ASSESSMENTS CONCERNING DYNAMICS DATA OF THE MAIN FOLIAR PATHOGENS OF WHEAT UNDER THE CLIMATIC CHANGES FROM THE LAST YEARS

A. BORCEAN, L. MOLNAR, Simona NIȚĂ

U.S.A.M.V.B. Timişoara, Calea Aradului 119, Timişoara, 300645, Romania
***E-mail:** adrian_borcean@yahoo.com*

Abstract: *Research aim of the present paper is to present the dynamic of main foliar diseases of wheat caused by the fungus Erysiphe graminis and Septoria tritici. The biologic material consist from an assortment of three of the most used wheat cultivars from the area. Technology used in the experimental field was the standard applied for this location. The experience was implemented on the soil and climatic conditions from Didactic Station. Last three years bring a very significant change of the main climatic factors (temperature and rain water) with a direct influence in dynamic of majority of diseases caused by fungus and bacteria. Taking all this in consideration we are revealing in the present paper the behavior of three from the most important cultivars from the Western Plain at the attack of both funguses under the last three years climatic changes. The experience was calculated after normal statistic method for bifactorial experiences, with first factor the cultivar and the second factor the observation year. The achievements bring by the present work consist from the first author experience in research of the wheat diseases and also the possible reactions of the pathogen relating to local biocoenosis factors. Limits of the research are that data refer strictly to the relation between cultivars and pathogens. Practical implications of the research are that all data presented in the present paper are a part of a complex study of wheat diseases protection strategy. This strategz is important for the both funguses, Erysiphe graminis and Septoria tritici because they can be considered as endemic disesas for wheat in the Western Plain of Romania. The originality of the work comes from the fact that data are relevant in view of cultivars behaviour under specific conditions. The relevant data, experimental results give an overview of pathogen behavior in relation to experimental conditions.*

Key words**:** *wheat, pathogens, dynamic*

INTRODUCTION

Wheat, is one of the most important crops from the Western Plain of Romania and this is the reason why this crop was the target of a large numbers of studies during time. An important number of this studies refer at the influence of both, technology and climatic factors on wheat (1, 2, 3, 4, 5, 6, 7). The main foliar diseases present in the last three years (2007-2010) have a high dynamic of variation, mostly due to climatic changes. This was the motive for the present paper in which are presented the results after bonitation of frequency and intensity of attack for fungus *Erysiphe graminis* and *Septoria tritici.*

MATERIAL AND METHODS

The experimental field was placed at Didactic Station of University of Agricultural Sciences and Veterinary Medicine of Banat County from Timisoara and it was organized after the method with two experimental factors.

First factor was the experimental years with five graduations: 2007, 2008, 2009, 2010 and the average of experimental cycle which was considerd witness for this factor. The second factor was the variety with seven graduations: Kristina, Romulus, Alex, Ciprian, Arieşan, Lovrin34 and the average of the varieties which was considered the witness for this factor.

RESULTS AND DISCUSSIONS

First observations which could be done at the evolution of fungus *Erysiphe graminis* attack, is the constant apparition of this fungus, even under dryness condition from the year 2007, when powdery mildew appear since the end of April due to water from rains from the end of March and beginning of April. Beginning with May, powdery mildew disappear almost completely from the field usually because of the high temperatures and the lack of rains.

Referring to the temperature evolutions between 2007 and 2010, it is clear that between April and beginning of June, the only year which was close to the multiannual average was 2010. In the same time, the water from rain has an evolution which was in disadvantage of the pathogens because this evolution show a lack of rains between April and June, specialy between 2008 and 2009.

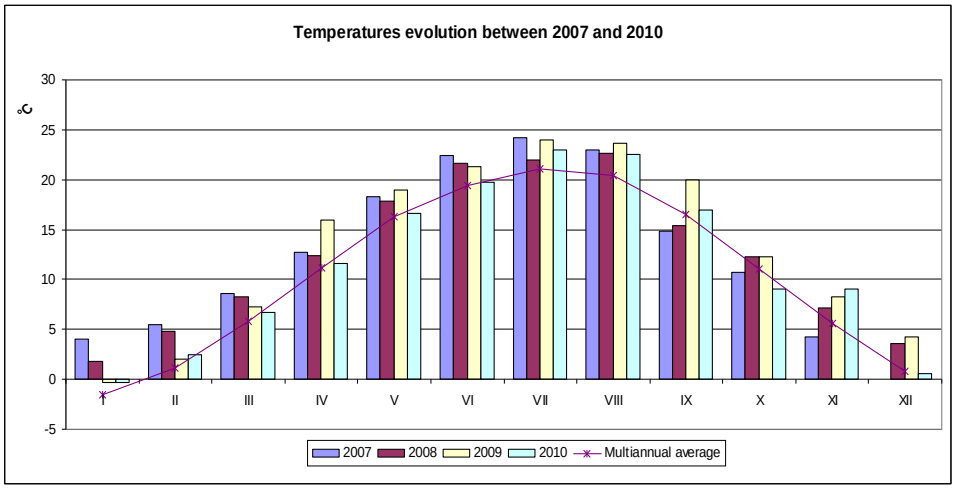

Figure 1. Temperature evolution between 2007-2010 reported to multiannual averages

