

**INCREASING THE PRODUCTIVITY OF SOILS IN BUKHARA REGION: PROBLEMS
AND SOLUTIONS (on the example of Jondor district)**

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Annotation: For many years, new scientific approaches and research have been conducted in Jondor district of Bukhara region to increase soil fertility. In particular, new innovative developments are being developed and analyzed in Jondor district to increase soil fertility. In the future, these analyses can be used to increase soil fertility in Jondor district.

Keywords: Soil, Soil fertility, Salinity, Agriculture, Groundwater, Farmer.

Introduction. Irrigated soils in Uzbekistan are found in different horizontal latitude zones. The productivity of irrigated soils depends on the nature of the soil-forming rocks, soil types, irrigation periods, salinity levels, and the complex of agrotechnical and reclamation measures carried out on them.

Currently, with the growing threat of a global ecological crisis, soil protection from degradation processes is one of the urgent problems of the world. The importance of this problem is that it is impossible to preserve the flora and fauna, water and air purity without eliminating the process of soil degradation and preserving the soil layer of the Earth. Therefore, it is impossible to maintain the ecological well-being of humanity without maintaining the normal functioning of the biosphere.

Bukhara region is located in the southwestern part of Uzbekistan. This land is full of vast plains. Often it covers desert and semi-desert areas. Such places are characterized by a unique climate. Hot summers and dry winters are typical. The shape of the earth's surface and the condition of the soil are serious obstacles to agriculture. Farmers face many difficulties in obtaining crops. Jondor district is in the most acute situation in this regard. Because sandy and saline soils prevail there. Sandy soils quickly lose water. Saline soils slow down plant growth. Soil fertility directly determines productivity. If there are enough nutrients there, crops will grow well. Otherwise, the yield will be low. In the case of Jondor district, finding and implementing ways to increase productivity is of great importance. This will not only increase the yield. It will also help preserve land resources for a long time. In this region of Uzbekistan, soils are rapidly deteriorating due to water shortages and climate change. Therefore, a scientific approach is necessary. As a result, agriculture will be strengthened. The income of the population will increase. Solving this issue will have a positive impact on the country's economy.

Literature analysis. Today, research work aimed at the state of fertility of irrigated soils, its preservation and improvement is being carried out by a number of foreign and republican scientists: N.P. Melikhova, A.A. Zibarov, N.V. Onistratenko, S.G. Kotchenko, K.D. Shepherd, M.J. Soule, S.D. Garrett, S.S. Sobolev, M.Zaslavsky, G.P. Surmach, G.I. Shvebs, X.M. Mustafayev, S.U. Kerimkhanov, V.B. Gussak, M.U. Umarov, A.M. Rasulov, D.R. Ismatov, L.T. Tursunov, I. Turapov, X.M. Maksudov, R.Q. Koziev, M.M. Toshkoziev, L.A. Gafurova, A.A. Khanazarov, R.Kurvantoev, Sh.M. Bobomurodov, The studies conducted by N.Yu.Abdurakhmonov, I.U.Urazbaev, A.U.Akhmedov, I.A.Ziyamammedov, A.J.Ismonov, G.M.Nabiyeva, D.A.Qodirova, M.Saidova, G.S.Sodikova, O.A.Jabborov, O.T.Sobitov and others provide information on the properties, fertility, and qualitative improvement of soil cover. The quality and composition of the fertility of irrigated soils around the world are changing every year, including "of the 1.5 billion hectares of arable land in the world, 0.4 billion hectares

are of high quality, 0.8 billion hectares are of good quality, and 0.3 billion hectares are of infertile land. Soil salinization has a serious impact on the decline in fertility." Therefore, it is important to identify the degradation processes affecting soil fertility, develop scientific solutions aimed at preventing such negative processes, increase and protect soil fertility, and effectively use land resources [3].

The correct and rational use of any means of production largely depends on the depth and comprehensive study of its important properties. Therefore, preventing soil degradation, which is considered one of the urgent problems of today, and eliminating its consequences, first of all, requires rational use of soils, increasing their fertility, knowing their quality, economic value, and protection, scientifically based sequential planting of various plants according to soil conditions, and proper soil cultivation [2,7,].

