International Journal of Modern Agriculture, Volume 10, No.1, 2021
ISSN: 2305-7246

Properties of Meadow -Gray Soils and the Bioprapatics Effect on the Porloq-4 Cotton Harvesting

Abdurakhmonov NY[1], Kalandarov NN[2], Sobitov UT[2], Mansurov ShS[2], Koraev AX[2], Mirsodikov MM[3]

Abstract: The article presents the research results conducted on the irrigated meadow-gray soils conditions for personalized agriculture using various biopreparations in the cotton variety Porloq-4 cultivation. In this case, the changes in these soils properties during the growing season were compared and their productivity was determined. It was found that the mechanical composition of the studied soils is mainly light sandy, medium sandy in some areas, the soils are mostly weakly saline in the spring before planting and partially unsalted, and by the end of the vegetation season in the fall, mostly weakly saline, some layers of the partial soil profile were moderately saline, the salinity type being sulphate and chloride-sulphate.

During the spring, the amount of the nutrient elements in the plowed layer of irrigated meadow gray soils are as following: humus 1.12%, total nitrogen 0.105%, phosphorus 0.162%, gross potassium 1.49-1.64%, mobile nitrogen 19.6 mg/kg, phosphorus 11,2 mg/kg and potassium 158 mg/kg. In the variants of irrigated meadow gray soils in the study, different biopreparations were used in relation to the control variant in the mowing phase of the Porloq-4 cotton variety including, in RIZOKOM-1 mobile nitrogen 10.0 mg/kg, mobile phosphorus 1.6 mg/kg and exchangeable potassium 5.0 mg/kg, respectively in DAG -1 is NO_3-20,0 P_2O_5-5,4 K_2O-30,0; in BIODUX NO_3-7,0, P_2O_5-5,6, K_2O-6,0; in MIKRO-1 is NO_3-18,0, P_2O_5-7,9, K_2O-15,0; in MIKRO-2 is NO_3-9,0, P_2O_5-7,7, K_2O-9,0 and in HARVEST is NO_3-8,0, P_2O_5-5,4, K_2O-10,0 mg/kg, including variants in which different biopreparations were used relative to the control option during the flowering phase, in RIZOKOM-1 mobile nitrogen 10.0 mg/kg, mobile phosphorus 2.7 mg/kg and exchangeable potassium 5.0 mg/kg, in DAG-1 is NO_3-20,0, P_2O_5-8,4, K_2O-20,0 in BIODUX NO_3-8,0, P_2O_5-2,6, K_2O-10,0;in MIKRO-1 is NO_3-19,0, P_2O_5-6,9, K_2O-20,0; in MIKRO-2 is NO_3-10,0, P_2O_5-0,5, K_2O-10,0 and in harvest is NO_3-11,0, P_2O_5-1,5, K_2O-10,0 mg/kg with relatively high values. At the end of the growing season, the amounts of humus, total nitrogen, phosphorus and potassium remained stable in the variants using different biopreparations compared to the control variant, RIZOKOM-1 mobile nitrogen 2,0 mg/kg, mobile phosphorus 1,1 mg/kg and exchangeable potassium 5,0 mg/kg, мос равишда in DAG -1 NO_3-4,0, P_2O_5-2,0, K_2O-5,0; in BIODUX NO_3-3,0, P_2O_5-1,2, K_2O-0,0; in MIKRO-1 NO_3-2,0, P_2O_5-5,0, K_2O-0,0; in MIKRO-2 NO_3-4,0, P_2O_5-1,1, K_2O-0,0 and in harvest increased by NO_3-4,0, P_2O_5-1,0, K_2O-0,0mg/kg while some variants observed no change in mobile potassium the yield of Porloq-4 cotton was 43.0 ts / ha in the control variant with NPK mineral fertilizers and 2.0-9.0 s/ha in the variant with NPK + treated with various biopreparations.

Keywords: meadow gray soils, key area, mechanical composition, salinity degree and types, humus and nutrients, soil absorption capacity, biostimulants, Porloq-4 cotton variety, harvest.

