

## MEASUREMENTS CONCERNING SOME YIELD ELEMENTS ON SUNFLOWER CULTIVARS IN THE CLIMATIC CONDITIONS OF 2016 AT S.C.D.A. SIMNIC

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**Keywords:** *sunflower, cultivars, drought tolerance, physiologic maturity, yields*

### ABSTRACT

*Within the frame of the ADER 1.1.3. project „Creation of sunflower hybrids with improved drought and extreme temperatures resistance” there were established two trials, involving lines and hybrids.*

*Most of the hybrids registered yields above 4.000 kg /ha, although the rainfall in the critical phases were very low, thus showing the drought tolerance of most of the studied hybrids. With respect to the registered yields of the studied lines, most of them were above 2.000 kg/ha. There are lines with registered yields above 3.000 kg/ha, with the maximum registered yield of 3.790 kg/ha.*

*The physiological maturity – most of the studied hybrids reach earlier this stage compared to the other hybrids. Some of the studied lines reached their physiological maturity four days earlier.*

### INTRODUCTION

Sunflower is grown in Romania under different climatic conditions. As a result, there is a wide range of sunflower cultivars present in Romania, their production behavior research under various conditions being very necessary. The creation of new hybrids and sunflower lines with improved drought and extreme temperatures tolerance is more than necessary in the actual climatic conditions worldwide.

### MATERIALS AND METHODS

The trials were established in 2016 for the sunflower crop and there were observed the yield elements within the vegetation period for hybrids and lines - created and tested for improved drought and extreme temperatures tolerance. The trials were established at the Agricultural and Development Research Station Șimnic - Craiova on a preluvosoil, pseudogleic in its depth, low in humus (only in the first 25 cm the humus percentage is 2, 35), medium supplied with phosphorus and potassium, with a moderate calcium and sodium content, without being endangered by alkalization or salinization (C.V. Popescu., C. Bora, 2009).

### RESULTS AND DISCUSSIONS

The cultivars and the technologies used for the establishment of these experimental fields were recommended within the frame of the ADER 1.1.3. project.

The climatic data registered in 2016 are presented in table 1. From table 1, it can be observed that in the month of July, a month with maximum water consumption, the rainfall was inferior to the monthly multiannual average, not covering the sunflower crop's monthly requirements.

The sowing dates for the cultivars were 18th and 19th of April 2016 and the sunflower crop's registered emergence was the 4th of May 2016. Fertilisation consisted in applying 250 kg/ha 20.20.0. type complex fertilizers and the weeds' control consisted in applying a preemergent dose of 1,5 l/ha of DUAL GOLD.

**Table 1**

**Climatic data 2015 - 2016**

Month	Temperatures (°C)			Rainfall (mm)		
	Monthly average	Monthly multiannual average	Difference	Monthly sum	Monthly multiannual sum	Difference
<b>October</b>	11,0	11.8	-0.8	70,3	44.5	25.8
<b>November</b>	8,9	5.5	3.4	115,2	44.9	70.3
<b>December</b>	4,7	0.4	4.3	0	45.1	-45.1
<b>January</b>	-2,5	-1.4	-1.1	66,2	32.7	33.5
<b>February</b>	7,2	1.0	6.2	37,3	30.6	6.7
<b>March</b>	7,7	5.6	2.1	127,2	33.7	93.5
<b>April</b>	14.7	11.8	2.9	48,1	46.0	2.1
<b>May</b>	16.3	16.9	-0.6	101.2	66.9	34.3
<b>June</b>	21.9	20.4	1.5	121.3	67.9	53.4
<b>July</b>	23.9	22.6	1.3	44.1	61.5	-17.4
<b>August</b>	23.1	22.1	1.0	26.0	48.9	-22.9
<b>September</b>	19.5	17.5	2.0	40.2	42.4	-2.2
<b>Total/average</b>	<b>13.03</b>	<b>11.2</b>	<b>1.83</b>	<b>797.1</b>	<b>565.1</b>	<b>232</b>

Harvest was done as follows: the trial with the 16 tested hybrids on the 5<sup>th</sup> of September 2016, and the trials involving the other 34 hybrids and 81lines on the 7<sup>th</sup> of the same month.

The yields of the studied hybrids and lines are presented in tables 2 and 3.

By analyzing the registered the yields for the studied hybrids (table 2), it can be observed that, in general, they were between 3.003 kg/ha for the no. 6 hybrid within the 34 hybrids trial and 5.575 kg/ha for the no.14 hybrid within the 16 hybrids trial. Most of the hybrids registered yields higher than 4.000 kg /ha, although the rainfall in the critical phases were very low, thus showing the drought tolerance of the majority of the tested hybrids.

