

RESEARCH ON THE PRODUCTIVE BEHAVIOUR OF SOME ALFALFA CULTIVARS IN THE PEDOCLIMATIC CONDITIONS OF S.C.D.A. ȘIMNIC – CRAIOVA

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ABSTRACT

In the paper, there are presented observations and measurements on the yields registered by alfalfa fodder and seed cultivars, in the second establishment year. It can be observed that the best yield result (70,15 t/ha) was registered by the F 2609-17 line. As for the studied varieties, Teodora registered

the highest yield (67,84 t/ha). As well, all the studied lines' yields were superior to the standard. For the seed alfalfa, it can be observed that the highest seed yields were registered by the F 2609-17 line (493 kg/ha) and by the Teodora variety, with a registered yield of 482 kg/ha.

INTRODUCTION

The feeding of a growing world population is a major global challenge, which consists to increase agricultural productivity, guarantee access to food for all individuals, and at the same time ensure food security for consumers (Bonciu E., 2017).

The concerns of researchers to discover and improve the methods of manipulation of genetic material determined a revolutionary concept of creating new plant genotypes. The genetic genius has helped to expand of knowledge of life processes, creating endless possibilities for direct intervention in the genetic material, with economic and social implications of the most promising, which can generate deep changes in agriculture (Bonciu E. and Sarac I., 2016). Thus, 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., Bora C., 2009).

Drought and associated effects can cause serious damage to crops. In the Oltenia region, drought is one of the major factors that affect crops' growth and yields (Bonea Dorina and Urechean Viorica, 2011; Bonea Dorina, 2016). 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).

MATERIALS AND METHODS

Within 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, suitable for mechanized harvesting and with superior quality for diverse use, at **alfalfa** crop, there were established 13 trials with varieties and lines (Catinca, Daniela, Madalina, Teodora, F 2608-17, F 2609-17, F 2610-17, F 2611-17, F 2612-17, F 2613-17, F 2614-17, F 2615-17 and F 2616-17).

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 harvested 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 09.03 2017.

RESEARCH RESULTS

From Table 1, it can be observed that, generally, the monthly average temperature was superior to the multiannual monthly average - within the month of April, the monthly temperature was superior by 4.8 °C to the multiannual

monthly average. The registered rainfall was superior to the multiannual monthly average (with a maximum of over 110 mm during the months of June and July), with the exception of the registered rainfall in April, lower by 34.9 mm.

Table 1

Climatic data 2017 - 2018

Month	Temperature (°C)			Rainfall (mm)		
	Monthly average	Multiannual monthly average	Difference	Monthly average	Multiannual monthly average	Difference
October	12.7	11.8	0.9	100.2	44.5	55.7
November	6.4	5.5	0.9	70.3	44.9	25.4
December	3.2	0.4	2.8	62.0	45.1	16.9
January	1.4	- 1.4	0	36.3	32.7	3.6
February	0.8	1.0	- 0.2	72.5	30.6	41.9
March	3.9	5.6	- 1.7	95	33.7	61.3
April	16.6	11.8	4.8	11.1	46.0	- 34.9
May	19.2	16.9	2.3	60.2	66.9	- 6.7
June	21.6	20.4	1.2	182.3	67.9	114.4
July	22.3	22.6	- 0.3	177.3	61.5	115.8
August	24.1	22.1	2.0	19.2	48.9	- 29.7

The 2018 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 the best result was registered for the F 2613-17 line

(26.39 t/ha). From the varieties, Teodora registered highest result (25.73 t/ha). It can be observed that all the lines registered superior yields compared to the standard.

Table 2

**Comparative yield results for fodder alfalfa 2018,
second year – first cut**

No.	Variant	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Catinca	24,62	4,92	100	Standard
2	Daniela	25,37	5,07	103	0,15
3	Madalina	24.78	4,96	101	0,04
4	Teodora	25.73	5,15	105	0,23
5	F 2608 – 17	25,16	5,03	102	0,11
6	F 2609 – 17	26.37	5,27	107	0,35
7	F 2610 – 17	26.11	5,22	106	0,30
8	F 2611 – 17	25.54	5,11	104	0,19
9	F 2612 – 17	26.18	5,24	106	0,32
10	F 2613 – 17	26.39	5,28	107	0,36
11	F 2614 – 17	25.76	5,15	105	0,23
12	F 2615 – 17	26.08	5,22	106	0,30
13	F 2616 – 17	26.24	5,25	107	0,35

