

Effect Of Agrophysical Properties of Soil in Cotton Irrigation

Y.R.Ashirov¹, S.Kh.Isayev²

¹Tashkent State Agrarian University, University street,2, Tashkent, Uzbekistan, yusufboy_86@mail.ru

²National Research University "Tashkent Institute of Irrigation and Agricultural Reclamation Engineers", Kori Niyozzi street, 39, Tashkent, Uzbekistan, sabirjan.isaev@mail.ru.

Abstract: In this article, the pre-irrigation standing moisture of cotton is 75-80-70 in relation to LFWC, depending on the irrigation procedures of cotton varieties in the conditions of light sandy loam soils. compared to the version irrigated in the percent order, the bulk density improved by 0.02-0.03 g/cm³, the porosity was 1.5-2.5% higher, the cotton yield was 1 per hectare compared to the irrigation method Information on the possibility of obtaining an additional crop up to 6-3.3 s/h is provided.

Keywords: mechanical composition of light sand, meadow gray, irrigation methods, standing volume mass, standing porosity, water permeability, cotton productivity.

Introduction: If we look at today's analysis, according to the indicators of fresh water consumption assessment for 1960-2014, 70% of the total fresh water consumption was contributed by agriculture and animal husbandry sectors. Of this, 20% of agricultural land is irrigated land, and 40% of the total food production is produced in these lands.

According to the estimates of the World Water Institute, by 2025 there will be approximately 3.5 billion in the world. the population may face the problem of water shortage. In particular, this indicator is 1.2-1.8 mln. enough for a person. By 2080, the demand for fresh water is projected to increase by 25% due to changes in the global climate, weather, precipitation and vegetation period, despite the increase in crop irrigation efficiency.

Currently, 17 countries around the world are considered to be "extremely" water-scarce countries. According to this indicator, Uzbekistan ranks 25th among 164 countries (level 2 on a five-point scale), that is, it is among the countries with a "high" level of water shortage.

By 2030, about 40 million of the population of Uzbekistan 7-8 km of available water resources per person. causing cubic reduction. In such conditions, the level of water scarcity may increase from 13-14% to 44-46%, which will negatively affect the development of agriculture and industry.

Based on the above problems, it is urgent to develop and implement new innovative and economical irrigation technologies in cotton fields.

The static mechanical composition is different, the time of the soil lifting through the capillaries was checked and it was concluded that: the higher the thickness of the soil layer, the higher the thickness of the soil layer, despite the same mechanical composition, compared to the lower thickness, moisture is absorbed through capillaries. It was found that the rise is slow, and the rise is slow due to the air resistance of the soil, M.A. Pankov [1].

As a result of applying the technology of mulching cotton between the rows with straw in the conditions of dense gray areas of the Tashkent region, uniform wetting of the soil along the edge and reduction of physical evaporation of moisture was achieved, as a result, irrigation water was reduced by 30 percent. was saved, 4.1 centners of additional cotton per hectare was obtained, and it was observed that 280-300 thousand soums of income increased per hectare as a result of research, M.Y. Esanbekov [2].

In the following years, when water is supplied to mitigate the water shortage, the dynamics of salts are more rapid when irrigating cotton and winter wheat with the subirrigation method in the conditions of barren, meadow-alluvial and meadow soils: towards the end of the growing season goes, the amount of salts in the soil increases a little, but it is recommended to wash away these salts with water of 1500-2000 m³/ha per hectare in late autumn and winter, when crops are not irrigated, S.Kh. Isayev [3].

In the following years, due to sudden changes in climate, our republic is currently reducing the water shortage due to comprehensive water conservation, complete management of river flow, technical improvement of

irrigation systems, application of modern technologies, planting and introduction of crops that consume less water. O.Ramazanov, M.Khalmirzayeva, V.Nasonov [4], V.YE.Yeremenko [5] and V.A. In the cove [10]. Optimum duration, duration of irrigation, irrigation interval, irrigation norms and effective water-saving technologies in irrigation of cotton varieties reduce the compaction of the surface layer of the soil, increase the porosity of the soil and increase the moisture of the soil.

