

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ  
ПОЛТАВСЬКИЙ ДЕРЖАВНИЙ АГРАРНИЙ УНІВЕРСИТЕТ  
University of Opole (Poland)  
International Slavis University (Macedonia)  
Cooperative Trade University of Moldova  
Institute of Soil Science and Plant Cultivation  
State Research Institute (Poland)**

**Кафедра рослинництва**

**МАТЕРІАЛИ V МІЖНАРОДНОЇ НАУКОВО-ПРАКТИЧНОЇ  
ІНТЕРНЕТ-КОНФЕРЕНЦІЇ**

**Актуальні напрями та проблематика у  
технологіях вирощування продукції  
рослинництва**

**25 листопада 2025 року**

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## **Актуальні напрями та проблематика у технологіях вирощування продукції рослинництва**

Матеріали V Міжнародної науково-практичної  
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У збірнику тез висвітлено результати досліджень, які присвячені сучасним аспектам із розв'язання проблемних питань в аграрній науці, зокрема біологізації рослинництва, інноваційним заходам у технологіях вирощування сільськогосподарських культур. Видання адресоване науковим та науково-педагогічним працівникам, аспірантам, здобувачам вищої освіти, фахівцям агрономічної служби агроформувань різного виробничого напрямку.

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Відповідальність за зміст поданих матеріалів, точність наведених даних і відповідність принципам академічної доброчесності несуть автори. Матеріали видані в авторській редакції.

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**THE EFFECT OF BIOLOGICAL AND MINERAL FERTILIZERS ON THE BIOLOGICAL PRODUCTIVITY OF GRAIN SORGHUM VARIETIES OF DIFFERENT MATURITY GROUPS**

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The basis for the introduction of new agronomic methods of crop cultivation is an increase in yield and profits resulting from the production of grain crops that have high plasticity and adaptability to the combined effects of drought and elevated air temperatures. In this regard, sorghum is unique in its biological characteristics and economically valuable features. Among the main crops, sorghum is characterized by high drought resistance, stable yields, and universal use of grain and biomass. Due to the high starch content in the grain, sorghum grain is characterized by high energy content. The starch obtained from the grain during refining does not contain anti-nutritional components and, therefore, can be used in the preparation of various sauces and stuffings used in the manufacture of bakery and confectionery products. It is also used in the textile and medical industries. Currently, manufacturers are quite interested in grain sorghum as a bioenergy crop from which bioethanol, biogas, and liquid biofuel can be produced. To ensure the high competitiveness of this crop on the market, it is essential to ensure production using high-yielding varieties and hybrids that are characterized by maximum adaptation to environmental factors and the use of elements of modern cultivation technologies. Important factors for the success of this system are the use of mineral chemical fertilizers in connection with the characteristics of the variety. However, excessive increases in mineral fertilization levels can lead to many problems related to environmental pollution and harmful effects on the health of humans and other organisms in the ecosystem. One of the promising methods that can reduce this problem is the use of biofertilizers based on nitrogen-fixing, phosphorus- and potassium-mobilizing microorganisms, which can increase plant productivity by improving their nutritional regime. Biofertilizers, also known as microbial inoculants, are organic products containing specific microorganisms that are secreted from plant roots and root zones. These bioinoculants colonize the rhizosphere and the interior of

the plant, promoting its growth when applied to seeds, plant surfaces, or soil. They not only improve soil fertility and crop yields by adding nutrients to the soil, but also protect plants against pests and diseases.

The aim of the study was to determine the effect of different doses of mineral fertilizers ( $N_0P_0K_0$ ,  $N_{35}P_{35}K_{35}$ ,  $N_{65}P_{65}K_{65}$ ,  $N_{85}P_{85}K_{85}$ ) and use of the BINOC Zerno biofertilizer, based on microorganisms capable of nitrogen fixation, phosphorus and potassium mobilization, on the grain yield of the early-maturing sorghum varieties Svat and mid-maturing sorghum varieties Vinets.

Field trials were conducted on the territory of the State Enterprise “Experimental Farm “Stepne” of the Institute of Pig Breeding and APV of the National Academy of Agrarian Sciences” during 2024 and 2025.

The results of the study showed a positive effect of the studied factors and their complex interaction on the structural elements of both sorghum varieties. Thus, in the variants with the application of  $N_{35}P_{35}K_{35}$ , the length and weight of the panicle, the number of grains in it, and the weight of 1000 grains increased compared to the control in the early-maturing variety Svat by 2.50 cm, 1.90 g, 162 pcs., 1.80 g, respectively, and in the mid-season variety Vinets - by 2.70 cm, 2.60 g, 177 pcs., and 2.50 g, respectively, for each parameter compared to the control. Increasing the mineral fertilizer level to  $N_{65}P_{65}K_{65}$  contributed to an increase in individual plant productivity parameters in the early-maturing variety Svat by 3.70 cm, 3.50 g, 199 pcs., 3.60 g, respectively, and in the mid-season variety Vinets – by 3.80 cm, 4.80 g, 250 pcs., and 4.00 g, respectively, for each parameter compared to the control. In the variant with the use of mineral fertilizer at a dose of  $N_{85}P_{85}K_{85}$ , the values of the studied parameters increased compared to the control in the early-maturing variety Svat by 5.00 cm, 5.00 g, 225 pcs., 5.00 g, respectively, and in the mid-season variety Vinets – by 5.20 cm, 6.20 g, 284 pcs., and 5.10 g, respectively, for each parameter compared to the control.

In the variants of complex application of biofertilizer and mineral fertilizer, an increase in the length and weight of the panicle was noted compared to the control by 3.00-5.20 cm and 2.50-5.40 g, respectively, in the early-maturing variety Svat, and by 3.10-5.60 cm and 3.50-6.60 g, respectively, in the mid-season variety Vinets. The number of grains in the panicle increased by 12.8-17.9% in the early-maturing variety Svat, by 12.8-21.2% in the mid-season variety Vinets, and the weight of 1000 grains increased by 9.60-37.1% in the early-maturing variety Svat, by 2.46-18.5% in the mid-season variety Vinets. At the same time, a regular increase in the values of the studied parameters was noted as the plants' mineral nutrition improved. Overall, the most effective in the experiment was the combined application of the biological preparation and  $N_{85}P_{85}K_{85}$ , where the values of the biological productivity elements of both sorghum hybrids were the highest. The effect of the use of technological elements on the grain yield of both studied sorghum varieties was most significant with the complex application of biofertilizer and  $N_{85}P_{85}K_{85}$ . With this combination of agricultural practices, the grain yield of both varieties studied was the highest.

Thus, the combined use of mineral fertilizers  $N_{85}P_{85}K_{85}$  and biofertilizers based on microorganisms that are capable of nitrogen fixation, phosphorus and potassium mobilization is an effective method of increasing the biological productivity of

sorghum. The mid-season variety Vinets is more responsive to the application of these agrotechnical methods.

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### THE EFFECT OF BIOLOGICAL FERTILIZERS AND MICROELEMENTS ON SOYBEAN YIELD

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An important factor in achieving economically and environmentally sustainable food security is the expansion of legume cultivation areas and an increase in their productivity. Soybeans are the most important food and feed legume currently grown worldwide in various climatic conditions. As a source of high-quality, low-cost plant protein and oil, it plays a significant role in providing the population with high-quality