ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 8, Issue 11 , November 2021

Influence of Lands with Irrigation Erosion Under Conditions of Typical Gray Soils on Cotton Yield

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ABSTRACT: The article presents the consumption of mineral fertilizers in the cultivation of cotton varieties Sultan in the conditions of ancient irrigated, eroded, typical gray soils of the Tashkent region, zigzag irrigation 0.15 l / sec. Analysis of data on irrigation with a rate of 682-782 m3 / ha during the period of operation, maintaining soil moisture at the rate of 70-70-60% relative to Field Moisture Holding Capacity (FMHC) with the introduction of fertilizers of 100 kg / ha.

KEY WORDS: irrigation erosion, soil cultivation, zigzag method, irrigation rate, soil leaching, cotton growth and development, cotton yield.

I. INTRODUCTION

Today, with a feeling of water scarcity in the world, wise use of water is required, especially when it comes to watering crops. The deterioration of the land reclamation state and the occurrence of irrigation erosion processes are directly related to the correct organization of irrigation.

Worldwide, due to irrigation erosion, 100 million hectares of land, or 56 percent of the cultivated area, suffer losses, including 81% in Australia, 74% in Central America, 63% in North America, 50.6% in South America, 52.3% in Europe, 59.0% in Asia and 46.0% in Africa. In addition, agriculture loses 75 billion tonnes of topsoil every year due to irrigation erosion worldwide. Irrigation erosion occurs on the soils of all countries involved in irrigated agriculture, and it seriously damages soil fertility, productivity and quality. Such soils in Uzbekistan amount to 643.2 thousand hectares, and are found mainly in the territories of Tashkent, Andijan, Samarkand, Kashkadarya, Surkhandarya, Jizzakh regions, and partly Fergana and Namangan regions. Due to irrigation erosion, the nutritional regime of plants and ameliorative state, agrochemical, agrophysical properties of the soil deteriorate, the yield of agricultural crops and the quality of products decrease.

In the global cotton industry, it was revealed that rainfall, drip irrigation and irrigation using flexible hoses can save irrigation water by 50-60%, increase cotton yield by 8-10 centners per hectare due to the efficient use of irrigation water and maintaining a fertile soil layer. In this regard, it is necessary to study the improvement of intensive methods of agricultural production, the introduction of modern water-saving and resource-saving agricultural technologies in conditions of a deteriorated land reclamation state in the process of water shortage and irrigation erosion.

As a result of the negative impact of irrigation erosion in the agriculture of the republic, more than 0.3 million tons less cotton are grown annually. Due to this type of erosion process, the most fertile part of the soil, fertilizers introduced into it, are washed out by toxic agrochemicals, which leads not only to a decrease in soil fertility, but also to environmental pollution. On most farms, the top arable layer was washed away under typical gray soils. Scientists estimate that it takes 300 to 3,000 years for a 20-centimeter soil layer to form.

To obtain a plentiful and high-quality crop on this type of land, it is necessary to take anti-erosion measures and apply more fertilizer and water than on eroded land.

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There have been many studies on erosion control of irrigated crops using simple tillage, rainwater, soil, pipes, drip irrigation methods, but these methods are not widely used in production due to their cost or complexity. Until now, most agricultural crops are irrigated by furrows, which have the following disadvantages: a large amount of manual labor is required, there is no possibility of equal and sufficient distribution of water to each furrow, excessive consumption of irrigation water, a grass, paper or polyethylene barrier is required on each furrow, which by the working bodies of the cultivator, it is scattered over the field, and leads to the spread of finger grass, and the plastic films do not quickly rot and pollute the environment.

In connection with the acute scarcity of agricultural land and water resources in the country, the rational use of water resources is required. Inefficient water use and inappropriate irrigation of crops in areas with a steep slope (0.50) lead to high water consumption and irrigation erosion, which leads to significant damage to agricultural production and the environment.

One of the most important factors in the agricultural technology of growing cotton on irrigated lands is the correct organization of irrigation. Irrigation of cotton is determined by the soil, climate, biological characteristics of the cultivated variety and the level of agricultural technologies used. The timing of irrigation, norms and the use of water-saving agricultural technologies prevent unnecessary water consumption, soil leaching, waste of mineral fertilizers and environmental pollution.

