RESERCH ON THE INFLUENCE OF TEHNOLOGICAL FACTORS ON SEED PRODUCTION AT THE *BROMUS INERMIS* LEYSS. IN THE THIRD YEAR OF VEGETATION

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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. The research conducted during the period 2022-2023, at the Research and Development Station for Meadows, 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 production (kg/ha) 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 m^2 (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 production was higher.

Key words: variety, distance between rows, fertilization

In the context of climate change, drought is becoming the most significant and acute problem affecting crop growth, survival and persistence in many parts of the world, especially in arid and semi-arid regions (Mollasadeghi V. *et al*, 2011; Hussain S.S. *et al*, 2018). The development of drought-tolerant varieties is an essential objective of plant improvement programs. It is expected to be a key component in climate change mitigation, loss minimization and production stability strategies (Gustafan D.L., 2011).

Field management practices, including sowing, fertilization, irrigation and weed control etc., are important factors in improving seed yield. Research on perennial grasses has shown that agronomic practices, such as plant density, fertilization and residue management, have influenced the level of yield and the quality of seeds (Khan S. *et al*, 2017).

Permanent pastures, in Romania represent 33% of the total agricultural area (4.9 million ha) and they are an important forage resource but inappropriate management systems in the past have led to their present state of degradation (Vîntu V. *et al*, 2011; Samuil *et al*, 2012).

Rational use of fertilizers can produce substantial increases of the production and biodiversity and fodder quality improvement (Vîntu V. *et al*, 2008).

MATERIAL AND METHOD

The purpose and objectives of the research conducted during the period of 2022-2023, at the Research and Development Station for Meadows, Vaslui (46°40' - 36°10' N latitude and 27°44' - 20°40' E longitude), were represented by the analysis of the influence of row spacing and fertilization on seed production ($kg \cdot ha^{-1}$), at the smooth brome (*Bromus inermis* Leyss.), in the third year of vegetation.

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

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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 production (kg·ha^{-1}) was determined by weighing the manually harvested seeds on each variant, then reporting to the area unit.

The agricultural year 2022-2023 was a dry year (*figure 1*), the amount of precipitation was 443.6 mm, 90.2 mm lower than the annual average (533.2 mm), affecting the growth and development of plants.

Although this agricultural year has been more rainy, the rainfall deficit of the previous year was felt this year as well. In terms of temperatures, it was a very hot year, the monthly average being 2.2 ^{o}C higher than the multi-annual average. During the growing season the precipitation deficit and very high temperatures (May-June) had less favorable effects on the growth and development of smooth brome plants (*figure 2*).

