CONSIDERATIONS ON THE DYNAMICS OF FOLIAR DISEASES OF WHEAT IN THE CLIMATE OF TIMISOARA

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Abstract: *The goal 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 consists from an assortment of three of the most used wheat cultivars. In the experimental field the technology used was the standard technology applied for this location area. 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 experiences with two factors, where the 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 strategy is important for the funguses, Erysiphe graminis and Septoria tritici because they can be considered as endemic diseases 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 behavior under specific conditions. The relevant data, experimental results give an overview of pathogen behavior in relation to experimental conditions.*

Key words: *wheat, Erysiphe graminis, Septoria tritici*

INTRODUCTION

For the Western Plain of Romania wheat represent one of the most important crops. This is the reason why this crop was the target of a large numbers of studies during time. An important number of these studies refer at the influence of both, technology and climatic factors, on wheat (1, 2, 3, 4, 5, 6, and 7). The main foliar diseases present in the last five years (2007-2011) have a high dynamic of variation, mostly due to climatic changes. In the present paper are presented the results after frequency and intensity of attack bonitation for both fungus *Erysiphe graminis* and *Septoria tritici*.

MATERIAL AND METHODS

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. For this reason we collect the climatic data from Timisoara Meteorological Station.

Regarding to the experience and to the statistic calculation, the first experimental factor was the experimental years with six graduations: 2007, 2008, 2009, 2010, and 2011 and the average of experimental cycle which was considered witness for this factor. The second factor was the variety with five graduations: Kristina, Romulus, Alex, Ciprian, Arieşan, Lovrin

34 and the average of the varieties which was considered the witness for this factor.

RESULTS AND DISCUSSIONS

From the beginning we can say that after seven years of observation and taking in consideration the evolution of attack parameters (frequency and intensity) it is obvious that fungus *Erysiphe graminis* have one of the most constant apparitions. 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 almost completely disappears from the field usually because of the high temperatures and the lack of rains.

Analyzing the temperature evolutions between 2007 and 2010, it is clear that between Aprils and beginning of June, the only years which was close to the multiannual average was 2010 and 2011. In the same time, the water from rain has an evolution which was in disadvantage of the pathogens because of the lack of rains between April and June, especially between 2008 and 2009. In 2011, the rainfall water quantity was near the multiannual average in May which stimulates the foliar diseases, especial the powdery mildew and leaf blotch.

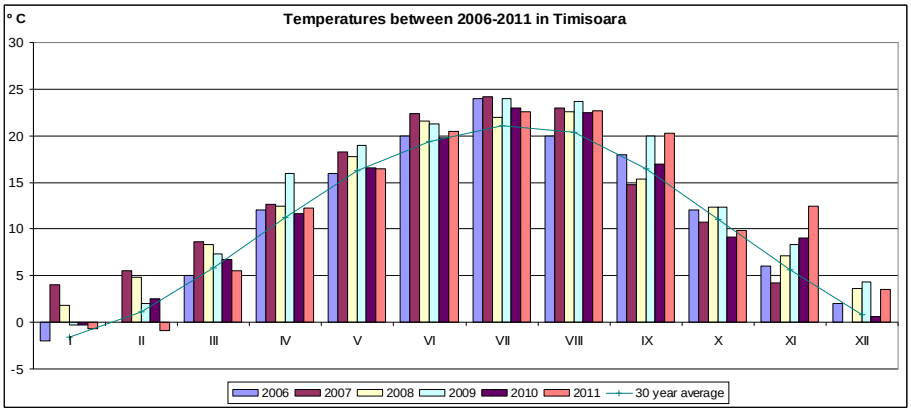

Figure 1. Temperature evolution between 2006 - 2011 reported to multiannual averages

