅₀ P₈₀ K₈₀ and N₂₀₀ P₈₀ K₈₀. As witness in fertilizers effect on fungus *Fusarium graminearum* we chose to take the combination with lowest nitrogen amount N₁₀₀ P₈₀ K₈₀.

Statistic calculation was done after the model of experiment with two factors.

Attack frequency and intensity were read from the experimental trials in the vegetation stage of fully ripe, when kernels were hard and shiny with at least 65 % dry matter, the stage 89 on BBCH scale.

RESULTS AND DISCUSSIONS

Observations figures concerning attack frequency and intensity from the field are in table 1 as well as the attack degree calculated based on frequency and intensity of attack. Because the attack degree is a synthetic indicator of attack frequency and intensity of attack we will refer at it for statistic calculation.

In the year 2009, frequency registered low values, but the intensity of attack have higher values than frequency and as it can be observed, the higher values was in the trials where was applied the largest amount of nitrogen.

Table 1.

Field readings for frequency and intensity and calculated attack degree of fungus *Fusarium graminearum* for the experimental variants in the year 2009.

Nr. crt.	Hibridul	Agrofondul	Frecvența (%)				Intensitatea (%)				Gradul de atac			
			R1	R2	R3	x	R1	R2	R3	x	R1	R2	R3	x
1	DKC 3511	N ₁₀₀ P ₈₀ K ₈₀	1	1	5	2,3	5	5	10	6,6	0,05	0,05	0,5	0,2
		N ₁₅₀ P ₈₀ K ₈₀	5	10	5	6,6	10	5	20	11,6	0,5	0,5	1	0,66
		N ₂₀₀ P ₈₀ K ₈₀	5	15	15	11,6	10	10	15	11,6	0,5	1,5	2,25	1,41
2	DKC 4626	N ₁₀₀ P ₈₀ K ₈₀	3	5	5	4,3	5	5	5	5	0,15	0,25	0,25	0,21
		N ₁₅₀ P ₈₀ K ₈₀	3	10	5	6	5	5	10	6,6	0,15	0,5	0,5	0,38
		N ₂₀₀ P ₈₀ K ₈₀	15	10	10	11,6	10	5	5	6,6	1,5	0,5	0,5	0,83
3	DKC 4964	N ₁₀₀ P ₈₀ K ₈₀	5	5	5	5	10	5	10	8,3	0,5	0,25	0,5	0,41
		N ₁₅₀ P ₈₀ K ₈₀	10	5	10	8,3	15	5	15	11,6	1,5	0,25	1,5	1,08
		N ₂₀₀ P ₈₀ K ₈₀	15	5	25	15	15	10	10	11,6	2,25	0,5	2,5	1,75
4	DKC 4983	N ₁₀₀ P ₈₀ K ₈₀	5	1	1	2,3	5	10	10	8,3	0,25	0,1	0,1	0,15
		N ₁₅₀ P ₈₀ K ₈₀	5	5	5	5	5	10	5	6,6	0,25	0,5	0,25	0,33
		N ₂₀₀ P ₈₀ K ₈₀	10	5	5	6,6	15	15	20	16,6	1,5	0,75	1	1,08
5	DKC 5170	N ₁₀₀ P ₈₀ K ₈₀	5	5	1	3,6	1	5	5	3,6	0,05	0,25	0,05	0,11
		N ₁₅₀ P ₈₀ K ₈₀	10	5	10	8,3	5	5	5	5	0,5	0,25	0,5	0,41
		N ₂₀₀ P ₈₀ K ₈₀	15	15	10	13,3	5	10	5	6,6	0,75	1,5	0,5	0,91
6	DKC 5183	N ₁₀₀ P ₈₀ K ₈₀	1	5	5	3,6	1	5	1	2,3	0,01	0,25	0,05	0,1
		N ₁₅₀ P ₈₀ K ₈₀	5	5	5	5	1	5	5	3,6	0,05	0,25	0,25	0,18
		N ₂₀₀ P ₈₀ K ₈₀	15	10	15	13,3	15	10	15	13,3	2,25	1	2,25	1,83
7	Media hibrizilor	N ₁₀₀ P ₈₀ K ₈₀	3,3	3,6	3,6	3,5	4,5	5,8	6,8	5,7	0,16	0,19	0,24	0,20
		N ₁₅₀ P ₈₀ K ₈₀	6,3	6,6	6,6	6,5	6,8	5,8	10	7,5	0,49	0,37	0,66	0,51
		N ₂₀₀ P ₈₀ K ₈₀	12,5	10	13,3	11,9	11,6	10	11,6	11,1	1,45	0,96	1,5	1,30

