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EFFECTIVENESS OF BIOLOGICAL PRODUCTS AND ORGANIC FERTILIZERS FOR COTTON ON IRRIGATED ERODED TYPICAL SIROZEMS

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Kamilov Bobir Sultonovich

Phd., Agricultural Sciences Associate Professor, Uzbekistan

Mahkamova Aliya Shinibaevna

Assistant., Tashkent State Agrarian University, Tsau, Uzbekistan

ABSTRACT

The article presents the influence of organomineral and biological preparations on the growth and development of cotton seedlings in conditions of irrigated typical sierozem. Also, depending on the degree of soil erosion, the growth rate of cotton varies. According to the data obtained, higher rates were observed in the option with the use of biological product Rizokom-1 and in the collected soil compared to other options.

KEYWORDS

Irrigated, typical sierozems, eroded soil, slightly washed-out, moderately washed-out, washed-out, cotton, mineral fertilizers, biological products, fertility, relief.

INTRODUCTION

Rational use and protection of land from wind and water soil erosion is one of the most important national economic tasks of modern agricultural science.

Of particular importance for the development of agriculture is not only the fight against soil erosion, but the restoration of the fertility of eroded soils. The problem of increasing the fertility of irrigated lands has

become especially urgent. In the conditions of irrigated agriculture in Central Asia, where highly hilly terrain dominates, agricultural measures to combat erosion are not always carried out taking into account the characteristics of these soils, as a result of which the physical, water-physical, agrochemical, biological and other properties of the soil deteriorate. A negative consequence of erosion is a decrease in the content of nutrients, which leads to a sharp decrease in soil

fertility, due to the decrease in the yield of sown crops and the quality of the resulting products deteriorates.

Kh. Akhadov emphasizes that the role of soybean in improving soil properties and increasing productivity is very great. During the growing season of soybean, nitrogen in the soil increased by 0.079% (in the soil sample before the experiment, nitrogen was 0.069%), phosphorus - by 0.021-0.017%, humus - by 0.021-0.035% compared to the control variant. [1]

Crops planted as green manure develop differently in the soil depending on the type of root system. Kenzhaev Yu., Oripov R. in experiments conducted on meadow-gray soils, the provision of plants with roots was 188.9 g per 1 m² of the control variant; 354.1 g in a mixture of chickpeas + rapeseed + peas; 195.8 g in barley+soy; 205.4 g in peas; in rye 280.2 g; in barley - 201.7 grams. Planting green manure crops on land freed from grain, growing 11.6-36.2 tons of green mass per hectare by October-November, incorporating it into the soil, going through the rotting process until early spring, contributed to improving the agrophysical, chemical and biological properties of the soil, increasing cotton yield and achieving improved fiber quality [7].

Nitrogen is one of the limiting nutrients for plant growth. Higher plants obtain nitrogen from the soil either in the form of nitrates or ammonium ions, and nitrate is an important source of nitrogen for crops. G.I. Dzhumaniazova and others developed a biological product with complex action, Rizocom-1, based on mudflow-resistant phosphomobilizing rhizobacteria of cotton [3]. When a biological product is introduced into the soil by pre-sowing treatment of cotton seeds, phosphorus-mobilizing rhizobacteria actively develop in the root zone of cotton in saline soil and activate the development of nitrogen cycle microorganisms, especially nitrifiers. When using the biological

preparation Rizocom-1 in the soil during the budding phase, the number of nitrifiers increased by 2 orders of magnitude (from 4.4 to 6.4 lg CFU/g of soil), the activity of nitrate reductase practically did not change, the N-NH₄ content increased by 7.3 mg/g kg of soil (from 12.5 to 19.8 mg/kg of soil) compared to the control (traditional cotton sowing) against the background of full mineral fertilizer.

The data obtained indicate that, under the influence of the biological product Rizocom-1, activation of the nitrogen cycle components—the number of nitrifiers, nitrate reductase activity, and mobile forms of nitrogen (N-NH₄)—in saline soils occurs, which led to an improvement in nitrogen nutrition of cotton plants.

