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

COMPORTAMENTUL UNUI SORTIMENT DE HIBRIZI DE FLOAREA SOARELUI LA ATACUL PRINCIPALILOR AGENȚI PATOGENI ÎN CONDIȚIILE DE LA STAȚIUNEA DIDACTICA A U.S.A.M.V.B. TIMIŞOARA

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Abstract: *In the present paper are presented results for the year 2008 concerning behavior of an assortment of 32 sunflower lines from Monsanto on pathogen attack, in natural conditions at Didactic Station of Banat's University Of Agricultural Sciences And Veterinary Medicine Timişoara. 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 these pathogens. All this underline the importance of a new technology for sunflower, a technology which must bring some efficient measures to fight against these sunflower endemic pathogens.*

Rezumat: *În prezenta lucrare sunt redate rezultatele din anul 2008 a evaluării comportamentului unui lot de 32 de linii de floarea soarelui de proveniență Monsanto la atacul agenților patogeni în condiții de infecție naturală la Stațiunea Didactică a Universității de Ştiințe Agricole şi Medicină Veterinară a Banatului Timişoara. Este binecunoscut faptul că zona în care este amplasat câmpul de experiență este în fiecare an ținta atacurilor unor agenți patogeni endemici pentru floarea soarelui printre care se numără Phomopsis helianthi şi Phoma macdonaldi. Prin prezenta lucrare se dorește atragerea atenției asupra faptului că până în prezent nu s-a putut găsi nici un material genetic care să prezinte rezistență verticală la aceşti agenți patogeni, fapt care subliniază încă odată importanța elaborării unei tehnologii care să aducă o protecție cât mai eficientă împotriva agenților patogeni la floarea soarelui.*

Key words**:** *sunflower, pathogens, natural conditions*
Cuvinte cheie: *floarea soarelui, agenți patogeni, condiții naturale*

INTRODUCTION

Taking in consideration the necessity of enlargement of the hybrid assortment in Romania, the main producers of sunflower hybrid are conducting a large number of tests with their lines and hybrids in our country. One of the Monsanto trials with sunflower lines, between 2006, 2007 and 2008, 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 is 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 “08 EF4RO” 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. Afterwards there was done the statistic interpretation of the field results. The witness for statistic report was the experimental average.

In the year 2008 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.

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

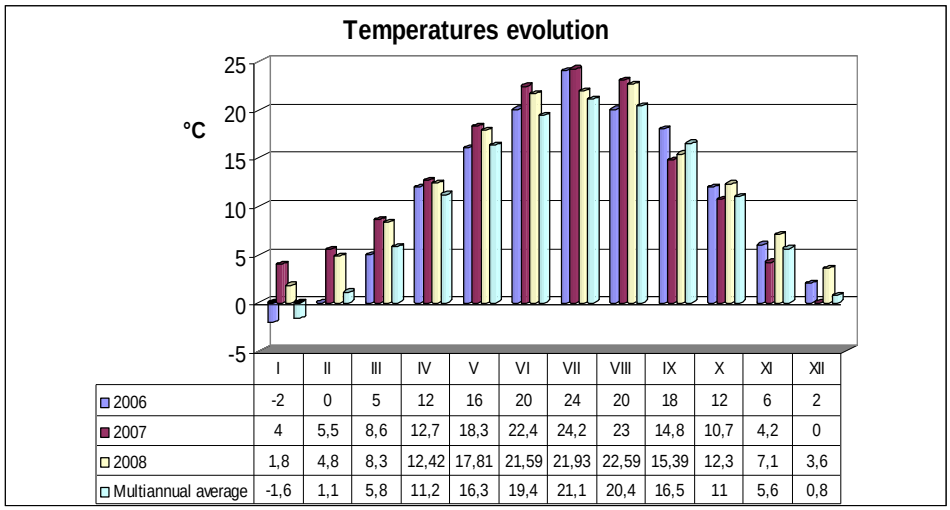
Over the vegetation period there was made a diseases motoring and a succession of evaluations of attack frequency and intensity of this diseases. All we can say about these evaluations is that they pop out the conclusion that there were two groups of diseases:

- 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.*

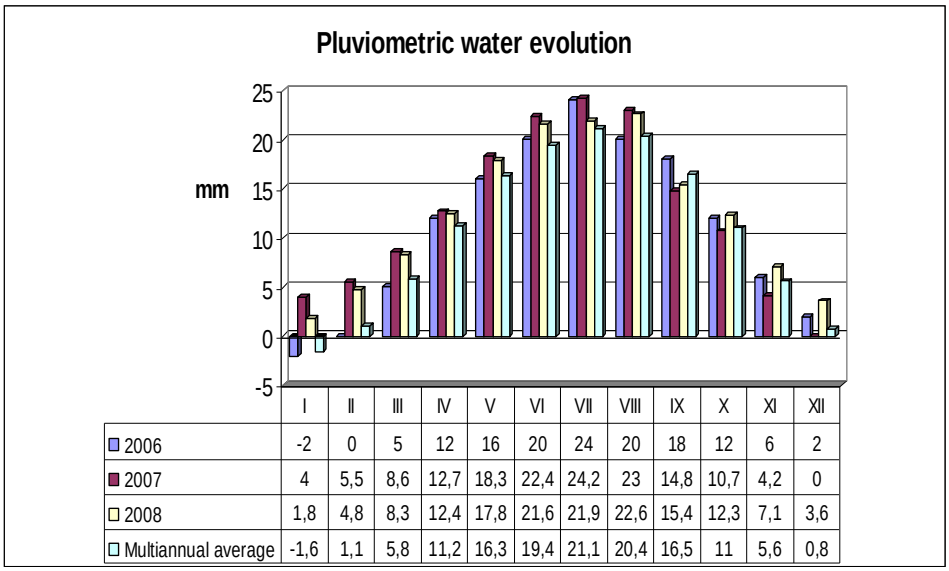
In the present paper we will present the experimental results for the pathogens *Phomopsis helianthi* and *Phoma macdonaldi*, the pathogens with highest rate of attack under the climatic conditions from the year 2008.

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.



	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 multianual average

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 means that we have to analyze the frequency of attack.

The statistic analyzes results of *Phomopsis helianthi* frequency of attack point out that there are no resistant lines but only tolerant lines. On these criteria we can put the lines 08 EF4RO-10, 08 EF4RO-11, 08 EF4RO-12 and 08 EF4RO-19 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 08 EF4RO-4 and 08 EF4RO-25 was at a significant difference from witness, which prove again that this lines are really 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. Results show that only one line, 08 EF4RO-1 was have a frequency significant negative difference on witness, which mean that it is more tolerant than all. Also there are only one line, 08 EF4RO-23, 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 08 EF4RO-14 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.