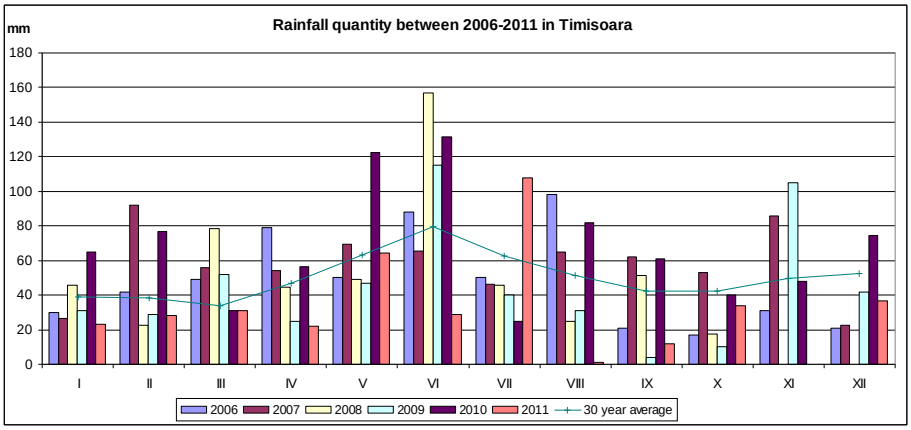

Figure 2. Rain water evolution between 2006 - 2011 reported to multiannual averages

Table 1.

The dynamic of fungus *Erysiphe graminis* frequency between 2007 and 2011

Factor A Year	Factor B - Variety					Averages of factor A	Difference	Signif.
	Kristina	Romulus	Alex	Ciprian	Arieşan			
2007	6,6	5	6,6	5	10	6,64	-10,14	00
2008	15	28,3	18,3	18,3	33,3	22,64	5,86	*
2009	10	10	11,6	13,3	18,3	12,64	-4,14	-
2010	15	36,6	20,3	18,3	36,6	25,36	8,58	**
2011	14,3	16,3	16,6	15,3	20,6	16,62	-0,16	-
Average of years	12,18	19,24	14,68	14,04	23,76	16,78	Control	-

DL 5%=5,3 DL 1%=7,8 DL 0.1%=13,3

Factor B - Variety	Kristina	Romulus	Alex	Ciprian	Arieşan	Average of varieties
Averages of factor B	6,64	22,64	12,64	25,36	16,62	11,75
Difference	-9,98	10,88	0,88	13,60	4,86	Control
Significance	000	***	-	***	**	-

DL 5%= 3,4 DL 1%=4,7 DL 0.1%= 5,7

Table 2.

The dynamic of fungus *Erysiphe graminis* intensity between 2007 and 2011

Factor A Year	Factor B - Variety					Averages of factor A	Difference	Signif.
	Kristina	Romulus	Alex	Ciprian	Arieşan			
2007	1	3,3	5	2,3	5	3,32	-4,284	00
2008	6,6	13,3	6,6	8,3	13,3	9,62	2,016	-
2009	5	8,3	5	6,6	11,3	7,24	-0,364	-
2010	5,6	16,3	10,6	10,3	9,6	10,48	2,876	*
2011	4,3	10,3	7,3	6,6	8,3	7,36	-0,244	-
Average of years	4,5	10,3	6,9	6,82	9,5	7,60	Control	-

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

Factor B - Variety	Kristina	Romulus	Alex	Ciprian	Arieşan	Average of varieties
Averages of factor B	3,32	9,62	7,24	10,48	7,36	5,08
Difference	-4,04	4,53	2,15	5,39	2,27	Control
Significance	00	***	-	***	-	-

DL 5%=2,8 DL 1%= 3,3 DL 0,1%= 4,5

Table 3.

The dynamic of fungus *Septoria tritici* frequency between 2007 and 2011

Factor A Year	Factor B - Variety					Averages of factor A	Difference	Signif.
	Kristina	Romulus	Alex	Ciprian	Arieşan			
2007	6,6	5,3	3	5	8,3	5,64	-9,34	000
2008	16,7	16,7	11,7	13,3	35	18,68	3,69	**
2009	10	11,7	8,3	11,7	18,3	12	-2,98	-
2010	24,3	21,3	16,7	20,7	38,7	24,34	9,35	***
2011	12,6	14,3	10,6	16,6	17,3	14,28	-0,70	-
Average of years	14,04	13,86	10,06	13,46	23,52	14,98	Witness	-

