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Soil Erosion in Large Slopes and its Prevention Measures

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Abstract: This article ramp largest irrigated heavy, medium and light soil and water erosion lands through the application of new technical means and technologies developed measures to reduce the erosion of the furrow irrigation. In particular, information will be provided on how to achieve high and quality yields of agricultural crops, including cotton, through the identification of elements of water-saving irrigation techniques.

At present, out of the total area of 44797.7 thousand hectares, 27521.6 thousand hectares are used in agriculture, and 4238.6 thousand hectares are irrigated lands. They are located in agricultural areas with different natural soil-climatic conditions, and intensive farming is carried out mainly on 4278.0 thousand hectares of irrigated land, where the reclamation, ecological status and level of soil fertility differ sharply. Unfortunately, the reclamation situation in 65.9% of these areas is unsatisfactory, 1.5 mln. more than 0.7 million hectares to deflation. hectares are strongly deflated, 660,000 hectares are irrigated, 40,000 hectares are jar eroded, and there is a steady decline in soil fertility in irrigated agriculture.

Clear recommendations and conclusions are given on the method used to prevent soil leaching.

Keywords: Soil, slope, moisture capacity, irrigation rate, irrigation regime, irrigation technique, irrigation technology, tillage, erosion, yield.

INTRODUCTION

In agriculture, soil fertility is of great importance in obtaining high yields, and one of the factors that strongly and negatively affects it is the process of erosion (soil erosion). Erosion is caused by the decomposition of the physical and chemical properties of rocks, soils or other surface integrity. Protecting the soil from the process of erosion, protection of the soil in general is our main encyclopedia. One of the urgent tasks is to study the natural conditions of Uzbekistan, the impact of various soils on erosion processes on soil fertility, measures to combat them and increase the fertility and rational use of eroded soils.

Today, according to international environmental organizations, 3,200 hectares of fertile land are being destroyed every day due to accelerated erosion around the world. As a result of the

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development of productive forces, the area of degraded land is increasing day by day. As a result, $ 100 billion a year is lost.

According to the results of scientific research, the yield in eroded soils decreases by 5-10 times, and various weeds increase by 2-4 times. Accelerated erosion is therefore a disaster for agriculture around the world. Because in a short time, under the influence of this erosion, the top fertile part of the soil in millions of hectares of irrigated lands is eroded and turned into barren lands. In the last hundred years, 2 billion hectares of fertile soils in the world have been eroded.

In view of the above, the main reasons are the deterioration of soil reclamation, the main factors that increase soil fertility, in particular, increased deflation and erosion processes, incomplete adherence to the main tillage system, increased soil compaction in the topsoil and subsoil, crop structure and their productivity. non-alternative to soil fertility, plant feeding regimes, and the return of nutrients from the soil to the soil by biomass, such as the incompleteness of the laws of nature and other factors. Therefore, in view of the current demand, the reduction of soil erosion in the cultivation of agricultural crops is a very important task in maintaining and increasing soil fertility.

MATERIALS AND METHODS

Improving soil fertility, preventing irrigation erosion, as well as preventing the intensification of deflation-erosion processes are required to address the following issues:

1. Regular monitoring of the general condition of lands and their efficient use [2, 3,4];

2. Maintaining the balance of nutrients removed from the soil and added to the soil, adding more organic matter [5, 6];

3. Further increase the scientific and practical potential of farmers, land users in general [7, 8, 9, 10];

4. Development of measures to reduce soil erosion through the introduction of resource-saving technologies that increase soil fertility, including the introduction of the proposed technology, etc. [11, 12, 13].

Wind erosion (deflation) i.e. the movement of rocks and soil particles under the influence of wind force depends on wind force, return and topsoil, this type of erosion occurs when the wind force exceeds 3-5 m / s in non-irrigated lands. Aggregates smaller than 1 mm in size under the influence of wind erosion are visible in dust storms separated from the soil mass. It has been noted that humus content in the soil has decreased 2.5-3 times in 100 years. Scientific research has shown that when the wind speed is 4-5 m / s - weak, when it is 5-15 m / s - moderate, and when it is more than 15 m / s - strong erosion [14].