**Table 2**

**Sunflower hybrids – registered yield results**

No.	Hybrid	Yield (Kg/ha)	Standard yield (Kg/ha)	Plant height (cm)	Calatidium diameter (cm)	TKW (gr.)
1	F 708	4.758	4.912	137,2	18,0	46
2	Favorit	3.758	3.872	146,2	17,4	42
3	Performer	4.053	4.163	160,0	18,7	42
4	CDIL HS 15 M6	4.433	4.570	133,5	19,2	41
5	FDI15T5A	4.325	4.426	141,0	17,2	43
6	FDI5T3A	3.647	3.731	139,0	18,7	35
7	FDIHS15M10	4.901	5.038	128,7	18,0	39
8	FDI15T2A2	4.655	4.791	164,7	20,7	42
9	FDS LHC 15 M5	3.946	4.066	131,5	19,3	41
10	FDI 15 T 12 A	3.785	3.895	130,8	17,7	40
11	SU MAMA 2	4.540	4.672	144,5	20,7	47
12	CHSU 10A	4.249	4.374	150,2	17,2	43
13	T 7 A 1	4.740	4.897	137,7	17,5	43
14	T 11 A	5.370	5.575	125,5	16,3	42
15	VL IMI M1	4.182	4.314	129,0	18,3	41
16	VL IMI M15	4.499	4.637	131,5	19,0	40
1	Stupina 1d	3.437	3.471	132,8	14,5	59
2	Stupina 2 d	3.593	3.639	128,0	15,3	46

3	Stupina 3d	4.111	4.156	145,2	16,2	51
4	Stupina4d	3.406	3.451	125,0	15,0	54
5	Stupina 6d	3.111	3.166	131,8	15,7	43
6	Stupina 8d	2.973	3.003	121,3	15,8	49
7	Stupina 10d	3.687	3.739	129,0	18,0	47
8	Stupina 12d	4.286	4.334	123,7	16,8	44
9	Stupina 14d	3.928	3.967	142,2	16,8	47
10	Stupina15d	4.664	4.720	133,3	20,7	50
11	Standard	4.696	4.769	137,7	18,0	53
12	Stupina16d	3.785	3.838	127,0	17,3	46
13	Stupina 17d	3.647	3.712	132,7	16,8	46
14	Stupina 21d	4.107	4.157	119,5	19,0	45
15	Stupina 23d	4.741	4.807	124,3	21,5	44
16	Stupina24d	4.901	4.962	134,0	17,5	37
17	Stupina 26d	4.597	4.662	136,7	17,3	49
18	Stupina 27d	4.258	4.318	131,7	17,3	45
19	Standard	4.540	4.603	145,7	20,3	42
20	Stupina 28d	4.441	4.499	140,3	18,2	61
21	Stupina 30d	4.526	4.607	138,2	18,3	45
22	Stupina 32d	4.093	4.160	125,2	17,2	51
23	Stupina 33d	4.905	4.981	126,2	18,0	43
24	Stupina 34d	4.303	4.374	114,7	16,2	37
25	Stupina 37d	4.513	4.596	139,8	17,5	53
26	Stupina 38d	3.591	4.006	129,2	16,7	43
27	Stupina	5.196	5.250	160,5	17,2	44
28	Stupina 41d	3.959	4.014	122,3	16,7	44
29	Standard	4.655	4.731	136,7	18,0	49
30	Stupina 44d	4.272	4.346	132,3	16,3	38
31	Stupina 29d	4.245	4.311	142,8	18,5	46
32	Stupina 22d	4.767	4.859	144,0	17,3	41
33	Stupina 25d	4.566	4.632	138,8	18,3	48
34	Stupina 36d	3.651	3.710	124,2	18,0	38

