OENOTHERA BIENNIS L. IN SOUTH-WESTERN BANAT

OENOTHERA BIENNIS L. – ÎN SUD – VESTUL BANATULUI

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Abstract. *Common evening primrose or Evening star is an important medicinal plant known as the "supreme antidote". Original from Central America, it is spread nowadays all over Europe, Asia, New Zeeland and Australia. The plant parts that are used are: seeds, leaves, seed oil, and roots. Therapeutic uses: hypo-lowering cholesterol level, anti-inflammatory. Therapeutic directions: skin diseases, neuro-dermatitis, rheumatism, liver diseases, convulsive cough, etc. Seed oil is a potential treatment for a large number of diseases such as eczema, cancer, multiple sclerosis, rheumatoid arthritis, and in the pharmaceutics industry. The material studied was a population from Sasca, harvested from the Nera River basin. In the paper we present results of biometrical measurements concerning the evolution of the following features: plant height, number of ramifications per plant, number of capsules per plant, volume of 1000 grains, and seed oil content evolution. The study was carried out on three different agri-funds: $N_0P_{60}K_{60}$, $N_{50}P_{60}K_{60}$, and $N_{150}P_{60}K_{60}$. Research results point out the positive effect of nitrogen fertilisation on both plant growth and ramification and seed weight features, and the negative impact of fertilisation on seed oil content.*

Rezumat. *Luminița este o importantă plantă medicinală, cunoscută ca fiind „regele ce vindecă tot". Originară din America Centrală, în prezent s-a răspândit în întreaga Europă, Asia, Noua Zeelandă şi Australia. Părțile utilizate: semințele, frunzele, uleiul din semințe şi rădăcinile. Acțiunea terapeutică: hipocolesterolemiantă, anti inflamatoare. Indicații terapeutice: dermatoze, neurodermită, reumatism, afecțiuni hepatice, tuse convulsivă etc. Uleiul din semințe este considerat a fi un potențial tratament pentru un număr mare de boli ca: eczeme, cancer, scleroză multiplă, artrită reumatoidă, cât şi în industria farmaceutică. Materialul cercetat a fost populația de Sasca, recoltat din bazinul râului Nera. În lucrare sunt prezentate rezultatele măsurătorilor biometrice referitoare la evoluția următoarelor caractere: înălțimea plantelor, numărul de ramificații/plantă, numărul decapsule/plantă şi masa a o mie de boabe, cât şi evoluția conținutului de ulei din semințe. Studiul s-a făcut pe trei agrofonduri, după cum urmează: $N_0P_{60}K_{60}$, $N_{50}P_{60}K_{60}$, $N_{150}P_{60}K_{60}$. Rezultatele cercetărilor evidențează efectul pozitiv al fertilizării cu azot asupra creşterii şi ramificării plantelor cât şi asupra însuşirilor ponderale ale semințelor, dar şi efectul negativ al fertilizării cu aspect asupra conținutului de ulei din semințe.*

Key words: *Common evening primrose, Oenothera biennis L., fertilisation*
Cuvinte cheie: *Luminita, fertilizare*

INTRODUCTION

Common evening primrose cultivation technology is little known. The effect of fertilisation on morphological features and on seed yield and oil content in the De Sasca Population is a good research topic since we are interested in introducing this species into cultivation and into plant improvement given the fact that there are no zoned cultivars of the species.

MATERIAL AND METHODS

The De Sasca Population grows spontaneously on the sandy banks of the Nera River. In the reference area, precipitations reach annually about 800 mm, and average annual temperature is 10°C. The species under study has, in the reference area, 110-125 cm in height, 190-210 leaves and 30-40 flowers.

Common evening primrose is an important medicinal plant known as "the healer-of-all trades". Originary from Central America, it is nowadays spread all over Europe, Asia, New Zeeland, and Australia.

The plant species we use are the seeds, leaves, seed oil, and roots.

Therapeutic action: hypocholesterolemiant and anti-inflammatory.

