FORAGE PRODUCTIVITY OF SOME SMOOTH BROMEGRASS (*Bromus inermis* Leyss.) CLONES

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Abstract

The aim of the research was to determine the feed production potential of some smooth brome clones (Bromus inermis Leyss.) *in the silvostepa area. The research was conducted during the period 2022-2024, at the Research and Development Station for Meadows (RDSM), Vaslui (46°40' - 36°10' north latitude and 27°44' - 20°40' east longitude). 25 Smooth brome sources were used as initial material in the research. The experiment was conducted as a completely randomized block design in three repetitions. In this research, the production of dry matter of this species in the years 17, 18, and 19 vegetation, respectively, under the conditions of pedoclimation of the area of experimentation. The results showed that differences of statistical significance were obtained between the variants taken in the study, in the three years taken in the study. The best-performing variants were the* $V_{8\ B1CL8}$ *variants in the 17th year of vegetation and the* $V_{11\ B1CL11}$ *in the 18th and 19th years. These high-yielding clones can be used as parents in polycross to develop synthetic varieties.*

Keywords: grassland, pasture, meadow, green mass, perennial, production.

INTRODUCTION

Maintaining the productive potential of temporary grasslands at the highest level can be achieved only if they are used in their composition species with productive potential, valuable species, application of fertilizers and their rational use (DEAK *et al*., 2009; HANCOCK, 2011). The smooth brome is adapted to colder climates, resistant to drought and extreme temperatures (UNDERSANDER *et al*., 1996; KOSTOPOLULU and KARATASSIOU, 2016). Thanks to the highly developed root system, the unassisted obsiga has high resistance to extreme temperatures and drought (TURK *et al*., 2015). The technology of growing the seed batches of fodder species is different from the technology of fodder production, with a tendency to improve the morphological peculiarities of seed production and seed quality indices (ENE and MOCANU, 2016; SAMUIL *et al*., 2012; VACARCIUC *et al*., 2023).

Bromus inermis is an important species due to its high drought tolerance and ability to adapt to new environmental conditions (RAAWE, 2004).

Smooth brome is characterized by a unique morphology of the aerial part. Vegetative shoots are predominant and similar to generative shoots; they are formed from a high percentage of leaves, which contributes to high feed production as well as high quality of the resulting feed (KOZŁOWSKI *et al.*, 1992; MACKIEWICZ- WALEC *et al*. 2024). Understanding how plants adapt to drought is crucial for predicting the impact of climate change on grasslands composition and diversity (KROEGER and OTFINOWSKI, 2024).

MATERIAL AND METHOD

The purpose and objectives of the research carried out at the Research and Development Station for Meadows Vaslui were represented by the forage productivity of some smooth bromegrass (*Bromus inermis* Leyss.) clones. The research was carried out during the period 2022-2024, within the Research and Development Station for Meadows (RDSM), Vaslui (46°40'-36°10' north latitude and 27°44'-20°40' east longitude). The experience was established in 2006, it consists of 25 variants (individual plants), in 4 repetitions, each variant having a length of 6 m and a width of 1 m.

(green - optimal period; orange - water deficit period)

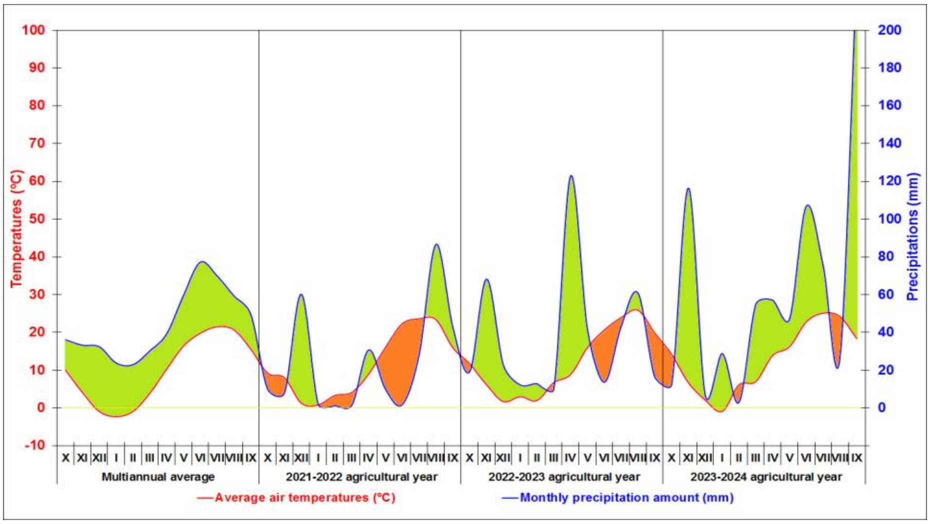

Figure 1. 2021-2024 Agricultural period climadiagram

In the three years studied, only one cut was performed per year, the second cut being only one of cleaning. The time of harvesting the plants was when over 50% of the plants had flowered. Each variant was harvested and weighed, representing the amount of green mass (G.M.) A sample of 200 g G.M., dried at 65°C for 8 hours, then weighed. The climatic conditions of the experimentation period, namely 2022-2024. In the agricultural period 2022-2023, there were two dry years with recorded rainfall being half of the multiannual average. During the period from April to September, there was a precipitation deficit every month. The agricultural year 2023-2024 was marked by high rainfall. Although the rainfall was above the multiannual average, there were also periods of water stress and uneven distribution (figure 1). The results were statistically interpreted by analyzing variance and calculating last significant differences (LSD).