Introduction: One of the most pressing issues in the world today is the issue of ecology and food security. Soil erosion, salinization, humus, and nutrient depletion, etc…are the main factors, which lead to soil degradation, and these processes result, humanity is losing more than 15 million hectares of fertile land each year. According to the FAO, 30 years from now, more than 70 percent of the world's population will need food to feed itself. In the global climate change, there is an increase in drought and desertification, deterioration of soil reclamation and ecology, a decrease in humus and

[1] Doctor of Biological Sciences, Senior Researcher, Research Institute of Soil Science and Agrochemistry *Tashkent, Uzbekistan; nodirjon_1976@mail.ru*
[2] Doctor of Philosophy in Biological Sciences, PhD, Research Institute of Soil Science and Agrochemistry *Tashkent, Uzbekistan*
[3] Junior Researcher, Research Institute of Soil Science and Agrochemistry, Tashkent, Uzbekistan

nutrients, resulting in reduced soil fertility, reduced crop yields and other similar problems. [18, 19, 24].

Therefore, in the speeches of the President of the Republic of Uzbekistan at the first summit of the Organization of Islamic Cooperation on science and technology, which took place on September 10, 2017 in Astana, Kazakhstan global climate change is causing landslides in many regions, shrinking fertile lands, desertification, water scarcity, drought, providing drinking water to the population, and the ecological catastrophe in the Aral Sea region, which poses a greater threat to our region, in order to solve these problems, it is proposed to cooperate in the "personalized agriculture"development. It has been argued that this concept implies attention to their specific genotypes, taking into account the reactions of agricultural crops to a particular environment, soil, fertilizer, water and biostimulants[17].

In overcoming the above problems, the practical application of the "personalized agriculture" will increase crop yields and reduce costs, while ensuring soil fertility sustainability without harming the environment. Currently, in developed countries, through the agriculture personalization, the excellent agro-technical development, agro-ameliorative and agrochemical measures for a particular variety of a particular crop type and the achievement of high potential yield of the variety. At the same time, the genetic potential of genes that improve the various qualitative and quantitative characteristics of the selected variety is studied, on the basis of which all agro-technical, agro-ameliorative, agrochemical and agro-ecological measures are carried out. In this regard, FAO has developed a concept for sustainable agriculture development based on 5 key principles. These principles include the rational use of natural resources, including land and water resources, through the introduction of resource-efficient innovative developments aimed at preserving and increasing the genetic diversity of crops, mitigating the negative impact on agroecotomy, in particular soil cover, and reducing the cost of processing agricultural products.

Through the implementation of the concept of personalized agriculture, it will be possible to use land and water resources efficiently, significantly reduce the level of environmental pollution and the cost of agricultural production, maximize productivity. Part of the research on personalized agriculture using biostimulants for Porloq cotton varieties was conducted on selected base farms in Syrdarya region, where changes in soil cover, its ecological and reclamation status and all its properties are directly related to the irrigated soil cover degradation.

The productivity of agricultural crops currently grown on irrigated lands is significantly lower than the yield that can be obtained from them. The main reasons for this are incomplete implementation of measures to increase soil fertility, improper placement of agricultural crops and varieties suitable for soil and climatic conditions of the regions, insufficient attention to the application of effective and innovative agro-technologies, in general, the concept of personalized agriculture [11].

Information provided in this article is funded by the Ministry of Innovation Development of the Republic of Uzbekistan №A-FA-BV-2019-6 Prepared on the basis of soil research data conducted within the framework of the practical project “Development of biostimulants, biofertilizers and preservatives suitable for new generation varieties for personalized agriculture”.

The study purpose: As a result of the application of biostimulants to Porloq cotton varieties for personalized farming development of recommendations to prevent soil degradation processes, improve reclamation, stabilize soil fertility, increase crop yields by identifying changes in the properties of irrigated soils.

Object of research: Part of our research was conducted on irrigated meadow-gray soils on the terrace III of the Syrdarya River, consisting of weakly washed aeolian soil deposits of the farm "Shoyzoq ota" Boyovut district of Syrdarya region, Porloq-4 cotton variety was selected as an agricultural crop.

