RESULTS CONCERNING THE ATTACK OF THE FUNGUS *USTILAGO MAYDIS* 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 Ustilago maydis in climatic conditions from 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, 4626 DKC, DKC 4964, 4983 DKC, DKC DKC 5783 and 5170). Factor B was the amount of nitrogen applied to three 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. 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 relevance of data, experimental results give an overview of pathogen behavior in relation to hybrids experienced by groups of precocity.*

INTRODUCTION

Over the last year in the experiments conducted in the city region Bozovici from Almaj Valley, one of the pathogens observed in experiments with maize was the common corn smut (*Ustilago zeae*). Between July and August we have made a number of observations and it was very interesting to see the differences between hybrids to the attack of fungus *Ustilago maydis* considering also that this data may be interesting as information for other researchers and farmers is the reason of the present paper with experimental results (1,2,4,5,6,7,8,9,12,13,14).

This data can bring also some considerations concerning the technology used traditionally on the region because it is well known that the infections with *Ustilago maydis* are successfully only if the plants are injured (1,2,3,4,5,6,7,8,9,10,11,12,13,14).

MATERIAL AND METHOD

During the year 2009 in the experimental field there was tested six hybrids for their behavior to the attack of different pathogens and pests. Also the test include a variation on nitrogen doses applied, between 100 kg /ha active nitrogen matter and 200 kg /ha active nitrogen matter on a constant phosphorus and potassium background.

The experimental field was placed on a luvosol moderately gleyed with weak acid reaction, moderate humus content, eubazic. Weather conditions during the vegetation period in

the year 2009 comparing with average(figure1 and figure 2) was favorable both, for the maize plants and for pathogens because almost all values of month temperatures and rain water was very close to long term values.

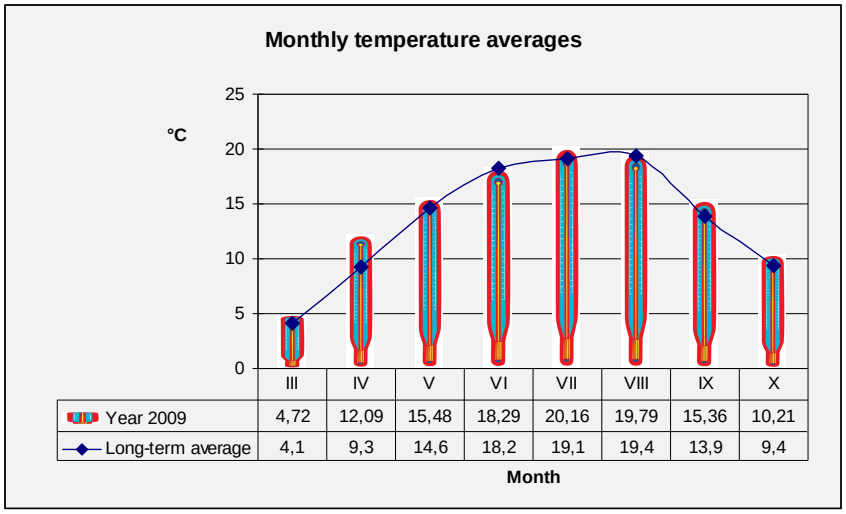

Figure 1.Monthly temperature averages, compared with long term averages recorded at Bozovici Meteorological Station