In this regard, it is relevant in the country to conduct research on saving irrigation water, reducing erosion, maintaining a clean environment, maintaining a fertile soil layer by irrigating cotton on irrigated lands, and irrigating cotton in an acceptable way.

When leaving cotton, it is important to conduct research on irrigation, especially on uneven terrain, to increase irrigation erosion and reduce leaching of the fertile soil layer.

In the Action Strategy of the Republic of Uzbekistan for 2017-2021, "... improving the reclamation state of irrigated lands, rational and economical use of water resources and, on this basis, the achievement of sustainable agricultural production" is defined as one of the important tasks. In this regard, in the country for furrow irrigation of winter wheat and cotton in areas with irrigation erosion, it is necessary to research to save irrigation water, reduce erosion, keep the environment clean, and maintain a fertile soil layer [1,2,3].

II. THE DEGREE OF STUDY OF THE PROBLEM

On the part of a number of domestic and foreign scientists, such as V.B. Gusak, Kh. Makhsudov, K. Mirzazhonov, Sh. Nurmatov, Kh. Khamdamov, K. Muminov, S. Elyubaev, L. Gofurova, M. Khamidov, D. Nzaraliev, S. Kh. Isaev, B. Sh. Matyakubov, N.F. Bespalov, M.N. Zaslavsky, D.A. Arman, M.S. Kuznetsov, H.H. Bennett, G.P. Glazunov, Zings, M.Wolter and others carried out multifaceted studies on the origin of irrigation erosion and its negative consequences, on the preservation of soil fertility and the effectiveness of zigzag irrigation [7,8,9,10,11,12,13].

The aim of the study is to grow a rich and high-quality crop with the preservation of soil fertility in the conditions of irrigated erosional soils of the Pskent district of the Tashkent region.

The object of the study was the depth of groundwater, the composition of heavy sands, typical gray soils, grain and cotton fields subject to irrigation erosion, cotton varieties "Sultan".

The subject of research is irrigation and its elements, water and soil, irrigation quality, irrigation erosion, high and high-quality cotton harvest.

III. RESEARCH METHODS

All observations, measurements and analyzes in the research were carried out on the basis of the methodological manuals "Methods of agrochemical, agrophysical and microbiological research in polyvinyl cotton-growing regions",

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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"Methodology for conducting field experiments" [4,5,6].

The studies were carried out in field and laboratory conditions: the total amount of humus in the soil was determined by the method of I.V. Tyurin, mobile forms of nitrogen and phosphorus according to Granvald-Lyazh, V.P. Machigin, gross amounts of nitrogen, phosphorus, potassium according to the methods of I.M. Maltseva, L.P. Gritsenko. the mechanical composition of the soil was determined with a pipette treated with sodium hexametaphosphate according to M.P. Bratchev. The volumetric weight of the soil was determined by the cylindrical method, the water permeability of the soil was determined by the metal ring method, the method of filling the site with a field moisture capacity of 3x3 m, the pre-irrigation soil moisture was determined by a refractometer using the thermostat-scale method of S.N. Ryzhov. Water consumption during irrigation of cotton and winter wheat was determined using a triangular-shaped water meter for 900 g. The method of B.A. Dospekhova.

IV. RESEARCH RESULTS

Irrigation erosion of the republic is acutely observed during irrigation of agricultural crops on sloping areas. It is known that under the influence of erosion the highest, most fertile soil layers are washed away (Fig. 1)

Fig. 1 The process of formation of irrigation erosion in cotton growing.

Based on the above, in order to reduce water erosion, preserve and increase soil fertility, increase cotton yield and technological properties, protect the environment from pollution, save water, mineral fertilizers, scientific research was carried out on the lands of the farms "Ashirmetov Zhumaboy", "Oybek Sotiboldiev "And" Tadjibaeva Zavra "of the Piskentsky district of the Tashkent region.