In field conditions, local points were marked in stationary plots, samples were taken, and studies were carried out to in-depth study of the morphological and general physical properties of soils. In laboratory conditions, soil samples were tested for humus, total nitrogen, phosphorus, potassium, as well as mobile phosphorus and potassium, CO₂ carbonates, and salt content. The mechanical composition of the soil was analyzed using methods developed at the Analytical Center of the Scientific Research Institute of Agrochemistry and Soil Science of the Republic of Uzbekistan ("Methods of agrochemical analysis of Central Asian soils and plant cover", Tashkent, 1977; Ye. Arinushkina "Manual on chemical analysis of soils", Moscow, 1970; A.F. Vadyunina and Z.A. Korchagina "Methods for studying the physical properties of soils", Moscow, 1986).

Scientific research is being conducted around the world to find ways to effectively use lands that have been degraded under the influence of various negative processes, whose fertility and quality indicators have decreased, and to restore their fertility in order to obtain the desired yield from agricultural crops. In this regard, special attention is being paid to scientific research on land resource management through studying the condition of soils subject to varying degrees of erosion, selecting and planting crop species suitable for the region, and continuously monitoring soil fertility.

Analyses and results. The ability to retain water is also included in this concept. The activity of microorganisms and the mechanical components of the soil play an important role. Increasing productivity increases yields. Ensures long-term viability of the land. In Bukhara region and Jondor district, soil should be managed scientifically. New technologies should be introduced. For example, modern analytical instruments can be used to monitor the state of the soil. This will strengthen agriculture. It will improve the living conditions of the region's population. Almost 70 percent of the population in rural areas of Uzbekistan depends on agriculture. Therefore, the soil issue affects the lives of millions of people.

Soil conditions in Jondor district. The area of Jondor district is 5.17 thousand square kilometers. This land is mainly flat. Sandy deserts and salt pan zones are common. The level of groundwater salinity is high. Soil fertility remains low due to natural conditions. It is difficult to grow crops on sandy and saline soils. Water drains away quickly. Salts damage plant roots. Yields are usually low. Major crops such as cotton and grain suffer greatly. Cotton is one of the main sectors of the Uzbek economy. When the harvest there falls, the entire region suffers. Grain crops are essential for feeding the population. In areas such as Jondor, the yield of these crops is 20-30 percent lower than the annual average.

To assess soil fertility, it is necessary to study the chemical composition in depth. It is necessary to determine the amount of nutrients. It is necessary to measure the level of salinity. It is important to check the pH indicators. It is also necessary to analyze the mechanical composition. Some lands in Jondor district lack nitrogen and phosphorus. These substances are essential for

plant growth. High salinity reduces cotton yields. The same effect is seen in grain crops. Soil analysis provides a solid basis for agricultural plans. This helps farmers make the right decisions. For example, as a result of the analysis, you can find out which fertilizer is needed. Such analyzes are regularly conducted in scientific centers of Uzbekistan. They provide farmers with free advice.

Bonitet shows the productive potential of the soil. This concept is of great help in choosing crops. It tells which plants grow best on which land. Soil maps should be drawn up in the Jondor district. Through scientific research, productive areas can be found. It is recommended to use them wisely. This prevents waste of resources. Bonitet scores are a simple method of assessing soil. It works on a 100-point scale. In areas like Jondor, where the scores are low, crop selection requires caution. With the help of maps, farmers can select the best lands. This saves time and money.

Ways to improve soil fertility. Improving soil fertility requires a combination of several measures. For the Jondor district, these ways are as follows. Let's consider each step in detail. The sequential application of these measures gives the best result. This is what farmers' experience shows.

Soil diagnostics and assessment. Improving productivity begins with determining the condition of the soil. This process includes several steps. First, you need to measure the level of salinity. On saline soils, yields are low. Crops grow slowly. Then you need to analyze nutrients. Check the amount of nitrogen, phosphorus and potassium. If these substances are lacking, the plants become weak. The quality of the crop decreases. The analysis is carried out in laboratories. Sampling is simple: it is taken from a depth of 20-30 cm from the surface of the earth.

