

SUNFLOWER YIELD AND YIELD COMPONENTS UNDER FIELD CONDITIONS OF ARDS SIMNIC

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ABSTRACT

This paper presents the results of the research carried out on five sunflower hybrids at ARDS Simnic, Craiova, under the climatic conditions of 2020 year, regarding the number of plants/plot, plant height, head diameter and the yield. Sunflower hybrids were found significantly different as compared to control (Performer) for all the traits studied. Hybrid FD 18E41 proved to be the best with a maximum yield of 3.06 t/ha, a number of plants/plot of 109, a plant height of 139.3 cm, and with a head diameter of 17 cm. This sunflower hybrid can be successfully grown in ARDS Simnic area due to the best adaptation to local conditions.

INTRODUCTION

Sunflower (*Helianthus annuus* L.) is one of the important oil crops cultivated in the world, which was ranked the 3rd after soybean and rapeseed. In Romania, it is grown on an area of 1006 thousand hectares, with a production of 3062 thousand tonnes sunflower seed (FAO, 2018).

Previous studies made on sunflower have showed that it can easily adapt and perform well under a variety of climate and soil condition (Anjum et al., 2012; Canavar et al., 2010).

Although sunflower has high yield with great adaptation capacity, numerous factors such as drought, heat, weeds, soil, etc can cause substantial yield losses to sunflower and consequently, the cultivation of the most suitable hybrids, for specific area is of major importance.

Drought is an abiotic factor that limiting the yield of cultivated plants throughout the world, therefore the development of drought tolerant

genotypes is an important breeding objective.

The Oltenia area is often affected by drought; here only two out of ten years are favourable to agricultural crops (Bonea, 2016; Bonea and Urechean, 2019; Bonea, 2020 a; b).

Many researchers reported that the elements that are participating in the yield formation (yield components and the yielding capacity) are specific traits to the cultivated genotype, but these are influenced by the environmental and technological factors (Bonea and Urechean, 2020; Ion et al., 2018; Radu and Bonea, 2020; Sălceanu et al., 2011; Sălceanu and Olaru, 2017; Urechean et al., 2019).

The objective of the study is to check the performance of the sunflower hybrids for various yield components under the conditions of ARDS Simnic, Dolj.

MATERIAL AND METHOD

This experiment was conducted in 2020 year at the ARDS Simnic, Craiova and was laid out in randomized complete block design with three replications.

The experiment comprised of five sunflower hybrids: PERFORMER, FD 18E41, FD 18CL58, T 19-6A and Y 19-20A1.

The crop was sown in 11.04.2020. The complex fertilizer NPK 20-20-0 (250 kg/ha) were applied.

The crop was kept weed free by hoeing twice during the growth period and by used Dual Gold 1.5 l/ha. All other agronomic practices were kept uniform for all the plots during the entire growth period.

Observations during the course of study regarding the number of plants/ha, plant height (cm), head diameter (cm), yield (t/ha) were recorded using standard procedures.

The year of study 2020 was not very favourable to sunflower because of the drought during April, as well as because of the extremely high temperatures recorded all over the year (except May).

The collected data were analyzed statistically by using analysis of variance and least significant difference test (LSD) was applied to compare the differences among hybrids.

RESULTS AND DISCUSSIONS

Number of plants/plot

Statistical analysis of the data revealed that number of plants/plot was significantly affected by hybrids (Table 1).

Maximum plant population was observed in hybrid T 19-6A (125) and FD 18CL58 (111). For the other hybrids

tested, the plant population was statistically similar to that of the control (Performer).

According to Sarwar et al., (2013) these differences among hybrids for plant population area may be attributed to the better germination percentage.

Table 1

Influence of the hybrid on the number of plants/plot

No. crt.	Hybrid	Number of plants/plot	Relative number of plants/plot (%)	Difference (number)	Significance
1	PERFORMER (control)	84	100	-	-
2	FD 18E41	109	130	+25	ns
3	FD 18CL58	111	132	+27	*
4	T 19-6A	125	149	+41	**
5	T19 -20A1	83	99	-1	ns

LSD 5% = 27.0; LSD 1% = 39.0; LSD 0.1 % = 56.0

Plant height

The plant height showed significant difference among the sunflower hybrids tested (Table 2). These findings are in accordance with Iqbal et al., (2017) and Radu and Bonea (2020) who also reported significant differences

for plant height among sunflower hybrids tested.

