SEED PRODUCTION IN BIRDSFOOT TREFOIL (*LOTUS CORNICULATUS* L.) UNDER ASSOCIATED CROP SYSTEMS

PRODUCEREA DE SĂMÎNȚĂ LA GHIZDEI (*LOTUS CORNICULATUS* L.) ÎN SISTEM DE CULTURĂ ASOCIATĂ

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***Abstract**: Birdsfoot trefoil (Lotus corniculatus L.) represents an important leguminous species for the permanent and temporary pasture ecosystems. In order to produce seeds in this species, we propose birdsfoot trefoil (8 kg/ha) seeding in association with annual gramineae (oat and spring barley), according to the results achieved along four years of study. This seeding system makes the entire period of seed production in birdsfoot trefoil efficient.*

***Rezumat**: Ghizdeiul (Lotus corniculatus L.) constituie o specie de leguminoasă importantă pentru ecosistemele de pajişti permanente şi temporare. Pentru producerea de sămânță la această specie, în urma rezultatelor de cercetare obținute pe o durată de 4 ani, se propune semănatul ghizdeiului (8 kg/ha) în cultură asociată cu o graminee anuală (ovăz sau orzoaică de primăvară). Acest sistem de cultivare eficientizează întreaga perioadă de producere de sămânță la ghizdei*

***Key words**: Lotus corniculatus, seeds, associated crop, profitability*
***Cuvinte cheie**: ghizdei, semințe, cultură asociată, profitabilitate*

INTRODUCTION

Birdsfoot trefoil (*Lotus corniculatus* L.) has the highest adaptability to the environmental conditions among the pasture perennial leguminous species. With its presence within the floristic structure of many permanent or temporary pastures, it contributes to the achievement of big, high-quality yields, and also to the provision with biological nitrogen of the entire ecosystem.

Under the technological system of seed production in birdsfoot trefoil, usually we may not achieve anything during the first year of vegetation, but a low-quality, inefficient forage biomass crop. (Dragomir N., 1994; Fairey 1994; Garcia Diaz 1999, 2000)

This paper work intends to establish a new technology of seed production, by cultivating birdsfoot trefoil under protective crop systems, and to make this seed crop efficient.

MATERIALS AND METHODS

Our researches have been performed during 1998-2002, at S.C.D.P. Timisoara, on a brown eumesobasic soil, strongly gleyied, with pH = 5.6, moderately supplied with phosphorus and potassium.

The experimental protocol was consisted of a bi-factorial experience, with the following factors: A – seeding distance for birdsfoot trefoil (a_1 = 12.5 cm; a_2 = 25 cm), B – protective crops for birdsfoot trefoil (b_1 = birdsfoot trefoil, pure crop; b_2 = green-mass oat +

birdsfoot trefoil, hidden crop; b_3 = grain oat + birdsfoot trefoil, hidden crop; b_4 = green-mass Persian clover + birdsfoot trefoil, hidden crop).

Regarding the birdsfoot trefoil, we have seeded the variety Nico, with a seeding norm of 8 kg/ha. The species cultivated as protective crops were seeded in the following norms: 80 kg/ha for oat and barley, 5 kg/ha for Persian clover. In the case of birdsfoot trefoil, in pure crop, we have applied, within the first year of vegetation, the herbicide Pivot (0.8 l/ha). In order to diminish the competitive effect exerted by the protective plant, we have not fertilized this experience.

During the first year of vegetation, we have determined the biomass yield achieved in the birdsfoot trefoil and also in the protective species, as well, and the seed yield was determined in the second, third and fourth year of vegetation.

The results achieved were statistically processed with the method of variance analysis and we have also analyzed the economic efficiency, through the determination of the profitability degree.

RESULTS AND DISCUSSIONS

The results achieved in the first year of vegetation prove that, by cultivating the birdsfoot trefoil under protective crop systems, with oat or spring barley, the forage biomass yield is much bigger than in the pure-crop birdsfoot trefoil. So, in pure crop, we have achieved a yield of 1.39 t/ha, and in associated crop – 2.51-3.44 t/ha D.M., in the situation when birdsfoot trefoil has been seeded at 12.5 cm distance between rows. By increasing the seeding distance to 25 cm, the D.M. yield will be lower, in all variants (Table 1).

Table 1

Dry matter or grain yield achieved in the protective crops for birdsfoot trefoil seed crop (year I of vegetation)

Variants		D.M. yield*) t/ha	Grain yield kg/ha
Distance between rows for birdsfoot trefoil	Protective crops for birdsfoot trefoil		
12.5 cm	Birdsfoot trefoil – pure crop	1.39	-
	Green-mass oat + birdsfoot trefoil hidden crop	2.51	-
	Grain oat + birdsfoot trefoil, hidden crop	-	2432
	Green-mass barley + birdsfoot trefoil, hidden crop	3.44	-
	Persian clover + birdsfoot trefoil, hidden crop	1.48	-
25 cm	Birdsfoot trefoil – pure crop	1.26	-
	Green-mass oat + birdsfoot trefoil hidden crop	2.31	-
	Grain oat + birdsfoot trefoil, hidden crop	-	2500
	Green-mass barley + birdsfoot trefoil, hidden crop	3.26	-
	Persian clover + birdsfoot trefoil, hidden crop	1.40	-

*) It also includes the D.M. yield achieved in birdsfoot trefoil crop.