Research results: In 2018-2020, in order to reduce water consumption in cotton irrigation procedures, to achieve high-quality soil moistening and to obtain a high and high-quality cotton harvest, scientific research was carried out in the conditions of the meadow gray soils of the Jizzakh region. The experiment consisted of 6 variants, as follows: variants 1 and 4 pre-irrigated cotton with standing moisture of 65-65-60 percent relative to LFWC, variants 2 and 5 pre-irrigated cotton standing moisture in the order of 70-70-60 percent compared to LFWC, options 3 and 6 were carried out before watering the cotton with standing moisture in the order of 75-80-70 percent compared to LFWC and in 4 repetitions. The area of each option is $7.2 \times 50 = 360 \text{ m}^2$ and is placed on the 1st floor. The total area of the experiment is 0.86 ha.

The methodology of the experiment was carried out on the basis of the methodological manuals "Methods of agrochemical, agrophysical and microbiological research in irrigated cotton areas" (SoyuzNIXI, 1963) and "Methodology of field experiments with cotton" (SoyuzNIXI, 1981) adopted by SRIOAOCBSP. [6, 7, 8, 9]. In the field of scientific research, mineral fertilizers were applied in the annual rate of N-200 kg/ha, R-140 kg/ha and K-100 kg/ha. 70 percent of phosphorus and potassium fertilizers were given before autumn plowing, and the rest before planting. 20-25 percent of nitrogen fertilizers were given to cotton before planting, and the rest was given during the period of cotton combing and flowering. Our scientific research was conducted on S-6524 and Pakhtakor-1 varieties of cotton.

According to the mechanical composition of the soil of the experimental field, the amount of humus in the 0-100 cm layer of the soil in the experimental field is 0.820-0.845-0.825 percent (2018-2020) and phosphorus-29,6-27.8-26.2 mg/kg, nitrate nitrogen 12.6-11.8-12.4 mg/kg, and potassium 155-142-100 mg/kg.

In the experimental field, the volume mass of the soil was determined at the beginning of the growing season in the general background and at the end according to the options. According to the results of the three-year scientific research, before placing the experiment in 2018, the volume mass of the soil was 1.41 g/cm^3 in the 0-50 cm layer and 1.42 g/cm^3 in the 0-70 cm layer. in the lower 0-100 cm layer, this indicator was equal to 1.43 g/cm^3 , by the end of the growing season, before watering the cotton, the moisture content was 75-80-70 percent compared to LFWC $1.44\text{-}1.43 \text{ g/cm}^3$ in the 0-50 cm layer, $1.45\text{-}1.44 \text{ g/cm}^3$ in the 0-70 cm layer and $1.46\text{-}1.45$ in the 0-100 cm layer It consisted of g/cm^3 .

The moisture content of cotton before watering is $1.42\text{-}1.41 \text{ g/cm}^3$ in the 0-50 cm layer, $1.43\text{-}1$ in the 0-70 cm layer in the 70-70-60% order of LFWC. 1.43 g/cm^3 and $1.43\text{-}1.44 \text{ g/cm}^3$ in the 0-100 cm layer.

The standing humidity of cotton before irrigation is 65-65-60 percent in the order of LFWC, and in the variant it is $1.44\text{-}1.43 \text{ g/cm}^3$ in the 0-50 cm layer, $1.45\text{-}1.45$ in the 0-70 cm layer. g/cm^3 and it was found to be $1.46\text{-}1.46 \text{ g/cm}^3$ in the 0-100 cm layer.

According to the results of the study, it was shown that the volume mass of the soil before irrigation of cotton was improved by $0.02\text{-}0.03 \text{ g/cm}^3$ in the 75-80-70 percent watered option compared to LFWC. This can be explained by the less compaction of the soil volume mass due to the reduction of the number of processing with technical means between the rows during the cotton growth period. It was observed that these laws were preserved in other years of the experiment, [11, 12, 13, 14, 15].

Another important agrophysical property of the soil is its porosity. If the porosity of the soil is high, air exchange is improved, microbiological processes are accelerated, thermal conditions change in a positive direction, and as a result, conditions are created for soil fertility, [16, 17, 18, 19].

