



## SCIENTIFICATION OF THE EFFECTS OF GROUNDWATER ON PLANT GROWTH

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### ABSTRACT

*Low groundwater temperatures lead to longer plant growth periods. All this ultimately affects the yield and quality of the agricultural crop, the ripening period of its fruits. In turn, the low-temperature water-air soil environment of the aeration zone, of course, does not ensure the timely dissolution of natural and artificial nutrients and fertilizers and does not allow their timely full assimilation by plant root systems. Under such conditions, some of these nutrients sink under the influence of falling currents of cold water and mix with groundwater. All this ultimately affects the yield and quality of the agricultural crop, the ripening period of its fruits.*

Moistening of the fertile layer of soil often causes irrigation water to seep down from the fertile layer. In addition, water wastage is observed in irrigation networks. These waters are added to groundwater, often leading to an increase in groundwater levels in irrigated areas where ditches are insufficient and groundwater flow is insufficient. Rising saline groundwater causes soils to become swampy and secondary salinization.

-The main purpose of the application of mathematical methods to the sciences of the earth, hydrogeology and reclamation is to model the growth of plants, the impact of soil

processes, groundwater levels and the processes occurring in them. Many scientists of the world have been engaged in this direction. However, they are mainly limited to studying the rise of groundwater to soil salinity through experimental methods and developing recommendations to prevent this salinization. During the former Soviet era, certain works were carried out in this direction, for example, drainage wells (boreholes) were dug and groundwater was discharged into ditches. But after the collapse of the former Soviet Union, this work remained halfway and was not completed.



-This project studies the effects of groundwater elevation on soil salinity (on the example of Gijduvan district of Bukhara region) using theoretical and experimental methods, mathematical modeling, mechanics of contact media, as well as methods and principles of biomechanics, based on existing norms, soil salinization with groundwater rise. mathematical models representing the relationship between the process are constructed. Depending on the temperature of groundwater and surface water (cotton, grain, rice, sunflower), multi-parameter empirical formulas of crop growth and yield for 3 years are developed and a long-term forecast of yield is developed.

According to its origin, groundwater is an infiltration formed as a result of the absorption of atmospheric precipitation, river and irrigation water; condensation formed by the condensation of water vapor in rock layers; sedimentary rocks are divided into sedimentary and magmatic cooling waters formed as a result of the immersion of seawater in the process of formation, or wash water released from the earth's mantle. The natural outflow of groundwater to the surface is called a spring, and is divided into flowing and boiling (hot spring).

Groundwater is a natural solution that contains almost all known chemical elements. In terms of mineralization (total amount of solutes in water, g / l), groundwater is fresh (up to 1.0), saline (1.0-10.0), saline (10.0-50.0) and saline (from 50). many) types. In terms of temperature, it is cold (up to 4 °C), cold (4-20 °C), warm (20-37 °C), hot (37-42 °C), hot (42-100 °C) and extremely hot (Above 100 °C) is divided into groundwater.

Infiltrative water is common in nature, the rest being very rare in its pure form. Groundwater is used in water supply of the population, industry and pastures, irrigation of lands, medicine (mineral waters), heat supply

(hot water), extraction of various salts and chemical elements (iodine, boron, bromine, etc.). Groundwater causes swamps and salinization of soils. To combat this, open and closed horizontal drains and boreholes are drilled. Groundwater is widely used in deserts. The Karakum, Kyzylkum and Ustyurt pastures are mainly supplied with groundwater.

More than 150 large groundwater deposits have been identified in Central Asia. Their annual renewable operational reserves are more than 1,500 m/s, the share of fresh water is about 1,000 m/s, and the rest is mineralized at various levels (2-3 to 15 g/l). There are more than 40,000 used boreholes in Central Asia, of which about 5,000 are artesian wells; most of them are used to irrigate crops (see Artesian waters) [1,2,3,].

After the independence of the Republic of Uzbekistan, our country has undergone rapid changes in all areas and achieved a number of achievements.

Also, the rapid development of the agricultural sector, in turn, will lead to an increase in the consumption of water resources. Radical innovations have been introduced in the implementation of a unified policy in the field of water resources management, as well as in the field of rational use and protection of water resources, prevention and elimination of harmful effects of water. Consistent and sustainable development of agriculture is to ensure the food security of the country. Development of the concept of water development in 2020-2030 Water saving through the implementation of promising projects in the field of water management, foreign investment, active assistance to agricultural producers in the introduction of water-saving irrigation technologies, expansion of production capacity of modern irrigation systems through private investment to



increase the share of irrigated lands using technologies to at least 10 % of the total area of irrigated lands [4,5,].

