

THE YIELD RESULTS OF SOME ALFALFA CULTIVARS AT S.C.D.A. ȘIMNIC – CRAIOVA

Popescu C.V. (1), Maria Schitea (2), Bora C. (3), Radu V.L (3)

(1) University of Craiova, Faculty of Agronomy, 19, Libertății Str. Craiova, Dolj, Romania; E-mail: catalin.popescu@gmail.com;

(2) National Agricultural Research and Development Institute Fundulea, 915200, Fundulea, Călărași, Romania; E-mail: schitea@ricic.ro;

(3) Research and Development Agricultural Station Simnic – Craiova, 54, Bălcești Str., Craiova, Dolj, Romania E-mail: constantinbora@yahoo.com; scda_simnic@yahoo.com

Keywords: alfalfa, cultivar, green mass, seed, fodder, yield

ABSTRACT

In the paper, there are presented the green mass and seed yields registered by various alfalfa cultivars, in the pedoclimatic conditions of the Research and Development Agricultural Station (S.C.D.A.) Șimnic – Craiova.

It can be observed that the yields of the studied lines were superior to the varieties' yields, both for the green mass and for the seeds.

Within the trials related to the green mass production, it can be observed that the highest registered yields were 63,86 t/ha at F 2507-16, followed by the F 2512-16 line by 63,19 t/ha. With respect to the seed production, the same lines and in the same order registered the highest yields.

The lack of rainfall in the months of June and August considerably diminished the registered yields. More, the fourth cut was totally compromised.

INTRODUCTION

The creation of new, more productive seed and fodder alfalfa varieties and lines, with improved drought and high temperatures tolerance is more than necessary in the actual climatic conditions worldwide (Popescu C.V. et al., 2009). In Romania, new and modern alfalfa cultivars with improved seed and fodder yields are tested (Schitea Maria et al., 2003, 2014), along with new cropping technologies both in dry and/or irrigated conditions (Bora C., 2001, 2002 and 2007; Moga I. et. al, 2005; Popescu C.V. et al., 2009). Drought and associated effects can cause serious damage to crops. In Oltenia region the drought is frequent, only two years out of ten being favorable for the crops (Urechean et al., 2008; Urechean and Bonea, 2017).

MATERIALS AND METHODS

Within the frame of the ADER 1.1.7 project – *Maximization of the vegetal protein' yields and the increase of the contribution of the atmospheric nitrogen fixation to the crop rotation optimization, through creating new leguminous seed and fodder varieties, more productive, with improved thermic and hydric stress and pathogen tolerance, mechanized crops and with superior quality at alfalfa crop*, there were established 13 trials – varieties and lines.

The seeding for the **fodder alfalfa** was done at a 12,5 cm row distance by using a seeding rate of 1.200 germinable seeds/m². The trials consisted of randomized blocks, 3 repetitions and a final plot of 10 m². For the **seed alfalfa**, the seeding rate was 250 germinable seeds/m², in rows distanced at 25 cm. For both of the crops, the seeding date was 18.03 2016.

RESEARCH RESULTS

From Table 1, it can be observed that:

- the annual monthly average temperature was superior by 0,6 °C to the multiannual monthly average - within the month of June, the monthly temperature was superior by 3 °C to the multiannual monthly average;
- the registered rainfall for 6 months was net inferior to the multiannual monthly average and the total rainfall was inferior to the multiannual monthly average by 81,7 mm;
- between 16th of Mai and the 18th of September only 89 mm rainfall was registered, on the 2nd and the 3rd of July;
- within an interval of 125 days, practically only 2 days registered rainfall.

The 2017 registered yield' results for the tested alfalfa varieties and lines are presented in the following tables.

From the data presented in table 2, it can be observed that all the lines registered superior results related to the varieties' yields, the best results for the green mass were registered at F 2512-16 line – 26,14 t/ha.

Table 1

Climatic data 2016-2017

Month	Temperature (°C)			Rainfall (mm)		
	Monthly average	Multiannual monthly average	Difference	Monthly average	Multiannual monthly average	Difference
October	10,3	11,8	-1,5	63,3	44,5	18,8
November	5,2	5,5	-0,3	75,2	44,9	30,3
December	-0,3	0,4	0,1	5,0	45,1	-40,1
January	-5,1	-1,4	-3,7	11,1	32,7	-21,6
February	1,6	1,0	0,6	31,2	30,6	0,6
March	9,8	5,6	4,2	32,1	33,7	-1,6
April	11,1	11,8	-0,7	71,1	46,0	25,1
May	16,7	16,9	-0,2	74,2	66,9	7,3
June	23,4	20,4	3,0	0	67,9	-67,9
July	24,2	22,6	1,6	89,2	61,5	27,7
August	25,4	22,1	3,3	0	48,9	-48,9
September	19,4	17,5	1,9	26,0	42,4	- 16,4
Total/average	11,8	11,2	0,6	483,4	565,1	- 81,7