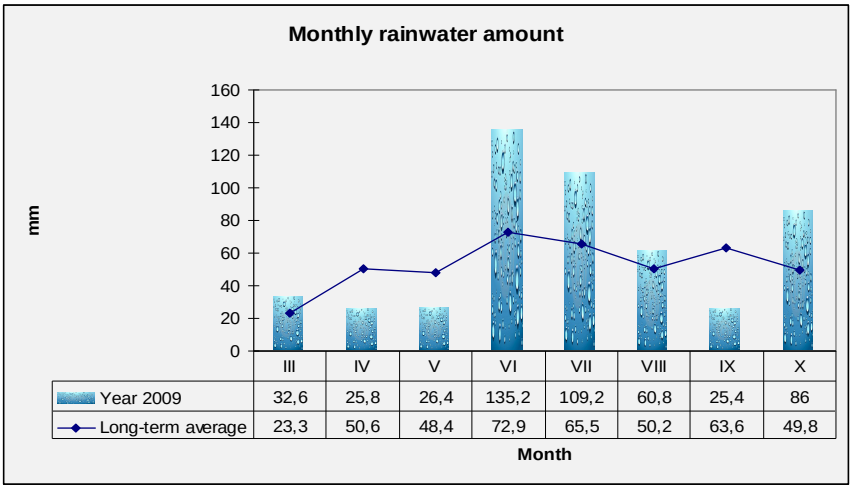

Figure 2.Monthly rainfall water amount, compared with long term averages recorded at Bozovici Meteorological Station

The experience was organized after the classic two factors experience. First factor was the maize hybrid with six graduations (DKC 3511, DKC 4626, DKC 4964, DKC 4983, DKC 5170, DKC 5183) and we chose to take as witness for hybrids the experimental average. The second factor was the fertilizer sort with three graduations: $N_{100}\ P_{80}\ K_{80}$, $N_{150}\ P_{80}\ K_{80}$ and $N_{200}\ P_{80}\ K_{80}$. As witness

in fertilizers effect on fungus *Ustilago maydis* we chose to take the combination with lowest nitrogen amount N_{100} P_{80} K_{80}.

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 early dough, when kernel content almost half of dry matter(45 %), the stage 83 on BBCH scale

RESULTS AND DISCUSSIONS

Attack frequency and intensity from the field readings 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 and intensity have a normal behaviour. The first think to remark was that the tested hybrids was all sensitive to fungus *Ustilago maydis*. The values of attack frequency and intensity are all under a general threshold of 30 %, but this is lower for the nitrogen dose of 100 kg /m^2 and it rise gradually for the nitrogen dosage of 150 kg /ha and 200 kg /ha nitrogen.

From the point of view of behavior under the infectious pressure of fungus *Ustilago maydis* this values point out a nice uniformity of hybrids tolerance to the fungus attack. There can be observed a relatively uniformity of attack frequency values between hybrids from the same group of precocity. From this perspective hybrids DKC 3511 DKC 4626 and DKC 4964 have higher values of attack frequency than hybrids DKC 5170 and DKC 5183 for the same nitrogen dosage.

Intensity of attack was very low on the majority of the hybrids, but it can be made the same notice on the uniformity of the data distribution.

Table 1.

