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IRRIGATION METHODS OF WINTER WHEAT GROWN ON PASTURE SOILS

Yerkaboy Berdibayev
Tashkent State Agrarian University, University str., 2, 100140, Tashkent, Uzbekistan
Correspondence: *erkaboy.berdiboyev@gmail.com*

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Abstract. *The results of the research conducted on the scientifically based irrigation procedure of winter wheat grown in conditions of meadow alluvial soils of the Tashkent region, taking into account the amount of atmospheric precipitation and the depth of seepage water are described.*

Keywords: *soils, winter wheat, water resources, irrigation procedures, biological characteristics.*

СПОСОБЫ ОРОШЕНИЯ ОЗИМОЙ ПШЕНИЦЫ, ВЫРАЩЕННОЙ НА ПАСТБИЩНЫХ ПОЧВАХ

Аннотация.*Описаны результаты исследований, проведенных по научно обоснованному порядку орошения озимой пшеницы, выращиваемой в условиях лугово-аллювиальных почв Ташкентской области, с учетом количества атмосферных осадков и глубины просачивания воды.*

Ключевые слова: *почвы, озимая пшеница, водные ресурсы, порядок орошения, биологические характеристики.*

1 Introduction

Economical and efficient use of available water resources has become one of the pressing issues in our arid environment with limited water resources. Due to the transition to new forms of ownership in agriculture - peasants and farms, the type of crops and the structure of their placement have changed dramatically. Such changes taking place in agriculture began to have an active influence on the order of water use in irrigation systems, the water regime and balance of the soil. The change in the water regime of the soil, in turn, requires the appropriate stratification of the irrigation regime of the cultivated crops. Currently, there is a need to develop scientifically based irrigation procedures taking into account the climatic, soil, hydrogeological, relief conditions of the reclamation area, the type of cultivated crop, its composition, its role in crop rotation, and its biological characteristics.

2 Materials and methods

The purpose and tasks of scientific work:

The main goal of the scientific research is to develop a scientifically based irrigation procedure for winter wheat grown in conditions of meadow alluvial soils of the Tashkent region, taking into account the amount of atmospheric precipitation and the depth of seepage water.

Specific tasks that serve to solve this problem include the following:

- Study of the soil conditions (type, mechanical composition, structure, water-physical properties and fertility) of the experiment site;
- To study the effect of irrigation of winter wheat in different order on the order of water;
- to study the effect of different irrigation methods on the growth, development and productivity of winter wheat and on the quality of the grain;

- determination of moderate irrigation methods of winter wheat depending on the amount of atmospheric precipitation and the amount of water in the conditions of meadow soils;
- to determine the water needs of winter wheat in terms of general and growth periods and their constituent elements;
- determining the bioclimatic coefficient of winter wheat for specific conditions;
- to determine the economic efficiency of different irrigation methods.

Novelty of scientific work. For the first time, the water requirement of winter wheat in terms of general and main growth periods was determined in conditions of meadow alluvial soils. Also, the order of moderate irrigation of winter wheat (terms, number of irrigations, annual and seasonal irrigation norms) was determined, taking into account the level of water supply of the year, the depth of groundwater, and measures to prepare the field for planting.

Practical importance of scientific work: In the cultivation of winter wheat in the conditions of meadow alluvial soils, irrigation before plowing the land, providing seed water immediately after planting, and during the growing season, the soil moisture before irrigation is not less than 70-80-65% compared to its ChDNS. Necessary scientific recommendations for production were developed on the irrigation method that allows economical use.

3 Results and discussion

Irrigation procedures, i.e. irrigation periods, number and rates, are of great importance for the comfortable growth and abundant harvest of winter wheat under irrigated conditions. Irrigation procedures for most crops, including winter wheat, largely depend on the type of soil, its mechanical composition, water-physical properties, productivity, salinity level, the depth of groundwater, the amount of atmospheric precipitation during the growing season, air temperature and relative humidity, wind activity, depends on the biological characteristics of the plant, planting period, seedling thickness and other factors. It is very important to develop irrigation measures for cultivated crops taking into account these factors. It is known that winter grain crops, including winter wheat, differ from other crops in that they go through two stages during the growth and development period: in the first stage, wheat germinates after being planted in the fall, grazes, sets and winters during this development period; the second stage - wakes up in the early spring of the following year, resumes its growth and completes the period of budding, goes through the stages of tube wrapping, earing, flowering and ripening. Therefore, these two periods are taken into account when ensuring the water needs of winter wheat: the first period is the autumn non-growing period, during which quality plowing (irrigation before plowing) and seed collection (seed water) and the necessary moisture supply to the plant until the winter period are required. irrigation is carried out for the purpose; the second period is the period after the restoration of life functions of overwintered plants (conditionally the growth period), in which seasonal irrigation is carried out, taking into account the water needs of wheat.

