OBSERVATIONS CONCERNING THE MAIN PATHOGENS OF THE WINTER WHEAT STEM BASE BETWEEN 2006-2008 AT DIDACTIC STATION OF U.S.A.M.V.B. TIMIŞOARA

OBSERVAȚII PRIVIND ATACUL PRINCIPALILOR AGENȚI PATOGENI AI BAZEI PLANTEI LA GRÂUL DE TOAMNĂ ÎN PERIOADA 2006-2008 LA STAȚIUNEA DIDACTICA A U.S.A.M.V.B. TIMIŞOARA

Adrian BORCEAN, Levente MOLNAR, Simona NITĂ,

University of Agricultural Sciences and Veterinary Medicine of Banat from Timisoara

Abstract: *In the present paper are presented results for the interval between 2006-2008 concerning behavior of an assortment of 8 winter wheat varieties on stem base pathogens attack, in natural conditions at Didactic Station of Banat's University Of Agricultural Sciences And Veterinary Medicine Timişoara. In this paper from the main technological measures it is analyzed only the influence of the sowing density over two of the main steam base pathogens Pseudocercosporella herpotrichoides* (Fron.) Deighton *and Gäeumannomyces graminis* (Sacc.). *Also, in this paper it can be observed the behavior of an assortment of the most cultivated varieties of winter wheat from the Western Plain of Romania, varieties which was created in some Agricultural Research Stations from Romania and Serbia, and due to this, the varieties have different degrees of soil and climate accommodation.*

Rezumat: *În prezenta lucrare sunt redate rezultatele din intervalul 2006-2008 a evaluării comportamentului unui sortiment de 6 soiuri de grâu de toamnă la atacul agenților patogeni ai bazei paiului, în condiții de infecție naturală la Stațiunea Didactică a Universității de Ştiințe Agricole şi Medicină Veterinară a Banatului Timişoara. În lucrare , dintre verigile tehnologice importante, este analizată doar influența densității de semănatasupra a doi dintre principalii agenți patogeni ai bazei paiului la grâul de toamnă, Pseudocercosporella herpotrichoides* (Fron.) Deighton *şi Gäeumannomyces graminis* (Sacc.). *De asemenea în lucrare se poate observa comportamentul a mai multor soiuri , dintre cele mai cultivate în Câmpia de Vest, provenite de la Stațiuni de Cercetări din România şi Serbia, deci soiuri cu diferite grade de adaptare la condițiile pedoclimatice.*

Key words**:** *winter wheat, stem base pathogens, natural conditions*
Cuvinte cheie*: grâu de toamnă, agenți pathogeni ai bazei paiului, condiții naturale*

INTRODUCTION

During the last three years, we try to evaluate the potential of the infection pressure for the main pathogens of winter wheat stem base. This pathogens are very strong saprophytes and they don't produce large amount of crop on normal years, but we know that there are some risk in the years with high amount of rains and if there are some high amounts of nitrogen fertilizers applied(1,2,3,4,5).

MATERIAL AND METHOD

To observe the reaction of the winter wheat varieties to the stem base pathogens attack we organize two experiments, each one after the three factors with three repeats model. The experimental factors where as it follows:

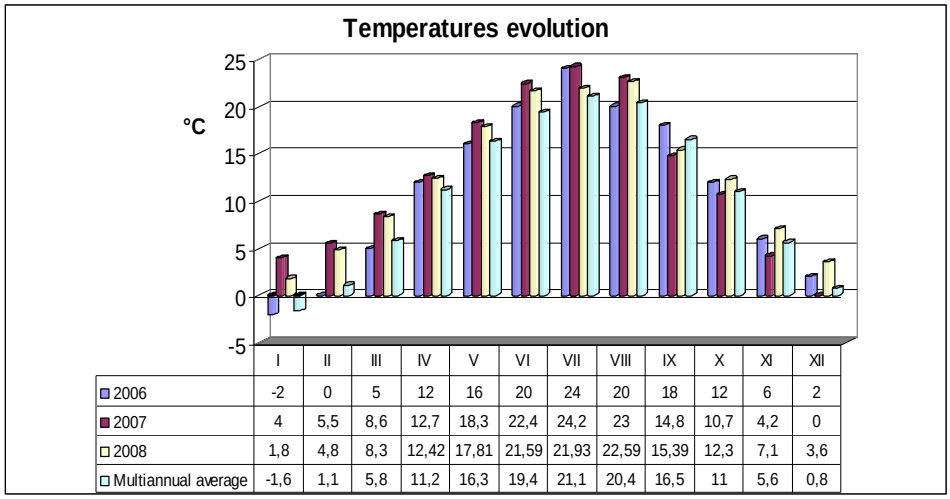
For the first experiment:

- the experimental year with 3 graduations – 2006, 2007 and 2008;
- the variety with 8 graduations: Lovrin 34, Maxima, Dropia, Romulus, Delia, Alex, Europa and NS 7000;

- the sowing density with two graduations: 550 kernels/ m^2 and 650 kernels/ m^2;

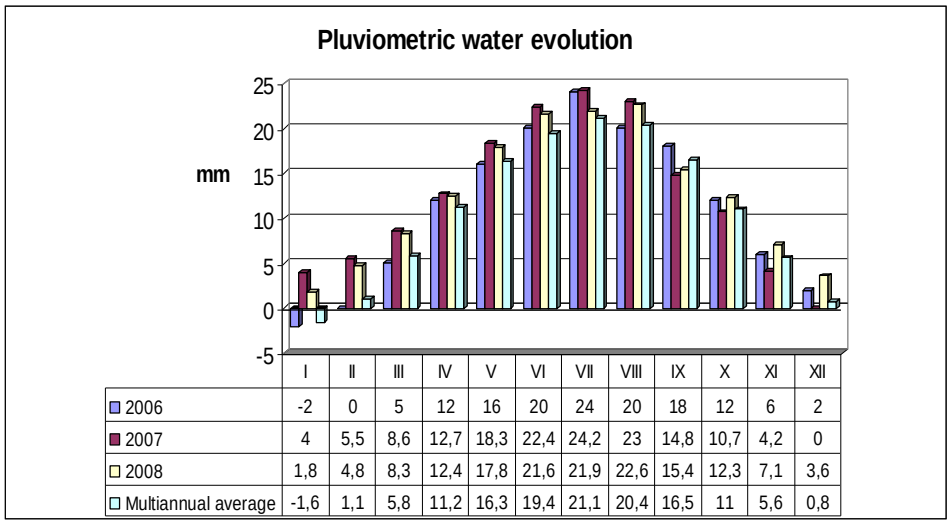
For the second experiment:

- the experimental year with 3 graduations – 2006, 2007 and 2008;
- the variety with 8 graduations: Lovrin 34, Maxima, Dropia, Romulus, Delia, Alex, Europa şi NS 7000;
- the nitrogen amount with three graduations: 100 kg /ha a.s., 150 kg /ha a.s. and 200 kg /ha a.s.



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2006	-2	0	5	12	16	20	24	20	18	12	6	2
2007	4	5,5	8,6	12,7	18,3	22,4	24,2	23	14,8	10,7	4,2	0
2008	1,8	4,8	8,3	12,42	17,81	21,59	21,93	22,59	15,39	12,3	7,1	3,6
Multiannual average	-1,6	1,1	5,8	11,2	16,3	19,4	21,1	20,4	16,5	11	5,6	0,8

Figure1. Temperature evolution between 2006 and 2008, comparing with multiannual average



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
2006	-2	0	5	12	16	20	24	20	18	12	6	2
2007	4	5,5	8,6	12,7	18,3	22,4	24,2	23	14,8	10,7	4,2	0
2008	1,8	4,8	8,3	12,4	17,8	21,6	21,9	22,6	15,4	12,3	7,1	3,6
Multiannual average	-1,6	1,1	5,8	11,2	16,3	19,4	21,1	20,4	16,5	11	5,6	0,8

Figure 2. Pluviometric water evolution between 2006 and 2008, comparing with multiannual average

The evaluation of frequency and intensity of attack for the pathogens was done in the

last decade of April because from experience we know that at the end of May the attack of the stem base and root pathogens at winter wheat are stopped because of two factors: the plants maturation and the lack of water (1,2,3,4,5,6). On the base of the frequency and intensity observations we determine the attack degree of the pathogens, the results for this indicator was put in statistic calculations (1,2,3, 7,8,9,10).

Concerning the experimental conditions, from the interval 2006-2008, the most favorable for the stem base pathogens was 2008 because the repartition of the rains in February and March was better than there was in 2007, even if this is not visible on the graphics (figure 2). The temperature evolution was in normal parameters for the last 10 years even if the graphics show higher temperature averages comparing with multi annual averages for the analyzed month (figure 2).

RESULTS AND DISCUSSIONS

During the experimental period, between 2006 and 2008, the main pathogens present in the field at the stem base was *Pseudocercosporella herpotrichoides*(Fron.) Deighton and *Gäeumannomyces graminis* (Sacc.).

