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**THE EFFECTIVENESS OF THE USE OF GROWTH REGULATORS IN THE CULTIVATION OF WINTER WHEAT DEPENDING ON AGROMETEOROLOGICAL INDICATORS**

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**Abstract.** The paper considers the question of the effectiveness of the use of plant growth regulators in the cultivation of winter wheat under late sowing periods and weather and climate conditions. The research of scientists on the issue of the positive influence of plant growth regulators on productivity, stress resistance and adaptability of winter wheat plants at different sowing times is confirmed in the scientific work. It was established that during the research, the climatic conditions in the years of the field experiment significantly differed from the average long-term indicators, which caused a change in wheat sowing dates to a later date. Studies have shown that the treatment with growth regulators, which was carried out in the spring after the restoration of vegetation after wintering in the mid-bush phase, showed the survival of plants from 314-316 units/m<sup>2</sup>, while the percentage of survival was 82.6-83.4. The effect of growth regulators was characterized by the rate of emergence of crops during the vegetation period, therefore, according to the results of observations, it was found that the growth regulator Ceron provided better protection against emergence of winter wheat, while Medax Top showed an emergence of plants in the range of 1-3%. Research on the effect of growth regulators on wheat yield showed an increase in indicators on the version with the drug Ceron by 1.7 centners/ha.

We recommend the use of growth regulators Ceron and Medax Top, which contribute to the regulation of morphological processes in winter wheat plants and are an effective way to increase productivity.

**Key words:** winter wheat, growth regulators, productivity, climatic conditions, morphological indicators

**Introduction.**

The yield of winter wheat depends on many factors, including meteorological conditions and the application of plant growth regulators. Meteorological conditions, such as temperature, precipitation, lighting and humidity, can significantly affect the development of wheat and its yield [3]. Growth regulators can also have a positive effect on wheat yield. They contribute to the improvement of plant assimilation of nutrients, stimulate the development of the root system, increase the resistance of plants to stressful conditions and improve photosynthesis [1]. A mixture of nitrogen fertilizers with humic growth regulators can have a synergistic effect and contribute to an even greater increase in wheat productivity. They can provide an optimal combination of nutrients and stimulating substances for the growth and development of plants. Growth regulators, such as potassium humate or sodium humate, can improve the development of the root system of plants, provide better assimilation of nutrients and water, and also increase the resistance of plants to stressful conditions [3, 4]. Combining nitrogen fertilizers with growth regulators can contribute to an even greater improvement in the



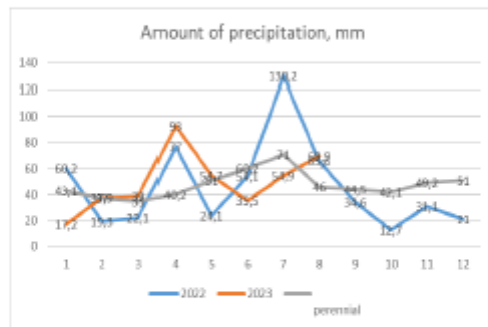
yield of winter wheat. The effectiveness of the application of growth regulators may depend on the variety of wheat, agrotechnical conditions and climatic features of the region [2].

**Main text.**

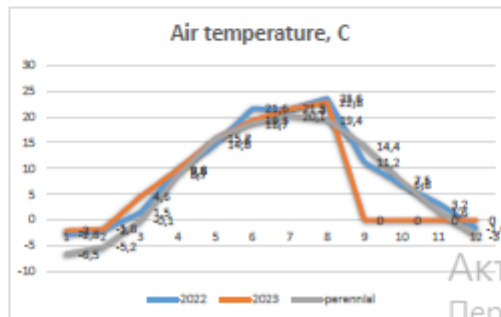
The study of the influence of growth regulators during the cultivation of winter wheat was laid in 2022. The area of the accounting plot for the variety is 150 m<sup>2</sup> (3x50), the placement of the plots is consecutive. The experiment was repeated three times.

