THE BEHAVIOR OF A SUNFLOWER ASSORTMENT AT THE ATTACK OF THE MAIN PATHOGENS UNDER CONDITIONS FROM DIDACTIC STATION OF U.S.A.M.V.B. TIMIŞOARA

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Abstract: *Research aim was to test the tolerance of a range of sunflower lines to infectious pressure of the main endemic pathogens Phomopsis helianthi and Phoma macdonaldi under soil and climat conditionsfrom Didactic Station of U.S.A.M.V.B. Timişoara. Stage of research is advanced taking in consideration that the experience is consist from a trial of 32 sunflower lines. Technology was the standard applied in the Western Plain of Romania for sunflower. It is well-known that the area where the experimental field was implemented is the target of a few sunflower endemic pathogens which produce crop losses every year, two of this are Phomopsis helianthi and Phoma macdonaldi. By the present paper we try to draw the attention to the lack of genetic material at the present hybrids assortment with vertical resistance to this pathogens. All this underline the importance of a new technology for sunflower, a technology which must bring some efficient measures to fight against this sunflower endemic pathogens. The novelty for this experience is that of presentation of some new sunflower lines with a promising tolerance at the pathogens. Also the work bring important data for agricultural practice in the experimental area. As achievement in this work are underlined the possible reactions of the pathogens in direct coordination with local soil and climatic factors. Limits of the research are draw by the limited data from only one year of observations. Practical implications of the research consisted of playing a part of a complex study of strategy in the sunflower protection. The originality of the work comes from the fact that data are relevant in order of the uniformity of lines origin and because of this, the data provided are useful for the Monsanto producers in the management and breeding strategies. Importance of the paper became from bringing in front of the specialists some new promising sunflower biologic material for the near future. The relevance of data from experimental results give an overview of endemic pathogens behavior in relation to tested sunflower lines.*

Key words**:** *sunflower, pathogens, natural conditions*

INTRODUCTION

One of the higher challenging task in a modern agriculture is to enlarge the varieties and hybrid assortment and from this point of view Romaniais not an exception. The main producers of sunflower hybrid are conducting all the time a large number of tests with their lines and hybrids in our country. One of the Monsanto trials with sunflower lines, between 2006, 2007, 2008 and 2009 was placed at Didactic Station of Banat's University Of Agricultural Sciences And Veterinary Medicine Timişoara. The purpose of the trials was to see which are the most adapted sunflower line to the environment and technology conditions (1, 2, 3, 4).

MATERIAL AND METHOD

The trial was organized after the single factor with three repeats model where the experimental factor was the 32 Monsanto lines. The name "09MF" is a generic name given by Monsanto just to ensure an impartial evaluation.

During the vegetation period we observed the behavior of the biologic material at the pathogens attack. For this purpose we take notes of the frequency and intensity of attack for all the pathogens which affect the plants. Afterwards there was done the statistic interpretation of the field results. The witness for statistic report was the experimental average.

