

THE IMPORTANCE OF SOIL PERMEABILITY IN IRRIGATING WINTER WHEAT

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Abstract. In this research work, an analysis of the water permeability indicators of the soil of the experimental field in the cultivation of winter wheat varieties under the conditions of irrigated light sierozem soils of the Kashkadarya region is presented. Studies have shown that furrow and sprinkler irrigation methods led to a decrease in soil permeability by the end of the growing season as a result of irrigation work and an increase in irrigation rates.

Keywords: *Light gray soils, experiments, winter wheat, varieties, water permeability, rate, irrigation method.*

Аннотация. В данной исследовательской работе приводится анализ показателей водопроницаемости почвы опытного поля при возделывании сортов озимой пшеницы в условиях орошаемых светлых сероземов Кашкадарьинской области. В исследованиях установлено, что проведение поливных работ методами бороздкового и дождевального орошения и увеличение поливных норм приводит к снижению водопроницаемости почвы к концу вегетационного периода.

Ключевые слова: *светлые сероземы, опыты, озимая пшеница, сорта, водопроницаемость, норма, способ полива.*

Annotatsiya: Ushbu tadqiqot ishida Qashqadaryo viloyatining sug'oriladigan och tusli bo'z tuproqlari sharoitida kuzgi bug'doy navlarini yetishtirishda tajriba dalasi tuprog'ining suv o'tkazuvchanligi ko'rsatkichlari tahlillari keltiriladi. Tadqiqotlarda egatlab va yomg'irlatib sug'orish usullarida sug'orish ishlarining olib borilishi va sug'orish me'yorlarining ortib borishi natijasida amal davri oxiriga kelib tuproqning suv o'tkazuvchanligi pasayishiga olib kelganligi aniqlangan.

Kalit so'zlar: *och tusli bo'z tuproqlar, tajribalar, kuzgi bug'doy, navlar, suv o'tkazuvchanlik, me'yor, sug'orish usuli.*

Introduction. Due to such factors as population growth, increased food needs, expansion of industrial production, and climate change, the demand for water resources in the countries of the world is increasing year by year. As a result, a trend of water resource scarcity is observed in many regions of the world. As is known, agriculture is the largest water consumer in the world. Therefore, the entire world scientific community emphasizes the most priority way to mitigate water shortages in agriculture, in particular, the economical use of water in irrigated croplands, including the widespread introduction of water-saving technologies [1].

The list of top 10 wheat-producing countries in the world includes China, India, Russia, the USA, France, Canada, Pakistan, Ukraine, Australia, and Germany. Currently, the introduction of intensive agricultural technologies in the cultivation of winter wheat varieties, along with increasing grain yield, the effective use of irrigated lands, and improving the technological quality indicators of grain are among the most pressing tasks.

The process of formation, growth, and yield of wheat occurs under the influence of many factors. One of the most important of them is the level of water supply, which requires the rational use of water resources, especially in irrigated areas. The irrigation regime directly affects not only the yield indicator, but also the morphological structure of the plant, the development of the root system, and the physicochemical properties of the soil. Wheat, by its biological nature, is considered an average water-demanding crop, and sufficient water during the growing season is the basis for its grain formation [2].

The sprinkler irrigation system, compared to traditional irrigation methods, allows for water conservation, maintaining a stable soil moisture balance, and ensuring uniform plant growth. At the same time, it is important to adapt the irrigation regime to regional agro-climatic conditions, prevent excessive or insufficient water consumption, improve crop quality, and ensure environmental sustainability [3].

Water permeability is measured by the volume of water that can penetrate a certain area of soil at a given time. Water permeability depends on the total

porosity of the soil and its size. For example, in soils with a light mechanical composition, due to the large porosity, water permeability is always high. Soils with a heavy mechanical composition and a cloddy-dusty structure have low water permeability. When assessing soil permeability, the scale recommended by N.A. Kachinsky can be used. Accordingly, under conditions of a temperature of 100 C and a water pressure of 5 cm, soil permeability is assessed as follows: if more than 1000 mm of water passes during the first hour of observation, the soil permeability is considered disturbing, from 1000 to 500 mm - extremely high, 500-100 mm - excellent, 100-70 - good, from 70 to 30 - satisfactory, less than 30 mm - unsatisfactory [4].