In the experimental field, taking into account these characteristics of the wheat plant, its water needs in different periods of growth and development are provided by watering in different order according to the experimental scheme.

As can be seen from the data presented in the table, in the 1st, 2nd, 4th, 5th and 6th variants of the experiment, irrigation was carried out at the rates of 610–760 m3/ha in the research years before plowing. Irrigation was done through old egates where cotton was watered during the

growing season. 50–60 cm of this soil. Li layer was thinned to ChDNS and provided high-quality plowing. Watering was carried out on October 18, 1999, October 5, 2020, and October 13, 2021.

In the 3rd variant of the experiment, plowing was carried out without irrigation, and plowing was carried out with poor quality due to the fact that the soil moisture was much lower than moderate moisture: large (10-25 cm in size) lumps appeared, which caused difficulties in preparing the land for planting, the seed was not planted to the required depth (4-5 cm). .

In the 1st, 4th, 5th and 6th variants of the experiment, with the sowing of seeds (November 13–14, 2019, October 23–24, 2020, and November 4–5, 2021)

During the research years, seed water was given at the rate of 600–870 m3/ha. In the 3rd option, due to the fact that irrigation was not carried out before plowing and the moisture reserve in the soil was very low, seed water was given at the rate of 1020–1170 m3/ha in the experimental years. This is 150–560 m3/ha more than in the case of irrigation before plowing. In general, the total irrigation rate during the non-growing period is 1220–1580 m3/ha in options 1, 4, 5 and 6. of 600–760 in the 2nd option and 1020–1170 m3/ha in the 3rd option.

Irrigation of winter wheat during the growth period was carried out according to the experimental scheme based on soil moisture before irrigation. The rate of irrigation per gallon was determined according to the formula proposed by S.N. Rozhov, and according to the options, the amount of water given to each delyanka was taken into account using Chipolletti (VCh-25, VCh-50) and the amount of waste water using Thomson (VT-90) water measuring devices. (the net irrigation rate was determined by the difference between the amount of water supplied for irrigation and the amount of water discharged).

The duration and number of irrigations varied according to experimental options and years. The relatively dry years 2021 and 2023 were early in the growing season, with 24.1–61.0 mm of rain in February and 42.1–56.6 mm in March, and therefore irrigations were started much earlier: in all warrants, the first irrigation was 3–19 was carried out in April. Irrigations in these years were completed on May 10-30 according to options. In 2022, when rainfall was very high, with 127.2 mm in February, 104.7 mm in March, and 127.9 mm in April, the first irrigations began on May 5–19.

In 2021 and 2022, the beginning of the irrigation season coincided with the end of the full-bottle phase and the beginning of the tuber phase of wheat, and in 2022, the end of the tuber phase coincided with the beginning of the spike phase, and the last irrigation period coincided with the beginning of the milk-wax ripening phase of the grain.

In the 1st, 2nd and 3rd versions of the experiment, irrigation was carried out every 32–37 days in 2020 and 2021, in the 4th version 20–26 days, in the 5th version 14–21 days, and in the 6th version 14–30 days, while in 2022, in the 4th version 22 days, 17-20 days in option 5 and 15 days in option 5.

In 1999–2020 and 2020–2021, 289.9–324.6 mm of rain fell during the off-season of winter wheat, and irrigation was carried out 2–4 times according to options: 2 times each in options 1, 2, and 3, and 3 times in options 4 and 6. , and option 5 required 4 waterings. In 2021-2022, the amount

of precipitation was 663.4 mm. and the number of irrigations according to options was 1-3 times: 1 time in options 1, 2 and 3, 2 and 3 times in options 4 and 6, and 3 times in option 5.

