

THE BEHAVIOR OF SOME SUNFLOWER HYBRIDES AGAINST THE MAIN PATHOGENS DURING 2018 IN DOBROGEA

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Abstract: In this paper, the behavior of 15 sunflower hybrids was observed at the attack of the main pathogens (*Phomopsis helianthi*, *Sclerotinia sclerotiorum*, *Alternaria helianthi*) on demonstrative plots set up at S.C. SPORT AGRA SRL in Amzacea, Constanta County, within the climate conditions of year 2018. The hybrids taken into account come from seed companies: Ciproma, Syngenta, Euralis, Limagrain and Pioneer. Sunflower culture technology was the same for all hybrids. Foliar treatments with Pictor 0.5 l/ha fungicide were performed against pathogens. Observations were performed between July and August 2018. Crop technology included pre-emergent herbicide Gardoprim Plus 3.5 l/ha and post-emergent herbicide, Listego PLUS 2 l/ha which limited the weed and *Orobanche cumana* attack.

Key words: sunflower, hybrids behavior, Dobrogea, yields

INTRODUCTION

Farmers have to choose the sunflower (*Helianthus annuus* L.) hybrids from a highly diversified offer of foreign hybrids accepted for cultivation in our country, which is changing from one year to another. Thus, it is absolutely necessary for them to know the behavior of sunflower hybrids to the main pathogens as well as their productions under soil and climatic conditions especially for the new ones that are less known or even unknown (Ion et al., 2010).

Alternaria blight caused by *Alternaria helianthi* (Hansf.) Tubaki & Nishihara is an important fungal disease of sunflower that causes significant yield losses from 27 to 80% (Balasubrahmanyam & Kolte 1980) affecting the quality of seed and its germination (Hiremath & Kulkarni 1990). White mold attributed to *Sclerotinia sclerotiorum* (Lib) de Bary was and remain one of the most widely spread pathogens from Romania. Stem canker caused by *Phomopsis helianthi* Munt.-Cvet. et al. has become one of the most dangerous diseases of sunflower worldwide since first described from the former Yugoslavia (Muntanola-Cvetkovic et al., 1981; Jinga et al., 2016).

The paper aimed to present the behavior of sunflower hybrids to the main pathogens, and the yields obtained in 2018 at S.C. SPORT AGRA SRL Amzacea, Constanța County, on demonstrative plots.

MATERIALS AND METHODS

The hybrids taken into account come from seed companies: Ciproma, Syngenta, Euralis, Limagrain and Pioneer. The experience has been organized at S.C. SPORT AGRA S.R.L. Amzacea, Constanta on demonstrative plots. The area of each plot was 1120 m², the density was 63000 grains/ha. Seeding date was April 11. The study followed the behavior of 15

sunflower hybrids. The field of agriculture company is situated in the South Dobrogea Plateau (South-Eastern Romania), represented by cambic chernoziom with a profile deeper than other chernozioms, a blackish-brown soil of 40-50 cm thickness, medium texture (Demeter, 2009). The content of nutrients was: mobile P index -72; N index -4; K index -200; humus -3.11%; neutral pH -7.2. The climate is deeply temperate continental, with an average annual temperature of 10.7 -11.7 °C, with a high temperature in the period 20th June to 15th August. Quantity of precipitations during the vegetation period was presented in Table 1.

Precipitation was atypical in June and July representing 223 mm, making possible a high attack of the main pathogens of sunflower crops as it is shown in the results.

Table 1. Precipitation during 2018 growing season of sunflower (Amzacea, Constanta)

	Month								
	Jan.	Feb.	March	Apr	May	June	July	Aug.	
Days	The growing season 2018: Precipitation (mm) for 10-day periods								Sum
1-10	0	9	6	2	64	35	98	0	214
11-20	44	31	37	0	28	0	2	0	142
21-31	19	80	26	0	0	41	47	0	213
Sum	63	120	69	2	92	76	147	0	569
Days	Average 1961-1990 : monthly values of precipitation (mm)								Sum
1-31	27.7	24.0	29.1	31.8	37.7	47.1	38.9	37.4	464.0

The attack rate (AR) was calculated with the formula $AR = F \times I / 100$ (F% -frequency of the attacked organs, I % -intensity of organs attack). Observations on phytosanitary status of sunflower hybrids and material sampling were made on July 16 and August 7, 2018 (Figure 1 and 2). There are presented technological elements such as: plant density, flowering and harvest dates; humidity at harvest and yields.

Weeds were removed using preemergent herbicide Gardoprim Plus 3.5 l/ha (S-metolaclo 312.5 g/l + terbutilazin 197.5 g/l) and postemergence herbicide Listego Plus 2 l/ha (imazamox 25 g/L), applied to 4-6 leaves of sunflower, were used. The main pests which were present in the first part of growth cycle were removed with seeds treatment using Maxim XL 035 FS 5 l/t (25 g/l fludioxonil 19.7 g/l metalaxil-M). Later, when at the top of the stem the bud starts to form, Pictor 0.5 l/ha (boscalid and dimoxystrobin) was applied against the main pathogens.

The preceding crop was wheat, 6-7 plants/m², the fertilizers applied were represented by Agrisol 20.10.10+10S, 190 kg/ha.