**Table 3**

**Sunflower crop lines – registered yield results**

No.	Hybrid	Yield (Kg/ha)	Standard yield (Kg/ha)	Plant height (cm)	Calatidium diameter (cm)	TKW (gr.)
1	Simnic 1b/016	2.107	2.110	82,2	14,6	29.9
2	Simnic 2b/016	2.500	2.498	87,2	15,6	25.2
3	Simnic 3b/016	3.018	3.004	97,4	16,6	28.1
4	Simnic 4b/016	3.036	3.077	84,6	14,6	31.8
5	Simnic 5b/016	2.964	2.973	79,4	17,2	26.9
6	Simnic 6b/016	3.197	3.207	97,6	19	32.7
7	Simnic 7b/016	2.179	2.202	89,8	17,6	32.0
8	Simnic 8b/016	2.357	2.360	85,2	16,4	29.1
9	Simnic 9b/016	1.946	1.886	68,6	12,8	35.6
10	Simnic 10b/016	2.429	2.445	82	12,8	33.8
11	Simnic 11b/016	2.875	2.879	83,2	17,2	28.4
12	Simnic 12b/016	3.107	3.065	90,4	17,4	31.6
13	Simnic 13b/016	3.054	3.081	98,4	17,6	33.9
14	Simnic 14b/016	2.554	2.582	102,4	15,8	30.0
15	Simnic 15b/016	2.179	2.145	104,6	15,8	38.9
16	Simnic 716b/016	2.054	2.055	98,8	16,6	28.7
17	Simnic 819b/016	2.660	2.738	116,6	17,2	46.5
18	Simnic 20b/016	1.196	1.208	98,8	16,2	47.8
19	Simnic 21b/016	3.732	3.769	124,2	17	56.8
20	Simnic 22b/016	2.322	2.376	106	14,4	41.4
21	Simnic 23b/016	2.536	2.563	127,2	16	28.1
22	Simnic 24b/016	2.214	2.246	124	14	42.3

23	Simnic 27b/016	2.286	2.321	127	14,6	43.4
24	Simnic 28b/016	2.196	2.225	129	15,8	45.5
25	Simnic 29b/016	2.232	2.260	122	17,6	50.7
26	Simnic 30b/016	1.250	1.269	104	14,8	32.4
27	Simnic 31b/016	2.179	2.227	105,8	14,4	45.1
28	Simnic 32b/016	1.678	1.677	110,6	14,8	39.9
29	Simnic 33b/016	2.803	2.850	114,4	15,4	40.0
30	Simnic 34b/016	2.410	2.437	92	13,4	40.3
31	Simnic 35b/016	839	852	83,4	13,2	29.5
32	Simnic 38b/016	3.232	3.261	100,4	17,6	31.4
33	Simnic 39b/016	1.697	1.717	113,2	16,4	30.0
34	Simnic 40b/016	2.607	2.634	110,8	20,8	30.6
35	Simnic 41b/016	2.322	2.342	103	14,6	34.8
36	Simnic 42b/016	929	937	88,2	11	30.1
37	Simnic 43b/016	1.321	1.337	90	14,2	29.2
38	Simnic 44b/016	2.857	2.876	113,2	18,4	33.5
39	Simnic 45b/016	1.768	1.782	106,8	16,2	29.5
40	Simnic 46b/016	357	364	92,2	9,8	-
41	Simnic 47b/016	696	711	93,6	12	22.8
42	Simnic 50b/016	321	329	82	11,4	-
43	Simnic 51b/016	661	668	95,8	13,2	28.7
44	Simnic 52b/016	2.446	2.479	99	19	43.7
45	Simnic 53b/016	2.696	2.723	97,2	18,8	49.2
46	Simnic 54b/016	3.732	3.767	98,6	18,8	48.2
47	Simnic 55b/016	911	927	87,4	18,2	49.0
48	Simnic 56b/016	1.893	1.928	97,2	19	40.4
49	Simnic 57b/016	1.572	1.600	90	13,8	41.5
50	Simnic 58b/016	1.357	1.382	90,4	13,6	37.3
51	Simnic 61b/016	2.518	2.546	96,6	14,6	39.4
52	Simnic 62b/016	2.625	2.662	99	15,4	45.2
53	Simnic 63b/016	2.339	2.360	116,6	15,4	37.0
54	Simnic 64b/016	3.750	3.790	131,4	16,8	34.5
55	Simnic 65b/016	3.393	3.430	129	17	31.6
56	Simnic 66b/016	3.429	3.455	129,2	14	30.6
57	Simnic 67b/016	3.339	3.338	116,8	14	33.0
58	Simnic 68b/016	3.161	3.185	118	17,2	38.1
59	Simnic 69b/016	2.572	2.599	110,4	16,8	35.7
60	Simnic 70b/016	2.625	2.667	126,6	18,8	32.4
61	Simnic 71b	3.178	3.193	120,2	19,8	37.3
62	Simnic 72b	2.482	2.511	111,6	14,2	34.7
63	Simnic 73b/016	2.768	2.801	113	15,6	34.7
64	Simnic 76b/016	2.554	2.594	105,8	15,2	34.8
65	Simnic 77b/016	2.286	2.317	106,2	14,4	37.8
66	Simnic 78b/016	3.143	3.186	101,2	15,6	35.2
67	Simnic 79b/016	1.482	1.510	106	16	33.3
68	Simnic 80b/016	1.393	1.413	94,6	15	32.3
69	Simnic 81b/016	2.929	2.915	90,6	16,6	33.5
70	Simnic 82b/016	3.553	3.581	87	14,4	34.9
71	Simnic 83b/016	1.982	2.004	81,4	14,4	34.8
72	Simnic 84b/016	1.607	1.618	97,2	16	30.3
73	Simnic 85b/016	2.679	2.711	85	13,8	44.7
74	Simnic 86b/016	1.107	1.121	106,4	14,8	39.6
75	Simnic 87b/016	1.661	1.673	112,6	16	37.9
76	Simnic 88b/016	1.446	1.471	109,8	14,8	38.9
77	Simnic 89b/016	1.196	1.218	117,2	14,4	41.4
78	Simnic 90b/016	1.625	1.650	115,4	15,4	42.8
79	Simnic 91b/016	1.071	1.083	113,4	15,2	35.6
80	Simnic 92b/016	1.214	1.232	117,2	16,4	36.1
81	Simnic 93 b/016	804	821	111,8	15,8	42.7

