THE EFFECT OF CHANGES IN THE GROUNDWATER LEVEL AND MINERALIZATION ON THE YIELD OF AUTUMN WHEAT

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Abstract

In Uzbekistan, the use of groundwater in agriculture is 3-5 km3 per year. This creates the basis for achieving high yields of agricultural crops in conditions of low water. The article presents the results of scientific research on the impact of groundwater level, salinity, amount and rate of irrigation on the yield of winter wheat in the Syrdarya region, on an area with a groundwater level of 1-3 m and a mineralization of 1-3 g/l. The experiments were carried out in slightly, medium and highly saline areas of the Syrdarya region, and as a result, at a groundwater level of 1.5 m in areas with high salinity, the yield was 26,8 q/ha, in areas with medium salinity – 51,2 q/ha. and in areas with low salinity – 58,5 q/ha.

Keywords. groundwater, mineralization, number of irrigations, irrigation, irrigation rate.

Introduction. The socio-economic development of our country, as in other regions, largely depends on natural resources, in particular water resources. Today, the rational use of water has become one of the key issues for the sustainable development of our country. This is becoming increasingly important and relevant in the new economic, political, social and environmental processes taking place in the region due to the shortage of water resources and the deterioration of their quality [3]. Studies show that with the introduction of water-saving technologies in the use of water resources in the country, the reduction of water consumption, with the regulation of river flow, with a constant increase in the efficiency of irrigation and drainage systems, as well as the creation and planting of drought-resistant crop varieties, it is possible to mitigate water shortages [4; 5;].

Along with this, to solve these problems, the most rational way is to improve the method of managing the reclamation regime of irrigated lands, as well as the method of directing groundwater for irrigation of agricultural crops, in order to mitigate the shortage of water resources [1;2;8]. An important task in research is to improve the methods of managing the reclamation regime of irrigated lands and the possibility of directing groundwater for irrigation of agricultural crops on meadow-serozem soils of the Syrdarya region when cultivating winter wheat [15;16].

Materials and methods. In conditions of low water, experiments were carried out on sub-brigation irrigation of winter wheat on the land farms of A. Khodzhaev, "Chinor" and "Baraka" of the Khavas district of the Syrdarya region.

All experiments were carried out in four repetitions, and the area of the option was 2500 m2 (50 m long and 50 m wide). In plan, the plots were systematically arranged in four tiers (according to the level of groundwater) [1;2; 6].

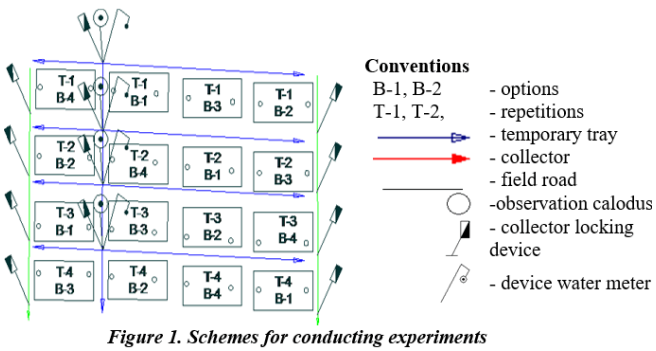

Figure 1. Schemes for conducting experiments

To determine the level and degree of groundwater mineralization in the experimental plots, 4 wells were drilled in the form of an envelope to the depth of groundwater and during the season every 10 days measurements were made using a Progress-2 conductometer [9;10].

Results and Discussion. In particular, in the zone with increased salinity of the farm "Chinor" with a groundwater level of 1,5 m, the yield was 26,8 q/ha, in areas with medium salinity – 51,2 q/ha and in areas with low salinity – 8,5 q/ha (Fig. 2). Along with this, on moderately saline soils of the Baraka farm, with a groundwater level of 2.0 m, the wheat yield was 54,8 q/ha, with a groundwater level of 0,8-0,9 m – 51,7 q/ha.

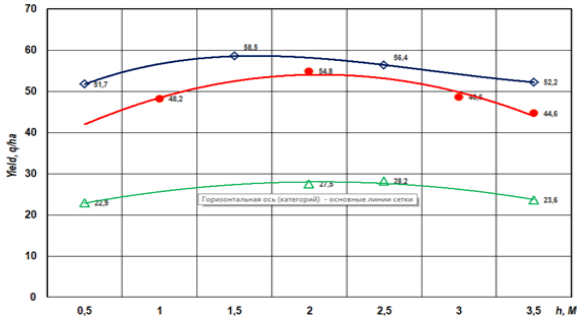

Figure 2. Changes in the yield of winter wheat depending on the level of groundwater.

On the sown areas of A. Khodzhaev's farm with low salinity, the average wheat yield was 56,4 t/ha at a groundwater level of 2.5 m and below, and at a groundwater level of 0,7-0,9 m, the yield was – 51,7 t/ha (Fig. 3).

When studying the change in the yield of winter wheat on the degree of soil salinity, on highly saline soils of the Chinor farm at a groundwater level of 2,3 m, the yield of winter wheat according to the FAO was 2-12 dS/m or 80-100% of the total yield.

On moderately saline soils of the Baraka farm, with a groundwater level of 2,0 m, the yield of winter wheat was 4–16 dS/m or 57–100% of the crop. Also, on slightly saline fields of A. Khodzhaev's farm with a groundwater level of 1.8 meters, the average yield was 2-12 dS/m or 80-100% of the total yield.