Anthropogenic erosion is the washing away of water by topsoil and subsoil soils in areas where human activities (agricultural activities, mining) are carried out improperly [15].

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Soil erosion under the influence of water and wind, the main factors influencing its development can be attributed to natural factors such as climatic conditions, unevenness of the surface, geological structure of the soil, plant composition, soil conditions, the order and methods of human land use, misuse of water resources [15, 16].

Many countries in the arid climate of the world, including Uzbekistan, have in recent years eroded lands in Tashkent region, Fergana Valley, Samarkand region, and prevention is one of the most pressing issues. After the new equipment and technical means created in the prevention of erosion, it is of great importance to carry out control and scientific research work. Currently, according to research institutes in the country, 722 thousand hectares are affected by irrigation erosion, 1812 thousand hectares by wind erosion (in arable lands), 1929 thousand hectares by water and wind erosion. With this in mind, the most pressing issue is the prevention of erosion processes, maintaining and increasing soil fertility, obtaining high and quality crops. Due to irrigation erosion alone, 450-500 thousand tons of cotton will be lost in the country. Depending on the degree of erosion in these areas, the cotton yield is up to 40% lower than in non-eroded areas. As a result of irrigation erosion, crop yields are reduced as a result of leaching of nutrients from the soil along with it. As a result, soil fertility in the same field varies, which requires the correct implementation of agro-technical measures, including the right approach to irrigation, fertilization, tillage and crop rotation systems. The existing irrigated arable lands of Uzbekistan have different fertility and mechanical composition, slope, as well as a variety of soils. Some of the mineral fertilizers used in irrigated and wind-eroded crop areas are lost along with water or wind, while in newly developed, leveled sandy soils, fertilizer use efficiency decreases sharply due to leaching of soil layers downwards [7,8,13,17]. . For this reason, in order to obtain high and high-quality crops from these areas, it is important to protect soils from erosion, to increase their productivity, which is of great economic and environmental importance.

Erosion prevention scientists have conducted research by many local and foreign scientists on the occurrence of water (irrigation) erosion, its harmful effects and the fight against them.

In two years, on average, 11 t / ha of soil was washed on ordinary arable land, 6.2 t / ha on deep loosening with plowing, and the yield of winter wheat was 20.2 and 22.0 t / ha, respectively. On $3\text{-}5^0$ light chestnut soils, 5.2 t / ha of spring plowing, 3.6 t / ha of deep plowing and 0.5 t / ha of plowing were washed.

In the field experiment, it was found that 122 kg / ha of soil particles were washed away when plowing was done at a depth of 70 sm, and 793 kg / ha without plowing.

It is known that in Uzbekistan, the relief is uneven, and on irrigated lands with high slopes, water (irrigation) erosion washes away soil particles, along with the loss of macro and micro elements, agrochemical residues, resulting in environmental pollution.

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In Central Asia, including Uzbekistan, a number of scientists have conducted research on soil erosion control, including: Maylibaev SS, Nasriddinov M. M., Iskandarov S.I., Tabet A.D., Mirzajonov K.M., Nurmatov Sh.N. and other scientists have found that the thickness of the humus layer and the amount of nutrients decrease with increasing washing rate [6, 7, 8,13,14, 15, 16].

To protect typical gray soils from irrigation erosion, it is recommended to take 6.6 sm deep furrows with 5 transverse barriers with an amplitude of 29-30 sm per 1 pogonometer and irrigate the cotton using 0.13 l / s of water [15].

Studies have shown that in the typical gray soils of Tashkent region, the leaching rate reaches 4.5 t / ha at a slope of 0.50 and up to 44.7 t/ ha at a slope of 4.3^0 [14].