The texture of the experimental site was typical irrigated, eroded gray soils with heavy sand, with a groundwater level of about 5-7 meters, and the experiment consisted of 6 variants and 3 repetitions. Each section is 100 meters long, 4.8 meters wide and has a total area of 480 m^2.

According to laboratory analysis, the agrochemical properties of typical irrigated gray soils of farms "Ashirmetov Zhumaboy", "Oybek Sotiboldiev" and "Tadjibaeva Zavra" in the Piskent district of Tashkent region, which have been irrigated for a long time, are as follows: humus plowing 0.926% in a layer of 0-30 cm, 0.762 % in the layer 30–50 cm under the drive, in the layers the total nitrogen is 0.072 and 0.056, respectively; total phosphorus 0.094; is equal to 0.081 percent. Nitrate nitrogen in the 0–30 cm layer of the drive was 9.34, in the 30–50 cm layer below the drive - 9.02, mobile phosphorus - 30.27, 26.56; exchangeable potassium 155; At 122 mg / kg, and the experimental fields were provided with humus, nitrogen and potassium at a low level, and with phosphorus at an average level, it was concluded that in order to

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
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grow a high and high-quality crop, it was necessary to fertilize at a high level with nitrogen and potassium, as well as phosphorus at a in moderation.

The data on the bulk density of the soil showed that in the upper soil layer of 0–30 cm it was 1.29 g / cm3 and in the lower 30–50 cm 1.34 g / cm3, as a result of erosion of the fertile soil layer as a result of erosion, the bulk density in the drive and sub-drive soil layer was slightly higher than the permissible value.

In the experimental field, the soil permeability averaged 193.3 m3 / ha for 6 hours at the beginning of the application period, but by the end of the application period, the zigzag irrigation option had an average of 8.7 m3 / ha more water per hour than with conventional irrigation.

During the first watering, the soil leaching was the same in all variants. During the second irrigation, 3.7-3.9 t / ha of soil was washed in the first option, 3.4-3.6 t / ha in the third option and 3.2-3.4 t / ha in the fifth option. During the last fifth irrigation, according to the first option, 2.0-2.2 t / ha of soil was washed, while in the third option, these indicators were 1.2-1.4 t / ha. During the season, in the first variant, 15.6-16.6 t / ha were washed away, in the third - 13.9-14.9 t / ha, in the fifth variant - 11.8-12.6 t / ha of soil particles.

In the agrochemical analysis of the composition of wastewater in the 1st option on the 1st irrigation, ammonia nitrogen was 8.43-8.45%, phosphorus - 0.73-0.75, potassium - 4.35-4.45, nitrate - 6.45-6.55 mg / l, and in the 5th variant these indicators were 7.25-7.26; 0.58-0.59; 4.31-4.33; 3.24–3.26 respectively. From the above, it can be seen that by the end of the validity period, the amount of nutrients in the wastewater has decreased.

According to the results of phenological observations of the growth and development of cotton, the height and number of cotton leaves in June were taken into account, in July - the height of plants, crop horn, scallop, flower, in August - plant height and crop horn, and in September, the number of open and unopened stems was taken into account. By August 1, the height of cotton was 478.5 cm in the 1st variant with zigzag irrigation, 89.2 cm in the 5th variant and 92.4 cm in the 6th variant. on average 5.0-8.0 cm lower.

In September, the average number of cocoons for the experimental variants was 11.6-11.9 pieces. When irrigating cotton in a straight line, and when using the technology of zigzag irrigation of cotton in a straight line, this indicator was 11.9-12.7 pcs. Units

The average yield of cotton was 24.5-26.9 c / ha per hectare when irrigated cotton by direct sowing, and the average yield when irrigated in a zigzag manner was 28.2-30.5 c / ha

V. CONCLUSION

To reduce irrigation erosion in conditions of ancient irrigated, irrigated eroded typical gray soils of the Tashkent region, the rate of mineral fertilizers is 0.15 l / sec. It is recommended to irrigate at the rate of 682-782 m3 / ha during the application period, maintaining soil moisture at the level of 70-70-60% relative to the FMHC by applying 200, phosphorus-140 and potassium-100 kg / ha.

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