RESEARCH ON SEED QUALITY PRODUCED AT *Bromus inermis* Leyss. SPECIES

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Abstract

Seed production is undoubtedly of particular importance for the overseeding or reseeding of permanent grasslands and the establishment of temporary meadows, by providing the necessary seed material with higher quality indices. The research conducted during the period 2021-2024, at the Research and Development Station for Meadows (RDSM), Vaslui (46°40' - 36°10' north latitude and 27°44' - 20°40' east longitude) pursued the influence of fertilization and the distance between rows on seed germination (%) and value of the 1000 grains mass (g) for smooth brome (Bromus inermis Leyss.*). The organized experience was trifactorial, 2×3×5 type, it was placed according to the method of subdivided plots, with the plot harvestable area of 20 m2 (2 m × 10 m), in three replications, and the studied factors were: A - variety (a_1 - Mihaela, a_2 - Iulia Safir), B - the distance between rows with three graduations (b_1 - 25 cm, b_2 - 37.5 cm and b_3 - 50 cm) and C - fertilization with five graduations (c_1 - unfertilized, c_2 - $N_{50}P_{50}$, c_3 - $N_{50}P_{50}K_{50}$, c_4 - $N_{75}P_{75}K_{75}$ and c_5 - $N_{100}P_{100}K_{100}$). Following the study, it was found that by applying mineral fertilized with $N_{75}P_{75}K_{75}$ and by sowing at 25 cm distances between rows seed quality was higher.*

Keywords: variety, distance between rows, fertilization

INTRODUCTION

Bromus inermis Leyss. Species or smooth brome is found in temperate areas of Asia, Europe and North America, being a perennial gramine with a high drought tolerance, frost, is widely used for the cultivation of temporary meadows and improving of permanent ones (Samuil C. *et al*, 2010; Saeidnia F. *et al*, 2019).

Smooth brome is a perennial grasses with high drought resistance (Raawe H., 2004). Well developed root system with many ramifications lead to the adaptability of different soil types (Rogalski M., 2004).

The role of this grasses is significant in the agricultural system, because they protect the soil from water erosion and wind erosion, enrich it with organic matter and help infiltrate precipitation (Goloborodko S.P. *and* Dymov O.M., 2019).

The grasslands contribute to the management of feed resources, atmospheric carbon storage, biodiversity conservation, beautify the landscape and provide spaces for recreational activities (Marusca T. *et al*, 2010).

Seed quality is vital for

agriculture, with increased production and the establishment of new crops particularly dependent on the seed stock. Seed size, weight, protein content, are closely related to seed quality (Marco D.G.D., 1990; Smart A.J. *and* Moser L.E., 1999; Snider J.L. *et al*, 2016; Sousa K.R. et al., 2016).

Although seed quality is affected by many factors, fertilizer management is particularly important. The deficiency of any of the macronutrients will significantly impede the growth of plants, reducing the quantity and quality of the yields obtained (Austin R.B., 1966).

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 analysis of the influence of the interaction between variety, row distance and fertilization on seed germination (G %) and the mass of 1000 grains - MMB (g) to smooth brome (*Bromus inermis* Leyss.), in seed culture.

The research was carried out during the period 2021-2024, within the Research and Development Station for Meadows (RDSM) Vaslui (46°40'-36°10' north latitude and 27°44'-20°40' east longitude).

To achieve the proposed purpose, a trifactorial experience was organized, 2×3×5 type, placed according to the method of subdivided plots, with the plot harvestable area of 20 m^2 (2m x 10m), in three replications.

The studied factors were*:*

A - *variety* with two graduations (a_1 - Mihaela, a_2 - Iulia Safir),

B - *the distance between rows* with three graduations (b_1 - 25 cm, b_2 - 37.5 cm and b_3 - 50 cm),

C - *fertilization* with five graduations (c_1 - unfertilized, c_2 - $N_{50}P_{50}$, c_3 - $N_{50}P_{50}K_{50}$, c_4 - $N_{75}P_{75}K_{75}$ and c_5 - $N_{100}P_{100}K_{100}$).

The biological material used is represented by the varieties Mihaela and Iulia Safir, both varieties were created at the Research and Development Station for Meadows, Vaslui (Silistru D., 2010; Silistru D., 2011).

The fertilizers were applied early in the spring, at the start of plant vegetation.