Regarding the attack of *Pseudocercosporella herpotrichoides*, as it become from table 1, the most favorable year was 2008 when the attack degree registered a distinctly significant difference. The varieties from experience have different responses to the fungus attack, the attack degree have a variance between 1.3 to Delia and NS 9000 and 2.6 to Lovrin 34, the last variety was the only one which pass the threshold and statistic registered a significant difference on the witness.

The increase of sowing density from 550 kernels/m^2 to 650 kernels/m^2 have as effect an increase of attack degree with a distinctly significant difference on the ensemble of experimental factors.

In the experiment with different nitrogen dozes prove that between wheat plants and fungus *Pseudocercosporella herpotrichoides* are very sensitive relations. From the beginning we can see that from the experimental years, the most favorable for the fungus was 2008 with a very significant difference on witness, because of the high rain amount from the February and March.

The winter wheat varieties have a higher dynamic than the one from different sowing density. The most tolerant varieties at *Pseudocercosporella herpotrichoides* attack prove to be Maxima, Romulus, Delia and NS 7000, all this varieties registered a negative significance. The most sensitive to the fungus attack was Alex, with a distinctly significant difference of attack degree and Europe with a very significant difference.

Second stem base pathogen present on the experimental field was *Gäeumannomyces graminis*. Statistic analyze for this fungus are on tables 3 and 4. We have to make the observation that even if this fungus have the same area like *Pseudocercosporella herpotrichoides* the concurrence between this species wasn't so high and both have almost the same behavior to experimental factors.

In the different sowing density experiment the attack degree averages registered a significant difference in 2007 and a distinctly significant difference in 2008 reported to witness. All this differences was due to the rains which fall in March of the analyzed year.

The varieties behavior has a large variance, with significant difference on Europe and distinctly significant difference on Lovrin 34, both varieties prove to be sensitive

Increasing the sowing density bring an increase of the attack degree with a distinctly significant difference.

Table 1.

Synthesis results concerning the attack degree of fungus *Pseudocercosporella herpotrichoides* (Fron.) Deighton, between 2006-2008

Factor A Year	Factor B Breed	Factor C Sowing Density (b.g./m^2)		Factor means A	Difference	Signif.
		550	650			
2006	Lovrin 34	1,4	3,1	1,3	Control	-
	Maxima	0,8	2,3			
	Dropia	0,9	2,6			
	Romulus	0,6	1,8			
	Delia	0,7	1,3			
	Alex	0,6	1,4			
	Europa	0,8	2,0			
	NS 7000	0,4	1,3			
2007	Lovrin 34	1,8	3,3	1,7	0,4	-
	Maxima	1,0	2,7			
	Dropia	1,0	2,5			
	Romulus	0,7	1,8			
	Delia	0,8	2,0			
	Alex	0,9	2,4			
	Europa	1,2	2,8			
	NS 7000	0,6	1,8			
2008	Lovrin 34	2,3	3,5	2,1	0,8	**
	Maxima	1,3	3,0			
	Dropia	1,5	2,9			
	Romulus	1,1	2,5			
	Delia	0,9	2,2			
	Alex	0,9	2,3			
	Europa	1,8	3,2			
	NS 7000	1,0	2,5			

DL 5%= 0,5 DL 1%= 0,7 DL 0,1%= 0,9

Factor B Breed	Lovrin 34	Maxima	Dropia	Romulus	Delia	Alex	Europa	NS 7000	Breeds means
Factor B means	2,6	1,8	1,9	1,4	1,3	1,4	2,0	1,3	1,7
Difference	0,8	0,1	0,2	-0,3	-0,4	-0,3	0,3	-0,4	Mt
Signif.	*	-	-	-	-	-	-	-	-

DL 5%= 0,5 DL 1%= 0,9 DL 0,1%= 1,0

Factor C Sowing density (b.g./m^2)	550	650
Factor B means	1,0	2,4
Difference	Mt.	1,4
Signifficance	-	**

DL 5% = 0,6 DL 1% = 0,9 DL 0,1%=1,7

Table. 2

Synthesis results concerning the attack degree of fungus *Gäeumannomyces graminis* (Sacc.), in year 2006-2008

Factor A Year	Factor B Breed	Factor C Sowing Density (b.g./m^2)		Factor means A	Difference	Signif.
		550	650			
2006	Lovrin 34	0,2	0,8	0,4	Mt.	-
	Maxima	0,1	0,5			
	Dropia	0,3	0,7			
	Romulus	0,2	0,4			
	Delia	0,1	0,4			
	Alex	0,1	0,5			
	Europa	0,3	0,8			
	NS 7000	0,2	0,5			
2007	Lovrin 34	0,4	1,3	0,6	0,2	*
	Maxima	0,2	0,6			
	Dropia	0,5	0,9			
	Romulus	0,3	0,7			
	Delia	0,2	0,6			
	Alex	0,3	0,6			
	Europa	0,6	1,2			
	NS 7000	0,3	0,7			
2008	Lovrin 34	0,7	1,5	0,7	0,3	**
	Maxima	0,4	0,9			
	Dropia	0,4	1,0			
	Romulus	0,3	0,8			
	Delia	0,4	0,8			
	Alex	0,3	0,6			
	Europa	0,5	1,3			
	NS 7000	0,3	0,7			