RESULTS AND DISCUSSIONS

Productivity data are shown in Tables 1 and 2.

The production yield obtained differences of statistical significance in year 17 of vegetation, 2022 (table 1), values ranging from 3035 kg•ha^{-1} to variant $V_{15\ B2CL3}$ and 4897 kg•ha^{-1} to variant $V_{8\ B1CL8}$, with 1477 kg•ha^{-1} more than the blank variant.

Table 1

Plant production at first cut in the 17, 18, and 19 years of vegetation at *Bromus inermis* Leyss.

Variant	Production *kg•ha^{-1} D.M.*		
	Year 17 (2022)	Year 18 (2023)	Year 19 (2024)
V_{1} B1CL1	3443	6935 ^{ooo}	5997 ^{ooo}
V_{2} B1CL2	3555	8417	6405
V_{3} B1CL3	4219 ***	8946	6874
V_{4} B1CL4	4557 ***	7624 ^{ooo}	6741
V_{5} B1CL5	3982 ***	7558 ^{ooo}	6611
V_{6} B1CL6	3741 **	8222	6378
V_{7} B1CL7	4257 ***	9600 ***	7116 *
V_{8} B1CL8	4897 ***	7447 ^{ooo}	6583
V_{9} B1CL9	3823 ***	8893	8996 ***
V_{10} B1CL10	3595	9104 *	7404 ***
V_{11} B1CL11	4285 ***	10303 ***	9622 ***
V_{12} Olga control	3420 $^{C.}$	8529 $^{C.}$	6673 $^{C.}$
V_{13} B2CL1	3392	7553 ^{ooo}	6052 ^{oo}
V_{14} B2CL2	3541	8130	6210 ^{o}
V_{15} B2CL3	3035 ^{ooo}	8811	6750
V_{16} B2CL4	3700 *	8409	7637 ***
V_{17} B2CL5	3245	7778 ^{oo}	7129 *
V_{18} B2CL6	3710 **	8349	7280 **
V_{19} B2CL7	3272	7755 ^{oo}	6607
V_{20} B2CL8	3675 *	7653 ^{ooo}	6036 ^{ooo}
V_{21} B2CL9	3281	7940 ^{o}	6298 ^{o}
V_{22} Doina	3163 ^{o}	9556 ***	7300 **

V_{23} Doina		3156 ^{o}	7807 ^{oo}	7617 ***
V_{24} Doina		3792 ***	9096 *	6475
V_{25} Doina		3929 ***	8910	7260 **
LSD	***0.5%***	***213.9***	***461.6***	***364.8***
	0.1%	***285.3***	***615.5***	***486.5***
	0.01%	***371.5***	***801.5***	***633.5***

Of the 25 origins in the 17th year of vegetation, 16 variants exceeded the V_{12} control variant, achieving higher yields by up to 43%. In the 18th year of vegetation, 2023 (table 1.), values were obtained between 6935 kg•ha^{-1} D.M. at $V_{1\ B1CL1}$ and 10303 kg•ha^{-1} D.M. at $V_{11\ B1CL11}$ variant, with 1774 kg•ha^{-1} D.M. more than the control variant. Significant statistical significance was obtained in $V_{10\ B1CL10}$, $V_{24\ Doina}$, and very significant statistical significance in $V_{7\ B1CL7}$, $V_{11\ B1CL11}$, and $V_{22\ Doina}$ variants. In 2023, only 9 variants exceeded the V_{12} control variant, up to 20 % more. The year 18 being also the year in which the production of the d.m was superior, the control variant V_{12} obtained 8529 kg•ha^{-1} while in the years 17 and 18 vegetation the obtained quantities were much lower, 3420 kg•ha^{-1}, respectively 6673 kg•ha^{-1} D.M.

Table 2

Average production at first cut in the 17, 18, and 19 years of vegetation at *Bromus inermis* Leyss.