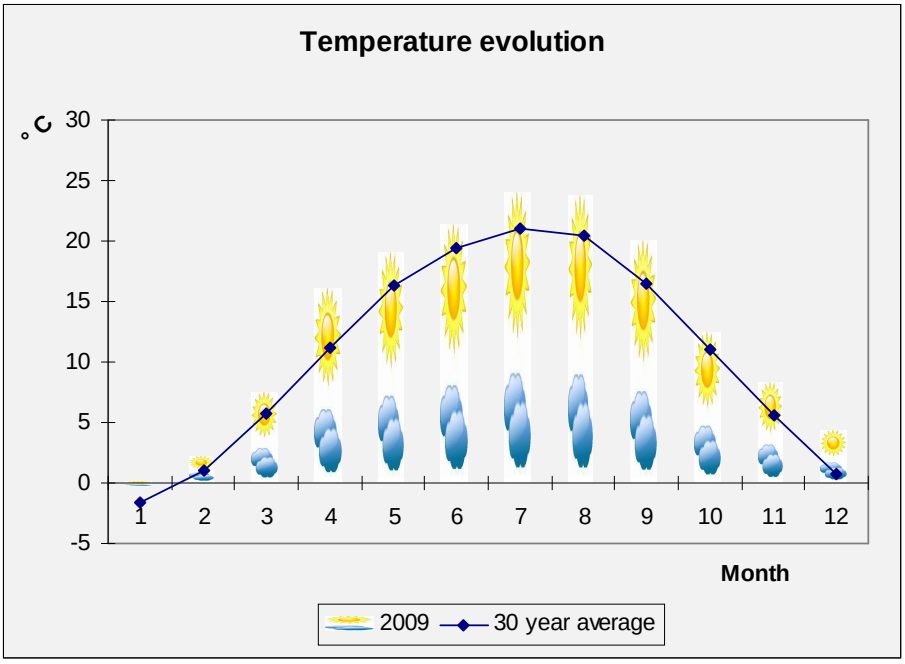

Figure1. Temperature evolution in 2009 comparing with multianual average

In the year 2009 the environment conditions was favorable for pathogens attack because the winter wasn't so hard, with positive temperatures which ensure a high rate of surviving of funguses resistance forms and also because in the second part of the vegetation period even if the water amount from the rains was not so high, specially on the summer end when we registered a luck of rain water (figure 2), but the rains was well distributed so they ensure a real good rate for fungus secondary infections.

Also, the winter was very favorable to the pathogens because of the absence of frost days. If we look at figure 1, from the start of the year, between January and April, the average of temperatures exceed with approximately 3 degrees Celsius the multi annual averages. During the period between May and August there was a lot of days with temperatures over 40 °C(figure 1).

All the sunflower technology steps was respected and coordinated with the weather conditions.

Throughout the vegetation period there was made a diseases monitoring and a succession of evaluations of attack frequency and intensity of this diseases. All we can say is that the evaluations we have done in the period of 3 years, along 2006-2008 was prove to be correct and also in the year 2009 after the primary evaluation in august we reach at the conclusion that there were two groups of diseases:

- first group which affect just a few plants, so this diseases was present in the field but their attack was under the treatment threshold and from this group was pathogens as

and Sclerotinia sclerotiorum;

- the second group was a group of pathogens which take advantage of the plants weather stress and have a massive apparition, in this group was *Phoma macdonaldi* and *Alternaria sp.*

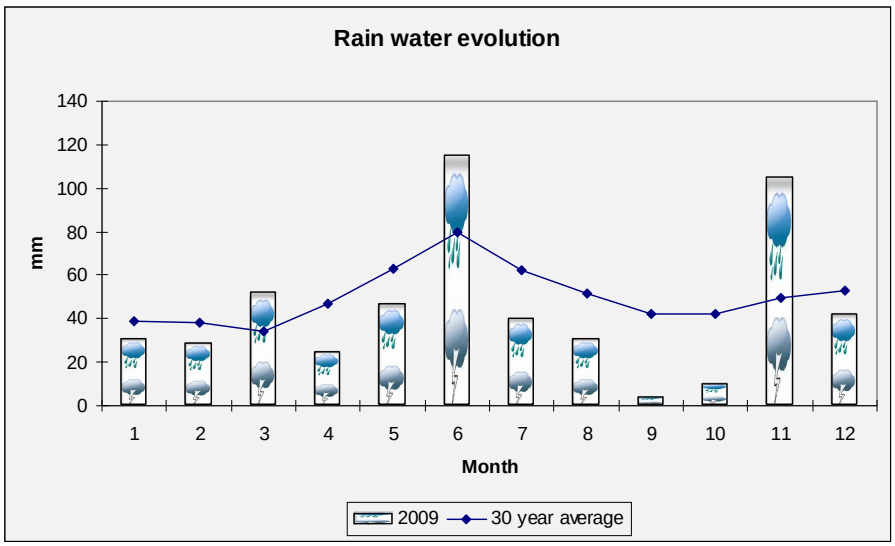

Figure 2. Rain water evolution in 2009, comparing with multianual average

In the present paper we will present the experimental results for the pathogens *Phomopsis helianthi* and *Phoma macdonaldi*, the pathogens with highest rate of attack under the climatic conditions from the year 2009.

Statistics was calculated after the method for one experimental factor. Witness for the statistic interpretation of the results was the experimental average for both fungi.

RESULTS AND DISCUSSIONS

In the case of fungus *Phomopsis helianthi* the most important is to have an image of the infected plants number, because this can create a projection of the total lose of plants in case that they fall under the disease effect. This mean that we have to analyze the frequency of attack.

The statistic analyze results of *Phomopsis helianthi* frequency of attack point out that there are a no resistant line but only tolerant lines. On this criteria we can put the 09MF- 17, 09MF- 18, 09MF- 19, 09MF- 40 and 09MF- 41 which statistical have a negative significance. The most tolerant line at this fungus we can consider to be 08 EF4RO-20 because statistic was ensure as distinct significant negative.

The intensity of fungus attack point out that only the lines 09MF-8 and 08 09MF-40 was at a significant difference from witness, which prove again that this lines are realy sensitive to *Phomopsis helianthi*.