Seed germination - G (%) was determined at the Territorial Inspectorate for Seed Quality and Propagating Material Vaslui, according to SR 1634/1999.

The mass of 1000 grains - MMB (g) of the seeds was determined for each experimental plot by weighing 100 seeds in eight repetitions, then the mean value obtained was multiplied by 10 (SR 7713/1999).

The results were statistically interpreted by analyzing variance and calculating last significant differences (LSD).

The climatic conditions of the experimentation period, namely 2021-2024, showed that the first

year of the vegetation was a year with above average rainfall, thus the climadiagram of this agricultural year, 2020-2021, it was similar to the multiannual average. In the agricultural period 2021-2023, the two and three year vegetation, were two dry years, there were recorded rainfall in half compared to the multiannual average, in the third year of vegetation in the period of April to September there was precipitation deficit every month. The fourth year of vegetation, namely the agricultural year 2023-2024, was a year with high rainfall, there were recorded rainfall above the multiannual average, however, there have been periods of water stress and uneven distribution (figure 1).

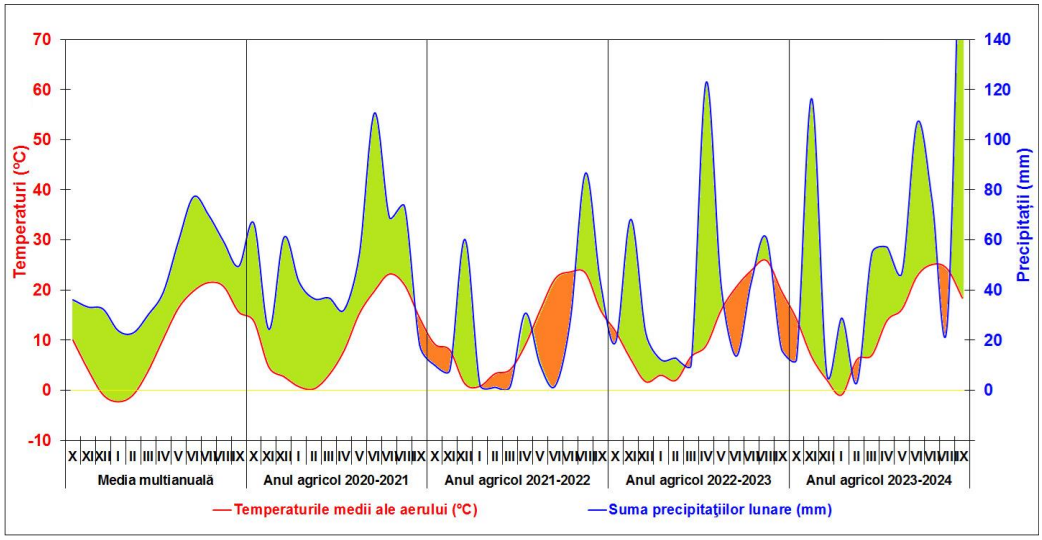

Figure 1. Climadiagram of agricultural period 2020-2024 (RDSM Vaslui)

RESULTS AND DISCUSSIONS

Seed germination is one of the most important quality parameters be of the seed material produced in the *Bromus inermis* Leyss. species and the mass of 1000 grains (MMB) is, also, one of the most important indicators of seed quality. Seeds with an above-average value of this indicator will store more energy, and from a practical point of view, in the technology of cultivation of smooth brome, the use of seeds with higher MMB value, under normal pedoclimatic conditions, it will cause a faster and more uniform emergence of the plants, and under the conditions of a water shortage in the soil, at the time of sowing, seeds can be sown deeper into the soil.

By improving the technology of cultivation of the *Bromus inermis* Leyss. species for the seed is also aimed at creating sowing material with larger values of germination and mass of 1000 grains (table 1).

In the three years of

production the average germination value was 94.3%, the lowest value was recorded in the second year of vegetation, of 89.3 % at the $a_2b_2c_1$ variant (Iulia Safir variety, sown at 37.5 cm between rows, unfertilized) and the highest value was recorded in the fourth year of vegetation of 97.3 %, at the $a_1b_3c_3$ variant (Mihaela variety, sown at 50 cm, fertilized with $N_{50}P_{50}K_{50}$) and $a_2b_2c_1$ variant (Iulia Safir variety, sown at 37.5 cm between rows, unfertilized).

