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"Scientific basis of rational and ecologically safe use of groundwater in irrigation (in the case of sunflower)"

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Abstract. The low temperature of underground water leads to the extension of the vegetation period of plants (for example, sunflower). For example, the growth and development of plants is delayed for 7-15 days. All this ultimately affects the yield and quality of the agricultural crop, the period of ripening of its fruits. As a result, the low-temperature water-air soil environment of the aeration zone naturally does not ensure the timely dissolution of nutrients and fertilizers. Also, it does not allow them to be fully assimilated by plant root systems in time. Under such conditions, part of the nutrients sinks under the influence of the falling currents of cold water and mixes with the groundwater. On the other hand, a cold water-air-soil environment of 14-18°C is harmful for plants, significantly reducing the rate of growth and development and exposing it to various diseases. All this, in turn, has a negative impact on the productivity and quality of agricultural crops, and the period of ripening of its fruits.

Key words: aeration zone, irrigation sources; underground water; temperature; mode of water consumption, transpiration coefficient.

Introduction. Groundwater is an important source of water for mankind. Groundwater supplies 50% of the world's population with drinking water, in whole or in part, and accounts for 43% of all water used for irrigation. 2.5 billion people worldwide depend solely on groundwater sources to meet their basic daily water needs. In 2022, the population of the earth is about 8 billion, and it is expected to reach 11 billion by 2100. In such a situation, modern science will have to do more extensive research on how to produce enough food without destroying the soil, water and climate. It has been called the greatest challenge humanity has ever faced. At the heart of this solution is the sustainable and safe use of groundwater.

Modern scientific research and measurements show that many of the world's major aquifers (groundwater reservoirs) are drying up. Such depletion can result in reduced stream flow, drying up of springs or wetlands, loss of vegetation, lower water levels in wells, and land subsidence. Another threat to groundwater is human-caused pollution, chemicals, and waste seeping into the subsurface. Pollution degrades groundwater quality and threatens human health and environmental health. Scientific understanding and proper management of groundwater is important because responsible use of groundwater can alleviate the problem.

Relevance and current status of the topic: The demand for water resources worldwide is increasing year by year. One of the most promising areas is the rational

use of underground water in the ecologically safe production of agricultural products. In the conditions of water scarcity, great attention is being paid to ensuring food security by using resource-saving technologies from irrigated lands.

Today, extensive research is being carried out on the environmentally safe use of underground resources, hydrogeological research to find new sources of underground water, and the study of the effect of physical and chemical properties of underground water on the development of plants. In this regard, groundwater is used for irrigation in arid and semi-arid countries. For example, 46% of the total irrigated area in the USA, 33% in the PRC, 59% in Iran, and 100% in Libya are irrigated from this source, while this figure is only 7% in our republic. In this regard, in the conditions of increasing water scarcity in our country, effective and rational use of underground water without negative impact on the environment, protection of underground water resources is one of the important tasks.

The purpose of the study: Low or high soil temperature, as well as irrigation water, negatively affects the growth and absorption of plant roots, the vital activity of microorganisms, which worsens the supply of nutrients, mainly nitrogen, to plants. In the summer, there are cases when rapid and sharp cooling of plant roots, especially in young plants, causes the so-called temperature "shock". This manifests itself in the wilting and even falling of the leaves. This can happen during the day when watering with cold (artesian, well, mountain) water, when the soil and plants are too heated by the sun. With a "shock" of temperature, the flow of water to the roots is temporarily reduced, which has a bad effect on the plant with high transpiration. The use of nutrients by the roots and their synthesis deteriorates. The optimal soil temperature for root growth of most plants is between about 15-25°C, so the temperature of the irrigation water should be close to these values. For irrigation, water should not be used directly from deep artesian wells, because the temperature of the water at the bottom of the artesian well is 8-10°C, such water must first be heated in a special pool or container; containers up to 50 m^3 are usually used. In most cases, containers are installed on metal or brick supports at a height of 10 m or installed at the highest point of the array. In this case, water from it can be supplied by gravity through the main pipeline, and then through the networks of each individual section. On hot days, the water in the tanks is 23-25°C. heats up to The quality of irrigation water depends on the content of water-soluble salts. River water usually contains small amounts of water-soluble salts, but it is not unusual to have large amounts of suspended particles. Groundwater is often highly mineralized. According to these indicators, water from reservoirs usually occupies an average level.

Experimental part (conducting research). The conducted field experiments showed that the temperature of the atmosphere, soil and underground water is integrally related to the vegetation process of annual plants. This shows that the difference between them will not increase sharply or decrease. Otherwise, it is noted that it will have a negative effect on the vegetative process of plants, especially on their germination, development and fruiting periods.

For the experiment, two different varieties of sunflowers, namely "Tashkent" and "Samarkand" were selected as annual plants.

To the sunflower-Asteraceae family. Belongs to the genus and species Heliantus annus. The cultural type is divided into planting and scenic evening types. The

homeland of the sunflower was planted in the southern regions of North America 3000 years ago in the states of Arizona and New Mexico. Some scientists say that sunflower was cultivated before wheat.

