## SECTION: AGRICULTURAL SCIENCES

# THE IMPORTANCE OF USING GROWTH REGULATORS IN WINTER WHEAT CULTIVATION IN THE NORTHEASTERN FOREST STEPPE OF UKRAINE

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Winter wheat is the most important agricultural crop in Ukraine, second in production volume only to corn, and is a strategic food crop. It also an excellent precursor for other crops as a feed and technical product used in the production of alcohol, starch, medicinal raw materials, food additives, as well as flour and concentrated feed. Wheat straw is used as bedding and coarse fodder for livestock, fuel for grain dryers and public buildings, as well as a raw material for building insulation.

According to official data from the State Statistics Service of Ukraine, the area under winter wheat cultivation for the 2024 harvest amounts to 4.3 million hectares. Ukraine harvests tens of millions of tons of wheat annually, but in recent years, the country's average yield has remained low, around 4.5-5.0 tons per hectare. One of the main reasons for this is the climatic conditions.

Over the last decade, there have been frequent instances of dry conditions in the northeastern Forest-Steppe region of Ukraine. These conditions are particularly noticeable at the beginning of the winter crop's vegetation period. According to scientists, drought is one of the most significant environmental factors negatively affecting the growth of winter wheat plants. It is noted that drought stress in winter wheat is more significant, and according to climate forecast models, dry periods are expected to become more frequent [1].

Dry conditions during the early vegetative phase can have serious consequences for crop yields. Conversely, excess water during this period also has a negative impact on yield and quality, as it increases the risk of certain diseases, leads to root

anoxia, and complicates soil tillage. These conditions slow down plant growth, affect the passage of physiological and biochemical processes such as photosynthesis, respiration, nutrient exchange, and growth stimulators [2, 3].

Partial mitigation of environmental stress can be achieved through the use of growth regulators. Growth regulators are balanced complexes of biologically active substances that activate essential plant life processes. Their action stimulates the growth of aboveground parts and the root system, ensuring more active utilization of soil nutrients and mineral fertilizers, providing plant protection properties, and resistance to diseases, high and low temperatures, and drought [4]. This leads to higher yields and improved quality of agricultural products.

Plant growth regulators influence the process of adaptation to adverse conditions by intensifying the activity of the cellular apparatus and inducing changes in plant structure. These combined effects include increasing plant tolerance to frost and reducing the phytotoxic effects of plant protection products. Research at the cellular and molecular levels has helped clarify the mechanisms behind these phenomena. Specifically, increased frost resistance is explained by an increase in the proportion of bound water under the influence of plant growth regulators, an increase in the content of proteins and carbohydrates that support the structural-functional organization of plants, and a decrease in the temperature at which the cytoplasm transitions from a liquid to a solid state. Experimental results have shown that new plant growth regulators are not inferior in effectiveness to leading global products, but they have significant advantages in terms of technical characteristics and cost [5].

Plant growth regulators can enhance water use efficiency by closing stomata. They also influence the increase in the root-to-shoot ratio and can affect the accumulation of antioxidants, which protect plants during stressful conditions. In agricultural settings, growth regulators are substances that affect physiological processes in plant metabolism, thereby positively impacting yield and product quality. This is mostly related to increasing cold resistance, limiting lodging, straightening bushes, reducing apical dominance, better placement of generative organs, more efficient use of nutrients, reducing losses during harvesting and improving harvest [6].

Using growth regulators can improve productive bushing and prolong leaf area activity. Scientists have found that growth regulators can reduce water evaporation by 29% [7]. Other studies indicate that growth regulators can indeed increase the rooting process [8]. Some researchers indicate that slow-growing plants can survive a longer period of drought than fast-growing ones [9].

With the help of growth regulators, it is possible to achieve a partial elimination of the stressful impact of the environment or to help plants in recovery after active stress. Theoretically, the regulator itself may induce an increase or decrease in yield, as its activity correlates with the influence of all other environmental parameters.

## References

1. Richardson K, et al., Synthesis Report from Climate Change Global Risks, Challenges and Decisions. Copenhagen, Denmark: University of Copenhagen, 2009.

2. Jaleel CA, et al., Differential responses in water use efficiency in two varieties of Catharanthus roseus under drought stress. Comp. Rend. Biol., 2008, 331. pp. 42–47.
3. Farooq M, et al., Physiological role of exogenously applied glycinebetaine in improving drought tolerance of fine grain aromatic rice (Oryza sativa L.). J. Agron. Crop Sci., 2008, 194. pp. 325–333.
4. Onychko V. I., Tkachenko O. M. Effectiveness of pre-sowing winter wheat seed dressing as a plant growth regulator Leader. Bulletin of the Sumy NAU. Series: Agronomy and biology - 2012, 2 (23). P.133-136.
5. Shvartau V., Mikhalska L. The role of phytohormones in plant life. Offer. No. 3. 2016. P. 70–72.
6. Vašák J, et al., Systém výroby řepky - česká a slovenská pěstitelská technologie ozimé řepky pro roky 1997 - 1999. Praha: Svaz pěstitelů a zpracovatelů olejnin, 1997, 116 s.
7. Green RL, et al., Effects of flurprimidol, mefluidide, and soil moisture on St. Augustinegrass evapotranspiration rate. HortScience, 1990, 25/ pp. 439-441.
8. Cooper RJ, et al., Root growth, seedhead production and quality of annual bluegrass as affected by mefluidide and a wetting agent. Agronomy Journal, 1987, 79. pp. 929- 934.
9. Kondoh S, et al., Interspecific variation in vessel size, growth and drought tolerance of broad-leaved trees in semi-arid regions of Kenya. Tree Physiol, 2006, 26. pp.899–90.

# ВПЛИВ РІСТРЕГУЛЮВАЛЬНИХ ПРЕПАРАТІВ НА РОЗВИТОК МІКРОБІОТИ РИЗОСФЕРИ КУКУРУДЗИ

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Стимулювання виробництва зерна у світовій практиці є головним напрямом аграрної політики для задоволення потреб людства продуктами харчування. Серед групи зернових важливе місце займає вирощування кукурудзи, однієї із найбільш продуктивних та цінних за біологічними властивостями культур. Сьогодні кукурудза посідає друге місце серед сільськогосподарських культур у світі після пшениці і за посівними площами, і за рівнем продажів, що пояснюється її широким застосуванням і високою врожайністю. Вона є більш високоенергетичним кормом порівняно з пшеницею, ячменем і вівсом. Крім того, з ростом цін на енергоресурси підвищився інтерес до використання зерна кукурудзи як найбільш дешевого матеріалу для виробництва біоетанолу [1].