RESEARCH ON THE INSTALLATION OF *Bromus inermis* Leyss., *Onobrychis vicifolia* Scop. SPECIES AND MIXTURES BETWEEN THEM ON SANDY SOILS

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Abstract

In Romania, sand and sandy soils occupy about 500,000 hectares, or over 2% of the country's territory. Of the regions with sandy soils, the Oltenia Plain has the highest share, with 170,000 ha. Bromus inermis Leyss. *and Onobrychis vicifolia* Scop. *species are adapted to arid climate conditions and grow well on nutrient-deficient soils, being successfully cultivated on eroded land in the forest-steppe area, and limiting the expansion of sandy soils and creating a suitable layer of vegetation, can be an option by using these species. The research conducted during the 2024-2025 agricultural year, at the Experimental Didactic Station through the Experimental Center of Tamburesti, belonging to the University of Craiova was to establish the best technological option for fixing sandy soils with the help of the Bromus inermis* Leyss., *Onobrychis vicifolia* Scop. *species, and mixtures between them. Following the study, it was found that Bromus inermis* Leyss., *Onobrychis vicifolia* Scop. *species and mixtures between them can be installed on sandy soils but keeping them in culture is difficult.*

Keywords: mixture ratio, seeding method, vegetation coverage

INTRODUCTION

In Romania, sand and sandy soils occupy about 500,000 hectares, or over 2% of the country's territory. Of these, 150,000 hectares of movable and semi-mobile sands.

Their formation is due to the natural factors that contributed to their formation, in particular wind, temperature, pluviometric regime and flowing waters. These surfaces are located in the west and south-west of the Romanian Plain, known as the sands of southern Oltenia east and north-east of Baragan, on the right side of the Ialomita, Calmatui and Buzau rivers, as well as the Tecuciului Plain, in the Danube Delta and in the north-west of the country, at Carei-Valea lui Mihai, the western part of the Banat Plain (Coteț P., 1976; Iancu P. *and* Bonciu P., 2010; Stănilă A.N. *et al*, 2020).

Of the regions with sandy soils, the Oltenia Plain has the highest share, with 170,000 ha.

Bromus inermis Leyss. and *Onobrychis vicifolia* Scop. species are adapted to arid climate conditions and grow well on nutrient-deficient soils, being successfully cultivated on eroded land in the forest-steppe area. Thus, limiting the expansion of sandy soils and creating a suitable layer of vegetation, can be an option by

using these species, especially since on sandy lands, species with close characteristics, such as *Bromus tectorum* L. (Lehnhoff E.A. *et al*, 2019) and *Onobrychis Arenaria* (Kit.) DC. (Țiței V., 2021). The research was carried out in the Romanati Plain (left of the Jiu River, which owns 81,000 ha of sandy soils) at the Experimental Didactic Station through the Experimental Center of Tamburesti, belonging to the University of Craiova and they aimed to research the fixing of sandy soils with the help of *Bromus inermis* Leyss., *Onobrychis vicifolia* Scop. species, and mixtures between them.

MATERIAL AND METHOD

The research was carried out in the 2024-2025 agricultural year at Experimental Center of Tamburesti, belonging to the University of Craiova. The purpose of the research was to establish the best technological option for fixing sandy soils, within the Experimental Didactic Station - Experimental Center Tamburesti, belonging to the University of Craiova, with the help of the *Bromus inermis* Leyss., *Onobrychis vicifolia* Scop. species, and mixtures between them. In order to achieve the purpose, the analysis of the installation capacity of cultivated species and the analysis of the vegetation coverage and its evolution were followed.

The experimental factor was the species or mixture cultivated with 5 graduations, respectively:

v_1 - sown with *Bromus inermis* Leyss. 100 % (control variant);

v_2 - sown with *Bromus inermis* Leyss. 75 % + *Onobrychis viciifolia* Scop. 25 %;

v_3 - sown with *Bromus inermis* Leyss. 50 % + *Onobrychis viciifolia* Scop. 50 %;

v_4 - sown with *Bromus inermis* Leyss. 25 % + *Onobrychis viciifolia* Scop. 75 %;

v_5 - sown with *Onobrychis viciifolia* Scop. 100 %.

