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THE EFFECT OF WATER-SAVING IRRIGATION TECHNOLOGY BASED ON THE APPLICATION OF HYDROGEL POLYMER COMPOUND OF WINTER WHEAT ON SOIL SALT REGIME

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Abstract
In this article, the effects of using a highly swelling hydrogel polymer compound, synthesized from local raw materials, as a water-saving irrigation technology at different application rates in the cultivation of the winter wheat variety "Starshina" on gray-brown, light sandy, non-saline soils in the newly developed desert zone of the Bukhara region are discussed. The obtained results are also presented.

Keywords: winter wheat, chlorine ion, dry residue, hydrogel, irrigation.

Introduction

Each region differs from each other in terms of its soil and climatic conditions. This, in turn, requires the selection of agrotechnologies, irrigation regimes, and fertilization rates for growing wheat in agricultural fields, as well as the selection of varieties that are suitable for the natural climatic conditions of that region.

Today, various wheat varieties are grown and grain crops are harvested in the Central Asian region. However, due to global climate change and other factors, obtaining high yields from agricultural crops requires the study and scientific substantiation of agrotechnologies, irrigation regimes, fertilization rates, and the meliorative state of irrigated areas, which in turn requires conducting field research.

The Object of the Study

The brown soils of the newly developed desert zone of the Bukhara region, a highly swelling hydrogel polymer composite synthesized from local raw materials, the winter wheat variety "Starshina" and its water-saving irrigation technology.

Research Methods

Field, laboratory studies and phenological observations were carried out in accordance with the "Methods of conducting field experiments" of the Research Institute of Cotton Breeding, Seed Breeding and Agrotechnologies (UzPITI). Also, the water-physical properties of soils, agrochemical indicators and the amount of salts in the soil were carried out based on the "Methodology of agrochemical, agrophysical and microbiological studies in irrigation areas", "Methods of agrophysical studies of soils of Central Asia", "Methods of agrochemical studies of soils of Central Asia", and statistical analyses were performed using computer programs based on the manuals "Methods of conducting field experiments" by B.A. Dospekhov.

Experimental System and Methods of Conduct.

Scientific research work was carried out in 2019-2023 on the newly developed brown, light loamy soils of the "Oltin Bashok" farm located in the "Navbahor" MFY of the Korovulbazar district of the Bukhara region.

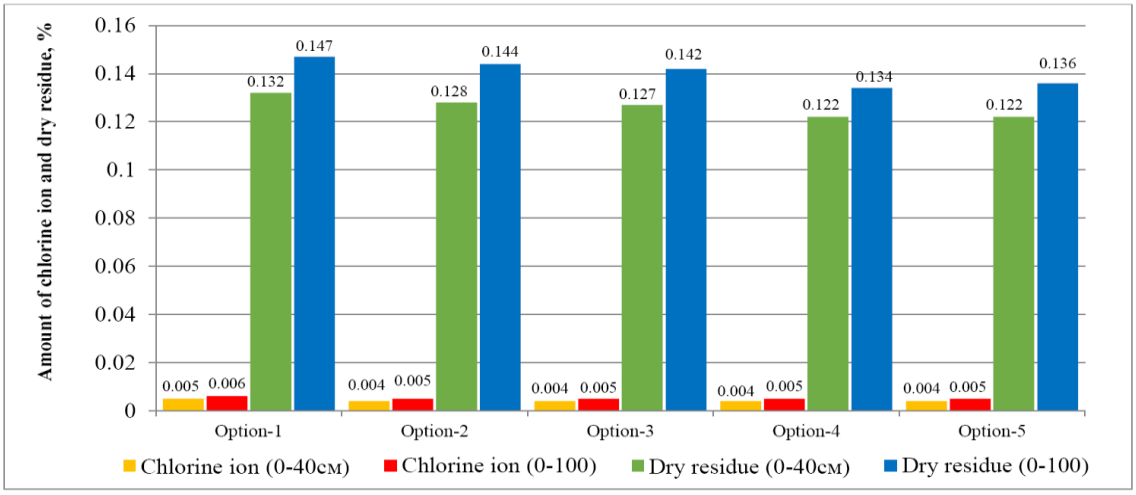
The research work was carried out in 5 variants, 3 plots, the experiments were arranged in one tier, and the area of each plot was 500 m2 (length 50 m, width 10 m), the calculated area of the experimental field was 1500 m2, and the total area was 7500 m2. The irrigation regime in the scientific research field, the rate of mineral fertilizers, and all agrotechnical measures were carried out on the basis of the recommended technological map for newly developed areas of the Korovulbazar district of the Bukhara region.

In this field experiment, all options were pre-irrigation soil moisture at 70-70-65% compared to CHDNS, fertilization rates were the same, N-250, P-180, K-90 kg/ha, and the field was planted with the elite winter wheat variety "Starshina". At the same time, as a water-saving technology, in addition to option 1, in option 2, a hydrogel polymer compound was introduced into the soil at rates of 50 kg/ha, in option 3 - 75 kg/ha, in option 4 - 100 kg/ha, and in option 5 - 125 kg/ha.