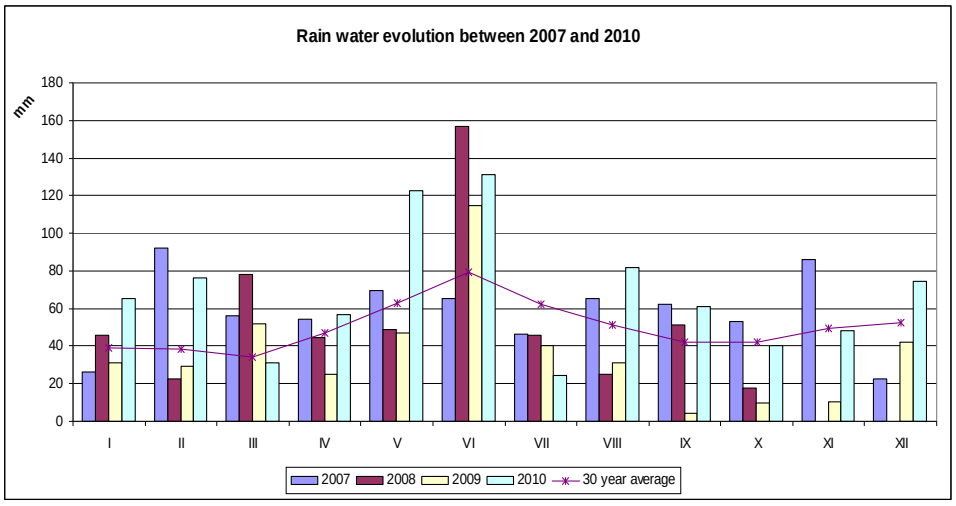

Figure 2. Rain water evolution between 2007 - 2009 reported to multiannual averages

Table 1.

The dynamic of fungus *Erysiphe graminis* frequency between 2007 and 2009

Factor A Year	Factor B - Variety						Averages of factor A	Difference	**Signif**
	Kristina	Romulus	Alex	Ciprian	Arieşan	Lovrin 34			
2007	*6,6*	*5*	*6,6*	*5*	*10*	*10*	7,2	-11,95	00
2008	15	28,3	18,3	18,3	33,3	56,6	28,3	9,15	**
2009	10	10	11,6	13,3	18,3	20	13,86	-5,28	0
2010	15	36,6	20,3	18,3	36,6	36,6	27,23	8,08	**
Average of years	11,65	19,97	14,2	13,72	24,55	30,8	19,15	Witness	-

DL 5%=5.0 DL 1%=7.6 DL 0.1%=12.1

Factor B - Variety	Kristina	Romulus	Alex	Ciprian	Arieşan	Lovrin 34	***Average of varieties***
Averages of factor B	11,65	19,97	14,2	13,72	24,55	30,8	19,15
Difference	-7.5	0.82	-4.95	-5.43	5.4	11.65	Witness
Significance	000	-	00	00	***	***	-

DL 5%=3.1 DL 1%=4.2 DL 0.1%=5.5

Table 2.

The dynamic of fungus *Erysiphe graminis* intensity between 2007 and 2009

Factor A Year	Factor B - Variety						Averages of factor A	Difference	***Signif***
	Kristina	Romulus	Alex	Ciprian	Arieşan	Lovrin34			
2007	1	3,3	5	2,3	5	6,6	3,8	-4,5	000
2008	6,6	13,3	6,6	8,3	13,3	13,3	10,2	1,9	-
2009	5	8,3	5	6,6	11,3	10	7,7	-0,6	-
2010	5,6	16,3	10,6	10,3	9,6	16,3	11,4	3,1	*
Average of years	4,5	10,3	6,8	6,8	9,8	11,5	8,3	Witness	-

DL 5%=2,1 DL 1%=3,3 DL 0,1%=4,9

Factor B - Variety	*Kristina*	Romulus	Alex	*Ciprian*	*Arieşan*	Lovrin34	***Average of varieties***
Averages of factor B	4,5	10,3	6,8	6,8	9,8	11,5	8.3
Difference	-3.8	2.0	-1.5	-1.5	1.5	3.2	Witness
Significance	000	*	-	-	-	***	-

DL 5%=1,6 DL 1%= 2,2 DL 0,1%= 2,8

Table 3.