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	08 EF4RO-1	16	15	15	15.3	2,0	-	8	8	8	8	0,3	-
2	08 EF4RO-2	11	15	20	15.3	2,0	-	5	10	10	8,3	0,7	-
3	08 EF4RO-3	17	12	15	14.6	1,3	-	8	5	6	6,3	-1,2	-
4	08 EF4RO-4	15	20	22	19	5,7	x	10	10	15	11,6	4,0	x
5	08 EF4RO-5	10	10	15	11.6	-1,6	-	8	6	5	6,3	-1,2	-
6	08 EF4RO-6	12	10	10	10.6	-2,6	-	5	8	8	7	-0,6	-
7	08 EF4RO-7	10	18	15	14.3	1,0	-	10	10	10	10	2,3	-
8	08 EF4RO-8	17	15	15	15.6	2,3	-	10	10	10	10	2,3	-
9	08 EF4RO-9	16	10	12	12.6	-0,6	-	10	5	8	7,6	0,04	-
10	08 EF4RO-10	10	10	5	8.3	-4,9	0	5	10	3	6	-1,6	-
11	08 EF4RO-11	10	5	10	8.3	-4,9	0	5	3	5	4,3	-3,2	-
12	08 EF4RO-12	10	5	10	8.3	-4,9	0	10	5	8	7,6	0,04	-
13	08 EF4RO-13	20	15	10	15	1,7	-	8	10	8	8,6	1,04	-
14	08 EF4RO-14	12	12	15	13	-0,2	-	5	8	10	7,6	0,04	-
15	08 EF4RO-15	18	18	20	18.6	5,3	x	10	10	10	10	2,3	-
16	08 EF4RO-16	20	15	18	17.6	4,3	-	10	10	10	10	2,3	-
17	08 EF4RO-17	5	10	15	10	-3,2	-	2	5	8	5	-2,6	-
18	08 EF4RO-18	10	10	10	10	-3,2	-	5	5	8	6	-1,6	-
19	08 EF4RO-19	5	10	10	8.3	-4,9	0	5	7	8	6,6	-0,9	-
20	08 EF4RO-20	0	10	10	6.6	-6,6	00	0	5	8	4,3	-3,2	-
21	08 EF4RO-21	10	15	15	13.3	0,06	-	5	8	8	7	-0,6	-
22	08 EF4RO-22	17	15	18	16.6	3,3	-	5	10	10	8,3	0,7	-
23	08 EF4RO-23	10	15	15	13.3	0,06	-	5	10	10	8,3	0,7	-
24	08 EF4RO-24	18	20	25	21	7,7	xx	8	10	15	11	3,3	-
25	08 EF4RO-25	20	15	20	18.3	5,0	x	10	10	15	11,6	4,0	x
26	08 EF4RO-26	10	10	10	10	-3,2	-	5	5	10	6,6	-0,9	-
27	08 EF4RO-27	12	12	10	11.3	-1,9	-	5	7	5	5,6	-1,9	-
28	08 EF4RO-28	10	10	12	10.6	-2,6	-	7	5	5	5,6	-1,9	-
29	08 EF4RO-29	18	15	15	16	2,7	-	10	5	5	6,6	-0,9	-
30	08 EF4RO-30	12	15	10	12.3	-0,9	-	5	5	5	5	-2,6	-
31	08 EF4RO-31	17	15	20	17.3	4,0	-	8	8	10	8,6	1,0	-
32	08 EF4RO-32	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	08 EF4RO-1	10	10	15	11,6	-7.9	0	5	5	10	6,6	-4,7	-
2	08 EF4RO-2	17	15	22	18	-1,6	-	7	5	10	7,3	-4,0	-
3	08 EF4RO-3	15	20	12	15,6	-3,9	-	10	15	10	11,6	0,2	-
4	08 EF4RO-4	25	20	20	21,6	2,0	-	15	15	15	15	3,6	-
5	08 EF4RO-5	32	28	15	25	5,3	-	20	15	10	15	3,6	-
6	08 EF4RO-6	27	30	18	25	5,3	-	15	20	15	16,6	5,2	-
7	08 EF4RO-7	15	12	16	14,3	-5,3	-	10	10	15	11,6	0,2	-
8	08 EF4RO-8	15	10	21	15,3	-4,3	-	10	5	15	10	-1,3	-
9	08 EF4RO-9	20	15	18	17,6	-1,9	-	10	10	10	10	-1,3	-
10	08 EF4RO-10	17	20	15	17,3	-2,3	-	10	10	10	10	-1,3	-
11	08 EF4RO-11	27	22	32	27	7,3	-	15	10	20	15	3,6	-
12	08 EF4RO-12	15	20	12	15,6	-3,9	-	10	15	5	10	-1,3	-
13	08 EF4RO-13	30	25	26	27	7,3	-	15	15	15	15	3,6	-
14	08 EF4RO-14	23	30	28	27	7,3	-	15	20	20	18,3	6,9	x
15	08 EF4RO-15	26	22	20	22,6	3,0	-	15	10	10	11,6	0,2	-
16	08 EF4RO-16	15	15	15	15	-4,6	-	5	5	5	5	-6,3	-
17	08 EF4RO-17	28	20	22	23,3	3,6	-	15	10	10	11,6	0,2	-
18	08 EF4RO-18	17	12	15	14,6	-4,9	-	10	5	5	6,6	-4,7	-
19	08 EF4RO-19	20	15	12	15,6	-3,9	-	15	10	5	10	-1,3	-
20	08 EF4RO-20	15	17	20	17,3	-2,3	-	10	10	10	10	-1,3	-
21	08 EF4RO-21	21	12	16	16,3	-3,3	-	15	5	10	10	-1,3	-
22	08 EF4RO-22	32	10	32	24,6	5,0	-	20	5	20	15	3,6	-
23	08 EF4RO-23	30	34	18	27,3	7,6	x	20	15	10	15	3,6	-
24	08 EF4RO-24	25	23	22	23,3	3,6	-	15	10	10	11,6	0,2	-
25	08 EF4RO-25	30	20	26	25,3	5,6	-	20	10	10	13,3	1,9	-
26	08 EF4RO-26	20	15	15	16,6	-2,9	-	15	10	10	11,6	0,2	-
27	08 EF4RO-27	27	30	20	25,6	6,0	-	15	20	10	15	3,6	-
28	08 EF4RO-28	12	5	15	10,6	-8,9	-	5	5	10	6,6	-4,7	-
29	08 EF4RO-29	20	25	25	23,3	3,6	-	10	15	15	13,3	1,9	-
30	08 EF4RO-30	16	18	18	17,3	-2,3	-	5	10	10	8,3	-3,0	-
31	08 EF4RO-31	21	15	18	18	-1,6	-	10	5	10	8,3	-3,0	-
32	08 EF4RO-32	10	15	14	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

CONCLUSIONS

Experimental results and statistic interpretation point out the following conclusions:

1. Fungus *Phomopsis helianthi* was present in all experimental trials, and the best behavior on this fungus attack was at lines 08 EF4RO-10, 08 EF4RO-11, 08 EF4RO-12 and 08 EF4RO-19 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 08 EF4RO-1 because it registered a significant negative difference of attack frequency on witness.

3. All the sunflower lines we analyzed in 2008 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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