Table 1

The influence of the interaction between the studied factors on seed germination in the *Bromus inermis* Leyss. species

Variant			Seed germination (G %)		
			Year II (2021-2022)	Year III (2022-2023)	Year IV (2023-2024)
a_1 - Mihaela variety (control)	b_1 - 25 cm (control)	c_1- unfertilized (c.)	94.3^{control}	95.7^{control}	93,0^{control}
		c_2 - $N_{50}P_{50}$	95.3	95.7	91,3
		c_3 - $N_{50}P_{50}K_{50}$	95.0	94.3	89,7^{oo}
		c_4 - $N_{75}P_{75}K_{75}$	95.0	95.0	91,3
		c_5 - $N_{100}P_{100}K_{100}$	92.3	93.3^{o}	94,3
	b_2 - 37.5 cm	c_1 - unfertilized	92.3	94.0	95,3*
		c_2 - $N_{50}P_{50}$	92.0	93.7	93,3
		c_3 - $N_{50}P_{50}K_{50}$	91.3^{o}	93.3^{o}	91,0
		c_4 - $N_{75}P_{75}K_{75}$	91.0^{oo}	92.3^{oo}	92,3
		c_5 - $N_{100}P_{100}K_{100}$	89.7^{ooo}	90.3^{ooo}	94,3
	b_3 - 50 cm	c_1 - unfertilized	91.0^{oo}	92.3^{oo}	96,0**
		c_2 - $N_{50}P_{50}$	92.0	93.7	96,0**
		c_3 - $N_{50}P_{50}K_{50}$	92.0	94.0	97,3***
		c_4 - $N_{75}P_{75}K_{75}$	93.0	94.7	95,3*
		c_5 - $N_{100}P_{100}K_{100}$	93.3	94.3	93,0
a_2 - Iulia Safir variety	b_1 - 25 cm	c_1 - unfertilized	94.7	95.3	97,0***
		c_2 - $N_{50}P_{50}$	95.0	95.7	96,0**
		c_3 - $N_{50}P_{50}K_{50}$	94.7	95.3	95,0
		c_4 - $N_{75}P_{75}K_{75}$	93.0	94.0	92,0
		c_5 - $N_{100}P_{100}K_{100}$	90.7^{oo}	92.0^{oo}	90,0^{oo}
	b_2 - 37.5 cm	c_1 - unfertilized	89.3^{ooo}	90.7^{ooo}	97,3***
		c_2 - $N_{50}P_{50}$	91.0^{oo}	92.0^{oo}	93,0
		c_3 - $N_{50}P_{50}K_{50}$	94.0	94.0	90,0^{oo}
		c_4 - $N_{75}P_{75}K_{75}$	94.7	94.7	91,3
		c_5 - $N_{100}P_{100}K_{100}$	94.3	94.3	93,0
	b_3 - 50 cm	c_1 - unfertilized	92.3	93.7	90,0^{oo}
		c_2 - $N_{50}P_{50}$	92.3	93.7	92,0
		c_3 - $N_{50}P_{50}K_{50}$	94.0	95.7	94,0
		c_4 - $N_{75}P_{75}K_{75}$	94.0	94.7	94,0
		c_5 - $N_{100}P_{100}K_{100}$	96.7	96.0	94,0
LSD		*0.5 %*	*2.5*	*2.2*	*2.1*
		0.1 %	*3.3*	*3.0*	*2.8*
		0.01 %	*4.3*	*3.9*	*3.7*

The years two and three of vegetation were years with less favorable climatic conditions. The separate influence of the factors

studied manifested less. Year four of vegetation was a year favorable to the culture of smooth brome, with the increase in the distance between the rows increased and seed germination, instead with the increase of mineral fertilizer doses, seed germination was lower, significant and distinctly significant depending on the applied dose (table 2).

Table 2

The influence of the interaction between the studied factors on mass of 1000 grains in the *Bromus inermis* Leyss. species