Object and methods of research: The object of our research was the soil of the farm Tulepov Said Akhmad, Piskent district, Tashkent region. The soils of the studied object are represented by irrigated typical sierozems, meadow, and sierozem-meadow soils. The territory of the farm is located in the western part of the right bank of the lower reaches of the Angren River and is located, according to A.Z.Genusov, B.V.Gorbunov and N.V.Kimberg (1964) in the Chirchik Angren soil-climatic district, in the middle of a vast contour of irrigated typical gray soils. On the territory of the farm, in lithological and geomorphological terms, the III, IV and above-floodplain terraces of the Angren River are distinguished. They are characterized by hilly and ridged terrain. The ridges are wide with gentle slopes, so the soils are eroded to varying degrees. Logo-shaped depressions are identified between the shafts. It should be noted that typical gray soils, regardless of geomorphological location and the degree of erosion from the surface, are high-carbonate. In the upper horizons the content is 6-7%. However, in soils subject to erosion processes, this level of carbonates remains up to a depth of 40-50 cm,

then a sharp increase is observed and in the middle part they reach 9-10%.

The farm was chosen as an object of research due to the fact that its territory contains soil types characteristic of the irrigation zone of the Tashkent region. The terrain, land reclamation conditions, and agricultural crops are also typical. Experimental studies to study the processes of irrigation erosion were carried out on eroded irrigated typical gray soils occupied by cotton. The study was conducted in 3 periods. During the field period, sections were laid according to the degree of soil erosion, morphological descriptions were made, and soil samples were taken along genetic horizons for analysis.

Agrochemical analyzes of soils were carried out according to the method generally accepted in agrochemistry (Methods of agrochemical, agrophysical and microbiological studies in irrigated cotton areas, Tashkent, 1999; Methods of chemical analyzes of soil, used in the laboratory of mass analysis, Tashkent, 2005). Soil pH was measured using a standard mercury chloride electrode with automatic temperature compensation. Aggregate analysis was carried out according to the method of N.I.Savinov by fractionating the soil on a column of sieves in an air-dry state, the water strength of the soil structure was determined using the device of I.M.Baksheev.

Results of the study and their discussion: It is known that the mineral absorption of plants on irrigated lands, that is, obtaining a high and high-quality harvest, is closely related to the vital activity of microorganisms in the soil. Therefore, the question of the connection between the development of agricultural crops and the composition and quality of mineral fertilizers applied to the soil is being studied. That is why the production of biological fertilizers and their practical

application attract the attention of many scientists in foreign countries and in our country.

To identify the effect of the biological product against the background of NPK on the growth and development of cotton in laboratory experiments, we carried out phenological observations from the day of sowing the seeds at the beginning of each decade. The observation results are presented in the diagram. Before we begin to discuss the results of the influence (biological products) on the growth and development of cotton, it should be noted that the differences between the productive capacity of slightly washed-out and medium-washed soil are clearly manifested from the early phases of cotton development. As a rule, eroded soils in an irrigated zone have insufficient amounts of organic matter and other nutrients, so they are more responsive to fertilizer application than non-eroded soils of that genetic type. Therefore, an analysis of modern practices in the use of fertilizers indicates that in recent years, despite an increase in per-hectare norms of mineral fertilizers, especially nitrogen-phosphorus fertilizers, cotton yields are not growing, and in some cases there is a tendency to decrease. Therefore, in conditions of intensive farming, the development of nutrition issues and the use of mineral fertilizers for cotton to obtain a high and early-ripening crop with good fiber quality should include a complete and balanced provision of the needs of this crop not only for basic nutrients (NPK), but also for non-traditional types of fertilizers.

From this point of view, in our studies Rizocom-1. We used biological product 1. Because the decomposition of organic substances occurs due to the biological absorption of organic substances in the soil with the help of microorganisms.