The above pattern was also observed in the results obtained from the 2020 scientific research. In early spring, the porosity of the soil in the layers of 0-50, 0-70 and 0-100 cm was 49.7-49.3-48.9%, but by the end of the growing season, it slightly decreased and cotton standing moisture before irrigation is 65-65-60% in the order of LFWC in the version irrigated (control) 47.8-47.4-46.4% in these layers, standing moisture of cotton before irrigation is compared to LFWC 48.1-47.9-47.1% in the 70-70-60 percent irrigated version, 48.6-48.6 48.5-47.7% and 49.0-48.6-48.3%, and 48.2-47.9-47.0 in options 3 and 6, where cotton is irrigated in the opposite way. 1 and 48.1-47.5-46.9% were observed. According to the results of the analysis, the standing moisture of

cotton before irrigation is 70-70-60 percent compared to LFWC, the porosity of the soil in the irrigated version is 75-80-70. It was observed that it was 1.5-2.5% higher than the 70% regularly watered variant.

The water permeability of the soil is one of the most important properties, and it is one of the main indicators for determining the moisture reserve in the soil. In the experimental field, the water permeability of the soil was determined in the general background at the beginning of the growing season, and according to the options at the end of the growing season. According to the research results, at the beginning of the growing season of 2019, the water permeability of the soil was 1475 m³/ha for 6 hours, it decreased to 585 m³/ha in the first hour, and decreased in the following hours, and in the sixth hour, water absorption into the ground was equal to 76 m³/ha. it has been. The rate of water infiltration was 0.97 mm/min in the first hour, and 0.12 mm/min in six hours. Observations showed that during the season irrigation rates and changes in inter-row techniques led to soil compaction, the water permeability of the soil decreased slightly towards the end of the growing season. The water permeability of the soil irrigated in the order of 65-65-60 percent (control) was 1095 m³/ha for 6 hours, the standing moisture of cotton before irrigation was 75-80-70 percent in the order of LFWC 1205 m³/ha in the watered version and 1110 m³/ha in the irrigated version in the order of 70-70-60 percent compared to LFWC. In the first hour of observation, the water permeability of the soil was equal to 412-454-420 m³/ha, respectively, in the following hours, and in the 6th hour, water absorption into the ground was 60-70-63 m³ was equal to /. In this case, the rate of water absorbed into the soil was 0.68-0.75-0.70 mm/minute in the first hour, and 0.10-0.11-0.10 mm/minute in the sixth hour. Before watering cotton at the end of the growing season of cotton, the water permeability of the soil in the irrigated option is 75-80-70 percent compared to LFWC, as a result of processing between rows of cotton for 6 hours. it was found that it decreased by 1.3 times due to soil compaction. In this case, the water permeability of the soil was at an acceptable level in the case of irrigation by placing a film between the rows, compared to the case of continuous treatment between the rows during cotton care.

Summary: compared to the version irrigated through the egate, the standing moisture of cotton before watering during the operation period is 75-80-70 percent in the version irrigated in the order of 75-80-70 percent, reduction of the number of treatments between the rows, moisture in the mulched soil layer, due to optimization of nutrition, heat and air regime, it was found that the agrophysical properties of the soil are improved and fuel and lubricants are saved, the cotton yield can be increased by 1.6-3.3 s/ha per hectare compared to the control.

References:

12. Pankov M.A-Meliorativnoye pochvovedeniye, Tashkent, 1974, p. 30-36.
13. M.Y. Esanbekov-Improving elements of cotton irrigation technology in soils prone to irrigation erosion-// Doctor of Philosophy (PhD), abstract, Tashkent.: PSUAYEITI, 2017. p. 1-16 .
14. S.Kh. Isayev-Improving the technology of irrigation of cotton and grain by subirrigation method-//agricultural sciences doctoral dissertation abstract, Tashkent.: PSUYEAITI, 2016. pp. 1-26.
15. O.Ramazanov, M.Khalmirzayeva, V.Nasonov-"Water shortage in agriculture: problem and solution"-//Agro ilm Uzbekistan Agricultural Journal No. 1, 2008, page 41.
16. V.Yeremenko "Regime orosheniya i tekhniki poliva hlochatnika". Tashkent. kn. ANUz. 1957 g 16-20 st.
17. Methods of agrochemical, agrophysical and microbiological studies in irrigated lands. Tashkent. USSRCRI, 1963. P. 439.
18. Methods of agrochemical analysis of soil and plants. Tashkent 1977.
19. Methods of conducting field experiments. Tashkent, 2007. P. 148.
20. Cotton reference book. Tashkent. Labor press. 1989. P. 249-252.
21. Kovda V.A. "Fundamentals of the doctrine of soils" //Publishing Nauka, #2. Moscow, 1973. - p. 29-47.
22. Даулетбаев Б., Исаев С., Жапаркулова Е.-Влияние капельного орошения озимой пшеницы на урожайность зерна и экономию воды-//НАО «Казахский Национальный

- Аграрный Исследовательский Университет» [Исследования, результаты](#) журнал, № 4 (100) (2023):
23. Хасанова О., Исаев С.Х. Қор ва ёмғир сувлари билан бодом, хондон пистани томчилатиб суғориш самарадорлиги //Евразийский журнал академических исследований 3 (6 Part 3), 139-144.
 24. Bizhan Dauletbaev, Sbyrzhan Isaev, Odina Khasanova-THE EFFECTIVENESS OF DRIP IRRIGATION OF ALMOND AND PISTACHIO TREES WITH LOCAL RUNNING WATER-// To learn more about ICITE 2023 www.icite.ukgu.kz, Proceeding X International Conference «Industrial Technologies and Engineering» ICITE – 2023, Volume III, 319-323 стр.
 25. Yuldoshev Ramazon, Isayev Sabirjan- Grain Yield Efficiency Of The Drip Irrigation System Of Corn In The Conditions Of Gray Pasture-//Texas Journal of Agriculture and Biological Sciences, ISSN NO: 2771-8840, Date of Publication: 26-02-2024, 34-36 pp. <https://zienjournals.com>.
 26. Shukhrat Rizaev, Kamolidin Sharifov, Sabir Sanayev, Sabirjan Isaev and Bobur Kholmurzaev-Efficiency of agrotechnical and chemical measures in control of weeds in onion (*Allium cepa* L.) fields-E3S Web of Conferences 497, 03038 (2024), ICECAE 2024, <https://doi.org/10.1051/e3sconf/202449703038>.
 27. Inomjan Saparniyazov, Sabir Sanaev, Sabirjan Isaev, Shukhrat Rizaev, Anvar Shamsiev and Idrok Rakhmatov-Growing varieties sweet corn main period in Karakalpakstan- E3S Web of Conferences 497, 03043 (2024), ICECAE 2024, <https://doi.org/10.1051/e3sconf/202449703043>.
 28. Исаев С.Х., Отарбаев Б.С., Абдулхаков Ф., Шегенбаев А.Т., Копен М.- Применение способа капельного орошения при выращивании хлопчатника в Андижанской области- Ауыл шаруашылығы ғылымдары, №1(68)2024, МРНТИ 68.31.21: 70.21.31, <https://doi.org/10.52081/bkaku.2024.v68.i1.135>.
 29. Kopen M.B, Otarbaev B.S., Aldambergenova G.T., Shomantaev A.A., Isaev S.Kh.- Irrigation procedure (mode) of tomato grown by the low pressure drip irrigation method -Ауыл шаруашылығы ғылымдары, №1(68)2024, МРНТИ 68.31.01, <https://doi.org/10.52081/bkaku.2024.v68.i1.130>.
 30. S.Isayev, U.Jurayev, O.Murodov-Takroriy tariq ekinini yetishtirishda zovur suvlaridan foydalanish-International scientific conference on the topic "EFFECTIVENESS OF USING INNOVATIVE TECHNOLOGIES IN AGRICULTURE AND WATER MANAGEMENT" 2024 year The 23-24 rd of February Bukhara.