DL 5%= 0,1 DL 1%= 0,3 DL 0,1%= 0,5

Factor B Breed	Lovrin 34	Maxima	Dropia	Romulus	Delia	Alex	Europa	NS 7000	Breed means
Factor B means	0,8	0,4	0,5	0,4	0,4	0,4	0,7	0,4	0,5
Difference	0,3	-0,1	0	-0,1	-0,1	-0,1	0,2	-0,1	Mt
Signif.	**	-	-	-	-	-	*	-	-

DL 5%= 0,2 DL 1%= 0,3 DL 0,1%= 0,5

Factor C Sowing density (b.g./m^2)	550	650
Factor B means	0,3	0,8
Difference	Mt.	0,5
Signifficance	-	**

DL 5% = 0,3 DL 1% = 0,5 DL 0,1% =0,7

CONCLUSIONS

1. The experience with different nitrogen doses demonstrate that the relations between

wheat plants and fungus *Pseudocercosporella herpotrichoides* is very sensitive to nitrogen because the attack degree in 2007 registered a distinctly significant difference on the ensemble of the experimental factors and also in 2008 with the rains from the early spring the average of the attack degree increase with a very significant difference on witness.

2. Regarding on the attack of *Pseudocercosporella herpotrichoides* the most tolerant varieties was Maxima, Romulus, Delia and NS 7000.

3. A nitrogen amount of 150 kg/ha s.a. point out to be the most favorable because under this experimental condition it bring an increase of the tolerance to *Pseudocercosporella herpotrichoides.*

4. The increase of the sowing density from 550 kernels /m^2 to 650 kernels /m^2 bring an increase of *Pseudocercosporella herpotrichoides* attack degree on the ensemble of the experimental factors.

5. The applying of a high amount of nitrogen bring an increase of *Gäeumannomyces graminis* attack degree, but a dosage of 150 kg/ha a.s. prove to bring a good tolerance to pathogen attack.

6. Lovrin 34 was the only one variety sensitive to both pathogens observed, all other varieties have a very fluctuant behavior due to environmental factors.

LITERATURE

1. BÂLTEANU GH., BÎRNAURE V., SALONTAI AL., BORCEAN I., VASILICĂ C., 1991 - Fitotehnie, Ed. Didactică şi Pedagogică Bucureşti, 515 pag.
2. BOBEŞ, I., 1983 - Atlas de Fitopatologie şi protecţia agroecosistemelor, Ed. Ceres, Bucureşti;
3. BORCEAN I., A. BORCEAN, 2004 - Cultura si protecţia integrată a cerealelor, leguminoaselor şi plantelor tehnice, Editura de Vest, 509 pag.
4. BORCEAN I., DAVID GH., BORCEAN A., 2007 - Tehnici de cultura si protectie a plantelor tehnice, Ed. de Vest, 275 pag.
5. BORCEAN I., DAVID GH., BORCEAN A., 2006 - Tehnici de cultură şi protecţie a cerealelor şi leguminoaselor, Ed. de Vest, 275 pag.
6. DOCEA E., SEVERIN,V., 1990 - Ghid pentru recunoaşterea şi combaterea bolilor plantelor agricole, Ed. Ceres, Bucureşti,
7. HATMANU M., BOBEŞ I., LAZĂR AL., GHEORGHIEŞ C., GLODEANU C., SEVERIN V., TUŞA CORINA, 1989 - Fitopatologie, Ed. Didactică şi Pedagogică, Bucureşti, 468 pag.
8. IACOB VIORICA, E. ULEA, I. PUIU, 1998 - Fitopatologie agricolă, Ed. Ion Ionescu de la Brad, Iaşi.
9. HATMANU M., BOBEŞ I., LAZĂR AL., GHEORHIEŞ C., GLODEANU C., SEVERIN V., TUŞA CORINA, 1989 – Fitopatologie, Ed. Didactică şi Pedagogică, Bucureşti, 468 pag.
10. POPESCU GH., 1989 – Fitopatologie, Ed. Mirton, Timişoara
11. RĂDULESCU E., RAFAILĂ C., 1969 - Tratat de Fitopatologie agricola, Ed. Academiei R.S.R., 578 pag, Bucureşti.