STUDY ON THE ATTACK OF *FUSARIUM SP.* ON WHEAT STEM BASE UNDER CONDITIONS FROM TMISOARA DIDACTIC RESEARCH STATION

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Abstract: *Research aim was to test the tolerance of a range of wheat cultivars to infectious pressure of the pathogen Fusarium sp. in climatic conditions from Timisoara Didactic Research Station. 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 from Timişoara. Technology was the standard applied to this area. The experience was bifactorial. First factor was the cultivar with three graduations (Ciprian, Arieşan and Kristina). Factor B was the sowing density with two graduations (550 kernels / m^2 and 650 kernels / m^2). Both sowing density were applied on a constant fertilizers background elements of N_{100} P_{60} K_{60}. The novelty is relatively high, work providing important data for agricultural practice in the experimental area, taking in consideration the implications of fungus Fusarium sp. in yield amount due to infection propagation on wheat ears in some years. 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, including the competiotin between stem base pathogens. Limits of the research are that data from the fungus Fusarium spp. are just after one year bonitation. Practical implications of the research consisted of playing a part of a complex study of strategy in the of wheat protection reference experience. The originality of the work comes from the fact that data are relevant in view of cultivars behaviour under specific conditions. 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. All data are relevant for experimental conditions amd give an overview over the possibility of prevention of the pathogen attack on the wheat ears, judging after the relevance on the yield of Fusarium sp. attack.*

Key words: *Fusarium spp., wheat stem base rot, fertilizers*

INTRODUCTION

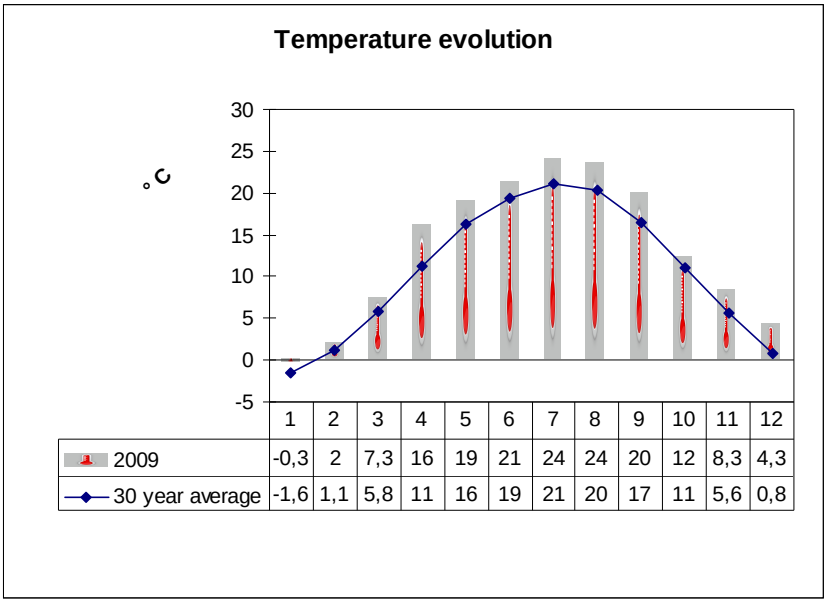
Between March and end of May 2009 we have made a number of observations in the wheat experimental of field crops discipline from Didactic Research Station. It was very interesting to see the differences between hybrids to the attack of fungus *Fusarium spp.* and, as a part of a larger study concern the main pathogens of the stem base and roots of wheat behavior in the climate conditions from Timisoara.

MATERIAL AND METHOD

Experimental conditions where those from Didactic Research Station from Timişoara and consist from a chernozem soil and ecological conditions. In the figures below are described temperature (figure 1) and rain (figure2) from the year 2009 and the multiannual average for this two whether parameters available for the experimental field.