Most of the registered yields for the studied lines (table 3) are higher than 2.000 kg/ha. There are lines that registered yield higher than 3.000 kg/ha, with a maximum registered yield of 3.790 kg/ha for the line no. 54.

Regarding the physiological maturity of the cultivars, it can be observed that most of the hybrids: no. 31, 33, 34, 14, 15 and 16 (table 4 and table 5), reach this stage earlier compared to the other studied hybrids.

For the studied lines (table 6) it can be observed that some of them reach their physiological maturity four days earlier.

**Table 4**

**Sunflower's phenological stages - 16 hybrids**

No.	No. of plants/trial		Emergence of the inflorescence bud	Flowering	Physiological maturity
	a	b			
1	90	89	24.06	12.07	28.08
2	95	96	22.06	10.07	28.08
3	101	96	22.06	12.07	31.08
4	102	98	22.06	8.07	31.08
5	99	93	20.06	10.07	31.08
6	98	97	22.06	12.07	31.08
7	95	93	22.06	8.07	29.08
8	116	68	20.06	14.07	26.08
9	105	96	16.06	10.07	22.08
10	103	99	16.06	6.07	24.08
11	104	82	18.06	6.07	22.08
12	110	105	18.06	8.07	24.08
13	98	87	16.06	8.07	22.08
14	100	96	16.06	3.07	18.08
15	106	91	16.06	6.07	18.08
16	105	96	16.06	6.07	18.08

**Table 5**

**Sunflower's phenological stages - 34 hybrids**

No.	No. of plants/trial		Emergence of the inflorescence bud	Flowering	Physiological maturity
	a	b			
1	84	99	22.06	12.07	30.08
2	94	97	22.06	10.07	26.08
3	90	95	22.06	10.07	26.08
4	89	84	22.06	10.07	26.08
5	93	95	24.06	14.07	22.08
6	86	84	26.06	16.07	22.08
7	84	91	26.06	16.07	22.08
8	101	91	20.06	16.07	31.08
9	93	89	20.06	12.07	31.08
10	94	91	20.06	14.07	31.08
11	81	90	20.06	10.07	28.08
12	74	82	20.06	8.07	26.08
13	83	91	24.06	14.07	28.08
14	78	94	24.06	14.07	31.08
15	80	98	17.06	10.07	31.08
16	87	98	17.06	8.07	22.08
17	81	84	20.06	2.07	22.08
18	85	71	20.06	4.07	22.08
19	64	95	20.06	8.07	26.08
20	71	100	20.06	1.07	22.08
21	83	87	20.06	3.07	24.08
22	78	98	20.06	30.06	26.08
23	85	95	20.06	5.07	24.08
24	85	108	20.06	5.07	24.08

25	88	89	20.06	2.07	24.08
26	90	95	17.06	8.07	24.08
27	89	94	17.06	8.07	28.08
28	90	87	17.06	8.07	28.08
29	81	100	17.06	8.07	16.08
30	79	91	15.06	10.07	24.08
31	75	96	12.06	6.07	16.08
32	81	102	18.06	6.07	24.08
33	89	86	18.06	1.07	16.08
34	84	93	18.06	4.07	16.08

