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YIELD OF WINTER WHEAT DEPENDING ON PRECEDING CROPS IN THE RIGHT-BANK FOREST-STEPPE OF UKRAINE

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Actuality. The realities of the current state of Ukraine's economy show that the share of agricultural production in its structure is 15-18 %, and in the case of state support, may increase to 25 %. The main task of agricultural production is food security of the state, and the successful solution of this problem largely depends on the level and rate of growth of grain farming. Due to its high nutritional value, winter wheat occupies a leading place among the most important grain crops. In world agriculture, it is one of the three strategically important agro-food crops (wheat, rice, corn).

Therefore, world food security depends on the state of development of wheat production. The potential of modern adaptive technologies for growing winter wheat is 30-50% increase in its yield from the current level. However, the main obstacle to the growth of wheat production may be climate change, which results in deteriorating moisture supply. Given that moisture reserves determine the agrochemical, agrophysical and biological properties of the soil, ensure the growth and development of plants, as well as the formation of elements of the crop structure. One of the determining factors in the formation of the water regime of the soil in winter wheat crops is the optimization of its placement in crop rotation after different preceding crops. The urgency of this issue has led to the choice of research.

Analysis of recent research and publications. Ensuring the potential level of productivity of modern varieties is possible by optimizing the placement of crops in crop rotation after the best preceding crops. Which is determined by a number of indicators, including the quantity and quality of crop residues left by the crop in the field, the type of root system and the depth of its penetration, water consumption, impact on phytosanitary conditions, harvest time and more. The issue of formation of optimal reserves of available moisture in the soil is especially acute, both at the time of sowing and in the process of vegetation of crops in modern conditions of climate change.

Productivity of winter wheat by 50-60% is laid in the autumn, during this period it is important to provide the culture with all necessary factors of life (moisture, nutrients, heat) in the optimal amount and optimal ratios, and largely depends on the preceding crops. Therefore, sowing after the best preceding crops, namely clean (area of insufficient moisture) and busy steam (perennial legumes on one slope, peas, oat mixtures) is crucial for the placement of winter cereals. However, the current structure of sown areas shows that the main areas (about 80 %) of winter cereals in Ukraine are placed after non-steam preceding crops: soybeans, winter and spring rape, corn for silage, buckwheat, cereals, sunflower. Which do not provide optimal conditions for the growth and development of winter wheat, which leads to a decrease in the availability of available moisture in the soil, deterioration of nutrient and phytosanitary regimes, and as a consequence of reduced yields. Therefore, the issue of placing winter wheat in crop rotation after the most effective preceding crops is relevant.

The purpose of the research is to establish the influence of preceding crops on the formation of winter wheat productivity in the Right-Bank Forest-Steppe of Ukraine.

Research results and their discussion. One of the main criteria for plant growth and development is sufficient moisture reserves in the soil. Placement of winter wheat after different predecessors creates unequal conditions for its growth and development, especially with different amounts of moisture that they leave behind. According to the results of research, it was found that the predecessors significantly affected the reserves of available moisture in the soil both during the sowing of winter wheat and during its growing season. It was found that at the time of sowing sufficient moisture reserves in

the 0-10 cm layer of soil were formed by placing winter wheat after peas and winter rape, respectively 11,5 and 10,9 mm. It should be noted that after sunflower, on average in 2019-2021, moisture reserves in the 0-10 cm layer of soil were 9,9 mm. And after soybeans and corn for silage, the reserves of available moisture were equivalent and the lowest compared to the studied predecessors 8,5 and 8,6 mm, respectively. Analyzing the moisture reserves in the meter layer of soil, it should be noted that the difference between the studied preceding crops and the control has only increased. Further observations of the available moisture content in the soil show that even intense autumn-winter precipitation could not compensate for moisture loss after such preceding crops as soybeans and sunflowers.

In particular, after the restoration of winter wheat vegetation, the largest reserves of moisture in a meter layer of soil were after peas and corn for silage (177,8 and 164,5 mm, respectively), and the smallest - after soybeans and sunflowers (155,6 mm and 152,3 mm). During the spring-summer growing season, moisture reserves have halved. The maximum retention of moisture in the soil in the layer of 0-10 cm and 0-100 cm was observed for the cultivation of winter wheat after peas and winter oilseed rape.

Crop yield is an integral indicator of the efficiency of its cultivation technology. According to the results of typical studies conducted during 2019-2021 on chernozems, the highest yield of winter wheat was formed after peas (5,68 t/ha). Placement of wheat after winter rape reduced its yield by 4.4%, which in absolute terms was 5,43 t/ha. After soybeans it was 5,37 and for sunflower – 5,20 t/ha.

The lowest crop yield compared to the control variant (peas) was obtained by placing it after corn on silage, where it was 5,01 t/ha. One of the main indicators of the quality of the obtained products is the content of protein and gluten in the grain of winter wheat. They reflect the value of the products. It should be noted that the content of protein and gluten in the grain of winter wheat is not only a genetically determined indicator, but it can also vary depending on growing conditions and technological measures. Analyzing the content of protein and gluten in the grain of winter wheat, it should be noted that on average over the years of research, depending on the preceding crops, it varied from 12,6 % to 13,3 % and from 24,0 to 25,5 %, respectively. The highest protein content (13,3%) of winter wheat grain was ensured by its placement

after peas. Rapeseed and soybeans as precursors had an equivalent effect on the protein content in the grain of winter wheat (13,0-13,1 %). The lowest protein content in the grain of winter wheat was obtained by placing it after sunflower and corn in silage, respectively 12,6 and 12,8 %. With regard to gluten content, the general trend regarding the influence of preceding crops persisted.

Conclusions and prospects.

1. During the sowing period of winter wheat, the largest reserves of available moisture, in 0-10 cm layer of soil, were formed after peas of 11,5 mm and rapeseed of 10,9 mm. When placing winter wheat after soybeans and corn on silage, the reserves of available moisture were minimal compared to other preceding crops and were 8.6 and 8.5 mm, respectively.

2. In the Right-Bank Forest-Steppe of Ukraine on typical chernozems the highest yield of 5,43-5,68 t/ha of winter wheat was formed after winter peas and rape. Soybean as a precursor provided a wheat yield of 5,37 t/ha. When placed after sunflower, the yield of wheat decreased compared to peas by 8,4 %, and corn for silage by 11,8 %.

3. The highest values of protein content of 13,1 and 13,3 % and gluten of 25,2 and 25,5 % in the grain of winter wheat were obtained for its placement after legumes (peas and soybeans). Winter rape, as a preceding crops, provided grain quality indicators at the level of 13, 0 % protein and 24,5 % fat. When placed after sunflower and corn in silage, the protein content was 12,6 and 12,8 %, and gluten – 24,0 and 24,1 %.