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RESEARCH REGARDING PRODUCTION POTENTIAL OF LUCERNE IN ECOLOGICAL CROP

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Abstract

Ecological farming is a sector that is relatively new, but great prospects for Romania, which aims to ensure and enhance the health of soil, plants, animals and, last but not last, the health of people. Natural resources offered by the vegetal cover is a way by which man satisfies his own needs and interests in full harmony with the lawe of nature. The vegetation cover consists of perennial grasses and leguminouses, as a natural resource with practical use to man, gets new content, circumscribed concept of sustainable development concept evolving. Lucerne is an essential component of agricultural ecosystem in lowland regions. In the context of sustainable agriculture use value of this crop should be evaluated as strictly agronomic and economic indicators, but also in terms of ecological indicators: environmental protection, landscape and ecological compensation effect. Value in use of lucerne as a feed resource is determined by the useful of this culture, food quality and conservation facility. The results of this paper are the subject of doctoral theme and presents total dry matter yields from variants of ecological culture of lucerne, lucerne mixture dual species: Dactylis glomerata and Trifolium alexandrinum or triple mixture of the aforementioned species. Results are presented on the influence of culture and fertilization on dry matter production.

Key words**:** *ecological, ecosystem, lucerne, production.*

INTRODUCTION

Ecological farming is a sector that is relatively new, but great prospects for Romania, which aims to ensure and enhance the health of soil, plants, animals and, last but not last, the health of people [4, 5].

The vegetation cover consists of perennial grasses and leguminouses, as a natural resource with practical use to man, gets new content, circumscribed concept of sustainable development concept evolving.

Sustainable development of agriculture requires, inter alia, multifunctionality, biodiversity, yield stability, environmental compatibility, ensuring the balance between tolerance ability of ecosystems and economic interests, soil sustainability of natural resources [2].

Lucerne is an essential component of agricultural ecosystem in lowland regions [3]. In the context of sustainable agriculture use value of this crop should be evaluated as strictly agronomic and economic indicators, but also in terms of ecological indicators: environmental protection, landscape and ecological compensation effect [1]. The paper present the results of this paper are the subject of doctoral theme and presents total dry matter yilds from variants of ecological culture of lucerne, lucerne mixture dual species: *Dactylis glomerata* and *Trifolium alexandrinum* or triple mixture of the aforementioned species. Results are presented on the influence of culture and fertilization on dry matter production.

MATERIAL AND METHOD

The research was conducted in locality Toporu (Giurgiu county).

Experimental variants were the culture system (*Medicago sativa*-pure culture; *Medicago sativa* - 18 kg/ha + *Trifolium alexandrinum* - 4 kg/ha; *Medicago sativa* -16 kg/ha+*Dactylis glomerata* - 6 kg/ha; *Medicago sativa* - 16 kg/ha+*Dactylis glomerata* - 6 kg/ha+ *Trifolium alexandrinum* - 4 kg/ha) and fertilization system (N_0P_0 kg/ha; N_0P_{70} kg/ha; $N_{70}P_{70}$ kg/ha; manure - 40 t/ha).

For comparison were placed in 2 variants of conventional culture (N0P70 kg/ha, N70P70 kg/ha), a variant without fertilization, considered organic (N0P0 kg/ha) and one organic fertilized variant (manure-40 t/ha). The varieties used were: Pomposa for lucerne, Tigri for *Trifolium alexandrinum* and Magda for *Dactylis glomerata*.

Organic fertilizer was applied once the crop establishment (in 2004). Every autumn, at the end of vegetation were applied phosphorus fertilizer. Nitrogen fertilizers were manage their spring before the vegetation.

Were conducted to determine hervesting efficiency as follows: first sew the earing grass and early flowering lucerne, and taking the next installment every 6-7 weeks.