In the experiment, the rates of irrigation of winter wheat per field varied depending on the options, depending on the critical moisture of the soil - moisture before irrigation: in options 1, 2 and 3, the rate of irrigation per field per year was 903-1350 m3 per hectare, in option 4 - 667-780, 5 - in option - 510-682 and in option 6 - 536-754 m3. The smallest irrigation rate was observed in the 5th and 6th variants of the experiment.

The total amount of water used per hectare consists of the seasonal irrigation rates of wheat during the off-season (irrigation before plowing and seed watering) and growing periods. The amount of irrigation water in the non-growing period, depending on atmospheric precipitation, in options 1, 4, 5 and 6, compared to the total amount of water used per hectare in 2021-2023, made 40%, in 2021 - 56% and in 2022 - 76%, in option 2 - 21 ,8– 27.5%, and in option 3 it was 36.7–45.2%. In options 2 and 3, the total consumption of irrigation water in the non-growing period is less than in other options, explained by the fact that in option 2 of the experiment, no seed water was given, and in option 3, irrigation was not carried out before plowing.

The seasonal irrigation rate during the growing season of winter wheat varied depending on the number of irrigations and irrigation rates in the years of the experiments. For example, in option 5, which is watered the most (3–4 times) during the growing season, its amount is 1717–2442 m3/ha. ni, 1239–2032 in option 6 with 2–3 irrigations, 1351–2170 m3/ha in options 1, 2 and 3 with 1–2 irrigations.

Per hectare during the non-growing and growing season water was given 2780–3390 m3/ha in 1999–2020, 2720–3620 in 2020–2021, and 2060–2940 m3/ha in 2021–2022. Comparing the value of this indicator according to the experimental options, the following can be seen: the lowest total water consumption by years is in option 6, excluding options 2 and 3, where irrigation was not carried out before plowing and seed water was not given, and its amount is formed 2818–3410 m3/ha per hectare. The highest total water consumption – 3296–3820 m3/ha – was recorded in option 5.

4 Conclusions

The soil of the experimental field belongs to the category of meadow alluvial soils, which make up the main part of the Chirchik-Ohangaron valley, and its upper 1 m. The li layer is medium and the lower layers have a light mechanical composition, the volumetric mass is 1.39 g/cm3, the porosity is 45.7–48.0%, the water permeability in 6 hours is 798.4–813.2 m3/ha, the marginal field is wet. capacity is 22.7% by weight. The amount of humus in the driving layer was 1.784%, nitrogen - 0.183, phosphorus - 0.161 and potassium - 1.07%. The depth of the seawater is 149-183 cm.

In the above soil conditions, the irrigation regime of winter wheat during the growing season varied depending on the weather conditions of the year: in the first two years, when atmospheric precipitation was 297.9–234.6 mm in October–June, irrigation was carried out before plowing and for seed recovery, and from irrigation during the growing season. irrigated at the level of 70–80–65% of the previous soil moisture compared to ChDNS, in option 6, irrigation was carried out 3 times at 540–750 m3/ha galic and 1760–2032 (2980–3410 m3/ha, taking into account irrigation norms during the non-growing season) , in the third year with a rainfall of 663.4 mm, it was

sufficient to irrigate 2 times at the rate of 570–660 m3/ha of galic and 1239 (2820) m3/ha of the general rate.

The total water consumption of winter wheat varied according to the options depending on the weather conditions of the year: in the 6th option of the experiment, the total amount of water used per 1 ha in the first two years of irrigation was 7321–7855 m3/ha, of which 39.6 -41.2% was covered by atmospheric precipitation, 25.5% by irrigation and 7.6% by seepage, and 6.4% by natural soil moisture. The coefficient of water requirement of this winter wheat is 153.1–204.8 m3/t. , which is 46.7–65.4 m3/h less than in the 4th and 5th options.

Option 2, which was irrigated before plowing and seed water was not given and irrigated up to 2 times during the growing season, had the lowest total water consumption, but the coefficient of water requirement was reached up to 199.8–290.0 m3/h.

In the experimental field, the most water consumption period of winter wheat in terms of growth phases - the critical period was from its tuber phase to the grain ripening phase, during which wheat required 60.8-81.8% of the total water consumption. This indicator was equal to 18.2–39.2% in the phases of accumulation and ripening.

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