Results and Their Analysis

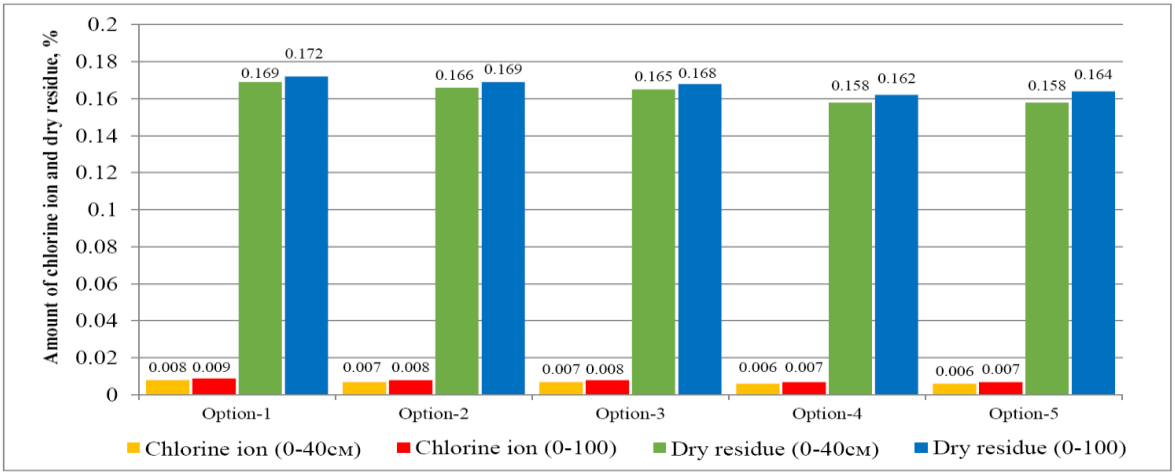
The effect of the technology of economical irrigation of winter wheat based on local hydrogels on the amount of salts in the soil was analyzed in the conditions of newly developed desert soils of the Bukhara region. It should be noted that the soils of the experimental field were newly developed desert soils, and since the hydrogel polymer compound was used in different proportions in the composition of the soils of other variants, except for the control variant, and the irrigation and seasonal irrigation rates were different, the amount of salts in the soil was also different. During scientific research, the amount of salts in the soil of the experimental field was determined annually at the beginning and end of the growing season, as well as the amount of chlorine ions, bicarbonate, sulfate ions and dry matter in the soil for all variants and replicates before and after irrigation. In 2019-2023, at the beginning of the growing season, in the control variant of the experiments, the amount of chlorine ions in the soil in the tillage (0-40 cm) layer and in the one-meter (0-100) layer

was 0.005; 0.006%, while in variants 2 and 3 of the experiments it was 0.004; 0.005%, respectively. In variants 4 and 5 of the experiments, the amount of chlorine ions in the soil was 0.004% in the 0-40 cm layer and 0.005% in the 0-100 cm layer. Data on the dry residue of salts in the soil at the beginning of the growing season in 2019-2023 are presented in Figure 1.



1- Figure. The effect of applying a hydrogel polymer compound on the salt regime of the soil (at the beginning of the average growing season in 2019-2023).

During the research, at the end of the growing season, that is, after harvesting winter wheat, the amount of chlorine ion in the soil was 0.008% in the 0-40 cm layer of plowing in the control version of the experiments, and the amount of chlorine ion in the soil in the 1 meter layer was 0.009%. In the 2nd and 3rd options, in which 50 kg/ha and 75 kg/ha hydrogel polymer compound was added to the soil, at the end of the growing season, the amount of chlorine ion in the soil was equal to 0.007% in the driving layer, and it was 0.008% in the 0-100 cm layer. In the 4th variant of the research, at the end of the growing season, the amount of chlorine ions in the soil was equal to 0.006% in the 0-40 cm layer, and it was 0.007% in the one-meter layer. In variant 5, where a hydrogel polymer compound was introduced into the soil at a rate of 125 kg/ha and winter wheat was grown, the amount of chlorine ions in the soil was 0.006% in the 0-40 cm layer of the plowed land, and 0.007% in the one-meter layer. When analyzing the changes in the amount of chlorine ions in the soil, it was found that the variants where a hydrogel polymer compound was introduced into the soil and irrigation was carried out did not have a significant effect on the accumulation of chlorine ions in the soil. The same pattern was observed for the dry residue of salts in the soil (Fig. 2).



2 - Figure. The effect of applying a hydrogel polymer compound on the salt regime of the soil (at the end of the average growing season in 2019-2023).

Conclusion

According to the results of studies on the effect of using a highly swelling hydrogel polymer compound synthesized from local raw materials as a water-saving irrigation technology at various rates on the soil salt regime in the newly developed desert zone of the Bukhara region, in the conditions of gray-brown, light loamy, non-saline soils, it was found that the variants in which the hydrogel polymer compound was used accumulated less salt than the control variant.

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