Concerning the results for fungus *Phoma macdonaldi*, as there are shown by the values from the table 2, we can appreciate from the beginning that there are no resistant line to this fungus; all the lines have plants infected by this fungus. Also as the statistic show almost all this lines registered an attack with frequency and intensity under the significance limit.

Table 1.

Frequency and intensity of attack for *Phomopsis helianthi* fungus on sunflower trial

Nr crt	Hybrid	*Phomopsis helianthi* – frequency %						*Phomopsis helianthi* – intensity %					
		R1	R2	R3	Average	Dif.	Signif	R1	R2	R3	Average	Dif.	Signif
1	09MF -2	16	15	15	15.3	2,0	-	8	8	8	8	0,3	-
2	09MF-3	11	15	20	15.3	2,0	-	5	10	10	8,3	0,7	-
3	09MF-6	17	12	15	14.6	1,3	-	8	5	6	6,3	-1,2	-
4	09MF-8	15	20	22	19	5,7	x	10	10	15	11,6	4,0	x
5	09MF-10	10	10	15	11.6	-1,6	-	8	6	5	6,3	-1,2	-
6	09MF-11	12	10	10	10.6	-2,6	-	5	8	8	7	-0,6	-
7	09MF-12	10	18	15	14.3	1,0	-	10	10	10	10	2,3	-
8	09MF-13	17	15	15	15.6	2,3	-	10	10	10	10	2,3	-
9	09MF-15	16	10	12	12.6	-0,6	-	10	5	8	7,6	0,04	-
10	09MF-17	10	10	5	8.3	-4,9	0	5	10	3	6	-1,6	-
11	09MF-18	10	5	10	8.3	-4,9	0	5	3	5	4,3	-3,2	-
12	09MF-19	10	5	10	8.3	-4,9	0	10	5	8	7,6	0,04	-
13	09MF-24	20	15	10	15	1,7	-	8	10	8	8,6	1,04	-
14	09MF-26	12	12	15	13	-0,2	-	5	8	10	7,6	0,04	-
15	09MF-27	18	18	20	18.6	5,3	x	10	10	10	10	2,3	-
16	09MF-28	20	15	18	17.6	4,3	-	10	10	10	10	2,3	-
17	09MF-30	5	10	15	10	-3,2	-	2	5	8	5	-2,6	-
18	09MF-39	10	10	10	10	-3,2	-	5	5	8	6	-1,6	-
19	09MF-40	5	10	10	8.3	-4,9	0	5	7	8	6,6	-0,9	-
20	09MF-41	0	10	10	6.6	-6,6	00	0	5	8	4,3	-3,2	-
21	09MF-42	10	15	15	13.3	0,06	-	5	8	8	7	-0,6	-
22	09MF-43	17	15	18	16.6	3,3	-	5	10	10	8,3	0,7	-
23	09MF-44	10	15	15	13.3	0,06	-	5	10	10	8,3	0,7	-
24	09MF-54	18	20	25	21	7,7	xx	8	10	15	11	3,3	-
25	09MF-60	20	15	20	18.3	5,0	x	10	10	15	11,6	4,0	x
26	09MF-62	10	10	10	10	-3,2	-	5	5	10	6,6	-0,9	-
27	09MF-63	12	12	10	11.3	-1,9	-	5	7	5	5,6	-1,9	-
28	09MF-65	10	10	12	10.6	-2,6	-	7	5	5	5,6	-1,9	-
29	09MF-66	18	15	15	16	2,7	-	10	5	5	6,6	-0,9	-
30	09MF-76	12	15	10	12.3	-0,9	-	5	5	5	5	-2,6	-
31	09MF-77	17	15	20	17.3	4,0	-	8	8	10	8,6	1,0	-
32	09MF-81	10	10	12	10.6	-2,6	-	5	8	10	7,6	0,04	-
Average		12.7	12.8	14.2	13.3	Wt.	-	6.8	7.6	8.6	7.7	Wt.	-
DL 5%=4,6 DL 1%=6,1 DL 0.1 %=7,9								DL 5% = 3,4 DL 1% = 4,5 DL 0.1 % = 5,8					

Table 2.