The constant infectious pressure of fungus *Fusarium graminearum* is shown by the fungus by this values of frequency and intensity because all the readings was done after infections in natural conditions and after a few years with low rate of rains. The quantity of water from rain is almost normal but the rain distribution in deficient because the water is collected in just a few summer storms.

Regarding to the biological material used in the experience, the values of frequency, and intensity point out a nice uniformity of hybrids tolerance to the fungus attack. The variation of frequency and intensity show one more time that the tolerance of hybrids is an individual propriety, and depend in a large scale by the weather conditions and technology applied at the moment.

The statistic calculation performed at attack degree data(table 2), point out that the differences to hybrids average are under the limit of significance and it can be explained, if we take a closer look at data from table 1 it is clear that for the same experimental condition some of the hybrids registred a higher frequency and lower intensity of attack and the other hybrids have the exactly opposite situation, but the result was a very balanced situation on the attack degree, proved by the luck of attack degree averages regarding to hybrids behavior on fungus *Fusarium graminearum* attack.

Table 2

Statistic interpretation data for attack degree of fungus *Fusarium graminearum* in the year 2009

Factor A Hibrid	Factor B - Fertilizers			Averages of Factor A	Differences	Significance
	N ₁₀₀ P ₈₀ K ₈₀	N ₁₅₀ P ₈₀ K ₈₀	N ₂₀₀ P ₈₀ K ₈₀			
DKC 3511	0,2	0,66	1,41	0,75	0,09	-
DKC 4626	0,21	0,38	0,83	0,47	- 0,19	-
DKC 4964	0,41	1,08	1,75	1,08	0,41	-
DKC 4983	0,15	0,33	1,08	0,52	- 0,14	-
DKC 5170	0,11	0,41	0,91	0,47	- 0,19	-
DKC 5183	0,1	0,18	1,83	0,70	0,03	-
Hibrids average	0,19	0,50	1,30	0,66	Witness	-

DL 5% = 0,58 DL 1% = 0,81 DL 0,1% = 1,15

Factor B - Fertilizers	N ₁₀₀ P ₈₀ K ₈₀	N ₁₅₀ P ₈₀ K ₈₀	N ₂₀₀ P ₈₀ K ₈₀
Averages of Factor B	0,19	0,50	1,30
Differences	Witness	0,31	1,11
Significance	-	**	***

DL 5% = 0,23 DL 1% = 0,31 DL 0,1% = 0,42

The nitrogen prove to have a stimulating effect on maize ears rot, the experimental averages was distinctly significant for 150 kg/ha and very significant for a nitrogen amount of 200 kg /ha(table 2).

CONCLUSIONS

➤ The frequency and intensity of fungus *Fusarium graminearum* attack have a very high variation on all hybrids which prove to have a very slight tolerance to this fungus, specially when there are technology and natural factors that stimulate the fungus attack.

➤ Nitrogen application increases the disposition of the plants to be infected by ear rot by extension of the period of maximum sensitivity, between period when stigmata are visible

and the moment when kernels are in milk stage.

➤ Attack degree registered a very low difference between hybrids, the values for all hybrids was under the significance threshold reported to experimental average.

➤ Regarding to the effect of nitrogen, it is very clear that the increasing of nitrogen dosage conduct to an increase of attack degree wich registry a distinct significant value of difference on the nitrogen amount of 150 kg/ha and a very significant difference on the nitrogen amount of 200 kg/ ha.

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