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

Nr. crt.	Hybrid	Fertilizers	Frequency (%)				Intensity (%)				Attack degree			
			R1	R2	R3	x	R1	R2	R3	x	R1	R2	R3	x
1	DKC 3511	N_{100} P_{80} K_{80}	15	25	10	16,6	1	5	5	3,6	0,15	1,25	0,5	0,63
		N_{150} P_{80} K_{80}	20	15	35	23,3	15	10	5	10	3	1,5	1,75	2,08
		N_{200} P_{80} K_{80}	20	25	25	23,3	10	20	15	15	2	5	3,75	3,58
2	DKC 4626	N_{100} P_{80} K_{80}	15	10	10	11,6	5	10	10	8,3	0,75	1	1	0,91
		N_{150} P_{80} K_{80}	10	15	5	10	15	5	15	11,6	1,5	0,75	0,75	1
		N_{200} P_{80} K_{80}	25	15	20	20	20	15	25	20	5	2,25	5	4,08
3	DKC 4964	N_{100} P_{80} K_{80}	10	20	5	11,6	20	10	15	15	2	2	0,75	1,58
		N_{150} P_{80} K_{80}	15	25	20	20	10	20	25	18,3	1,5	5	5	3,83
		N_{200} P_{80} K_{80}	20	30	30	26,6	25	20	30	25	5	6	9	6,66
4	DKC 4983	N_{100} P_{80} K_{80}	15	5	10	10	5	5	10	6,6	0,75	0,25	1	0,66
		N_{150} P_{80} K_{80}	25	10	10	15	20	10	10	13,3	5	1	1	2,33
		N_{200} P_{80} K_{80}	20	20	25	21,6	20	30	20	23,3	4	6	5	5
5	DKC 5170	N_{100} P_{80} K_{80}	5	5	10	6,6	2	5	5	4	0,1	0,25	0,5	0,28
		N_{150} P_{80} K_{80}	30	20	20	23,3	5	15	10	10	1,5	3	2	2,16
		N_{200} P_{80} K_{80}	20	35	30	28,3	15	20	15	16,6	3	7	4,5	4,8
6	DKC 5183	N_{100} P_{80} K_{80}	3	5	5	4,3	5	10	5	6,6	0,15	0,5	0,25	0,3
		N_{150} P_{80} K_{80}	25	10	20	18,3	20	10	15	15	5	1	3	3
		N_{200} P_{80} K_{80}	10	20	25	18,3	15	25	15	18,3	1,5	5	3,75	3,41
7	Hybrid average	N_{100} P_{80} K_{80}	10,5	11,6	8,3	10,1	6,3	7,5	8,3	7,4	0,65	0,87	0,66	0,73
		N_{150} P_{80} K_{80}	20,8	15,8	18,3	18,3	14,1	11,6	13,3	13	2,91	2,04	2,25	2,40
		N_{200} P_{80} K_{80}	19,1	24,1	28,8	25,8	17,5	21,6	20	19,7	3,41	5,20	5,16	4,59

After the statistic calculation, as it can be seen in table 2, the attack degree prove to have very close values for the majority hybrids. The differences between majority of hybrids was under the threshold of significance, the only one exception was the hybrid DKC 4964 with a significant difference on the average.

Table 2

Statistic interpretation data for attack degree of fungus Ustilago maydis in the year 2009

Factor A Hybrid	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	0,63	2,08	3,58	2,09	- 0,47	-
DKC 4626	0,91	1	4,08	1,99	- 0,57	-
DKC 4964	1,58	3,83	6,66	4,02	1,45	*
DKC 4983	0,66	2,33	5	2,66	0,09	-
DKC 5170	0,28	2,16	4,8	2,41	- 0,16	-
DKC 5183	0,3	3	3,41	2,23	- 0,33	-
Hibrids average	0,73	2,4	4,59	2,57	Witness	-

DL 5% = 1,30 DL 1% = 1,85 DL 0,1% = 2,68

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	0,73	2,4	4,59
Differences	Witness	1,67	3,86
Significance	-	**	***

DL 5% = 0,98 DL 1% = 1,33 DL 0,1% = 1,79

Application of nitrogen conduct to an increase of *Ustilago maydis* attack, the attack degree registry a distinctly significant difference on the nitrogen amount of 150 kg/ha and a very significant difference on the nitrogen amount of 200 kg/ ha. We consider that this is due to an extension of the period vegetation period between 3-10 days by aplication of nitrogen and by this we expose corn cobs longer to fungus attack.

CONCLUSIONS

- The frequency and intensity of fungus *Ustilago maydis* attack have grown slightly from earlier hybrids to tardily hybrids.
- Nitrogen application increase the disposition of the plants to be infected by smut by extension of the period of maximum sensitivity, between flowering and kernels milk stage.
- Attack degree registred a very low difference between hybrids, the values for 7 hybrids was under the significance threshold reported to experimental average and only hybrid DKC 4964 report a significant difference on witness.
- Regarding to the effect of nitrogen, it is very clear that the incresing of nitrogen dosage conduct to an increase of attack degree wich registry a distinct significan 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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