Table 2

**Comparative yield results for fodder alfalfa 2017,
second year – first cut**

No.	VARIANT	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Daniela	24,33	4,87	100	Mt.
2	Madalina	24,67	4,93	101	0,06
3	F 2112 – 09	25,72	5,14	106	0,27
4	F 2113 - 09	25,09	5,02	103	0,15
5	F 2209 - 12	24,83	4,97	102	0,10
6	F 2506 – 16	25,44	5,09	105	0,22
7	F 2507 – 16	26,04	5,21	107	0,34
8	F 2509 – 16	24,93	4,99	102	0,12
9	F 2510 – 16	25,88	5,18	104	0,31
10	F 2512 – 16	26,14	5,23	105	0,36
11	Syn 1 GR - 16	23,67	4,73	97	-0,14
12	Syn 2 GR – 16	23,15	4,63	95	-0,24
13	Syn 3 AE - 16	24,03	4,81	99	-0,06

Harvest date / first cut: 15.05.2017

Table 3

Comparative observations for fodder alfalfa varieties and lines 2017, second year – first cut

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Daniela	42	43	22	9,2
2	Madalina	42	43	22	9,2
3	F 2112 – 09	44	44	23	9,3
4	F 2113 - 09	44	44	23	9,3
5	F 2209 - 12	45	44	23	9,3
6	F 2506 – 16	45	45	23	9,4
7	F 2507 – 16	45	45	24	9,7
8	F 2509 – 16	45	46	23	9,4
9	F 2510 – 16	45	45	25	9,4
10	F 2512 – 16	46	47	24	9,7
11	Syn 1 GR - 16	42	43	21	10,9
12	Syn 2 GR – 16	42	43	21	10,9
13	Syn 3 AE - 16	43	43	22	11,1

Data presented in table 4 are showing the fact that all the lines registered superior yields compared to the varieties' yields – the best yield result was registered for the F 2507-16 with a value of 21,47 t/ha. The lack of rainfall in the month of June along with the prolonged heat diminished the yields.

Table 4

Comparative yield results for fodder alfalfa 2017, second year – second cut

No.	Variant	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Daniela	19,33	3,87	100	Mt.
2	Madalina	19,07	3,81	98	-0,06
3	F 2112 – 09	20,46	4,09	106	0,22
4	F 2113 - 09	19,74	3,95	102	0,08
5	F 2209 - 12	19,88	3,98	103	0,11
6	F 2506 – 16	20,16	4,03	104	0,16
7	F 2507 – 16	21,47	4,29	111	0,42
8	F 2509 – 16	20,55	4,11	106	0,24
9	F 2510 – 16	20,38	4,08	106	0,21
10	F 2512 – 16	21,11	4,22	109	0,35
11	Syn 1 GR - 16	18,56	3,71	96	-0,16
12	Syn 2 GR – 16	18,09	3,62	94	-0,25
13	Syn 3 AE - 16	18,64	3,73	96	-0,14

Harvest date / second cut: 22.06.2017

Table 5

**Comparative observations for fodder alfalfa varieties and lines 2017,
second year – second cut**

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Daniela	40	41	20	7,4
2	Madalina	40	41	20	7,4
3	F 2112 – 09	41	42	21	8,1
4	F 2113 - 09	41	42	21	7,9
5	F 2209 - 12	41	42	21	7,8
6	F 2506 – 16	41	42	21	7,9
7	F 2507 – 16	42	43	22	8,1
8	F 2509 – 16	41	42	21	7,8
9	F 2510 – 16	41	42	21	7,9
10	F 2512 – 16	41	42	21	7,9
11	Syn 1 GR - 16	39	40	19	7,1
12	Syn 2 GR – 16	38	40	19	7,1
13	Syn 3 AE - 16	39	40	19	7,2

From the data presented in table 6, it can be observed that for all the lines the registered yields are also superior to those of the varieties, the best results being registered for F 2507-16, in value of 16,35 t/ha. The yields were diminished due to the reduced soil moisture content and rainfall, although in the first two days of the month of July the registered rainfall was 75 mm (within the interval 04.07 - 31.07. 2017 no rainfall was registered).