### **Relevance of scientific research:**

If we take the total volume of water on Earth as 100 percent, it is 97.5 percent saline, while freshwater is 2.5 percent. Groundwater sources are one of the most inexpensive and convenient sources when close to an irrigation area. That is why it is widely used in foreign countries. In particular, 40 % of irrigated land in the United States is irrigated from groundwater, 33 % in the People's Republic of China and 5-6 % in Uzbekistan. To date, the available and limited water resources in the region have been fully distributed and developed between countries. Under the current circumstances, the growing demand for water in the region can be met mainly through the rational use of available water resources and the discovery of internal water resources. Therefore, the development of water-saving technologies is also receiving great attention by scientists.

In addition to groundwater resources, surface water is also used to irrigate and water pastures. Currently, 7% of the total groundwater resources are used. It is mainly used in Crimea, Moldova, Ukraine, the Volga region, Kazakhstan, Kyrgyzstan, Turkmenistan, Armenia, Georgia, Azerbaijan, USA, India, Algeria, Italy and other countries. When groundwater is used, its dynamic reserve is used, otherwise it is lost.

The advantages of using groundwater are:

- 1) Proximity to the irrigation area and shortness of the salt part of the main canal.
- 2) Decrease in groundwater level in the irrigated area.
- 3) High UWC of canals due to low water wastage, canal length.

4) No mud settling in the canals as the water is not turbid.

5) Low risk of salinization and swamping.

Disadvantages:

1) Deep waters and lack of reserves in some places.

2) Mineralization may be high.

3) The temperature is low.

4) Conditions for frequent mechanical lifting of water.

5) High operating costs.

Groundwater is used for irrigation as follows: through springs, through mine wells, through a water collection gallery [8,9,10].

One of the factors negatively affecting the current increase in grain yield is the shortage of water during the growing season, and the second is that most farms do not take into account local soil and hydrogeological conditions, real water requirements during the transition phases of their growth and development. Some of the toxic chemicals applied to the soil, weeds and insects applied to the soil during the irrigation of grain are washed into groundwater, leading to the deterioration of their ecological and reclamation status. The above reasons include the efficient use of water resources allocated to irrigated lands, a system of agro-technological measures that do not adversely affect the environmental situation, irrigation methods using hydrogel artificial polymer crystals to create opportunities for rational use of groundwater in the cultivation of cereals [12,13,14].

### **The purpose of the study:**

Water sources for irrigation are assessed by the following indicators: water quality, the amount of water flow during the annual and



growing seasons, the variation of water flow over the years, water flow regime, level and pressure regime, location relative to the irrigated area.

It is characterized by the quality of water, its temperature, the amount of mechanical leaks, mineralization and chemical composition, bacteriological composition.

Study of the source of irrigation in the case of high yields from grain fields in relation to its temperature on the basis of experiments on the efficient use of groundwater.

### **Level of study of research results:**

Wheat is an annual plant. Its root system is a poplar root, the main part of which develops in the drive layer of the soil, some roots are 100 sm. pit up to 40-130 sm in height. reaches The transpiration coefficient of wheat is 231-557 (average 400-500), the coefficient of water demand for grain is 60-190 m<sup>3</sup> / ts. is formed. These indicators vary depending on climatic conditions, type and variety of wheat, water supply, the amount of nutrients in the soil. Depending on the natural conditions of the cultivated areas, its autumn

or spring varieties are planted on irrigated lands. Autumn wheat is more resistant to cold and drought than spring wheat, it germinates when the soil temperature is 4-5 °C. During the growing season, an effective temperature of 2100 °C is required for winter wheat and at least 1300 °C for spring wheat.

The effect of the temperature of irrigation sources on autumn cereal crops is in fact little studied scientifically.

### **The task of the research:**

Based on the experiments conducted, the study of the source of irrigation depends on its temperature in the efficient use of groundwater to create clear guidelines. Water-saving technologies go through certain periods (phases) during the growth and development of cereals, that is, from seed germination to formation. During the developmental stages, morphological changes occur in plants and new organs are formed. Wheat goes through the following phases: germination, accumulation, germination, germination, flowering and ripening, as well as observations and study of the effectiveness of its yield [18,19,20].

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