In areas with high slope (0.05-0.2) to reduce the washing process, cotton was suggested to be irrigated by snake trail microegators with a depth of 2-3 sm. This is achieved by a 40-50% reduction in soil erosion when special snake trail ridges are installed and used instead of cultivator fertilizer field openers.

It has been proven that in typical gray soils subject to erosion, it is necessary to determine the optimal shape of the edges and water consumption for irrigation of potatoes. The effect of egat form on the amount of humus, nitrogen and potassium in the stream, the reduction of nutrients was found to depend on the elements of anti-erosion technology of irrigation. The cost-effectiveness of potato cultivation in typical gray soils eroded on foothills has been summarized.

Based on the research work in the field of erosion control in the experimental field of the Uzbek Cotton Research Institute of Tashkent region, the soil as a result of irrigation erosion in irrigated soils with a new profile, designed to obtain a stable profile and design slope in irrigated areas with a slope greater than 0.001. washing of particles, including macro and micro elements, loss of agrochemical residues and pollution of the environment, identification of elements of water-saving irrigation techniques, efficient use of water resources by applying them on farm lands, obtaining high quality crops.

The following research work has been carried out:

1. The mechanical composition of the soil was determined (N.A. Kachinsky's method on samples taken at a depth of 0-100 sm.).

2. The volumetric weight of the soil was determined (0-100 sm of soil on each 0-10 sm layer at the beginning and end of the growing season).

3. The amount of humus in the soil, total nitrogen and phosphorus were determined.

4. Soil water permeability was determined under field conditions.

5. Through changes (dynamics) of soil moisture. (Soil moisture was determined at the beginning and end of the vegetation, before and after concentration irrigation, and in all variants

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every 0–10 sm layer of 0–100 sm).

6. Variation (dynamics) of soil moisture along the length of the ridge (every 10 m (in light soils) and 20 m (in medium and heavy soils) to a depth of 0-150 sm (in the first half of the ridge) and 0.100 sm (in the second half of the ridge) along the length of the ridge) detected.

7. The speed and time of the water flow in the egat to the end of the egat were determined.

8. The vertical wetting diagram of the soil along the length of the egate was determined.

9. The coefficient of flat soil moisture was determined along the length of the egate.

10. The efficiency of irrigation equipment is found.

11. Soil washing particles were detected.

11. Phenological observations on cotton were revealed.

Productivity data were mathematically processed on a Rentium-4 computer using B.A. Dospekhov's method of analysis of variance [18].

The amount of water supplied to the experimental field was determined using Chipoletti (Spillway Chipoleti-50) and Thomson water meters.

RESULTS AND DISCUSSION

In order to ensure the efficient use of water resources, a new technical tool to reduce erosion will be created, which will provide a stable profile and design slope of the cross section. Conclusions are given on the reduction of erosion in irrigated lands with different mechanical composition of soils with a slope greater than 0.001. The mechanical composition of experimental field soils, their water-physical properties and nutrient content are determined. The level of groundwater in the experimental fields and their mineralization are determined. The elements of irrigation equipment used in production conditions in the experimental fields and the increase in their efficiency are identified. As a result, in order to make efficient use of water resources, a new technical tool that provides a stable profile and design slope of the cross section will be adapted to existing techniques for application in experimental fields.

It was taken into account that the normal supply of water to the experimental field [19, 20, 21] and the application of irrigation procedures in different soil conditions at the required level in the irrigation of cotton [22, 23, 24].

CONCLUSION

Based on the results of the technical means and technology used, the following conclusions and recommendations can be made:

1. Achieved reduction of erosion by irrigation water by 3 - 5 %;

2. This technology saves up to 5-8% of irrigation water as a result of the use of technical equipment.

3. Washing of soil fertility was prevented.

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4. Yield increases by 5 – 6 %.
5. The washing of the fertile layer of soil has been eliminated.
6. Soil erosion at the beginning and end of Egat (along the length) has stabilized.
7. Cotton grows and develops at a steady pace along the length of the stalk.

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