RESULTS AND DISCUSSIONS

On total dry matter yield can be observed after analyzing the behaviour of lucerne in the experimental variants, in terms of total annual yield, stronger influence of climatic conditions that occurred during the research. Thus, the highest dry matter yield was achieved in 2005, amid a regime of very high precipitation during the vegetation for plain Burnazului. The average dry weight of 2005 was 18.5 t/ha, 54% higher than 2004 production and 27% higher than the average in the three experimental years (Table 1). Average production of all variants during the years of research was 14.46 t/ha.

Ecological culture of lucerne variants (variant fertilized and fertilized with organic fertilizers) have achieved the lowest production in each of three years of research. These yields exceed an average 9-10 t/ha, which ensures economic efficiency however this culture system.

By comparison with lucerne in pure culture, mixed with *Dactilis glomerata* proved to be the most productive both in terms of ecological fertilization, especially in the variants of fertilization with chemical fertilization. Mixture we refer to production increases achieved by 11-26% on average for three years.

Analyzing the separate influence of culture system on dry matter yield (Table 2) shows that on average only three years of orchard grass and lucerne mixture provides a significant increase of production by 14% compared to pure culture from the other mixtures studied. Lucerne in pure culture made 13.69 t/ha DM, while the mixture with *Dactylis glomerata* made 15.68 t/ha DM.

Influence of fertiliyation on dry matter production presented in Table 3 show that variants with mineral fertilizer production increases have been very significant.

Within each fertilization variants (Table 4-6) to show the superiority of mixture with *Dactilys glomerata* at chemical fertilization (significant production increases by 15-16% compared to lucerne in pure culture with the same doses of fertilizers). This mixture is higher and ecological variants of fertilization, but statistically uninsured increases.

The data from Table 7 show that application of phosphorus at a dose of 70 kg/ha statistically determined production increases (7-13% compared to unfertilized variant) in all variants of lucerne culture system and when phosphorus and nitrogen is accompanied dose of 70 kg/ha, significant effects on production (increase of 9% compared to unfertilized variant) are found only in mixture with *Trifolium alexandrinum* and at the *Dactylis glomerata*.

Organic fertilization has an insignificant effect, similar to unfertilized variant.

CONCLUSIONS

In the ecological culture, the usefulness of lucerne acquires new values as follows: besides the role of forage resource, vegetal cover consists of lucerne in pure culture or mixed with *Trifolium alexandrinum* and the *Dactylis glomerata* is reserve conservation of biodiversity and contribute to improving the quality landscape.

Table 1. Production of dry matter, years 2004-2006

Species/ The mixture	Fertilization variants	2004	2005	2006	Media 2004-2006	
					t/ha	%
Medicago sativa	N_0P_0	10.3	17.4	12.2	13.3	100
	N_0P_{70}	11.8	18.4	13.1	14.4	108
	$N_{70}P_{70}$	11.4	17.8	12.9	14.0	106
	Manure 40 t/ha	9.8	17.2	12.0	13.0	98
Medicago sativa + *Trifolium alexandrinum*	N_0P_0	12.2	18.8	12.0	14.3	108
	N_0P_{70}	13.4	19.9	12.8	15.4	116
	$N_{70}P_{70}$	13.8	18.9	14.1	15.6	117
	Manure 40 t/ha	11.9	18.5	12.3	14.0	107
Medicago sativa + *Dactylis glomerata*	N_0P_0	12.7	19.2	12.6	14.8	111
	N_0P_{70}	15.3	20.9	14.2	16.8	126
	$N_{70}P_{70}$	14.8	19.8	14.0	16.2	122
	Manure 40 t/ha	13.7	18.5	12.4	14.9	112
Medicago sativa + *Trifolium alexandrinum* + *Dactylis glomerata*	N_0P_0	9.3	17.9	12.7	13.3	100
	N_0P_{70}	11.7	18.3	13.3	14.4	108
	$N_{70}P_{70}$	10.2	17.9	13.5	13.9	104
	Manure 40 t/ha	9.6	17.2	12.9	13.2	99
Average results	t/ha	12.0	18.5	12.9	14.46	-
	% towards 2004	100	154	107	121	-
	% towards average years	83	127	89	100	-
DL 5% mixtures	Similarly fertilized variants					1.8
	Average fertilized variants					1.7
DL 5% fertilization	Similar mixtures					0.8
	Average mixtures variants					0.4

