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AGRO-ECOLOGICAL EFFICIENCY OF SPELT WHEAT CULTIVATION: YIELD ANALYSIS AND BIOLOGIZATION ELEMENTS

У публікації розглянуто агроекологічні чинники, що впливають на формування продуктивності пшениці спельти (Triticum spelta). Основну увагу приділено аналізу елементів біологізації, зокрема використанню органічних добрив та біостимуляторів, як альтернативи інтенсивним хімічним технологіям. У роботі порівняно традиційні методи вирощування зі сталими підходами для визначення їхньої економічної та екологічної ефективності. Результати свідчать, що біологічні компоненти не лише сприяють стабілізації врожайності, а й значно покращують стан ґрунту та якісні показники зерна.

Ключові слова: *пшениця спельта, урожайність зерна, біологізація, стале сільське господарство, родючість ґрунту, агроекологія.*

The publication examines the agro-ecological factors affecting the productivity of spelt wheat (Triticum spelta). The main focus is on the analysis of biologization elements, particularly the use of organic fertilizers and bio-stimulants, as an alternative to intensive chemical technologies. The study compares traditional cultivation methods with sustainable approaches to determine their economic and environmental efficiency. The results indicate that biological components not only contribute to yield stabilization but also significantly improve soil health and grain quality indicators.

Keywords: *spelt wheat, grain yield, biologization, sustainable agriculture, soil fertility, agro-ecology.*

Modern agriculture faces the urgent need to transition from intensive chemical methods to sustainable practices. Spelt wheat (Triticum spelta) has regained global attention due to its high genetic diversity and resilience to adverse environmental conditions. Unlike common wheat, spelt is ideal for organic farming systems that prioritize soil health. This shift toward resilient crops is driven by the growing pressure on the global food system.

As a primary supplier of energy and vital nutrients, including proteins, vitamins, and fibers, wheat plays a crucial role in human nutrition. Projections suggest that by 2050, the global population will reach nearly 9.8 billion, significantly driving up the demand for this crop in both food and fodder sectors. Consequently, global output needs to rise by approximately one billion tons from its current level. However, yield progression has flattened since the late 20th century, primarily because of escalating environmental stressors like extreme heat and water scarcity linked to climate change [1].

These environmental constraints are not just local issues but global threats to stability.Global grain production faces significant threats from environmental stressors such as water scarcity, thermal extremes, and soil degradation, alongside the impact of unmanaged pests and pathogens. These challenges are primary drivers of food insecurity and widespread famine, particularly in emerging economies where malnutrition remains a critical issue. In this context, spelt wheat emerges as a superior alternative to modern varieties due to its unique nutritional and technological profile.

Nutritional and Technological Advantages

Compared to common wheat, spelt grain possesses higher energy value and contains greater amounts of beta-carotene, retinol, and fats. It is characterized by gluten that is more extensible but less elastic. Its mealy endosperm, combined with a high protein content and high viscosity (as measured by amylograph), are favorable properties for use in the production of cakes and confectionery products [2].

Methods of Biologization

The core of "biologization" includes the use of bio-fertilizers, bacterial preparations, and crop rotation management. These elements aim to activate the natural microbiological potential of the soil. Research shows that biological stimulants can replace up to 30% of synthetic nitrogen fertilizers without a significant drop in productivity. Beyond mere substitution of chemicals, these agents play a decisive role in plant survival and field performance.

Investigating the impact of biological products on the plant survival rate of winter spelt is highly relevant, as maintaining optimal crop density is a key factor in maximizing yields. The application of advanced bio-preparations helps minimize plant loss throughout the growing season, thereby enhancing the overall productivity of the crops [3].

Bio-preparations not only boost germination vigor but also enhance overall plant development, directly impacting both the quantity and quality of the grain. The integrated application of such agents is a vital component of sustainable crop production strategies [3].

In conclusion, the transition to sustainable spelt wheat cultivation through biologization is a strategic response to global food security and climate challenges. The integration of bio-preparations not only stabilizes yields and reduces chemical dependency but also significantly enhances the nutritional and technological properties of the grain. Implementing these methods is essential for developing eco-friendly agriculture and producing high-quality food products.

References:

1. Longin, C. F. H., & Würschum, T. (2016). Genome-wide association studies in spelt wheat. Journal of Agriculture and Food Chemistry, S. 2-3. Мова англ. (Дата звернення 22.02.2026)

2. Korhova, M. M. (2019) Productivity of winter wheat spelt in the South Steps of Ukraine Bulletin of Agricultural Science of the Black Sea Region. – 2019. – Issue 4. URL: https://dspace.mnau.edu.ua/jspui/handle/123456789/6794 Мова англ. (Дата звернення 22.02.2026)

3. Kondratiuk M.A. (2024) Influence of biological preparations on yield and quality of winter spelte grain in the conditions of the "stas" farms in the kozyatyn district of the vinnytska region, 20-25 URL: http://ir.polissiauniver.edu.ua/bitstream/123456789/16211/1/Kondratiuk_MA_KR_201_2024.pdf . Мова англ. (Дата звернення 22.02.2026)

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THE AGRICULTURAL SECTOR OF UKRAINE IN THE CONTEXT OF FULL-SCALE WAR

У роботі розглянуто вплив повномасштабної війни на розвиток аграрного сектору України. Проаналізовано скорочення обсягів виробництва сільськогосподарської продукції, порушення експортної логістики та втрати земельних ресурсів унаслідок бойових дій і мінування територій. Окрему увагу приділено змінам у структурі посівів, регіональному перерозподілу виробництва та особливостям функціонування ринку сільськогосподарських земель. Встановлено, що попри суттєві економічні втрати галузь зберігає потенціал до відновлення та подальшої модернізації.

Ключові слова: *аграрний сектор, повномасштабна війна, виробництво, експорт, ринок землі, продовольча безпека, відновлення.*

The paper examines the impact of full-scale war on the development of Ukraine's agricultural sector. It analyzes the decline in agricultural production, disruptions to export logistics, and losses of land resources as a result of hostilities and landmines. Particular attention is paid to changes in the structure of crops, regional redistribution of production, and the