**Table 6**

**Sunflower's phenological stages - 81 lines**

No	No. Plants/trial	Emergence of the infl. bud	Flowering	Physiological maturity	No	No. plants trial	Emergence of the infl. bud	Flowering	Physiological maturity
1	47	22.06	6.07	31.08	41	37	24.06	10.07	12.08
2	53	22.06	6.07	31.08	42	39	24.06	10.07	12.08
3	54	22.06	4.07	31.08	43	37	24.06	10.07	12.08
4	45	22.06	4.07	28.08	44	33	24.06	10.07	22.08
5	44	22.06	4.07	31.08	45	35	18.06	8.07	12.08
6	50	22.06	8.07	31.08	46	38	18.06	8.07	12.08
7	42	22.06	8.07	31.08	47	9	18.06	2.07	22.08
8	53	22.06	8.07	31.08	48	30	18.06	6.07	22.08
9	54	22.06	6.07	14.08	49	33	22.06	8.07	22.08
10	45	22.06	6.07	31.08	50	38	24.06	10.07	22.08
11	50	22.06	6.07	28.08	51	47	22.06	8.07	12.08
12	48	22.06	6.07	26.08	52	44	22.06	8.07	12.08
13	48	22.06	4.07	26.08	53	42	22.06	8.07	12.08
14	50	22.06	6.07	26.08	54	46	17.06	4.07	12.08
15	52	22.06	6.07	26.08	55	49	16.06	4.07	22.08
16	48	20.06	4.07	26.08	56	50	16.06	4.07	16.08
17	52	17.06	10.07	11.08	57	49	16.06	4.07	16.08
18	48	17.06	8.07	11.08	58	39	18.06	4.07	16.08
19	41	17.06	8.07	11.08	59	45	18.06	4.07	16.08
20	49	17.06	3.07	25.08	60	46	18.06	4.07	16.08
21	53	22.06	6.07	11.08	61	46	18.06	4.07	16.08
22	50	22.06	8.07	11.08	62	45	18.06	4.07	16.08
23	48	22.06	8.07	11.08	63	51	18.06	4.07	16.08
24	45	22.06	8.07	11.08	64	34	17.06	4.07	16.08
25	48	22.06	6.07	25.08	65	46	16.06	4.07	16.08
26	46	24.06	14.07	25.08	66	46	16.06	4.07	22.08
27	54	24.06	10.07	25.08	67	38	22.06	10.07	22.08
28	42	26.06	16.07	25.08	68	47	24.06	10.07	31.08
29	50	26.06	10.07	25.08	69	44	24.06	10.07	31.08
30	45	17.06	10.07	25.08	70	47	24.06	10.07	31.08
31	54	24.06	10.07	31.08	71	44	22.06	10.07	31.08
32	42	22.06	8.07	31.08	72	51	24.06	8.07	26.08
33	36	24.06	10.07	28.08	73	47	22.06	8.07	26.08
34	37	24.06	10.07	28.08	74	42	22.06	10.07	26.08
35	33	24.06	10.07	28.08	75	44	22.06	12.07	26.08
36	34	24.06	10.07	28.08	76	51	24.06	10.07	26.08
37	45	26.06	12.07	28.08	77	37	22.06	14.07	26.08
38	44	18.06	12.07	22.08	78	40	22.06	10.07	26.08
39	47	18.06	12.07	22.08	79	44	22.06	10.07	26.08
40	35	24.06	10.07	22.08	80	45	22.06	12.07	26.08
					81	37	24.06	14.07	26.08

## CONCLUSIONS

By analyzing the registered the yields for the studied hybrids, it can be observed that, in general, they were between 3.003 kg/ha for the no. 6 hybrid within the 34 hybrids trial and 5.575 kg/ha for the no.14 hybrid within the 16 hybrids trial. Most of the hybrids registered yields higher than 4.000 kg /ha, although the rainfall in the critical phases were very low, thus showing the drought tolerance of the majority of the tested hybrids.

Most of the registered yields for the studied lines are higher than 2.000 kg/ha. There are lines that registered yield higher than 3.000 kg/ha, with a maximum registered yield of 3.790 kg/ha for the line no. 54.

Regarding the physiological maturity of the cultivars, it can be observed that most of the hybrids: no. 31, 33, 34, 14, 15 and 16, reach this stage earlier compared to the other studied hybrids. For the studied lines, it can be observed that some of them reach their physiological maturity four days earlier.

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