The optimal temperature is 18-25°C. A higher temperature accelerates the germination process. Grass is cold-resistant to -6°C. The negative effect of high temperature is observed from full weeding to the end of the flowering period.

Demand for water. Sunflower consumes 2000-5000 m3 and more water on 1 hectare. The transpiration coefficient varies from 400 to 700. One plant requires more than 200 kg of water during the growing season. Thick hairs on the stems and leaves prevent evaporation. The flowering period, which requires a lot of water, absorbs 60% of the total water required during this period.

Demand for soil. Sunflower is grown in different soils. Depending on the level of salinity, sunflower can be planted in the saline soils of Uzbekistan.

Demand for food. Sunflower absorbs 25% of required nutrients after flowering. During the flowering period, it absorbs most of the nutrients. Absorbs the main part of phosphorus from weeding to the time of basket formation; absorbs nitrogen - from basket formation to the end of the flowering period, and potassium - from basket formation to the ripening period.

During the growth period, the following stages of development in sunflower have been identified:

- Germination takes 10-15 days, shoots, roots develop, and the seed pods come to the surface.
- Flowering lasts 25-30 days, the plant grows quickly and flowering begins. Yellow tongue-shaped flowers develop.
- Formation of the basket 30-40 days at this stage, all the hoops develop. A basket is formed when an average of 13 leaves develop in a plant.
- Flowering and ripening lasts 35-40 days, tubular flowers of both sexes are formed.

Biologically, sunflower is a pollinated plant, but it can fight on its own in nature. External pollination occurs mostly with the help of insects, and in some cases with the help of wind. A bush plant blooms on average for 8-10 days, one flower blooms for 24-36 hours and is pollinated.

Autumn and spring wheat crops can be sown after barley and wheat in sunflower field. Sunflowers should not be planted after sugar beets, alfalfa and watercress, as these crops dry out the soil. Rapeseed, blue peas, soybeans and beans are not planted after, because the diseases of these plants are the same.

The main requirement for tillage is removal of perennial weeds, leveling, moisture retention, multi-stage tillage of the soil infested with perennial weeds: first disking, then chiselling, heavy barrona it is walked, when the grass grows, the ground is plowed. Before planting, the surface of the soil is leveled, cultivation is done at a depth of 8-10 cm and the barrona is run. Organic and phosphorus-potassium fertilizers are applied before plowing. As an organic fertilizer, 15-20 t/ha local fertilizer, 40-60 kg PK, 10-15 kg NPK with planting, 30-50 kg nitrogen, 40-50 kg phosphorus after germination is used.

Planting time. It is sown in April as the main crop, and from June 20 to July 10 as a minor repeat crop. Sunflowers are planted in wide rows, 60, 70, 90 cm apart. It is advisable to have 40-50 thousand plants on 1 hectare of land on wet lands, 30-40 thousand on semi-irrigated lands, and 20-30 thousand on dry lands.

Analysis of the obtained results and conclusion: On July 7, 2022, sunflower as a repeated crop was sent to the experimental field, starting from the grain field of the "Toshev Sherzod" farm, Vobkent district. It was planted on the basis of a 0.6x0.8x0.4 scheme* using a seed planter installed on a branded trakror mechanism.

The following indicators were recorded during the planting process.

-atmospheric temperature is 36 °C;

-soil temperature is 32 °C.

The main source of water supply to the cultivated area is underground water and the domestic network of the farm. The temperature returned in them is as follows:

- the temperature of the water in the household network is 26 °C;

The temperature of the water in the well dug for underground water №9 is 16 °C. At a distance of 500 meters from the cultivated field, the temperature of the water in the farm's internal network reached 38 °C, and the temperature of the underground water reached 18 °C. Also, it was found that in this area, both of the above water sources are used together for the purpose of irrigation. Then it was noted that the temperature of the water there was 22 °C, and its temperature changed to 24 °C before reaching the cultivated field[1-20].

List of used literature

1. Khamidov M.Kh., Shukrulaev X.I, Mamataliev A.B. Agricultural hydrotechnical melioration. Textbook. "Sharq" publishing house. T,. Tashkent-2008.
2. Isayev X.S, Begmatov I.A, Akhmedov Sh.E, Haydarov B.A, Abduraimova D.A, Husenbayeva X.S. Methods of scientific research in reclamation. Study guide. "Sharq" publishing house. T,. Tashkent-2019..
3. Shermatov M. Sh. Fundamentals of hydrogeology and engineering geology. Textbook. T.: "Knowledge" publishing house, 2005.
4. Tulyaganova N.SH, Allayarov B.I, Agzamova I.A. Geology and hydrogeology. Study guide. T.: Science and Technology Publishing House, 2017.
5. Agzamova I.A, Gulyamov G'D. Groundwater dynamics. Study guide. T.: Science and Technology Publishing House, 2015.
6. Kayumov A.D, Agzamova I.A, Eshniyazov S.Kh. Hydrogeology and engineering geology: Study guide. T.: "Philosophers" publishing house, 2013.
7. Akhmedov Sh.R, Tursunov I.N, Amanova Z.U, Sultanov R.S, Olmasov S.Kh. Scientific justification of the influence of underground water sources for irrigation on the development of grain crops in the current natural conditions. Newsletter of Khorezm Mamun Academy-4/2022. 124-127 p.
8. Kiryukhin V.A., Korotkov A.I., Pavlov A.N. K 43. General Hydrogeology: Textbook for High Schools.—JL: Nedra, 1988.—359 p.: ill. ISBN 5-247-00004-8.
9. Shvartsev S.L. Sh 33. General hydrogeology: Textbook. for universities - M .: Nedra, 1996.-423 p: ill. ISBN 5-247-03485-6.
10. Shevchenko A.V., Vlasov M.V. Mathematical model of the relationship between surface and ground waters. Ecology and water management. No. 2(02), 2019, [117–129] DOI: 10.31774/2658-7890-2019-2-117-129.