Harvest date / first cut: 16.05.2018

Table 3

**Comparative observations for fodder alfalfa varieties and lines 2018,
second year – first cut**

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Catinca	40	42	21	7,9
2	Daniela	41	43	22	8,2
3	Madalina	40	42	21	7,7
4	Teodora	41	43	22	8,3
5	F 2608 – 17	40	43	22	8,4
6	F 2609 – 17	42	43	22	7,9
7	F 2610 – 17	40	43	22	8,1
8	F 2611 – 17	41	43	21	7,9
9	F 2612 – 17	41	42	22	8,2
10	F 2613 – 17	42	44	23	8,5
11	F 2614 – 17	42	43	22	8,1
12	F 2615 – 17	41	43	22	7,9
13	F 2616 – 17	42	44	23	8,4

Data presented in table 4 are showing the fact that all the lines registered superior yields compared to standard – the best yield result was registered for the F 2609-17 and F 2613-

17 lines with values of 22,43 t/ha and 22,44 t/ha respectively. From the varieties, Teodora registered the highest yield (21,64 t/ha).

Table 4

**Comparative yield results for fodder alfalfa 2018,
second year – second cut**

No.	Variant	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Catinca	20,37	4.07	100	Mt.
2	Daniela	21,29	4.26	105	0.19
3	Madalina	20.92	4.18	103	0.11
4	Teodora	21.64	4.33	106	0.26
5	F 2608 – 17	21,18	4.24	104	0.17
6	F 2609 – 17	22.43	4.49	110	0.42
7	F 2610 – 17	22.08	4.42	109	0.35
8	F 2611 – 17	21.34	4.27	105	0.20
9	F 2612 – 17	22.14	4.43	109	0.36
10	F 2613 – 17	22.44	4.49	110	0.42
11	F 2614 – 17	21.58	4.32	106	0.25
12	F 2615 – 17	21.84	4.37	107	0.30
13	F 2616 – 17	22.15	4.43	109	0.36

Harvest date / second cut: 21.06.2018

Table 5

**Comparative observations for fodder alfalfa varieties and lines 2018,
second year – second cut**

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Catinca	38	41	20	7,5
2	Daniela	39	42	21	8,1
3	Madalina	39	41	20	7,6
4	Teodora	40	42	21	8,1
5	F 2608 – 17	39	42	21	8,2
6	F 2609 – 17	41	42	21	7,7
7	F 2610 – 17	39	42	21	8,0
8	F 2611 – 17	40	42	20	7,8
9	F 2612 – 17	40	41	21	8,1
10	F 2613 – 17	41	43	22	8,3
11	F 2614 – 17	41	42	21	8,0
12	F 2615 – 17	40	42	21	7,8
13	F 2616 – 17	41	43	22	8,3

From the data presented in table 6, it can be observed that the best results were registered for F 2609-17 and F

2613-17 lines, in values of 21,35 t/ha and 21,31 t/ha. From the varieties, Teodora registered the highest yield (20,47 t/ha).

Table 6

**Comparative yield results for fodder alfalfa 2018,
second year – third cut**

No.	Variant	Green mass (t/ha)	Dry matter (t/ha)	Yield (%)	Difference (t/ha)
1	Catinca	19.21	3.84	100	Mt.
2	Daniela	20,33	4.07	106	0.23
3	Madalina	20.14	4.03	104	0.19
4	Teodora	20.47	4.09	106	0.25
5	F 2608 – 17	20,04	4.01	104	0.17
6	F 2609 – 17	21.35	4.27	110	0.43
7	F 2610 – 17	20.87	4.17	108	0.33
8	F 2611 – 17	20.29	4.06	106	0.22
9	F 2612 – 17	20.12	4.02	104	0.18
10	F 2613 – 17	21.31	4.26	110	0.42
11	F 2614 – 17	21.12	4.22	109	0.38
12	F 2615 – 17	20.76	4.05	106	0.21
13	F 2616 – 17	21.18	4.24	110	0.40

Harvest date / third cut: 27.07.2018

Table 7

**Comparative observations for fodder alfalfa varieties and lines 2018,
second year – third cut**

No.	Variant	Total weight (grams)	Length of the shoots (cm)	Weight of the leaves (grams)	No. of internodes
1	Catinca	38	41	20	7,5
2	Daniela	39	42	21	8,1
3	Madalina	39	41	20	7,6
4	Teodora	40	42	21	8,1
5	F 2608 – 17	40	42	21	8,2
6	F 2609 – 17	41	42	21	7,7
7	F 2610 – 17	39	42	21	8,0
8	F 2611 – 17	40	42	20	7,8
9	F 2612 – 17	40	41	21	8,1
10	F 2613 – 17	41	43	22	8,3
11	F 2614 – 17	41	42	21	8,0
12	F 2615 – 17	40	42	21	7,8
13	F 2616 – 17	40	42	22	8,3

