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A NEW CHALLENGE IN THE CONTEXT OF CLIMATE CHANGE – SPELT WHEAT

BRIANNA-NAOMI DAVID[4], RUBEN JITA [4], TEODOR MATEOC[1*], SAIDA FEIER-DAVID[3], NICOLETA MATEOC-SÎRB[1,2]

[1]*University of Life Sciences "King Mihai I" from Timişoara, Faculty of Management and Rural Tourism, Department Management and Rural Development*
[2]*Romanian Academy - Branch of Timisoara, Research Center for Sustainable Rural Development of Romania*
[3]*University of Life Sciences "King Mihai I" from Timişoara, Faculty of Bioengineering and Animal Resources*
[4]*University of Life Sciences "King Mihai I" from Timişoara, Doctoral School "Engineering of Vegetable and Animal Resources"*

Abstract: *Climate change in recent years on the European continent has had a direct impact on Romanian agriculture. The lack of precipitation during critical stages of plant growth and development, combined with extremely high temperatures over extended periods, has led to the onset of drought conditions in the air (atmospheric) and in the soil. These phenomena have determined farmers to reconsider their crop rotation and their tillage practices. Consequently, efforts are currently underway to introduce other crops with a lower proportion into cultivation, which will ensure more stable yields under extreme growing conditions and higher-quality agricultural products. One of these species, which has become increasingly popular and widely cultivated in recent years in Europe and in our country, is Triticum aestivum ssp. spelta, or spelt wheat. The research conducted as part of our study focuses on testing three varieties of spelt wheat – Zollernspelz, Atergauer, and Frankenkorn – under the climatic and soil conditions of western Romania, specifically the Lower Timiș Plain and the Vingăi Plain, on two different soil types: eutricambosol and faeziom.*

• Introduction

Spelt wheat is one of the oldest cultivated plants, having been grown even before common wheat (used for bread), primarily for its glassy grains, from which flour rich in gluten, vitamins, proteins, and minerals is obtained [1,2,3,7]. The whole wheat flour obtained from the grains is of very high quality, with a slightly nutty flavor, and is used to make bread without the need for additives. It is also becoming increasingly popular for use in various baked goods [4,5,13].

Another advantage over common wheat is its greater resistance to diseases and pests (the grain has a protective husk). It can also be grown successfully under extreme growing conditions (in wetter and colder areas, as well as in regions with scorching heat and prolonged drought) [5,15]. It makes efficient use of soils with varying textures, ranging from sandy-loam to loamy-clay, with a balanced application of nitrogen, phosphorus, and potassium, which are necessary for grain yield and quality [7,16].



Given these aspects, spelt wheat may in the future serve as an alternative to common wheat in the food supply, identifying the varieties that perform well under the conditions of climate change, which is leading to more heat waves and droughts, and global warming overall. Since it is more resistant to diseases and pests and is also widely used in the human diet, it is being more and more cultivated and promoted within organic farming systems that do not use chemical fertilizers or pesticides, resulting in the product **"organic spelt wheat"** [11,12,18].

• Material and method

The research material used in the two identical experiments conducted at the two locations – *the Lower Timiș Plain* and *the Upper Vingăi Plain* – during the 2025–2026 agricultural year included three varieties of spelt wheat: ***Zollernspelz*** – a semi-late-maturing variety, tolerant to major diseases, suitable for cultivation on low-fertility soils; ***Attergauer*** – a traditional spelt wheat variety, resistant to low temperatures and having excellent baking qualities; ***Frankenkorn*** – considered one of the most productive spelt varieties in Europe, it can be grown in both conventional and organic farming.

The experiment in ***the Low Plain*** was conducted on *faeoziem soil*, medium clay loam, located within the administrative territory of the village of ***Voiteni, Timiș***, while in the village ***Topolovățu Mare*** in ***the High Plain***, the soil type is *eutricambosol*, medium loam [17].

• Results and discussions

The lack of soil moisture prevented from carrying out basic soil preparation and pre-sowing operations under optimal conditions; in our case, these were performed in mid-October of the fall of 2025. Therefore, after harvesting rapeseed as the preceding crop, we used a disc harrow to break up the stubble, and then, at the end of September, we replaced plowing with scarification. These **agrotechnical measures** were adopted due to low soil moisture, which made it impossible to turn the furrow without creating a large amount of clods and prevented the preparation of high-quality soil.

Better soil tillage was achieved in the lower-lying area of our research, where soil moisture approached the average value, which also led to higher yields for the three cultivated varieties – ***Zollernspelz, Attergauer***, and ***Frankenkorn*** – averaging 174 kg/ha, compared to yields in the Upper Plain, where soil moisture deficiency was greater and soil preparation and the quality of cultivation suffered as a result.

Table 3. Yields for spelt wheat in the 2025/2026 crop year

Location – Soil Type	The cultivated variety	Average grain yield kg/ha	Difference in yield compared to the average for the varieties		Difference from the field average - control	
			kg/ha	%	kg/ha	%
Lowland Plain – Medium Clay loam faeozem	Zollernspelz	2523	-99	96,22	-12	99,53
	Attergauer	2555	-67	97,44	+20	100,79
	Frankenkorn	2788	+166	106,33	+253	109,98
Average yield of the varieties, kg/ha		2622	-	100,00	+87	103,43
High Plain – Medium-textured Eutricambosol	Zollernspelz	2379	-69	97,18	-156	93,84
	Attergauer	2395	-53	97,83	-140	94,48
	Frankenkorn	2569	+121	104,94	+34	101,34
Average yield of the varieties, kg/ha		2448	-	100,00	-87	96,57
Overall average yield of the cultivars (control field) kg/ha		2535	-	-	-	100,00

The overall average yield of the cultivated varieties in the 2025/2026 agricultural year was 2,535 kg/ha of STAS grain, value that was significantly and negatively affected by soil drought conditions in the fall of 2025, when soil moisture reserves were very low, and also by water shortages during grain formation and filling, when ***high temperatures and a lack of preci***pitation were recorded.

• Conclusions

Climate change, which has been having an evident impact on agricultural crops in recent years, is forcing farmers to make certain adjustments to their crop-growing practices, including: crop placement, changes in soil cultivation methods, determining the sowing season, and selecting genetic material.

Among the crops that have yielded satisfactory results under conditions of low humidity and high temperatures in recent years is **spelt wheat**. Under these growing conditions, ***spelt wheat can provide more stable and reliable yields compared to common bread wheat***.

Of the three varieties analyzed, the ***Frankenkorn*** variety showed better adaptation to stressful conditions during the growing season, achieving an average yield of 2,679 kg/ha across the two growing regions – a good result – given that this growing season included *periods of severe soil moisture deficit*, during the fall germination and during the fruit-setting phase.