The experience was placed in randomized blocks with the area of a plot of 36 m^2 (12 m × 3 m), the area of a repetition of 180 m^2 (15 m × 12 m) and the area of the experience of 600 m^2 (40 m × 15 m) (Jitareanu G. *and* Onisie T., 1998).

The varieties created at the Research and Development Station for Meadows Vaslui SCDP were used: at sainfoin, the Sersil variety - 2018 - at a density of 600 germinable grains/m^2; at the smooth brome variety Mihaela - 2009 - at a density of 1200 germinable grains/m^2. The date of sowing was 14.03.2025 and the date of emergence was 7.04.2025 (when 75% of the plants came out).

The appreciation of the emergence (16.04.2025) and the degree of vegetation coverage (16.06.2025) they were made by performing, in each repetition, a number of 3 determinations using the metric frame with the side of 0.5 m (0.25 m^2). The percentages determined at each observation were also compared with those initially established by each mixture.

The results were statistically interpreted by analyzing variance and calculating last significant differences (LSD). There were also analyzed the regressions between

the determined parameters and the percentage of mixed participation of each species. The soil on which the experience was established is an eutric psamosol, which is part of the protisoles class, heavily leached soil (decarbonated), with sandy texture, formed on wind deposits consisting of coarse materials (sand), having as underlying rocks unconsolidated or poorly consolidated silicate rocks.

This soil type has, in the Ao horizon (0-23 cm) the pH value of 6.31, the $CaCO_3$ content - 0 %, the humus content 0.64 %, the total nitrogen 0.032 % (IN 0,46), 53.3 ppm P_{AL}, 41.0 ppm K_{AL}, 1.6 me/100g Ah, 4.0 me/100g SB and 13.53 C/N ratio (Popa I. *et al*, 2025). The climatic conditions of the experimentation period, namely 2024-2025 agricultural year, from the Research and Development Station for Plant Culture on Sandy Soils Dabuleni (located 17 km from the experimental field), showed that rainfall amount was normal in October, in excess in November and in deficit in the rest of the analyzed months, and the average monthly temperatures were close to the multiannual ones (average of 1956-2025 period) (figure 1).

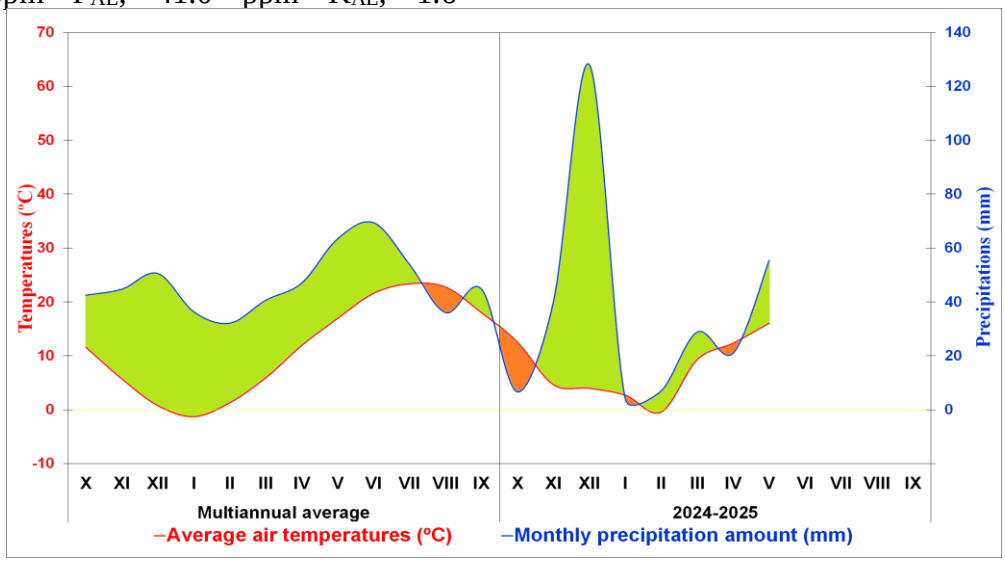

Figure 1. Climadiagram of agricultural year 2024-2025 (SCDCPN Dabuleni)