Table 8

Comparative yields of the cuts for fodder alfalfa varieties and lines 2018, second vegetation year

No	Variant	First cut 15.05.2018		Second cut 21.06.2018		Third cut 27.07.2018		TOTAL (t/ha)	
		G.M.	D.M.	G.M.	D.M.	G.M.	D.M.	G.M.	D.M.
1	Catinca	24,62	4,92	20,37	4.07	19.21	3.84	64.20	12.83
2	Daniela	25,37	5,07	21,29	4.26	20,33	4.07	66.99	13.40
3	Madalina	24.78	4,96	20.92	4.18	20.14	4.03	65.84	13.17
4	Teodora	25.73	5,15	21.64	4.33	20.47	4.09	67.84	13.57
5	F 2608 – 17	25,16	5,03	21,18	4.24	20,04	4.01	66.38	13.28
6	F 2609 – 17	26.37	5,27	22.43	4.49	21.35	4.27	70.15	14.03
7	F 2610 – 17	26.11	5,22	22.08	4.42	20.87	4.17	69.06	13.81
8	F 2611 – 17	25.54	5,11	21.34	4.27	20.29	4.06	67.17	13.44
9	F 2612 – 17	26.18	5,24	22.14	4.43	20.12	4.02	68.44	13.69
10	F 2613 – 17	26.39	5,28	22.44	4.49	21.31	4.26	70.14	14.03
11	F 2614 – 17	25.76	5,15	21.58	4.32	21.12	4.22	68.46	13.69
12	F 2615 – 17	26.08	5,22	21.84	4.37	20.76	4.05	68.68	13.64
13	F 2616 – 17	26.24	5,25	22.15	4.43	21.18	4.24	69.57	13.92

Considering the results for the seed production of the tested alfalfa varieties and lines trials (tables 9 and 10), it can be observed that the highest registered seed yield was for the F 2609-17 line (493 kg/ha). All the tested lines

registered superior yields compared to the standard. The highest registered seed yield for the varieties was registered by Teodora variety (482 kg/ha) – the harvest date was 30.07.2018.

Table 9

Comparative seed yield for the alfalfa varieties and lines 2018, second vegetation year

No.	Variant	Seed yield (Kg/ha)	Yield (%)	Difference (Kg)
1	Catinca	447	100	Standard
2	Daniela	473	106	26
3	Madalina	442	99	-5
4	Teodora	482	108	35
5	F 2608 – 17	451	101	4
6	F 2609 – 17	493	110	46
7	F 2610 – 17	479	107	32
8	F 2611 – 17	462	103	15
9	F 2612 – 17	457	102	10
10	F 2613 – 17	455	102	8
11	F 2614 – 17	458	102	11
12	F 2615 – 17	451	101	4
13	F 2616 – 17	466	104	19

Table 10

Comparative observations for seed alfalfa varieties and lines 2018, second year

No.	Variant	Date of floral buttons	Date of the first flower	Date of full flowering	Duration of the flowering (days)
1	Catinca	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	Teodora	24.V	28.V	19.VI	21
5	F 2608 – 17	24.V	29.V	19.VI	21
6	F 2609 – 17	25.V	29.V	19.VI	21
7	F 2610 – 17	25.V	30.V	19.VI	21
8	F 2611 – 17	25.V	29.V	19.VI	21
9	F 2612 – 17	25.V	29.V	19.VI	21
10	F 2613 – 17	24.V	29.V	19.VI	21
11	F 2614 – 17	25.V	30.V	19.VI	21
12	F 2615 – 17	25.V	29.V	19.VI	21
13	F 2616 – 17	25.V	29.V	19.VI	21

CONCLUSIONS

The climatic conditions of 2017 - 2018 were, in general, favorable to the alfalfa crop. The registered temperatures were superior most of the time to the multiannual monthly average temperatures. The registered rainfall was sufficient for the crop's good development, and thus for obtaining good yields on the luvisol were the trials were established.

The best yield results for the fodder alfalfa were registered by the F 2609-17 and F 2613-17 lines (70.15 t/ha

and respectively 70.14 t/ha), and by the Teodora variety (67.84 t/ha).

For the seed alfalfa, the highest yields were registered for the F 2609-17 line (493 kg/ha) and for the Teodora variety (482 kg/ha).

Analyzing the cuts, normally, the first cut registered the best yield results.

Good yield results for the alfalfa crop can be obtained when alfalfa is established in autumn, in line with a good water supply necessary for rising.

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