* 0.6 the distance between the rows is in meters, the distance between 0.8 plant seed crops is in centimeters and the depth at which the plant seeds are planted is in centimeters.

11. A. Balasubramanian. Methods of groundwater exploration. Handbook. Centre for advanced studies in earth science. University of Mysore. M., 2017.
12. John H. Cushman, Daniel M. Tartakovsky. The Handbook of Groundwater Engineering. CRC Press. Informa Ltd Registered in England and Wales Registered Number: 1072954, UK . 2020
13. Chi-Yuen Wang · Michael Manga. Water and Earthquakes. ISBN 978-3-030-64308-9 (eBook) https://doi.org/10.1007/978-3-030-64308-9 . Gewerbestrasse 11, 6330 Cham, Switzerland. 2021. 231-256-b
14. Carolin Tissen, Susanne A Benz, Kathrin Menberg, Peter Bayer, Philipp Blum. Groundwater temperature anomalies in central Europe. Environmental Reseachers Letters. 14(2019)104012.
15. Thomas C. Winter, Judson W. Harvey, O. Lehn Franke, William M. Alley. Groundwater and surface water a single resource. U.S. Geological Survey Circular 1139. Denver, Colorado. U.S.A. 1999
16. Barret L. Kurylyk, Kerry T.B. MacQuarrie, Jeffrey M. McKenzie. Climate change impacts on groundwater and soil temperatures in cold and temperate regions: Implications, mathematical theory, and emerging simulation tools. Earth-Sci. Rev. (2014), http://dx.doi.org/10.1016/j.earscirev.2014.06.006 .
17. F. Alkhaier, G. N. Flerchinger, Z. Su. Shallow groundwater effect on land surface temperature and surface energy balance under bare soil conditions: modeling and description. www.hydrol-earth-syst-sci.net/16/1817/2012/.
18. Vince P. Kaandorp, Pieter J. Doornenbal, Henk Kooi, Hans Peter Broers, Perry G.B. de Louw. Temperature buffering by groundwater in ecologically valuable lowland streams under current and future climate conditions. https://doi.org/10.1016/j.hydroa.2019.100031 2589-9155/ 2019 The Authors. Published by Elsevier B.V
19. Y. B. Rakhmatov, I. N. Tursunov, A. J. Erkinov. Assessment of the effect of groundwater temperature on cereal crops. EPRA International Journal of Multidisciplinary Research (IJMR). Volume: 7 | Issue: 4 | April 2021.
20. Sh.H. Hakimov, I.N. Tursunov, T. Yakubov. Application of modern water-saving irrigation technologies in the conditions of Bukhara region (in the example of Peshku district of Bukhara region). – 2 (2021) / ISSN 2181-1415.
21. Isayev S. X., Qodirov Z. Z., Oripov I. O., & Bobirova M. B. (2022). EFFECTS OF RESOURCE-EFFICIENT IRRIGATION TECHNOLOGIES IN IRRIGATION OF SUNFLOWERS ON LAND HYDROGEOLOGICAL CONDITIONS. British Journal of Global Ecology and Sustainable Development, 4, 95–100. Retrieved from https://journalzone.org/index.php/bjgesd/article/view/55
22. Egamberdiyev, M. S., Oripov, I. U., Hakimov, S., Akmalov, M. G., Gadoyev, A. U., & Asadov, H. B. (2022). Hydrolysis during hydration of anhydrous calcium sulfosilicate. Eurasian Journal of Engineering and Technology, 4, 76-81.
23. Egamberdiev, M. S., Oripov, I. U., & Sh, T. S. (2022). Development of a Method for Measuring the Layered Moisture State of Concrete and Various Bases. Eurasian Journal of Engineering and Technology, 4, 82-84.
24. Qodirov, Z. Z., Oripov, I. A., Tagiyev, A., Shomurodova, G., & Bobirova, M. (2022). WATER-SAVING IRRIGATION TECHNOLOGIES IN SOYBEAN IRRIGATION, EFFECT OF SOYBEAN ON GROWTH AND DEVELOPMENT. European Journal of Interdisciplinary Research and Development, 3, 79-84.

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31. THE IMPORTANCE AND PROSPECTS OF DRIP IRRIGATION OF COTTON IN UZBEKISTAN
32. Z Kodirov, I Oripov, SH Avezov, M Kurbonov - Инновационные исследования в науке, 2022