Variant			MMB (grams)		
			Year II (2021-2022)	Year III (2022-2023)	YearIV (2023-2024)
a_1 - Mihaela variety (control)	b_1 - 25 cm (control)	c_1 - unfertilized (c.)	3.72^{control}	3.27^{control}	3,64^{control}
		c_2 - $N_{50}P_{50}$	3.81	3.55**	3,38^{o}
		c_3 - $N_{50}P_{50}K_{50}$	3.71	3.17	3,54
		c_4 - $N_{75}P_{75}K_{75}$	3.82	3.21	3,64
		c_5 - $N_{100}P_{100}K_{100}$	3.91	3.27	3,69
	b_2 - 37.5 cm	c_1 - unfertilized	3.79	3.24	3,37^{o}
		c_2 - $N_{50}P_{50}$	4.15**	3.29	3,25^{oo}
		c_3 - $N_{50}P_{50}K_{50}$	4.17***	3.32	3,34^{o}
		c_4 - $N_{75}P_{75}K_{75}$	4.43***	3.33	3,29^{oo}
		c_5 - $N_{100}P_{100}K_{100}$	4.34***	3.47*	3,34^{o}
	b_3 - 50 cm	c_1 - unfertilized	4.03*	3.21	3,60
		c_2 - $N_{50}P_{50}$	4.28***	3.30	3,53
		c_3 - $N_{50}P_{50}K_{50}$	4.27***	3.32	3,37^{o}
		c_4 - $N_{75}P_{75}K_{75}$	4.25***	3.50*	3,00^{ooo}
		c_5 - $N_{100}P_{100}K_{100}$	4.48***	3.26	3,37^{o}
a_2 - Iulia Safir variety	b_1 - 25 cm	c_1 - unfertilized	4.01*	3.20	3,36^{o}
		c_2 - $N_{50}P_{50}$	3.95	3.41	3,27^{oo}
		c_3 - $N_{50}P_{50}K_{50}$	4.02*	3.44	3,24^{ooo}
		c_4 - $N_{75}P_{75}K_{75}$	4.32***	3.22	3,38^{o}
		c_5 - $N_{100}P_{100}K_{100}$	4.40***	3.38	3,57
	b_2 - 37.5 cm	c_1 - unfertilized	3.94	3.26	3,36^{o}
		c_2 - $N_{50}P_{50}$	4.29***	3.30	3,19^{ooo}
		c_3 - $N_{50}P_{50}K_{50}$	4.27***	3.38	3,34^{o}
		c_4 - $N_{75}P_{75}K_{75}$	4.41***	3.45	3,28^{oo}
		c_5 - $N_{100}P_{100}K_{100}$	4.44***	3.21	3,17^{ooo}
	b_3 - 50 cm	c_1 - unfertilized	3.90	3.13	3,44
		c_2 - $N_{50}P_{50}$	4.22***	3.51*	3,55
		c_3 - $N_{50}P_{50}K_{50}$	4.27***	2.96^{oo}	3,27^{oo}
		c_4 - $N_{75}P_{75}K_{75}$	4.23***	3.14	3,52
		c_5 - $N_{100}P_{100}K_{100}$	4.18***	3.24	3,15^{ooo}
LSD		*0.5 %*	*0.26*	*0.20*	*0.23*
		0.1 %	*0.29*	*0.27*	*0.31*
		0.01 %	*0.65*	*0.35*	*0.40*

In the three years of production the average mass value of 1000 grains was 3.54 g, the lowest value of the MMB being

recorded in the third year of vegetation (table 2), of 2.96 g at the $a_2b_3c_3$ variant (Mihaela variety, sown at 50 cm between rows, fertilized with $N_{50}P_{50}K_{50}$). The highest value was recorded in the second year of vegetation of 4.48 g, was at the $a_1b_3c_5$ variant (Mihaela variety, sown at 37.5 cm between rows, fertilized with $N_{100}P_{100}K_{100}$).

In the case of the researches carried out, the factors of distance between rows and fertilization have positively influenced the value of the mass of 1000 grains, only in the second year of vegetation (table 2) while in the three and four years of vegetation their influence was insignificant.

CONCLUSIONS

From the point of view of the quality parameters analyzed, seed germination and mass of 1000 grains, interaction between the studied factors, respectively the cultivated variety, distance between rows and fertilization influenced the quality of the seeds differently, but these results were also influenced by the climatic conditions of this period.

In the three years of production, the Iulia Safir variety was superior to the Mihaela variety, obtaining seeds of superior quality, and by administering mineral fertilizers ($N_{75}P7_5K_{75}$ and $N_{100}P_{100}K_{100}$) and sowing at smaller distances between rows, seeds with higher quality indices were obtained.

For obtaining seed yields with a higher biological value in the species *Bromus inermis* Leyss. it is recommended to grow the variety Iulia Safir, sown at a distance of 25 - 37.5 cm between rows and fertilized with NPK in doses of 75-100 kg·ha^{-1}.

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