These differences might be due to the genetic potential of hybrids and agro-climatic conditions.

Comparison with control indicated that minimum plant height (114.0 and 116

cm, respectively) was recorded in case of FD 18CL58 and T 19-6A .

Maximum plant height of 144.0 cm and 139.3 cm, respectively, was recorded in case of T 19-20A1 and FD 18E41, but these values were statistically similar to the control value.

According to Igrasan et al., (2017), the variation in plant height of various sunflower hybrids growing in identical field environments is likely explained by their different genetic makeup.

Table 2

Influence of the hybrid on the plant height

No. crt..	Hybrid	Plant height (cm)	Relative plant height (%)	Difference (cm)	Significance
1	PERFORMER (control)	146.7	100	-	-
2	FD 18E41	139.3	95	-7.4	ns
3	FD 18CL58	114.0	78	-32.7	000
4	T 19-6A	116.0	79	-30.7	000
5	T19 -20A1	144.0	98	-2.7	ns

LSD 5% = 11.6; LSD 1% = 16.5; LSD 0.1 % = 23.9

Head diameter

Comparative evaluation of head diameter in sunflower hybrids revealed that this trait was affected significantly by hybrids tested (Table 3).

The maximum value for this trait was observed at control Performer (17.3 cm). For the hybrids FD 18E41 and T 19-20A1, the head diameter was statistically similar to that of the control.

The minimum head diameter (11.7 and 14.3 cm, respectively) cm), was

recorded in case of FD 18CL58 and T 19-6A.

Other researchers have reported the head diameter of 14.5 – 20.7 cm (Popescu et al., 2016), 11.2 – 14.4 cm (Ion et al., 2018) and 12.2-14.7 (Radu and Bonea, 2020).

According to Borleanu and Bonea (2020) head diameter can be good selection criteria in breeding program to obtain the maximum seed yield in sunflower hybrids.

Table 3

Influence of the hybrid on the head diameter

No. crt.	Hybrid	Head diameter (cm)	Relative head diameter (%)	Difference (cm)	Significance
1	PERFORMER (control)	17.3	100	-	-
2	FD 18E41	17.0	98	-0.3	ns
3	FD 18CL58	14.3	83	-3.0	000
4	T 19-6A	11.7	68	-5.6	000
5	T19 -20A1	17.0	98	-0.3	ns

LSD 5% = 1.4; LSD 1% = 2.0; LSD 0.1 % = 2.9

Yield

The data presented in Table 4 indicate that the effect of hybrids on yield was significant. The yield varied between 2.23 and 3.06 t/ha.

Maximum yield (3.06 t/ha) was obtained by FD 18E41, and might be due to its higher genetic potential and its better adaptability under present agro-climatic conditions.

For the other hybrids tested, value for the yield was statistically similar to that of the control.

For several tested hybrids of sunflower in the different drought conditions at ARDS Simnic, Urechean et al., (2012) reported the yields between 0.85 and 1.85 t/ha; Popescu et al. (2017)

the yields between 0.97 and 2.16 t/ha, and Radu and Bonea (2020) the yields between 2.70-3.57 t/ha. So, the genotype, the quantity of rainfall and the air temperature from the growing season influences the growth and yield of sunflower hybrids.

Table 4

Influence of the hybrid on the yield

No. crt.	Hybrid	Yield (t/ha)	Relative yield (%)	Difference (t/ha)	Significance
1	PERFORMER (control)	2.48	100	-	-
2	FD 18E41	3.06	123	+0.61	*
3	FD 18CL58	2.35	95	-0.13	ns
4	T 19-6A	2.23	90	-0.25	ns
5	T19 -20A1	2.85	115	+0,37	ns

LSD 5% = 0.52; LSD 1% = 0.74; LSD 0.1 % = 1.08

CONCLUSIONS

For the specific growing conditions from ARDS Simnic, Craiova in the climatic conditions of 2020, the hybrid FD 18E41 proved to be the best with a maximum yield of 3.06 t/ha, a number of plants/plot of 109, a plant height of 139.3 cm, and with a head diameter of 17 cm.

This sunflower hybrid can be successfully grown in ARDS Simnic area due to the best adaptation to local conditions.

Generally, yield and yield components were affected by water stress for all tested hybrids comparatively with the values recorded in other well-watered years.

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