Main part. The ability of soil to absorb and pass water through itself is called soil permeability. In the field of land reclamation, the water permeability of the soil is very important. Water permeability occurs in two stages, in the form of water absorption and filtration into the soil, that is, first water is absorbed into the soil, then water seeps into the lower part of the soil layer. A certain part of the water absorbed by the soil is absorbed by plants, another part is used for evaporation through the soil, and the excess part is removed from the field in the form of wastewater.

The process of water permeability is measured by the volume of water absorbed from a certain area of soil at a certain time and is usually expressed in mm/hour. The course of permeability depends on the porosity of the soil and its size. In soils with a light mechanical composition, due to the large porosity, water permeability is always high. In loamy and clay soils, the amount of porosity and its size depend on the structural state of the soil. Such water-resistant soils with a crumbly structure also have high water permeability. Soils with a heavy mechanical composition and a cloddy, dusty structure have low permeability.

The better the water permeability, the more water does not remain on the soil surface, the more it is absorbed, and the more water absorbed into the soil, the more water is used to meet the plant's needs. The water permeability of the soil

was determined according to the methodology for conducting field experiments during 6-hour observations.

In our three-year studies (2022-2024), the water permeability of the soil was determined at 5 points of the field on the general background at the beginning of the growing season and at 3 points at the end of the growing season for each irrigation regime.

According to the results of experiments conducted in 2022, the water permeability of the soil of the experimental field at the beginning of the growing season with traditional furrow irrigation of winter wheat varieties was 303 m³/ha in the first 1 hour and 866.8 m³/ha over 6 hours, and on average 144.5 m³/ha over 1 hour. At the end of the growing season, with an irrigation regime of 65-70-60% of FC, the initial soil moisture content was 232.0 m³/ha in the first hour and 677.5 m³/ha over 6 hours, and on average 112.9 m³/ha over 1 hour; with an irrigation regime of 70-75-65% of FC, the initial soil moisture content was 226.5 m³/ha over the first hour and 656.6 m³/ha over 6 hours, and on average 109.4 m³/ha over 1 hour; with an irrigation regime of 75-80-70% of FC, the initial soil moisture content was 213.2 m³/ha over the first hour and 628.9 m³/ha over 6 hours, and on average 104.8 m³/ha over 1 hour.

When irrigating winter wheat varieties with sprinkler irrigation, the water permeability of the soil of the experimental field at the beginning of the growing season was 303 m³/ha in the first 1 hour and 866.8 m³/ha over 6 hours, and on average 144.5 m³/ha over 1 hour. At the end of the growing season, with an irrigation regime of 65-70-60% of FC, the soil moisture content was 229.0 m³/ha in the first hour and 703.0 m³/ha over 6 hours, and on average 117.2 m³/ha over 1 hour; with an irrigation regime of 70-75-65% of FC, the soil moisture content was 213.5 m³/ha over the first hour and 668.7 m³/ha over 6 hours, and on average 111.5 m³/ha over 1 hour; with an irrigation regime of 75-80-70% of FC, the soil moisture content was 207.6 m³/ha over the first hour and 652.8 m³/ha over 6 hours, and on average 108.8 m³/ha over 1 hour.

In conclusion, it should be noted that the conduct of irrigation work on irrigated lands and the increase in irrigation norms leads to a decrease in soil permeability at the end of the growing season. This can be explained by the increase in soil compaction with an increase in the number of irrigations. From the experiments, it was established that when irrigating winter wheat varieties with furrow irrigation, by the end of the growing season, a decrease in soil permeability was observed. With sprinkler irrigation, a decrease in soil permeability was also observed. However, compared to furrow irrigation, with sprinkler irrigation, soil compaction is less, and the porosity of the soil is relatively well preserved, due to which the water permeability indicator of the soil in the area is better.

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