Also, the irrigated soils of our republic are, by their nature, not rich in humus, and their use in agriculture

often leads to a decrease in the amount of humus. To prevent this situation and achieve a humus balance without deficiency in irrigated soils, it is necessary to annually apply 10-15 tons of manure per hectare of land. According to the Agricultural Research and Production Center of Uzbekistan, the amount of manure collected in our republic is 5-6 tons per hectare of land. Therefore, one of the most pressing issues in the development of agriculture is the development of new ways to enrich soils with organic substances and use them in production. Therefore, the influence of the organomineral fertilizer sodium humate on the chemical-agrochemical, physical and agrophysical properties of soils, particle size distribution, structure, density and productivity of agricultural crops in the conditions of irrigated gray soils in the Tashkent region is being studied. The influence of non-traditional

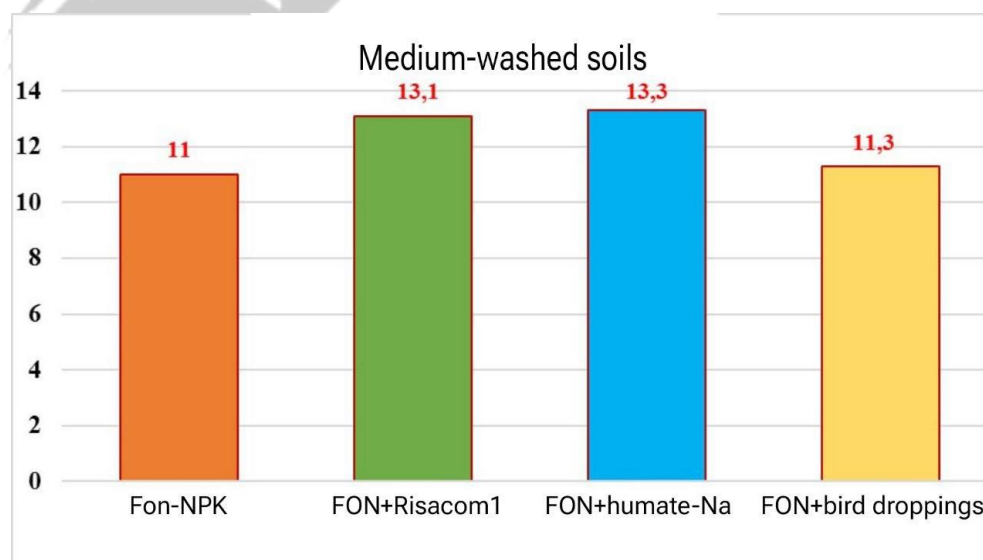
fertilizers on achieving a humus-free balance in irrigated soils under the influence of sodium humate was studied.

This sodium humate is an organo-mineral fertilizer obtained from coal mine waste, when applied to the soil, agrochemical and microbiological processes in the soil are studied. Our studies were carried out using 4 variants and 3 replications. The influence of Rizocom-1, sodium humate, chicken manure against the background of NPK on the growth and development of cotton.

It was found that the application of these organo-mineral fertilizers and biological preparations had a positive effect on the daily growth rate of cotton.

Figure-1

The influence of organic fertilizers and biological products on the growth and development of cotton seedlings over a 30-day period (cm)