The dynamic of fungus *Septoria tritici* frequency between 2007 and 2009

Factor A Year	Factor B - Variety						Averages of factor A	Difference	***Signif***
	Lovrin 34	Romulus	Alex	Ciprian	Arieşan	Kristina			
2007	6,6	5,3	3	5	8,3	6,6	5,8	*-11,6*	000
2008	36,7	16,7	11,7	13,3	35	16,7	21,7	4,2	**
2009	30	11,7	8,3	11,7	18,3	10	15	-2,44	0
2010	42	21,3	16,7	20,7	38,7	24,3	27.3	9,8	***
Average of years	28,8	13,7	9,9	12,6	25,0	14,4	*17,4*	Witness	-

DL 5%=1,8 DL 1%= 2,8 DL 0,1%= 4,5

Factor B - Variety	Lovrin34	Romulus	Alex	Ciprian	Arieşan	Kristina	Average of varieties
Averages of factor B	28,8	13,7	9,9	12,6	25,0	14,4	17,4
Difference	13,0	-4,8	-9,0	-5,6	9,5	-3,0	Witness
Signif	***	00	000	00	***	-	-

DL 5%=3,4 DL 1%= 4,6 DL 0,1%= 6,0

Table 4.

The dynamic of fungus *Septoria tritici* intensity between 2007 and 2009

Factor A Year	Factor B - Variety						Averages of factor A	Difference	***Signif***
	Lovrin 34	Romulus	Alex	Ciprian	Arieşan	Kristina			
2007	3,7	1	2,3	1	5	3,7	2,8	-3,6	0
2008	16,7	10	3,7	5	13,3	11,7	10,1	3,7	*
2009	11,7	6,7	3,7	6,7	6,7	3,7	6,5	0,1	-
2010	21,3	13,3	11,7	13,3	18,7	14,3	15.4	6,7	***
Average of years	13,3	7,7	5,3	6,5	10,9	8,3	8,7	Witness	-

DL 5%= 3,2 DL 1%=3,9 DL 0,1%=4,7

Factor B - Variety	Lovrin34	Romulus	Alex	Ciprian	Arieşan	Kristina	Average of varieties
Averages of factor B	13,3	7,7	5,3	6,5	10,9	8,3	8.7
Difference	4,6	-0,9	-3,3	-2,2	2,2	-0,4	Witness
Signif	***	-	00	0	*	-	-

DL 5%=2,0 DL 1%= 2,7 DL 0,1%= 3,5

From experimental cycle 2007-2010(table 1), the highest frequency of powdery mildew was recorded in the years 2008 and 2010, both statistic ensured as distinct significantly. As it was expected, the lowest average of attack frequency was in the year 2007,

statistic ensure as distinct significantly negative. Comparing with the other two years, in 2009 the difference to experimental cycle was significant negative. Powdery mildew intensity of attack has almost the same shape as frequency of attack. The highest level from experimental cycle was in the year 2010 with a significant difference to control and the lowest value was registered in the year 2007 with a very significant negative difference.

The varieties behaviour at powdery mildew attack over the experimental cycle was was capital influenced by the features gained in the breading process and the age of this varieties. From this point of view, it is clear and demonstrated by the statistic results, that the most sensible varieties was the oldest Lovrin 34 and Arieşan because this varieties lose their resistance and tolerance proprieties because of the evolution of pathogens intensity of attack. Thus the attack frequency has a very significant difference for Lovrin 34 and Arieşan. The lowest frequency of attack was obtained at varieties Alex, Ciprian with distinct significantly negative difference and Krystina with a very significant negative difference to witness.

Intensity of attack (table 2), have almost a similar evolution as frequency of attack. the most sensible varieties remain Lovrin 34 with a very significant difference and followed by Romulus with a significant difference. Arieşan, Alex and Ciprian registered a difference under the limit of significance. The best behavior from analyzed varieties was Krystina which has the lowest intensity of attack, with a very significant negative difference reported to witness. All this are indicating a good tolerance of Krystina to powdery mildew.

The second analyzed pathogen over the experimental cycle was *Septoria tritici* (tables 3 and 4). The same as *Erysiphe graminis, Septoria tritici* could be considered as endemic because it appears constantly in wheat fields from Western Plain of Romania every year. The dynamic of the fungus offer very good information of the varieties sensitiveness in a certain geographic area. Frequency and intensity of attack was both at the highest level in 2010, with a very significant difference to witness. Also the lowest value for frequency and intensity was in the year 2007.

Referring to the tested varieties, the most sensible prove to be Lovrin 34 with a very significant difference for both frequency and intensity. Arieşan is also very sensitive to *Septoria tritici* because the attack frequency has registered a very significant difference to witness but for attack intensitz the difference was only significant to witness. The best variety from our experience was Alex because over the four years of experience, the attack frequency was at a very significant negative difference and the attack intensity was at a distinct significant negative difference.