During the other years of vegetation, the highest seed yields were achieved within the first two years, compared to 50-60% in the third year. Along the three productive years, the smallest amounts of seeds were achieved in the case of birdsfoot trefoil as pure crop. So, this variant has led to mean seed yields of 226-242 kg/ha, compared to 194-219 kg/ha in the variants including protective plants. With regards to the protective plants, we have noticed oat and barley crops for green mass. By seeding the birdsfoot trefoil at 25-cm distances between rows, seed yield decreased with a mean of 10-12%, compared to the variant seeded at 12.5 cm. The analysis upon these results leads to the conclusion that the best crop variant for the achievement of birdsfoot trefoil seed is to cultivate this species as pure crop, with a norm of 8 kg/ha, at the distance between rows of 12.5 cm (Table 2).

Table 2

Influence exerted by seeding distance and protective crop upon seed yield in birdsfoot trefoil

Distance between rows for birdsfoot trefoil	Protective crops for birdsfoot trefoil	Seed yield in birdsfoot trefoil (kg/ha)			
		Year I of production	Year II	Year III	Mean
12.5 cm	Birdsfoot trefoil – pure crop	258	295	173	242
	Green-mass oat + birdsfoot trefoil hidden crop	230	281	146	219
	Grain oat + birdsfoot trefoil, hidden crop	181	272	145	199
	Green-mass barley + birdsfoot trefoil, hidden crop	171	294	153	206
	Persian clover + birdsfoot trefoil, hidden crop	230	279	152	220
25 cm	Birdsfoot trefoil – pure crop	234	297	148	226
	Green-mass oat + birdsfoot trefoil hidden crop	200	286	150	212
	Grain oat + birdsfoot trefoil, hidden crop	161	278	144	194
	Green-mass barley + birdsfoot trefoil, hidden crop	165	281	149	198
	Persian clover + birdsfoot trefoil, hidden crop	167	286	147	200
	LSD 5%	15	16	11	
	LSD 1%	21	21	15	
	LSD 0.1%	28	29	21	

If we want to make birdsfoot trefoil crop efficient for the entire vegetation period, including the first year of vegetation, then the calculation of profitability proves that the seed-production system becomes efficient if the seeding is performed in association with a protective plant.

Table 3

Profitability degree concerning seed production under conditions of protective crop (the mean for the four years of vegetation)

Variants		Expenses lei/ha	Total incomes lei/ha	Profit lei/ha
Distance between rows for birdsfoot trefoil	Protective crops for birdsfoot trefoil			
12.5 cm	Birdsfoot trefoil – pure crop	1210	3977	2767
	Green-mass oat + birdsfoot trefoil hidden crop	1090	3885	2795
	Grain oat + birdsfoot trefoil, hidden crop	1140	3958	2818
	Green-mass barley + birdsfoot trefoil, hidden crop	1100	3950	2850
	Persian clover + birdsfoot trefoil, hidden crop	1150	3670	2520
25 cm	Birdsfoot trefoil – pure crop	1210	2495	1295
	Green-mass oat + birdsfoot trefoil hidden crop	1090	2667	1577
	Grain oat + birdsfoot trefoil, hidden crop	1140	3910	2770
	Green-mass barley + birdsfoot trefoil, hidden crop	1100	3785	2685
	Persian clover + birdsfoot trefoil, hidden crop	1150	3350	2200

The analysis of the results presented in Table 3 leads to the conclusion that the highest profit value, namely 2850 lei/ha, was achieved in the variant with birdsfoot trefoil in association with green-mass spring barley. Similar results were achieved in the other variants, too, seeded in association with green-mass oat (2795 lei/ha) or grain oat (2818 lei/ha). In the variant seeded with pure crop, the profit value is lower, respectively 2767 lei/ha.

The level of seed yields achieved proves that the species cropped in association do not exert a negative competitive effect upon birdsfoot trefoil growth and development.

CONCLUSIONS

We may make the birdsfoot trefoil seed-crop efficient at maximum if we consider the biomass yield achieved in the first year of vegetation, too;

The most efficient variants are those cropped in association with oat or spring barley, the profit in these cases being 2800 lei/ha;

In the case of the associated birdsfoot trefoil crop, we may eliminate the fighting against weeds through application of herbicides, because of the competitive effect exerted by these crops upon weed species.

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