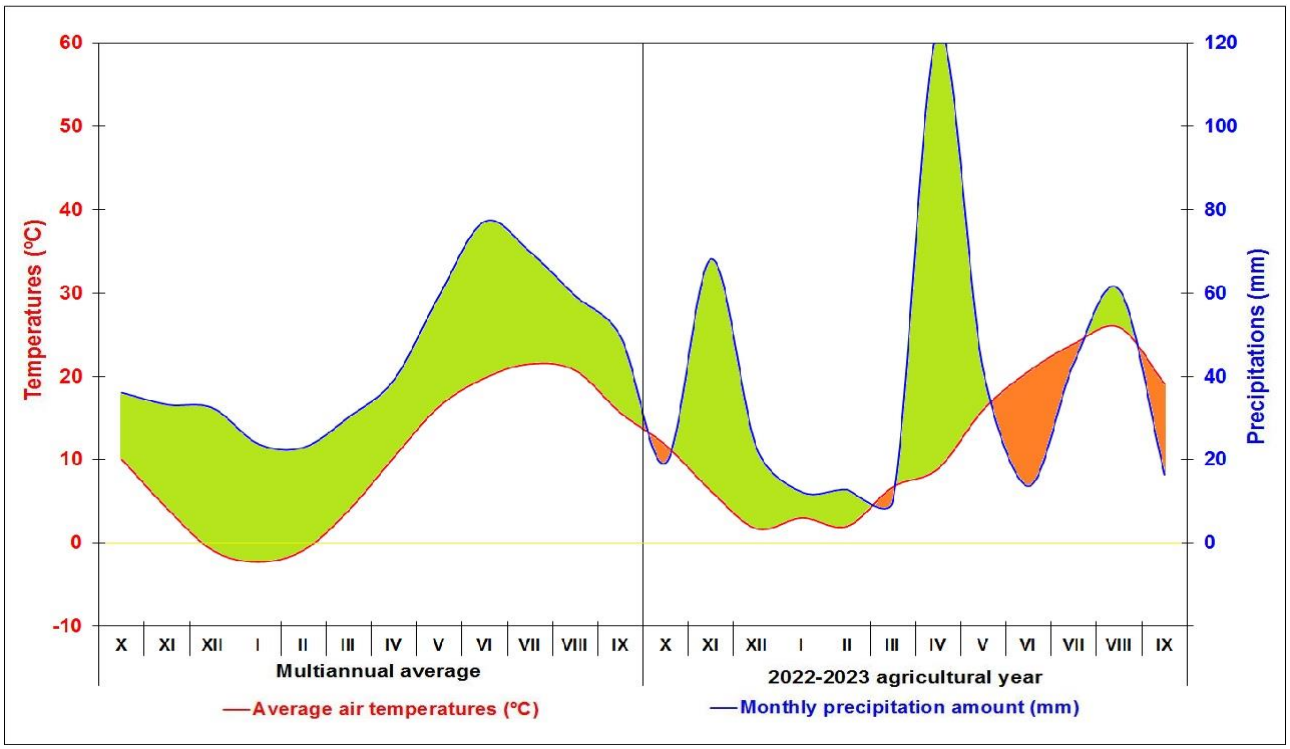

Figure 1 **Climadiagram of the 2022-2023 agricultural year**

Figure 2 - **Aspects of the experimental field**

The results were statistically interpreted by analyzing the variance and calculating the least significant differences.

RESULTS AND DISCUSSIONS

Smooth brome (*Bromus inermis* Leyss.) is a perennial grass for meadows with high feed value and high productivity (Liu G.X. *et al*, 2014). It is characterized by high tolerance to drought and low temperatures and average resistance to soil salinity, this species being introduced for the restoration of degraded meadows and the establishment of pastures (Liu G. *et al*, 2008; Antonova E.V. *et al*, 2015).

Analyzing the interaction between the cultivated variety, the distance between the rows and the fertilization on the seed production at the smooth brome, in the third year of vegetation, at cycle I of vegetation (*table 1.*) values between 171 kg·ha^{-1} at the $a_2b_3c_5$ variant (variety Iulia Safir, sown at 50 cm between rows, fertilized with $N_{100}P_{100}K_{100}$) and 363 kg·ha^{-1} at the $a_2b_1c_4$ variant (variety Iulia Safir, sown 25 cm between rows, fertilized with $N_{75}P_{75}K_{75}$).

From the point of view of statistical insurance, positive differences were obtained in both varieties, while in variants sown at 25 cm between rows a very significant statistical difference was obtained in variants $a_1b_1c_4$, $a_2b_1c_1$-c_5.

The variety Iulia Safir obtained a larger amount of seeds (kg·ha^{-1}) on average by 0.10 kg·ha^{-1} more (*figure 3.*) compared to the control variety (Mihaela). By sowing at shorter distances between rows, the highest values were obtained, by sowing at 25 cm between rows an average of 313 kg·ha^{-1} was obtained, when increasing the sowing distance the production obtained was decreasing.

After the application of mineral fertilizers the values had a growth tendency, thus in the variant fertilized with $N_{75}P_{75}K_{75}$, the largest quantity of seed, 268 kg·ha^{-1}, was obtained, and from the point of view of statistical insurance, the same variant obtained a very significant statistical difference from the control variant.

Sowing at 25 cm between rows and by administering mineral fertilizers in the pedoclimatic conditions of the agricultural year 2022-2023, led to the obtaining of larger quantities of seeds (kg·ha^{-1}).

Table 1

The influence of the distance between the rows and the fertilization on the seed production

Variant			Seed production (kg·ha^{-1})	Diferences (kg·ha^{-1})	Diferences (%)	Statistical significance
a_1 - Mihaela (control)	b_1 - 25 cm (control)	c_1 - unfertilized (control)	259	control	100	control
		c_2 - $N_{50}P_{50}$	277	18	106,9	
		c_3 - $N_{50}P_{50}K_{50}$	277	18	106,9	
		c_4 - $N_{75}P_{75}K_{75}$	315	56	121,6	***
		c_5 - $N_{100}P_{100}K_{100}$	288	29	111,2	*
	b_2 - 37,5 cm	c_1 – unfertilized	225	-34	86,9	oo
		c_2 - $N_{50}P_{50}$	230	-29	88,8	o
		c_3 - $N_{50}P_{50}K_{50}$	247	-12	95,4	
		c_4 - $N_{75}P_{75}K_{75}$	255	-4	98,5	
		c_5 - $N_{100}P_{100}K_{100}$	232	-27	89,6	oo
	b_3 - 50 cm	c_1 – unfertilized	173	-86	66,8	ooo
		c_2 - $N_{50}P_{50}$	192	-67	74,1	ooo
		c_3 - $N_{50}P_{50}K_{50}$	207	-52	79,9	ooo
		c_4 - $N_{75}P_{75}K_{75}$	217	-42	83,8	ooo
		c_5 - $N_{100}P_{100}K_{100}$	205	-54	79,2	ooo
a_2 - Iulia Safir	b_1 - 25 cm	c_1 – unfertilized	328	69	126,6	***
		c_2 - $N_{50}P_{50}$	344	85	132,8	***
		c_3 - $N_{50}P_{50}K_{50}$	333	74	128,6	***
		c_4 - $N_{75}P_{75}K_{75}$	363	104	140,2	***
		c_5 - $N_{100}P_{100}K_{100}$	341	82	131,7	***
	b_2 - 37,5 cm	c_1 - unfertilized	208	-51	80,3	ooo
		c_2 - $N_{50}P_{50}$	213	-46	82,2	ooo
		c_3 - $N_{50}P_{50}K_{50}$	227	-32	87,6	oo
		c_4 - $N_{75}P_{75}K_{75}$	258	-1	99,6	
		c_5 - $N_{100}P_{100}K_{100}$	233	-26	90,0	o
	b_3 - 50 cm	c_1 - unfertilized	180	-79	69,5	ooo
		c_2 - $N_{50}P_{50}$	177	-82	68,3	ooo
		c_3 - $N_{50}P_{50}K_{50}$	176	-83	68,0	ooo
		c_4 - $N_{75}P_{75}K_{75}$	201	-58	77,6	ooo
		c_5 - $N_{100}P_{100}K_{100}$	171	-88	66,0	ooo
		LSD	*5%*	22		
			1%	30		
			0,1%	38		