DL 5%=2,3 DL 1%= 4,4 DL 0,1%= 6,5

Factor B - Variety	Kristina	Romulus	Alex	Ciprian	Arieşan	Average of varieties
Averages of factor B	5,64	18,68	12	24,34	14,28	10,7216
Difference	-8,64	7,95	1,27	13,61	3,55	Witness
Significance	00	**	-	***	-	-

DL 5%=4,8 DL 1%= 6,6 DL 0,1%= 9,7

Table 4

The dynamic of fungus *Septoria tritici* intensity between 2007 and 2011

Factor A Year	Factor B - Variety					Averages of factor A	Difference	Signif.
	Kristina	Romulus	Alex	Ciprian	Arieşan			
2007	3,7	1	2,3	1	5	2,6	-5,16	00
2008	11,7	10	3,7	5	13,3	8,74	0,97	-
2009	3,7	6,7	3,7	6,7	6,7	5,5	-2,26	-
2010	14,3	13,3	11,7	13,3	18,7	14,26	6,49	***
2011	9,2	7,6	6,3	8,3	7,3	7,74	-0,02	-
Average of years	8,52	7,72	5,54	6,86	10,2	7,76	Witness	-

DL 5%= 2,6 DL 1%= 3,9 DL 0,1%=5,7

Factor B - Variety	Kristina	Romulus	Alex	Ciprian	Arieşan	Average of varieties
Averages of factor B	2,6	8,74	5,5	14,26	7,74	5,95
Difference	-5,14	2,78	-0,45	8,30	1,78	Witness
Significance	00	-	-	***	-	-

DL 5%=3,0 DL 1%= 4,7 DL 0,1%= 6,5

From experimental cycle 2007-2011 (table 1), the highest frequency of powdery mildew was recorded in the years 2008 and 2010, but if in 2008 the difference to control was significant, in 2010 the difference to control was statistic ensured as distinct significantly. As it was expected, because of the weather conditions, the lowest average of attack frequency was in the year 2007, statistic ensure as distinct significantly negative. Attack frequency differences between averages of the years 2009 and 2011 compared to the experimental average frequency of attack were below significance. Powdery mildew intensity of attack over the period analyzed (table 2) 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 distinct significant negative difference.

The varieties behavior at powdery mildew attack over the experimental cycle was capital influenced by the features gained in the breading process and the age of these varieties. From this point of view, it is clear and demonstrated by the statistic results that the most sensitive varieties were also the oldest ones, Romulus and Ciprian. Arieşan is also susceptible to powdery mildew taking in consideration that the attack frequency average was at a distinct significant difference to control, even if attack intensity average difference to control of this variety was under the significance threshold. The lowest frequency of attack was obtained at variety Krystina with an intensity of attack situated at a distinct significantly negative to witness and an attack frequency situated at a very significant negative difference to control.

Intensity of attack (table 2), have almost a similar evolution as frequency of attack. The most sensible varieties remain Romulus and Ciprian with a very significant difference to control. Arieşan, and Alex registered a difference to control under the limit of significance. The best behavior from analyzed varieties was at Krystina which has the lowest intensity of attack, with a very significant negative difference reported to control. 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. Both frequency and intensity 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 control.. The lowest value for attack frequency (with a very significant difference to control) and attack intensity (with a distinct significant difference to control) was in the year 2007.

Referring to the tested varieties, the most sensible to *Septoria tritici* attack prove to be Ciprian with a very significant difference for both frequency and intensity. Romulus is also very sensitive to *Septoria tritici* because the attack frequency has registered a very significant difference to witness but for attack intensity the difference was bellow the significance in relation to control. The best variety from our experience regarding to *Septoria tritici* attack behavior was Kristina. This is because in over the four years of experience analyze point out that both the attack frequency and the attack intensity was at a distinct significant negative difference reported to control.

CONCLUSIONS

1. *Erysiphe graminis* and *Septoria tritici* are endemic diseases for wheat in the Western Plain of Romania, because they produce damages to wheat crops every year, even if climatic conditions for these 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 were in the year 2007

and 2009.

3. The most sensitive varieties at *Erysiphe graminis* over the experimental cycle prove to be Ciprian and Romulus, and the most tolerant was Krystina.

4. Regarding to *Septoria tritici*, the most sensitive was varietie Ciprian and a good tolerance was shown only by Krystina.

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