RESULTS AND DISCUSSIONS

Installing any species on sandy soils is difficult, because on these soils there is no humus and nutrients in sufficient quantities and water retention capacity is very small. Although in the experimental field there is the possibility of irrigation, this was not necessary due to favorable climatic conditions in spring 2025. Compared to the initial sowing ratio, established for each variant, for both *Bromus inermis* Leyss. and *Onobrychis viciifolia* Scop. species the percentage of emerged plants was lower (table 1). In *Onobrychis vicifolia* Scop. the percentage of emerged plants was higher than *Bromus inermis* Leyss. by 5.1-16.1 %, at the same percentage of

participation in the mixture. Figure 2 shows the correlations between the percentage of participation in the mixture and the percentage of emerged plants where can be seen more clearly the differences between the initial and the resulting percentage.

Table 1

Appreciation of the plants emergence (16.04.2025)

Variant	*Bromus inermis* Leyss.				*Onobrychis viciifolia* Scop.			
	Participation (%)		Difference (%)	Significance	Participation (%)		Difference (%)	Significance
	initial	*final*			*initial*	*final*		
v_1 (c)	*100*	66.7	Control	Control	*0*	0	-	-
v_2	*75*	38.3	-28.4	o	*25*	24.8	-41.9	oo
v_3	*50*	26.1	-40.6	oo	*50*	36.1	-30.6	o
v_4	*25*	19.7	-47.0	oo	*75*	54.4	-12.3	ns
v_5	*0*	0	-	-	*100*	77.8	11.1	ns
LSD		*0.5 %*	*23.5*		*LSD*	*0.5 %*	*23.5*	
		0.1 %	*34.1*			*0.1 %*	*34.1*	
		0.01 %	*51.2*			*0.01 %*	*51.2*	

After 61 days from the plants emegence, the vegetation coverage in the two cultivated species was very small, compared to the percentage initially set for each variant, (table 2) between the initial and final percentage having negative deviations between 17.8-88.3 % of *Bromus inermis* Leyss. and 9.4-69.8 % of *Onobrychis viciifolia* Scop. species.

Figure 3 shows the correlations between the percentage of participation in the mixture and the soil degree of coverage with vegetation where to see more clearly the differences between the initial and the resulting percentage.

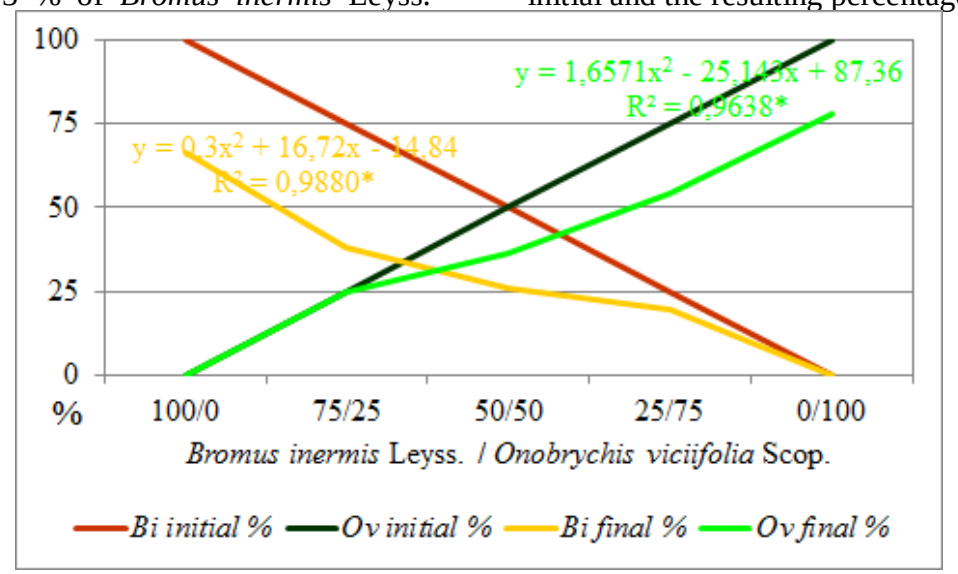

Figure 2. Correlations between the percentage of participation in the mixture and the percentage of emerged plants