Therapeutical uses: skin conditions, neuro-dermatitis, rheumatism, liver conditions, convulsive cough, etc.

Seed oil is a potential cure for a large number of diseases such as eczema, cancer, multiple sclerosis, rheumatoid arthritis, and in the cosmetics industry.

The studied material consisted of the De Sasca Population harvested from the Nera River basin.

In the present paper the authors present the results of biometrical measurements concerning the evolution of the following features: plant size, number of ramifications per plant, number of capsules per plant, and the volume of 1,000 grains, as well as seed oil content evolution.

The study was carried out on three agri-funds, as follows: $N_0P_{60}K_{60}$, $N_{50}P_{60}K_{60}$, and $N_{150}P_{60}K_{60}$.

Research results point out both the positive effect of nitrogen measurements on growth and ramifications, and seed weight measurements, together with the negative effect of nitrogen fertilisation on seed oil content.

Experiments carried out during the experimental years 2006-2008 were of the monofactorial type set out on three strips and three replications, with the following: $N_0P_{60}K_{60}$, $N_{50}P_{60}K_{60}$ and $N_{150}P_{60}K_{60}$. We made measurements concerning seed production and seed oil content and measurements concerning plant size, the number of ramifications, and the number of capsules per plant, and we measured the variation of the 1,000-seed volume.

Data calculus was done according to the setting method of the experiments in the field.

RESULTS AND DISCUSSIONS

Yield results obtained during the experimental cycle 2006-2008 are mentioned in Table 1. Results show that on the average for the fertilisation levels yields varied between 696 and 1,008 kg/ha.

Table 1.

Synthesis of yield results during the experimental period 2006-2008

Specification	N rate on the agri-fund $P_{60}K_{60}$			Yield (kg/ha)	%	Differences (kg/ha)	Significance
	N_0	N_{50}	N_{150}				
2006	635	961	1103	899	100		
2007	515	704	869	696	77	- 203	0
2008	720	1160	1324	1068	119	169	x

DL5% = 161. DL 1% = 307. DL 0.1% = 1022

Specification	N_0	N_{50}	N_{150}
Yield (kg/ha)	623	941	1097
%	100	151	176
Differences (kg/ha)		318	474
Significance		xxx	xxx

DL 5% = 115. DL 1% = 230. DL 0.1% = 304

Nitrogen fertilisers had a positive impact on seed yield which, increased in the studied interval with fertiliser rate increase. Thus, by fertilising with N_{50}, on the constant fund of $P_{60}K_{60}$, the yield increased with 51%, i.e. a very significant difference of 318 kg/ha. Doubling the nitrogen rate to N_{150} increased the yield compared to the control variant N_0 with 76%, i.e. a very significant difference of 474 kg/ha.

Figure 1 shows that plant size increased, under the impact of nitrogen fertilisers, from 150 cm in the control variant N_0 to 170 cm in the variant fertilised with N_{50} and to 192 cm respectively, in the variant fertilised with N_{150}. The number of ramifications per plant increased in the studied interval from 11.1 (N_0) to 14.4 (N_{150}), while the number of capsules per plant increased from 159 (N_0) to 330 (N_{150}).