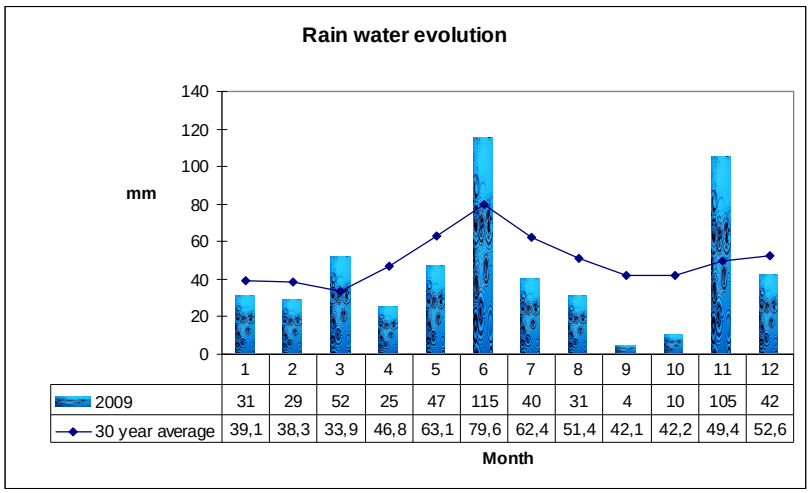
Assessing pathogen population dynamics was done by statistic analysis of attack degree, calculated as synthetic indicator on the base of the readings performed on the

experimental field of frequency and intensity of attack in the interval between March and May 2009, when the pathogen of the root and stem base of the wheat were monitored at the Didactic Station of the University of Agricultural Sciences and Veterinary Medicine of the Banat in Timişoara in a bi-factorial experiment.



	1	2	3	4	5	6	7	8	9	10	11	12
2009	-0,3	2	7,3	16	19	21	24	24	20	12	8,3	4,3
30 year average	-1,6	1,1	5,8	11	16	19	21	20	17	11	5,6	0,8

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



	1	2	3	4	5	6	7	8	9	10	11	12
2009	31	29	52	25	47	115	40	31	4	10	105	42
30 year average	39,1	38,3	33,9	46,8	63,1	79,6	62,4	51,4	42,1	42,2	49,4	52,6

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

The factors we monitored during the three experimental years were the cultivated cultivar and amount of nitrogen applyed. The two factors we monitored strongly influence the appearance and development of attack by pathogens, as follows: cultivar by resistance or degree of tolerance of cultivars to attack and nitrogen amount by the physiological influence on the length of different vegetation period and on the influence of physiological vigour of the plants and the easiness the pathogen is transmitted.

The first factor, experimental cultivar, had three graduations: Ciprian, Arieşan and Kristina. The second factor, the nitrogen amount also with three graduations, on the background of constant phosphorus and potassium amount: N_{100} P_{60} K_{60}, N_{150} P_{60} K_{60} and N_{200} 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 two different vegetation stages:

- first reading is on the stage when the second node of the stem is at least 2 cm above first node, the stage 32 on BBCH scale
- second reading when plants are on early milk stage, the stage 73 on BBCH scale.

RESULTS AND DISCUSSIONS

Observations figures concerning attack frequency and intensity from the field are in table 1. The attack degree calculated based on frequency and intensity of attack are also in table 1. Considering the attack degree is a synthetic indicator of attack frequency and intensity of attack and this is the reason why we will refer at it for statistic calculation.