It is necessary to study the mechanical composition of the soil. Determine whether it is sandy, clayey or saline. It is important to assess its water retention capacity. It is necessary to check the activity of microflora. Healthy microorganisms enrich the soil. They deliver nutrients to plants. There are many sandy soils in the Jondor district. They cannot retain water. As a result of diagnostics, individual advice is given for each plot. For example, biofertilizers are recommended for saline and nitrogen-deficient lands. Nitrogen fertilizers also help. Soil maps should be drawn up. Dividing fields into groups improves productivity. This method is simple and effective for Jondor farmers. They can manage their land themselves. Land reclamation and salinization reduction. Salinity destroys the soil. When groundwater rises, productivity decreases. Land reclamation measures solve this problem. Land reclamation means soil improvement work. It includes water management and salt reduction. Improving irrigation systems is the first step. Water-saving methods should be used. Drip irrigation reduces salinity. It reduces water consumption by 30-50 percent. This method slowly delivers water through pipes. It reaches the roots of plants.

It is necessary to build drainage systems. This will lower groundwater. It will prevent salinization. It is necessary to clean up saline areas. The method of washing out salts is used. Enrichment with organic matter helps. As a result of land reclamation in the Bukhara oasis, productivity has increased by 20-80 percent. Similar work is also needed in the Jondor district. This is economical and effective for farmers. Installing drainage pipes is a one-time expense. Then it will bring benefits for many years. The government of Uzbekistan supports such projects. Organic matter and biological fertilizers. Organic matter plays a key role in sandy and saline soils. Adding compost strengthens the soil. Pasture residues provide protection against dehydration. Biopreparations activate microflora. Improves crop nutrition. Compost is made from animal waste and plant residues. It provides water and nutrients to the soil.

Crop rotation preserves the soil. Rotation balances nutrients. In the Bukhara oasis, planting legumes with cotton and grain increases nitrogen levels. Productivity improves. Returning

organic residues to the soil strengthens the structure. This method provides natural and long-term benefits. Legumes, such as peas or beans, take nitrogen from the air. They enrich the soil. Using this method, farmers in Jondor increased their cotton yield by 15 percent.

Providing minerals and micronutrients. Crops need macro and micronutrients. Nitrogen, phosphorus, and potassium are the main nutrients. Making them sufficient increases yields. Micronutrients such as magnesium, copper, and zinc increase quality. Innovative fertilizers enhance biological activity. Biofertilizers work naturally. Unlike chemicals, they do not harm the environment.

Fertilizers should be selected based on soil analysis. Using the right option for each area is effective. This prevents waste of resources. For Jondor farmers, this is a simple rule. For example, if nitrogen is lacking, urea fertilizer is added. For phosphorus, superphosphate is used. Microelements are sprayed on the leaves. These methods improve crop quality.

Agrotechnical measures and crop rotation. Correct agrotechnical methods preserve the soil. Crop rotation prevents fatigue. Proper irrigation management is necessary. Dividing fields into groups helps. Modern monitoring systems monitor the condition of the soil. Agrotechnics means crop care rules. It optimizes land use.

In Jondor district, crop rotation of cotton, grain and legumes is effective. Vegetables are also included. Optimizing irrigation increases yields. Saves water. Cooperation with agroclusters strengthens control. Rotation works on a three-year cycle. The first year is cotton, the second is grain, the third is legumes. This does not exhaust the soil. Monitoring sensors measure water and moisture. Farmers monitor via mobile apps.

Practical examples. Farmers in Jondor district tried organic and biofertilizers. Yields increased significantly. Compost and nitrogen fertilizers increased cotton crops by 25-30 percent. Drip irrigation on saline lands reduced water consumption. Yields improved. One farming family used these methods on 10 hectares of land. Their cotton yield increased by 28 percent compared to the previous year.

Crop rotation saved nitrogen. Legumes helped. These experiments are useful for Jondor. They are also suitable for other regions. Farmers can easily apply them. For example, in one study, grain yields increased by 18 percent as a result of rotation. After salinity decreased, crops became more resistant to diseases.

Appropriate coefficients are used to assess soil fertility. One of the most important factors determining soil fertility is its mechanical composition, with light and medium loamy soils being the best [4].

Conclusions and recommendations. Increasing productivity for Jondor district and Bukhara region requires several measures. Soil diagnostics and analysis should be carried out. Land reclamation and drainage should be improved. It is necessary to use organic and biofertilizers in large quantities. It is important to provide macro and microelements. Crop rotation and optimization of agricultural technology are necessary. These measures will give the best results when working together.

Applying these measures, farmers will sustainably manage the soil. It will increase productivity. A scientific approach and new technologies will develop agriculture. In the future, the potential of the region will increase. Advice for farmers: conduct soil analysis annually. Get help from government programs. This will save land resources and enrich the population. These regions of Uzbekistan can become leaders in the future.

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