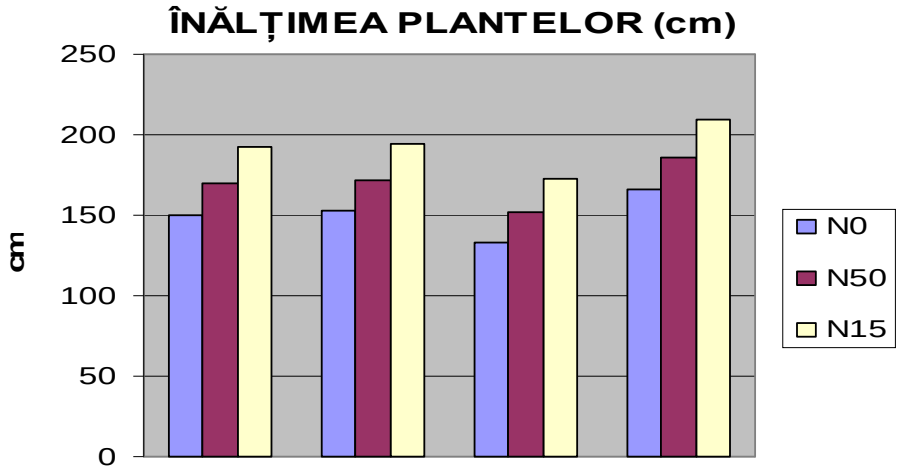


Figure 1. Plant size

	N_0	N_{50}	N_{150}
2006-2008	150	170	192
2006	153	172	194
2007	133	152	173
2008	166	186	209

DL 5% = 2.09. DL 1% = 3.14. DL 0.1% = 4.72

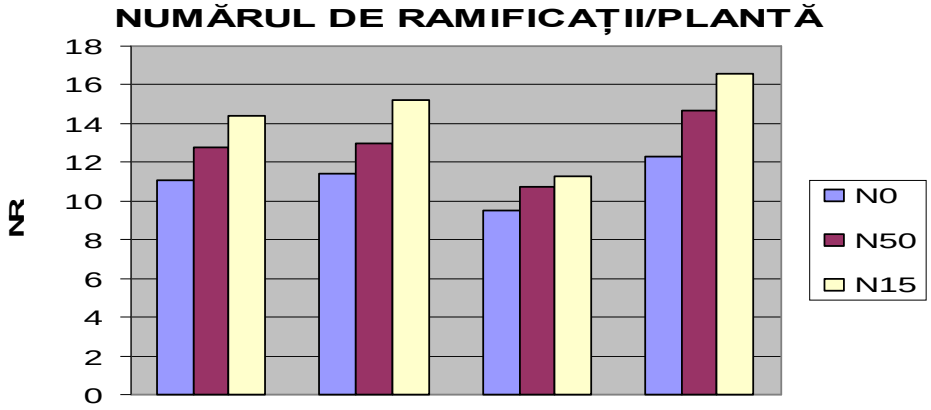
The volume of 1,000 seeds increased insignificantly in the studied interval, i.e. from 0.258 g/ha to 0.294 g/ha.

Figure 2 presents the variation of oil content depending on the water rate and annual climate conditions. In all experimental years oil content decreased with the nitrogen rate. On the average per experimental cycle oil content decreased from 17.0% in the variant $N_0P_{60}K_{60}$ to 16.1% in the variant fertilised with $N_{150}P_{60}K_{60}$.

Figure 2. Variation of oil content depending on the water rate and annual climate conditions

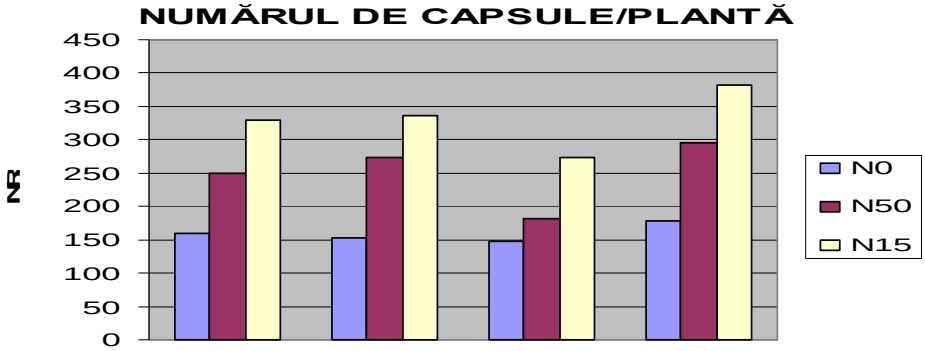
Oil yield is shown in Table 2. On the average for the fertilisation levels oil yield varied between 114 kg/ha (2007) and 176 kg/ha (2008). Nitrogen fertilisers, though decreasing oil content, had a positive impact on seed yield, which means that oil yield increased with the

nitrogen rate from 105 kg/ha (N_0) to 177 kg/ha (N_{150}). Differences in yield of 47 kg/ha (N_{50}) and 72 kg/ha (N_{150}) are statistically ensured as very significant.