In the year 2009, frequency registered normal values, but the intensity of attack have very low values than frequency. Also 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	Ciprian	N_{100} P_{60} K_{60}	5	5	10	6,6	5	4	3	4	0,25	0,2	0,3	0,25
		N_{150} P_{60} K_{60}	10	10	5	8,3	2	3	2	2,3	0,2	0,3	0,1	0,2
		N_{200} P_{60} K_{60}	15	5	15	11,6	4	5	5	4,6	0,6	0,25	0,75	0,53
2	Arieşan	N_{100} P_{60} K_{60}	10	5	10	8,3	3	5	5	4,3	0,3	0,25	0,5	0,35
		N_{150} P_{60} K_{60}	15	10	10	11,6	4	2	3	3	0,6	0,2	0,3	0,36
		N_{200} P_{60} K_{60}	15	20	15	16,6	5	5	4	4,6	0,75	1	0,6	0,78
3	Kristina	N_{100} P_{60} K_{60}	5	5	10	6,6	5	7	7	6,3	0,25	0,35	0,7	0,43
		N_{150} P_{60} K_{60}	15	10	5	10	4	5	5	4,6	0,6	0,5	0,25	0,45
		N_{200} P_{60} K_{60}	20	15	20	18,3	8	5	7	6,6	1,6	0,75	1,4	1,25
4	Average	N_{100} P_{60} K_{60}	9	6	10	8,3	4,3	5,3	5	4,8	0,32	0,27	0,47	0,35
		N_{150} P_{60} K_{60}	13	8	9	10	3,3	3,3	3,3	3,3	0,46	0,3	0,38	0,38
		N_{200} P_{60} K_{60}	15	11	14	13,3	5,6	5	5,3	5,3	0,77	0,49	0,71	0,65

Even at this low values of frequency and intensity we can consider that fungus *Fusarium spp.* is shown a constant infectious pressure because all the readings was done after infections in natural conditions and after a few years with low rate of rains. The second reason for the lower values registered, in our opinion is that the quantity of water from rain for the period we refer is lower then multiannual average (figure 2) and the rain distribution is deficient because the water was collected in just a few rains.

Also the biological material used in the experience, prove once again to have a nice diversity, based on the variation of the frequency and intensity values. In the same time, if the variation of frequency and intensity show one more time that the tolerance of varieties is an individual propriety and it have a strict dependency on the weather conditions and technology applied.

Statistic calculation performed for attack degree data (table 2), point out that the differences of varieties average are under the limit of significance for Arieşan but it register a negative significant value for Ciprian and a significant difference for Kristina. This behavior can be explained by the fact that fungus *Fusarium spp.* is very successful even in dry weather conditions, because of the lack of the rains in the first five month of the year 2009, so the experimental condition wasn't so favorable to diseases. Under those conditions all varieties registered at least a normal frequency of attack and lower intensity of attack of fungus *Fusarium spp.* The result was a very balanced situation on the attack degree, proved by the very close differences on the attack degree averages regarding to the experimental average and this was the defining behavior of tested varieties on fungus *Fusarium spp.* attack.

Table 2

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

Factor A Variety	**Factor B -** Fertilizers			**Averages of Factor A**	**Differences**	**Significance**
	$N_{100}\ P_{80}\ K_{80}$	$N_{150}\ P_{80}\ K_{80}$	$N_{200}\ P_{80}\ K_{80}$			
Ciprian	0,25	0,20	0,53	0,32	- 0,14	**0**
Arieşan	0,35	0,36	0,78	0,49	0,03	-
Kristina	0,43	0,45	1,25	0,71	0,25	**
Average	0,35	0,38	0,65	0,46	Witness	-

DL 5% = 0,13 DL 1% = 0,19 DL 0,1% = 0,31

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	0,35	0,38	0,65
Differences	Witness	0,03	0,30
Significance	-	-	**

DL 5% = 0,18 DL 1% = 0,26 DL 0,1% = 0,36

The nitrogen prove to have a stimulating effect on stem base rot caused by *Fusarium spp.*, even if the experimental averages has no significance for 150 kg/ha. But growing the nitrogen dosage to 200 kg /ha lead to an increase of fungus attack which registered a very significant difference (table 2).

CONCLUSIONS

- frequency and intensity of fungus *Fusarium spp.*attack have a very low variation but even in this circumstances it register a negative significant value for Ciprian and a significant difference for Kristina and only Arieşan register a value under significance limit for attack degree;
- nitrogen application increases the disposition of the plants to be infected by stem base rot.
- regarding to the effect of nitrogen, it is very clear that the incresing of nitrogen dosage conduct to an increase of attack degree which registry a distinct significan value of difference on the nitrogen amount on the nitrogen amount of 200 kg/ ha.

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