CONCLUSIONS

1. *Erysiphe graminis* and *Septoria tritici* are endemic diseases for wheat in the Western Plain of Romania, because they appear every year, even if climatic conditions for this two pathogens are not so favorable, as there was in 2007 and 2009.
2. Under climatic conditions of 2007- 2010 experimental cycle the most favorable year for both pathogens was in 2010 and the most unfavorable conditions was in the year 2007 and 2009.
3. The most sensitive varieties at *Erysiphe graminis* over the experimental cycle prove to be Lovrin 34 and Arieşan, and the most tolerant was Krystina.
4. Regarding to *Septoria tritici,* the most sensitive was varieties Lovrin 34 and Arieşan and a good tolerance was shown only by Alex and Ciprian

BIBLIOGRAFY

1. BÂLTEANU GH., BÎRNAURE V., SALONTAI AL., BORCEAN I., VASILICĂ C., Fitotehnie, Ed. Didactică şi

Pedagogică Bucureşti, 515 pag., 1991
2. BORCEAN I,TABĂRĂ V., PÎRŞAN P., DEMENESCU T., BORCEAN A., Cercetări privind stabilirea principalelor verigi tehnologice la porumb în condiţiile Banatului, Lucrări Ştiinţifice, U.A.Iaşi,Vol. XXXIV, pag 157-163, 1992.
3. BORCEAN I.,TABĂRĂ V., PÎRŞAN P., DAVID GH., POP GEORGETA, BORCEAN A., ŞUVEŢI SIMONA,CIULOI ANCA.,BORUGĂ L. Comportarea a 40 hibrizi de porumb în condiţiile cernoziomului de la Timişoara, Simpozin-Cultura plantelor de câmp U.S.A.M.V.B. Timişoara, pag 3-9, 1996.
4. DAVID GH., BORCEAN A., Sweet corn – A crop plant with high perspectives on the Western Plain of Romania, University of Agricultural Sciences College of Agricuklture Mezötúr, 1999.
5. BORCEAN I. , MIRCOVV. , IMBREA F., BORCEAN A.,_Preliminary results concerning the influence of electromagnetic treatments at maize, Universitatea Novi Sad, Biofizika u poljoprivrednoi proizvodnji, pag. 187-190, Novi Sad 2002
6. BORCEAN I. , DAVID GH.,BORCEAN A., IMBREA F., BOTOŞ L., On the behaviour of some new maize hybrids in the conditions of brown luvic soils in the hill area of the Banat, Lucrări Ştiinţifice Facultatea de Agricultură, U.S.A.M.V.B. Timişoara, Vol XXXIV, pag 187-192, 2002.
7. BORCEAN A, DAVID GH., MOLNAR L., Observaţii privind comportarea unui sortiment de hibrizi de porumb la atacul ciupercii Ustilago maydis în condiţiile anului 2006 de la SD a USAMVB Timişoara. Trends in European agriculture development, Faculty of Agriculture Timisoara and Faculty of Agriculture Novi Sad International Symposium, 2007
8. BORCEAN I, BORCEAN A., 2004**,** Cultura si protecţia integrată a cerealelor, leguminoaselor şi plantelor tehnice, Editura de Vest, 509 pag.
9. BORCEAN I., ŢĂRĂU D., BORCEAN A., DAVID GH., BORCEAN EUGENIA, Fitotehnia şi protecţia culturilor de câmp, Editura de Vest, 198 pag.
10. BORCEAN I., DAVID GH., BORCEAN A., Tehnici de cultură şi protecţie a cerealelor şi leguminoaselor, Editura de Vest, 346 pag.
11. POPESCU GH. – Fitopatologie, Ed. Mirton, Timişoara, 1998
12. M. HATMANU, I. BOBEŞ, AL. LAZĂR, C. GHEORGHIEŞ, C. GLODEANU, V. SEVERIN, Corina Tuşa – Fitopatologie, Ed. Didactică şi Pedagogică, Bucureşti, 1989, 468 pag.
13. NIŢĂ SIMONA, BORCEAN A., Study regarding some varieties of Zea mays everta Stuart which grow under the pedo-climatic conditions in Almaj Depresion, „60 de ani de învăţământ superior în Oltenia", Annales of University of Craiova, Vol XXXVII / A 2007, pag. 664-666, 2007
14. PÎRŞAN P., DAVID GH., BORCEAN A., WAUTERS S., Cercetări cu privire la studiul unui sortiment de hibrizi proveniţi din vestul Europei în condiţiile de la Timişoara, Lucrări Ştiinţifice, U.S.A.M.V.B. Timişoara, Vol XXX, 1998.