It is noteworthy to mention that obligatory parasitic plant *Orobanche cumana* was kept under control using resistant to imazamox hybrids. The product used was Listego Plus 2 l/ha.

RESULTS AND DISCUSSIONS

At the observations of July, there was a high AR to *Ph. helianthi* between 1.5 and 11.25% at the Neostar and Suria hybrids, respectively. For *A. helianthi*, AR ranged between 3.75 and 25% for the same hybrids (Table 2).

Table 2. Phytosanitary status - July 16

HYBRID	Pathogen								
	<i>Sclerotinia sclerotiorum</i>			<i>Phomopsis helianthi</i>			<i>Alternaria helianthi</i>		
	F (%)	I (%)	AR (%)	F (%)	I (%)	AR (%)	F (%)	I (%)	AR (%)
Suria	1	100	1	45	25	11.25	100	25	25
ES-Genesis	0	0	0	20	10	2	35	15	5.25
ES-Janis	2	100	2	35	20	7	70	20	14
ES Loris CLP	0	0	0	25	20	5	35	15	5.25
ES Electric CLP	0	0	0	20	10	2	35	15	5.25
SY Diamantis	0	0	0	20	10	2	35	15	5.25
SY Neostar	0	0	0	15	10	1.5	25	15	3.75
SY Bacardi	0	0	0	25	20	5	70	25	17.5
SY Gracia	0	0	0	20	15	3	35	20	7
LG 5555 CLP	0.5	100	0.5	35	20	7	75	30	22.5
LG 56635 CLP	0	0	0	35	15	5.35	70	30	21
LG 59580 SX	0.8	100	0.8	20	10	2	80	20	16
P64LE25	0	0	0	25	10	2.5	50	20	10
P64LE99	0	0	0	25	20	5	35	20	7
P64LE125	0	0	0	35	15	5.25	60	20	12

In August, due to the abundant rainfall in July (147 mm), we observed the occurrence of *Sclerotinia sclerotiorum* pathogenic attack on studied hybrids. Also to *Ph. Helianthi* and *A. helianthi*, the AR increased up to 35.75% (Suria) and 45% (Suria) respectively (Table 3).

Table 3. Phytosanitary status – August 7

Hybrid	Pathogen								
	<i>Sclerotinia sclerotiorum</i>			<i>Phomopsis helianthi</i>			<i>Alternaria helianthi</i>		
	F (%)	I (%)	AR (%)	F (%)	I (%)	AR (%)	F (%)	I (%)	AR (%)
Suria	1	100	1	65	55	35.75	100	45	45
ES Genesis	0	0	0	35	14	4.9	40	20	8
ES Janis	8	100	8	45	30	13.50	80	50	40
ES Loris CLP	5	100	5	55	30	16.50	65	40	26
ES Electric CLP	2	100	2	40	20	8	75	20	15
SY Diamantis	1	100	1	30	20	6	55	25	13.75
SY Neostar	0	0	0	25	15	3.75	45	35	15.75
SY Bacardi	0	0	0	30	30	9	80	35	28
SY Gracia	0	0	0	40	20	8	60	20	12
LG 5555 CLP	5	100	5	55	20	11	85	30	25.5
LG 56635 CLP	0	0	0	45	30	13.5	85	30	25.5
LG 59580 SX	3	100	3	40	20	8	90	20	18
P64LE25	2	100	2	35	20	7	70	20	14
P64LE99	0	0	0	35	20	7	45	20	9
P64LE125	0	0	0	35	15	5.25	60	20	12

Due to the agro-technical measures applied to these demonstrative lots this year (balanced fertilization and vegetation treatments), very good yields were obtained between 3281 kg/ha and 4254 kg/ha to Suria and Genesis respectively (Table 4).

Table 4. Technological sheet for sunflower

Hybrid	No. plants/m ²	Flowering date	Harvest date	Humidity (%)	Yield (kg/ha)
Suria	6	June 22	August 16	10.9	3281
ES Genesis	6	June 17	August 16	7.6	4254
ES Janis	6	June 17	August 16	8.3	4207
ES Loris CLP	6	June 21	August 16	8.3	3739
ES Electric CLP	6.5	June 19	August 16	7.9	4071
SY Diamantis	6	June 19	August 21	7.1	3791
SY Neostar	6.5	June 17	August 16	8.7	4219
SY Bacardi	6	June 18	August 16	7.9	3928
SY Gracia	7	June 19	August 21	9.1	4047
LG 5555 CLP	6	June 16	August 16	6.9	3701
LG 56635 CLP	6	June 18	August 21	8.0	3266
LG 59580 SX	6.5	June 16	August 16	8.0	3408
P64LE25	6.5	June 20	August 21	7.6	3650
P64LE99	7	June 21	August 21	8.2	4032
P64LL125	6	June 22	August 21	7.7	3857



Figure 1. Sunflower attacked by *Ph. helianthi* (left). *A. helianthi* (middle) and *S. sclerotium* (right)



Figure 2. Sunflower experimental field

CONCLUSIONS

ES Janis hybrid was the most susceptible to *S. sclerotium* pathogenic attack.
Suria hybrid was the most susceptible to *Ph. helianthi* and *A. helianthi*.
The highest yields was recorded with ES Janis -4207 kg/ha and ES Genesis -4254 kg/ha.

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