Variant	Production kg•ha^{-1} D.M. average 2022, 2023, 2024	Difference		Significance
		%	kg/ha	
$V_{1\ B1CL1}$	5459	87.9	-749	ooo
$V_{2\ B1CL2}$	6126	98.7	-81	
$V_{3\ B1CL3}$	6680	107.6	473	*
$V_{4\ B1CL4}$	6307	101.6	100	
$V_{5\ B1CL5}$	6050	97.5	-157	
$V_{6\ B1CL6}$	6113	98.5	-94	
$V_{7\ B1CL7}$	6991	112.6	784	***
$V_{8\ B1CL8}$	6309	101.6	102	
$V_{9\ B1CL9}$	7237	116.6	1030	***
$V_{10\ B1CL10}$	6701	108.0	494	*
$V_{11\ B1CL11}$	8070	130.0	1863	***
V_{12} Olga control	6207	100	C.	C.
$V_{13\ B2CL1}$	5666	91.3	-541	o
$V_{14\ B2CL2}$	5960	96.0	-247	
$V_{15\ B2CL3}$	6199	99.9	-8	
$V_{16\ B2CL4}$	6582	106.0	375	
$V_{17\ B2CL5}$	6051	97.5	-156	
$V_{18\ B2CL6}$	6446	103.9	239	
$V_{19\ B2CL7}$	5878	94.7	-329	
$V_{20\ B2CL8}$	5788	93.2	-419	o
$V_{21\ B2CL9}$	5840	94.1	-367	

V_{22} Doina	6673	107.5	466	*
V_{23} Doina	6193	99.8	-14	
V_{24} Doina	6454	104.0	247	
V_{25} Doina	6700	107.9	493	*
	LSD	***0.5%***	***411.8***	
		0.1%	***549.1***	
		0.01%	***715.0***	

In the 19th year of vegetation, 2024 (table 1), the obtained values were between 5997 kg•ha^{-1} D.M. at $V_{1\ B1CL1}$ and 9622 kg•ha^{-1} D.M. at $V_{11\ B1CL11}$. This year, too, values with positive statistical assurance were obtained for V_9, V_{10}, V_{11}, V_{16}, and V_{23} variants, obtaining very significant statistical significance. In this field of the 25 variants, 12 proved to be superior to the control variant (V_{12}), the production varied depending on the vegetation year and especially the climatic conditions of the year. In the three years of research (table 2.), the average production ranged from 5459 kg•ha^{-1} to $V_{1\ B1CL1}$ and 8070 kg•ha^{-1} to $V_{11\ B1CL11}$. The results obtained in the three years of production (table 2), show that this species achieves an important production of s.u. and in the 17-19 years of vegetation, these varied depending on the climatic conditions of the year.

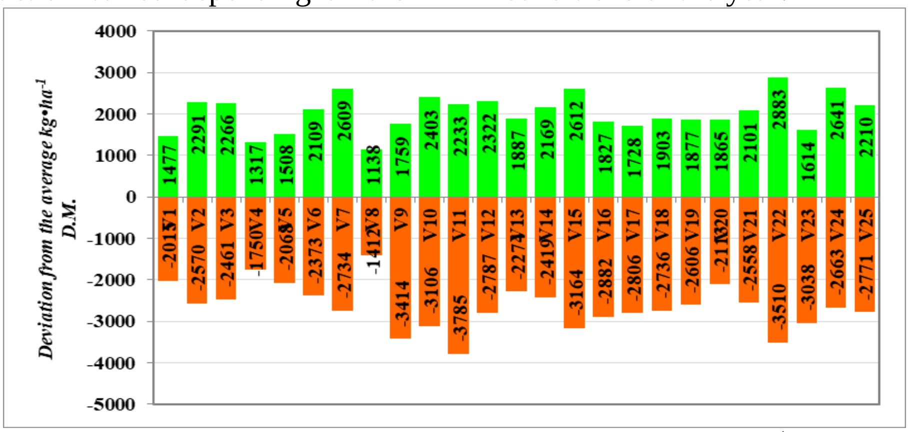

Figure 2. D.M. Production deviation from the average (kg•ha^{-1} D.M.)

Compared to the average over the three years of production (17, 18, and 19 vegetation), the positive and negative deviations (figure 2.) were recorded at the V_8, V_4, V_1, and V_{20} variants. The positive and negative deviations with the highest amplitude were recorded in the V_{22}, V_{11}, and V_{24} variants. The most important variants being V_8 and V_1, they are stable according to the climatic conditions of the last three years of vegetation, the obtained production did not have an increase or decrease compared to the V_{22} variant, where the oscillations were very much more in these years of production.

Assessing origins requires the determination of quantitative traits, as hereditary traits are a source of genetic diversity and can be easily modified under environmental conditions. The creation of new valuable varieties is possible due to the large range of variability within the genetic resources of *Bromus inermis* Leyss.

CONCLUSIONS

In this research, the dry matter. production obtained differences with statistical assurance. In 2022, year 17 vegetation productions were 3035 kg•ha^{-1} D.M. and 4897 kg•ha^{-1} D.M., in 18 year vegetation, the obtained productions ranged between 6935 kg•ha^{-1} and 10303 kg•ha^{-1}, and in 19 year vegetation, the production was between 5997 kg•ha^{-1} D.M. and 9622 kg•ha^{-1}. The highest yields in the three years studied were obtained at the V_8 variant, in the 17th year of vegetation, and at V_{11}, in the 18th and 19th years of vegetation. This study shows that this species, *Bromus inermis*, is a resistant species with high perennial, drought-tolerant, obtaining productions and in the 17-19 years of vegetation.

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