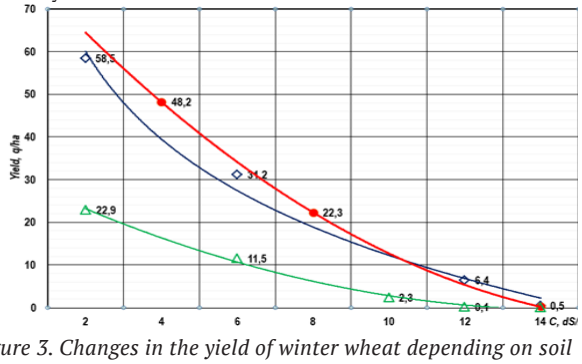

Figure 3. Changes in the yield of winter wheat depending on soil salinity.

Figure 4 shows that when winter wheat was irrigated 2-3 times on highly saline soils of the Chinor farm, the average yield was 23,0 q/ha, according to FAO 16 dS/m or 57% of the total yield.

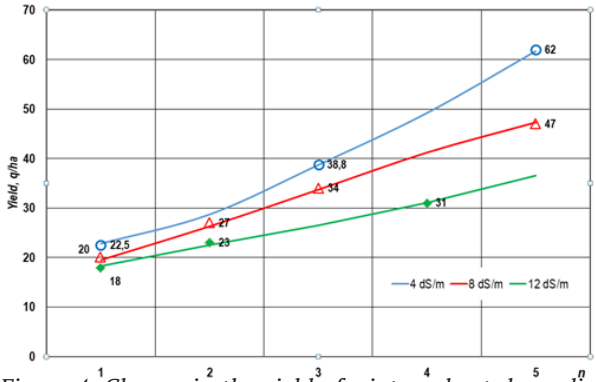

Figure 4. Change in the yield of winter wheat depending on the number of irrigations.

On the sown areas of medium salinity of the Baraka farm, when winter wheat was irrigated 3-4 times, the average yield was 38,8 t/ha, which was 8 dS/m according to FAO or 98% of the total yield. In addition, in the fields with low salinity of the farm of A. Khodzhaev, when winter wheat was watered up to 5 times, the average yield was 62,0 q/ha, according to FAO - 4 dS/m or 100% of the total yield.

On highly saline soils of farms of WUA im. Kh.Norchaeva, with an irrigation rate of 2100 m3/ha, the average yield was; in the farm "Chinor" - 28.8 t/ha, in the farm "Baraka" – 34,5 t/ha, in the farm of A. Khodzhaev – 39,7 t/ha.

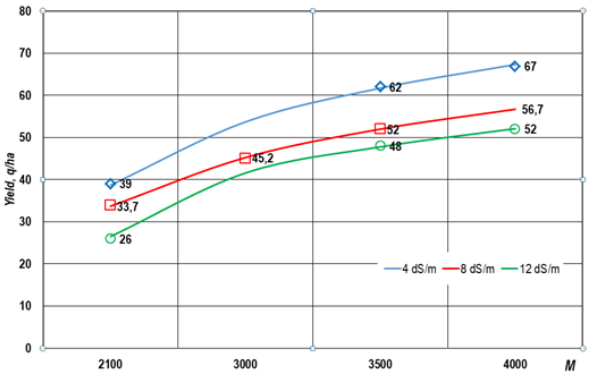

Figure 5. Change in yield of winter wheat depending on irrigation rates.

With an irrigation rate of 2800 m³/ha, the average yield of winter wheat was: on the farm "Chinor" – 36,3 t/ha, "Baraka" – 40,6 t/ha and A. Khodzhaev – 44,9 t/ha (Fig. 5).

Conclusion. The results of the study of the influence of the groundwater level, soil salinity, the number of irrigations and the irrigation rate showed that:

- the yield of winter wheat at a groundwater level of 1.5 meters was: in highly saline soils – 26,8 q/ha, in medium saline soils 51,2 q/ha and 58,5 q/ha in slightly saline soils, and at a level groundwater 2,0 m in highly saline soils – 27,5 q/ha, in medium saline soils 54,8 q/ha and in slightly saline soils – 56,4 q/ha;

- changes in the yield of winter wheat under saline soils were studied on the basis of the FAO method; was 57-100% of the yield, and on slightly saline sown areas 2-12 dS/m 80-100% of the yield.

- studies conducted to study the effect of the number of irrigations on the yield of winter wheat showed that on sown areas with high salinity, with 2-3 times of irrigation, the average yield was 23,0 q/ha, with 3-4 times of irrigation, the average yield was 38,8 q/ha, and with 5 times watering, the average yield was 62,0 q/ha. It should be noted the patterns of yield increase with an increase in the number of irrigations up to a certain point.

- when studying the effect of irrigation rates on the yield of winter wheat, the average yield of irrigated crops in highly saline fields at a seasonal irrigation rate of 2100 m3/ha, in moderately saline fields, the yield was 28,8 q/ha, in -39.7 q/ha. It should also be noted that with an irrigation rate of 2800 m3/ha on medium saline soils, the yield was 36,3 q/ha, on medium saline fields – 40,6 q/ha, and on slightly saline lands – 44,9 q/ha.

The conducted experiments make it possible to predict the yield of winter wheat in conditions of water scarcity.

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