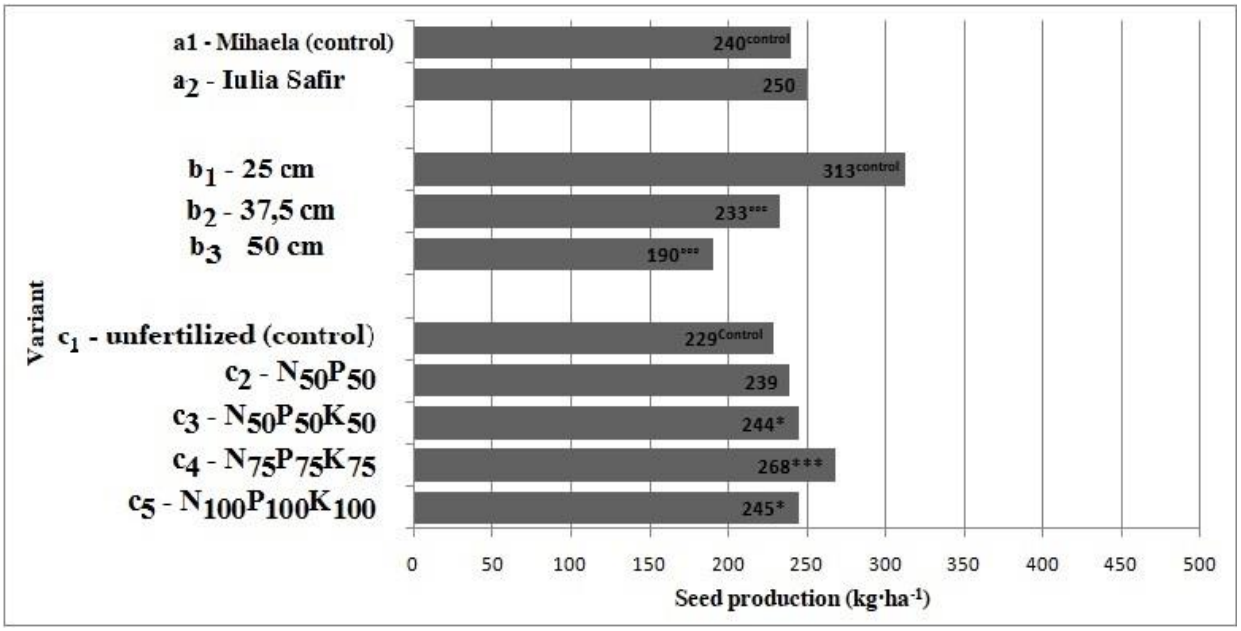

Figure 3 **Separate influence of the distance between the rows and the fertilization on the seed production**

CONCLUSIONS

From the analysis of the results obtained it was differentiated that each of the studied factors influenced the quantity of seed obtained but in the climatic conditions specific to the agricultural year 2022-2023, the results obtained were greatly influenced by the atmospheric drought felt from the previous year.

The variety Iulia Safir obtained a larger amount of seeds (kg·ha^{-1}) on average by 0.10 (kg·ha^{-1}) more compared to the Mihaela variety.

By sowing at a distance of 25 cm between rows larger quantities of seed were obtained compared to the variants that were sown at larger distances.

By administering $N_{75}P_{75}K_{75}$ the largest quantities of seed were obtained (kg·ha^{-1}).

By sowing at 25 cm between rows, by administering mineral fertilizers with $N_{75}P_{75}K_{75}$ and using the variety Iulia Safir, the largest quantities of seeds (kg·ha^{-1}) were obtained.

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