The lack of rainfall influenced as well the number of the cuts – only three cuts were obtained from the alfalfa fodder crop in 2017 – their comparative yields results are presented in table 8.

Table 6

**Comparative yield results for fodder alfalfa 2017,
second year – third cut**

No.	Variant	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Daniela	14,57	2,91	100	Mt
2	Madalina	14,23	2,85	98	- 0,06
3	F 2112 – 09	15,67	3,13	108	0,22
4	F 2113 - 09	14,83	2,97	102	0,06
5	F 2209 - 12	15,48	3,09	106	0,18
6	F 2506 – 16	15,52	3,10	106	0,19
7	F 2507 – 16	16,35	3,27	112	0,36
8	F 2509 – 16	15,61	3,12	107	0,21
9	F 2510 – 16	15,09	3,02	104	0,11
10	F 2512 – 16	15,94	3,19	110	0,28
11	Syn 1 GR - 16	13,88	2,78	95	-0,13
12	Syn 2 GR – 16	13,24	2,65	91	-0,26
13	Syn 3 AE - 16	13,16	2,63	90	-0,28

Harvest date / third cut: 28.07.2017

Table 7

Comparative observations for fodder alfalfa varieties and lines 2017, second year – third cut

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Daniela	34	35	16	6,1
2	Madalina	33	34	15	5,9
3	F 2112 – 09	34	35	16	6,2
4	F 2113 - 09	34	35	16	6,2
5	F 2209 - 12	34	35	16	6,2
6	F 2506 – 16	34	35	16	6,2
7	F 2507 – 16	35	36	17	6,4
8	F 2509 – 16	34	35	16	6,2
9	F 2510 – 16	34	35	16	6,1
10	F 2512 – 16	34	35	16	6,2
11	Syn 1 GR - 16	32	33	14	5,8
12	Syn 2 GR – 16	32	33	14	5,7
13	Syn 3 AE - 16	32	33	14	5,7

Table 8

Comparative yield of the cuts for fodder alfalfa varieties and lines 2017, second vegetation year

No	Variant	First cut		Second cut		Third cut		TOTAL (t/ha)	
		G.M.	D.M.	G.M.	D.M.	G.M.	D.M.	G.M.	D.M.
1	Daniela	24,33	4,87	19,33	3,87	14,57	2,91	58.23	11,65
2	Madalina	24,67	4,93	19,07	3,81	14,23	2,85	57.97	11,59
3	F 2112 – 09	25,72	5,14	20,46	4,09	15,67	3,13	61.85	12,36
4	F 2113 - 09	25,09	5,02	19,74	3,95	14,83	2,97	59.66	11,94
5	F 2209 - 12	24,83	4,97	19,88	3,98	15,48	3,09	60.19	12,04
6	F 2506 – 16	25,44	5,09	20,16	4,03	15,52	3,10	61.12	12,22
7	F 2507 – 16	26,04	5,21	21,47	4,29	16,35	3,27	63.86	12,77
8	F 2509 – 16	24,93	4,99	20,55	4,11	15,61	3,12	61.09	12,22
9	F 2510 – 16	25,88	5,18	20,38	4,08	15,09	3,02	61.35	12,28
10	F 2512 – 16	26,14	5,23	21,11	4,22	15,94	3,19	63.19	12,64
11	Syn1GR-16	23,67	4,73	18,56	3,71	13,88	2,78	56.11	11,22
12	Syn2GR–16	23,15	4,63	18,09	3,62	13,24	2,65	54.48	10,90
13	Syn3AE- 16	24,03	4,81	18,64	3,73	13,16	2,63	55.83	11,17

Considering the results for the seed production of the tested alfalfa varieties and lines trials, it can be observed that their registered seed yields are close to the standard's trial results (tables 9 and 10). The highest registered seed yield was for the line F 2507-16, valued 437 kg/ha – the harvest date was 01.08.2017.