The predecessor of winter wheat is corn. In the experiment, zoned varieties of Ukrainian selection adapted to the agro-climatic zone of the Forest Steppe were sown. The study of the condition of wheat plants after the restoration of vegetation led to the selection of growth regulators under conditions of excessive moisture in the early spring of 2023.

The agrometeorological characteristics are presented in diagram 1, 2.



**Diagram 1. The amount of precipitation in the area of the experiment, mm**



**Diagram 2. Air temperature indicators in the experiment area, mm**

Активация Wi  
Перейдіть до роз,  
активувати Windo



Climatic conditions in the years (2022-2023) of the field experiment significantly differed from the average long-term indicators. The autumn was rainy and cold, which caused the wheat sowing dates to be changed to a later date.

The average daily air temperature exceeded the long-term average by 1.7–2.5°C. Precipitation in the summer fell in the form of torrential rains accompanied by strong winds. Precipitation during the ontogenesis of winter wheat was uniform. During the growing season, a deficit-free balance of productive moisture was observed. The winter of 2023 was warm, almost snowless. The average annual amount of precipitation is in the range of 475–551 mm.

Treatment with growth regulators was carried out in the spring after vegetation recovery in the mid-bush phase, depending on the survival and recovery of plants after wintering (diagram 3).

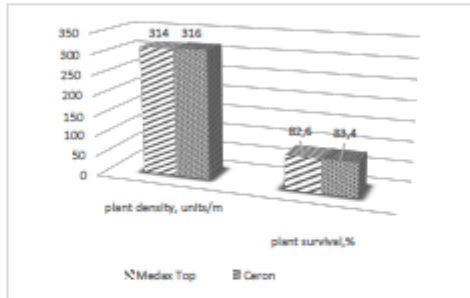


Diagram 3. Observation of winter wheat plants after the restoration of spring vegetation

According to the results of spring observations of winter wheat plants in experimental areas, the survival of plants was 314–316 units/m<sup>2</sup>, while the percentage of survival was 82.6–83.4.

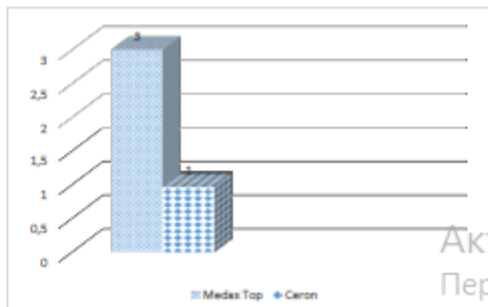


Diagram 4. Laying of plants per growing season, %

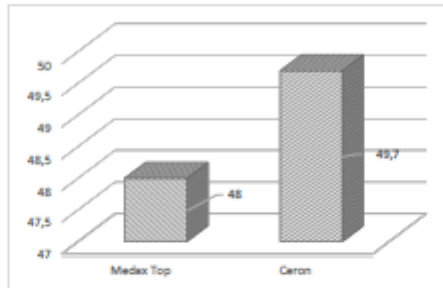
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The influence of growth regulators was characterized by the indicator of crop establishment during the growing season (diagram 4).

According to the results of observations, it was found that the growth regulator Ceron provided better protection against lodging of winter wheat, while Medax Top showed lodging of plants in the range of 1-3%.

The study of the influence of growth regulators on the yield of winter wheat is presented in the diagram. 5.



**Diagram 5. Research of growth regulators on the productivity of winter wheat, c/ha**

Research on the effect of growth regulators on wheat yield showed an increase in indicators on the version with the drug Ceron by 1.7 centners/ha.

**Summary and conclusions.**

The use of growth regulators Ceron and Medax Top contributes to the regulation of morphological processes in winter wheat plants and is an effective way to increase productivity. It should be noted that the conducted studies showed an increase in the yield index of the winter wheat variety of domestic selection during the late sowing period, which led to significant fluctuations in agrometeorological indicators during the years of the study. In the future, it is planned to carry out research on wheat varieties of foreign selection for different sowing periods, since climate changes significantly regulate the approach to the technology of crop cultivation.

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