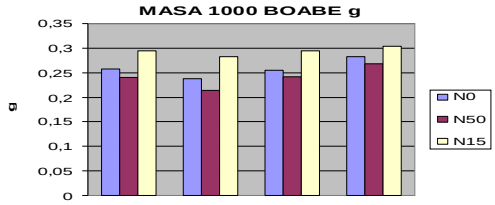
	N_0	N_{50}	N_{150}
2006-2008	11.1	12.8	14.4
2006	11.4	13	15.2
2007	9.5	10.7	11.3
2008	12.3	14.7	16.6

DL 5% = 3.02. DL 1% = 4.73. DL 0.1% = 5.66



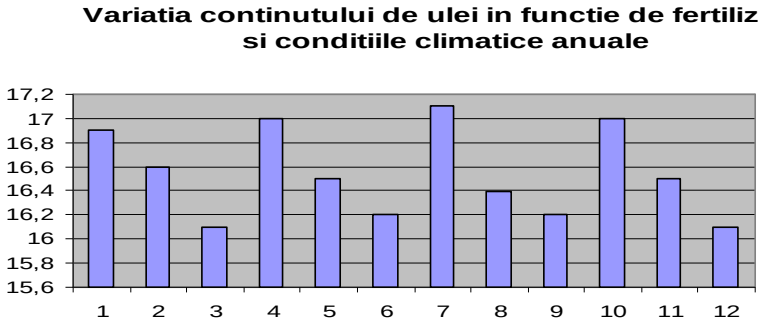
	N_0	N_{50}	N_{150}
2006-2008	159	250	330
2006	152	273	337
2007	147	182	273
2008	178	295	382

Dl 5% = 2.82. Dl 1% = 3.96. Dl 0.1% = 5.12



	N_0	N_{50}	N_{150}
2006-2008	0.258	0.241	0.294
2006	0.238	0.214	0.283
2007	0.255	0.242	0.295
2008	0.283	0.268	0.304

Figure 1. Main morpho-productive features measured during the period 2006-2008 in the „De Sasca" Population of the species *Oenothera biennis* L.



16.9	16.6	16.1	17	16.5	16.2	17.1	16.4	16.2	17	16.5	16.1
N_0	N_{50}	N_{150}	N_0	N_{50}	N_{150}	N_0	N_{50}	N_{150}	N_0	N_{50}	N_{150}
2006			2007			2008			2006-2008		

Table 2.

Oil content depending on fertilisation and annual climate conditions

Factor	N rate			Annual average			
	N_0	N_{50}	N_{150}	Kg/ha	X	Dif. kg/ha	Significance
2006	107	151	177	145	190		
2007	87	116	140	114	79	- 31	00
2008	123	191	214	176	121	31	xx

Dl 5%=10 Dl 1%=23 Dl 0.1%=73

Specification	N_0	N_{50}	N_{150}
Yield (kg/ha)	105	152	177
X	190	145	168
Difference (kg/ha)		47	72
Significance		xxx	xxx

Dl 5%=12 Dl 1%=17 Dl 0.1%=25

CONCLUSIONS

1. A De Sasca Population can be taken into account by plant breeders due to the seed yield that can be above 1,000 kg/ha with an oil content of 16-17%.

2. Nitrogen fertilisers had a positive impact on oil content which increased together with the nitrogen rate applied on the agri-fund of $P_{60}K_{40}$ with 51.0% for a rate of N_{50} and with 76.0% for a rate of N_{150}.

3. Oil content decreased when fertilised with nitrogen from 17.0% (N_0) to 16.1% (N_{150}), but oil yield increased from 105 kg/ha (N_0) to 177 kg/ha as a result of seed yield increase.

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