Table 2. The influence of culture on dry matter production, years 2004-2006

The mixture	Dry matter production		The difference (t/ha)	Significance
	t/ha	%		
Medicago sativa	13.69	100	-	Mt. (witness)
Medicago sativa + *Trifolium alexandrinum*	14.88	109	1.19	-
Medicago sativa + *Dactylis glomerata*	15.68	114	1.99	*
Medicago sativa + *Trifolium alexandrinum* + *Dactylis glomerata*	13.71	100	0.02	-
DL 5% = 1.69 t/ha	DL 1% = 2.56 t/ha		DL 0.1% = 4.11 t/ha	

Table 3. The influence of fertilization on dry matter production, years 2004-2006

Fertilization variants	**Dry matter production**		The difference (t/ha)	Significance
	t/ha	**%**		
N_0P_0	13.94	100	-	Mt.
N_0P_{70}	15.26	109	1.32	***
$N_{70}P_{70}$	14.93	107	0.99	***
Manure 40 t/ha	13.83	99	-0.11	-
DL 5% = 0.38 t/ha	DL 1% = 0.51 t/ha		DL 0.1% = 0.69 t/ha	

Table 4. The influence of culture system within each fertilization variants, years 2004-2006

The mixture	Relative production of dry matter (%)				The difference of culture (t/ha)			
	N_0P_0	N_0P_{70}	$N_{70}P_{70}$	G40	N_0P_0	N_0P_{70}	$N_{70}P_{70}$	G40
Medicago sativa	100	100	100	100	Mt.	Mt.	Mt.	Mt.
Medicago sativa + Trifolium alexandrinum	108	106	111	109	1.03	0.94	1.57	1.23
Medicago sativa + Dactylis glomerata	111	116	115	114	1.53	2.37*	2.17*	1.87
Medicago sativa + Trifolium alexandrinum + Dactylis glomerata	100	100	99	102	0	0	-0.16	0.23
DL 5% = 1.81 t/ha			DL 1% = 2.7 t/ha		DL 0.1% = 4.27 t/ha			

Table 5. The influence of fertilization in each culture system, years 2004-2006

Fertilization variants	Relative production of dry matter (%)				The difference of production (t/ha)			
	M.s.	M.s.+ T.a	M.s.+ D.g.	M.s.+ T.a.+ D.g.	M.s.	M.s.+T.a	M.s.+ D.g.	M.s.+T.a.+ D.g.
N_0P_0	100	100	100	100	Mt.	Mt.	Mt.	Mt.
N_0P_{70}	108	107	113	108	1.13**	1.04**	1.97***	1.13*
$N_{70}P_{70}$	105	109	109	104	0.73	1.27**	1.37**	0.57
Manure 40 t/ha	98	99	100	99	-0.3	-0.1	0.04	-0.07
DL 5% = 0.76 t/ha			DL 1% = 1.03 t/ha		DL 0.1% = 1.38 t/ha			

Ecological culture of lucerne variants (variant unfertilized and fertilized with manure) have achieved the lowest production in each of the three years of research.

By comparison with lucerne in pure culture, mixted with *Dactilis glomerata* proved to be the most productive both in terms of ecological fertilization, especially in the variants of fertilization with chemical fertilization. This mixture has achieved production increases of 11-26% on average for three years.

The ecological lucerne crop which ensures high returns for feed use in environmental condition and aesthetic quality of the vegetation cover, are based either on the absence of any fertilization or the organic fertilization (40 t/ha manure).

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