Frequency and intensity of attack for *Phoma macdonaldi* fungus on sunflower trial

Nr crt	Hybrid	*Phoma macdonaldi* – frequency %						*Phoma macdonaldi* – intensity %					
		R1	R1	R3	Average	Dif.	Signif	R1	R1	R3	Average	Dif.	Signif
1	09MF -2	10	10	15	11,6	-7.9	0	5	5	10	6,6	-4,7	-
2	09MF-3	19	15	20	18	-1,6	-	7	5	10	7,3	-4,0	-
3	09MF-6	15	20	12	15,6	-3,9	-	10	15	10	11,6	0,2	-
4	09MF-8	25	18	22	21,6	2,0	-	15	15	15	15	3,6	-
5	09MF-10	35	26	15	25	5,3	-	20	15	10	15	3,6	-
6	09MF-11	27	28	20	25	5,3	-	15	20	15	16,6	5,2	-
7	09MF-12	15	14	14	14,3	-5,3	-	10	10	15	11,6	0,2	-
8	09MF-13	15	15	16	15,3	-4,3	-	10	5	15	10	-1,3	-
9	09MF-15	20	18	15	17,6	-1,9	-	10	10	10	10	-1,3	-
10	09MF-17	17	20	15	17,3	-2,3	-	10	10	10	10	-1,3	-
11	09MF-18	27	22	32	27	7,3	-	15	10	20	15	3,6	-
12	09MF-19	15	20	12	15,6	-3,9	-	5	15	10	10	-1,3	-
13	09MF-24	26	25	30	27	7,3	-	15	15	15	15	3,6	-
14	09MF-26	23	30	28	27	7,3	-	15	20	20	18,3	6,9	x
15	09MF-27	26	22	20	22,6	3,0	-	15	10	10	11,6	0,2	-
16	09MF-28	15	15	15	15	-4,6	-	5	5	5	5	-6,3	-
17	09MF-30	30	20	20	23,3	3,6	-	15	10	10	11,6	0,2	-
18	09MF-39	17	12	15	14,6	-4,9	-	10	5	5	6,6	-4,7	-
19	09MF-40	20	15	12	15,6	-3,9	-	10	10	10	10	-1,3	-
20	09MF-41	15	17	20	17,3	-2,3	-	10	10	10	10	-1,3	-
21	09MF-42	18	15	16	16,3	-3,3	-	5	15	10	10	-1,3	-
22	09MF-43	32	10	32	24,6	5,0	-	20	10	15	15	3,6	-
23	09MF-44	30	30	22	27,3	7,6	x	20	15	10	15	3,6	-
24	09MF-54	25	23	22	23,3	3,6	-	15	10	10	11,6	0,2	-
25	09MF-60	30	20	26	25,3	5,6	-	10	20	10	13,3	1,9	-
26	09MF-62	20	15	15	16,6	-2,9	-	10	10	15	11,6	0,2	-
27	09MF-63	27	30	20	25,6	6,0	-	15	20	10	15	3,6	-
28	09MF-65	12	10	10	10,6	-8,9	-	5	5	10	6,6	-4,7	-
29	09MF-66	20	25	25	23,3	3,6	-	10	20	10	13,3	1,9	-
30	09MF-76	16	21	15	17,3	-2,3	-	10	5	10	8,3	-3,0	-
31	09MF-77	21	15	18	18	-1,6	-	10	10	5	8,3	-3,0	-
32	09MF-81	14	15	10	13	-6,6	-	5	10	10	8,3	-3,0	-
Average		21,0	18,7	19,1	19,6	Wt.	-	12,2	10,6	11,2	11,3	Wt.	-

DL 5%=7.4
DL 1%=9.9
DL 0.1 %=12.9

DL 5% = 5.9
DL 1% = 7.9
DL 0.1 % = 10.4

Results show that only one line, 09MF -2 have a frequency significant negative difference on witness, which mean that it is more tolerant than all. Also there are only one line, 09MF-44, with a significant difference of attack frequency and this line we can consider to be sensitive to the fungus. Sensitive to the fungus we can consider to be also the line 09MF-26 because this line prove to have attack intensity with a significant difference, and it was the only one line whit such behavior, the rest of the analyzed lines have the attack intensity under the witness value.

This point out a very good tolerance to both funguses from all the sunflower lines we analyzed in 2008 and also that there are pretty good chances to stop the fungus attack with a good spraying plan.

CONCLUSIONS

Experimental results and statistic interpretation point out the following conclusions:

1. Fungus *Phomopsis helianthi* was present in all experimental trials, and the best behaviour on this fungus attack was at lines 09MF- 17, 09MF- 18, 09MF- 19, 09MF- 40 and 09MF- 41 which registered a significant negative difference of attack frequency on witness.

2. For the fungus *Phoma macdonaldi* attack, the best behavior and we appreciate as the most tolerant line was , 09MF -2 because it registered a significant negative difference of attack frequency on witness.

3. All the sunflower lines we analyzed in 2009 point out a good tolerance to both fungus and there are pretty good chances to stop this funguses attack with a good spraying plan.

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