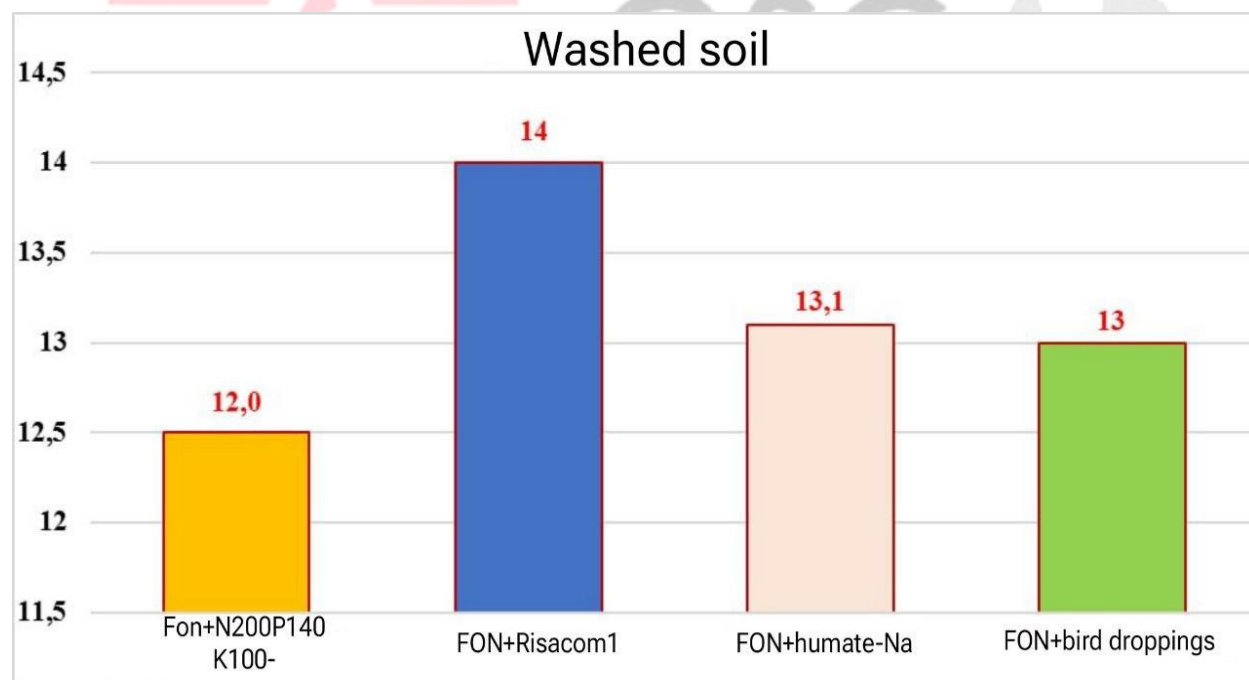
Experimental options were formed in laboratory conditions using slightly eroded, moderately eroded, reclaimed soils brought from the Piskent district of the Tashkent region. First, the soil was placed in separate containers according to the degree of erosion and seeds were planted in laboratory conditions. In each of the pots a control, Rizocom-1, sodium humate and chicken manure were formed. From the day of germination, the growth rate of cotton was observed every 10 days according to the variants. In all variants on moderately eroded soils, the growth rate of cotton was higher in the Fon+sodium humate option and the Fon+Rizocom-1 option (Fig. 1)

As can be seen from the diagram, as a result of changes in soil properties depending on the degree of erosion, a change in the growth and development of cotton was noted.

We observed that the dry and wet mass of cotton seedlings was affected by organic and biological products. In our studies, a high growth rate of cotton was achieved in the Von-Rizocom-1 variant. The second place was noted in the variant Background + sodium humate in washed away, reclaimed soils (Fig. 2).

Figure - 2

The influence of organic fertilizers and biological products on the growth and development of cotton seedlings over a 30-day period (cm)



The dry mass of cotton seedlings was also observed to depend on the level of fertilizer application and erosion over a 30-day period. At the same time, the

Fon+Rizocom-1 option has the highest indicator, i.e. in moderately eroded soils the total number of plants (2) weight is 0.005 g, the weight of leaves and stems is

0.003 g, the weight of roots is 0.002 g. In reclaimed soils this indicator was 0.007 g, 0.006 g and 0.001 g. In general, according to the data obtained as a result of all our observations, we can say that the growth and development of cotton seedlings was observed higher on washed away and reclaimed soils compared to the control variant.

CONCLUSIONS

In irrigated eroded typical gray soils, the use of organomineral fertilizers made on the basis of biologically active substances, various manures and wastes is of great importance in increasing productivity and obtaining high yields of agricultural crops. Of course, as a result of such fertilizing of crops on eroded soils, it leads to an increase in the content of humus in the soil and the creation of favorable biological conditions.

The difference in the productive capacity of weakly washed away, moderately washed away and washed out soils is especially clearly revealed when comparing the growth and development of cotton.

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