Table 2

Appreciation of the degree of vegetation coverage (16.06.2025)

Variant	*Bromus inermis* Leyss.				*Onobrychis viciifolia* Scop.			
	Participation (%)		Difference (%)	Significance	Participation (%)		Difference (%)	Significance
	initial	*final*			*initial*	*final*		
v_1 (c)	*100*	11.7	Control	Control	*0*	0	-	-
v_2	*75*	11.6	-0.1	ns	*25*	15.6	3.9	
v_3	*50*	7.4	-4.3	ns	*50*	20.0	8.3	*
v_4	*25*	7.2	-4.5	ns	*75*	26.9	15.2	**
v_5	*0*	0	-	-	*100*	30.2	18.5	***
		0.5 %	*7.2*			*0.5 %*	*7.2*	
	LSD	*0.1 %*	*10.5*		*LSD*	*0.1 %*	*10.5*	
		0.01 %	*15.7*			*0.01 %*	*15.7*	

The advantage of the cultivation of the two species in the mixture is given by their biological and morphological peculiarities. Thus, the *Bromus inermis* Leyss. species develop stolons, which contributes to the soil fixation, and the *Onobrychis viciifolia* Scop. species fix by symbiosis nitrogen, although this on sandy soils can be more difficult due to the lack of soil symbiosis bacteria. This can be solved by inoculating the seed material before sowing.

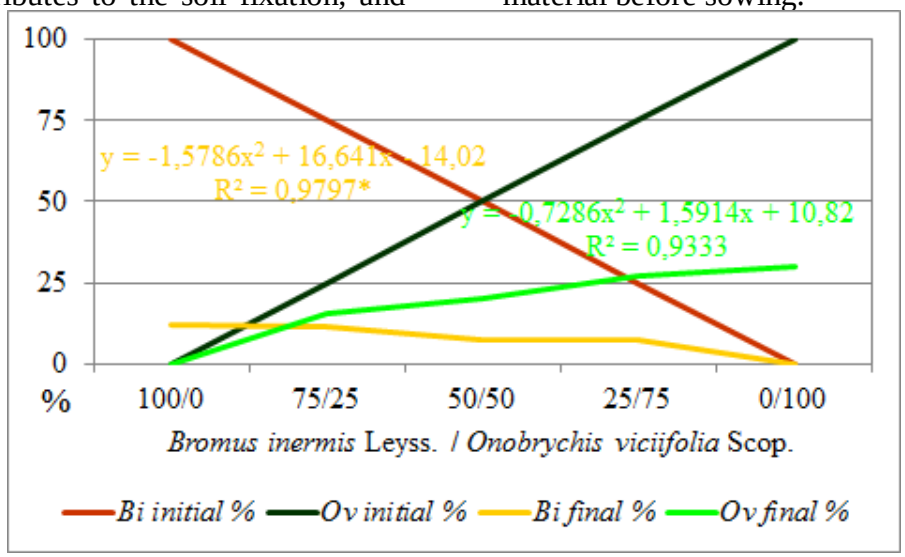

Figure 2. Correlations between the percentage of participation in the mixture and the soil degree of coverage with vegetation

CONCLUSIONS

In both species, the percentage of emergent plants was lower than originally set, in each of the 5 studied variants, but in *Onobrychis vicifolia* Scop. the percentage of emerged plants was higher than *Bromus inermis* Leyss. by 5.1-16.1

%, at the same percentage of participation in the mixture.

In both species, the degree of vegetation coverage was much lower than originally established, regardless of the variant studied, being between 17.8-88.3 % of *Bromus inermis* Leyss. and 9.4-69.8 % of *Onobrychis viciifolia* Scop. species.

Bromus inermis Leyss., *Onobrychis vicifolia* Scop. species and mixtures between them can be installed on sandy soils within Experimental Didactic Station - Experimental Center Tamburesti but keeping them in culture is difficult.

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