Table 9

**Comparative seed yield for the alfalfa varieties and lines 2017,
second vegetation year**

No.	Variant	Seed yield (Kg/ha)	Yield (%)	Difference (Kg)
1	Magnat	375	100	Standard
2	Daniela	404	108	29
3	Madalina	382	102	7
4	F 2112 – 09	414	110	39
5	F 2113 - 09	409	109	34
6	F 2209 - 12	411	110	36
7	F 2506 – 16	416	111	41
8	F 2507 – 16	437	116	62
9	F 2509 – 16	409	109	34
10	F 2510 – 16	421	112	46
11	F 2512 – 16	429	114	54
12	Syn 1 GR - 16	361	96	-14
13	Syn 2 GR – 16	349	93	-26
14	Syn 3 AE - 16	366	97	-9

Table 10

**Comparative observations for seed alfalfa varieties and lines 2017,
second year**

No.	Variant	Date of floral buttons	Date of the first flower	Date of full flowering	Duration of the flowering (days)
1	Magnat	25.V	29.V	19.VI	21
2	Daniela	24.V	28.V	19.VI	21
3	Madalina	24.V	28.V	19.VI	21
4	F 2112 – 09	24.V	28.V	19.VI	21
5	F 2113 - 09	24.V	29.V	19.VI	21
6	F 2209 - 12	25.V	29.V	19.VI	21
7	F 2506 – 16	25.V	30.V	19.VI	21
8	F 2507 – 16	25.V	29.V	19.VI	21
9	F 2509 – 16	25.V	29.V	19.VI	21
10	F 2510 – 16	24.V	29.V	19.VI	21
11	F 2512 – 16	25.V	30.V	19.VI	21
12	Syn 1 GR - 16	25.V	29.V	19.VI	21
13	Syn 2 GR – 16	25.V	29.V	19.VI	21
14	Syn 3 AE - 16	25.V	29.V	18.VI	21

CONCLUSIONS

The climatic conditions of 2017, characterized by an annual average temperature superior by 0,6 °C to the multiannual, a month (June) with registered temperature superior by 3 °C to the multiannual value, a total rainfall inferior to the multiannual monthly average by 81,7 mm and an interval of 125 days practically with only 2 days of rainfall, influenced both the fodder and the seed production of the tested varieties and lines.

The highest registered yields of the green mass were 63,86 t/ha at F 2507-16, followed by the F 2512-16 line by 63,19 t/ha. With respect to the seed production, the same lines and in the same order registered the highest yields.

BIBLIOGRAPHY

1. **Bora C.**, 2001 - *Folosirea rationala a apei la lucerna pentru masa verde in conditiile unui an secetos*, Bucuresti, *Cereale si Plante Tehnice*, 5, 36-38, ISSN 1220-1197.
2. **Bora C.**, 2002 - *Calculul indirect al consumului de apa in irigarea lucernei pentru masa verde*, Volum A.S.A.S, VI, 561, ISBN 973-31-2115-0.
3. **Bora C.**, 2007 - *Efectul raporturilor de semanat asupra productiilor de plante furajere*, *Lucrari Stiintifice SCDA Simnic*, vol. XV, Craiova.
4. **Moga I., Schitea, Maria**, 2005 - *Tehnologii moderne de productie a semintelor la plantele furajere*, Editura CERES, Bucuresti.
5. **Schitea Maria, Martura Th., Dihoru Alexandrina, Bora C., Constantinescu E., Zamfir Ileana, Pricop M., Popa Fl., Samartinean Adriana, Stirbu Domnica**, 2003 - *Noi genotipuri de lucerna cu productie ridicata de furaj si samanta*, Bucuresti, *Simpozion AGRAL*, 57-62.
6. **Maria Schitea, Eustațiu Constantinescu, Constantin Bora, Lenuța Drăgan, Elena Petcu, Georgeta Oprea, Elena Petrescu**, 2014 - *Teodora și Cezara – noi soiuri de lucernă create la I.N.C.D.A. Fundulea*, An. I.N.C.D.A. Fundulea, vol. LXXXII, 2014, *Electronic ISSN 2067–7758*.
7. **Popescu C.V., Bora C.**, 2009 - *The rational use of water as a main method to combat drought*, *Analele Universității din Craiova, seria Agricultură – Montanologie – Cadastru*. Vol. XXXIX, pag. 455 - 459.
8. **Popescu C.V., Bora C.**, 2009 - *Oportunitatea irigației culturilor agricole in zona centrala a Olteniei*, Editura SITECH, Craiova.
9. **Urechean V, Bonea D.**, 2017 - *Estimate of drought tolerance at some maize hybrids grown in the Central Oltenia zone with using stress tolerance indices* .17th International Multidisciplinary Scientific GeoConference SGEM, Conference Proceedings, 29 June - 5 July, Vol. 17, Issue 61, 681-688 pp, DOI: 10.5593/sgem2017/61/S25.089
10. **Urechean V., Bonea D., Constantinescu E.**, 2008 - *The influence of the hidric stress on the capacity of growth and development at the sunflower*. *Buletin USAMV Cluj-Napoca*, vol. 65, pp 123-128