Research methods: Research methods are based on generally accepted standard methods in soil science in the field, laboratory and in-house conditions [15]. Geographical, genetic, historical-comparative, chemical-analytical and profile methods were used in the research. 1: 5000 field soil surveys were conducted in spring, summer and autumn on the irrigated lands of the farm selected as the key area, The geographical location of the cuts was determined using GPS instruments and marked on the map, based on the adopted methods, samples were taken from the genetic layers of the soils and morphological features of the soil profile were recorded. Appropriate mechanical, chemical, physicochemical and agrochemical analyzes were performed on soil samples under laboratory conditions, and the obtained results were processed under chamber and cartographic conditions.

***Research results:* “**Shoyzoq ota” farm of Boyovut district of Syrdarya region is developed in the conditions of irrigated meadow-gray soils with groundwater level of 3-5 m. These soils are formed under the geomorphological conditions of irrigated light gray soils and are genetically "passed" from meadow soils to gray soils. Irrigated meadow gray soils differ from automorphic soils in all morphological features — color, structure, flora and fauna activity, however, increased levels of moisture and compaction, carbonate layers are washed down[10, 13].

Under irrigated farming conditions, the processes that take place in the soil are variable, and many properties of the soil change over a short period of time and become unstable. The mechanical composition of the soil is a property inherited from its parent rock, a low-variability, closely related to the productivity of agricultural crops, a feature that in many ways determines soil fertility. According to the results, the mechanical composition of irrigated meadow gray soils studied in key areas is mainly slightly sandy, while in some areas it is moderately sandy(Table 1).

Table 1. Mechanical content of irrigated meadow-serozem soils

Sample №	Depth of layer, cm	Soil particles %, size, in mm							Physical clay, mm	Names according to mechanical content
		Sand			Silt			Clay		
		>0,25	0,25 -0,1	0,1-0,05	0,05 - 0,01	0,01-0,005	0,005 - 0,001	0,001	<0,01	
1	0-30	8,0	2,0	21,4	31,7	20,2	8,5	8,2	36,9	medium loamy
	30-46	1,6	0,4	27,3	40,2	17,4	6,3	6,8	30,5	medium loamy
	46-77	3,2	0,8	18,7	47,0	15,5	7,8	7,0	30,3	medium loamy
	77-102	1,6	0,4	9,4	67,9	14,4	2,0	4,3	20,7	light loamy
	102-124	0,8	0,2	16,1	61,0	11,4	3,7	6,8	21,9	light loamy
2	0-30	4,0	1,0	22,3	47,2	15,1	2,6	7,8	25,5	light loamy
	30-48	1,2	0,3	25,7	49,4	10,4	5,2	7,8	23,4	light loamy
	48-78	0,4	0,1	22,7	54,4	11,6	5,9	4,9	22,4	light loamy
	78-110	1,6	0,4	21,6	52,2	11,7	5,9	6,6	24,2	light loamy
	110-134	2,0	0,5	4,8	68,4	10,9	6,2	7,2	24,3	light loamy
3	0-33	4,8	1,2	9,6	62,0	10,0	5,2	7,2	22,4	light loamy
	33-50	2,0	0,5	12,0	64,1	11,9	6,2	3,3	21,4	light loamy
	50-84	0,8	0,2	9,9	58,2	14,6	7,4	8,9	30,9	medium loamy
	84-120	1,2	0,3	13,6	56,9	11,4	9,4	7,2	28,0	light loamy
	120-148	0,4	0,1	11,6	60,7	14,5	3,4	9,3	27,2	light loamy
4	0-28	3,6	0,9	20,8	51,7	12,1	8,0	1,9	22,0	light loamy
	28-48	2,4	0,6	26,5	50,1	8,9	6,8	4,7	20,4	light loamy
	48-76	2,8	0,7	27,7	44,2	14,7	7,1	2,8	24,6	light loamy
	76-102	1,2	0,3	14,5	56,5	10,2	5,7	11,6	27,5	light loamy
	102-135	0,8	0,2	17,1	54,2	11,0	6,1	10,6	27,7	light loamy
5	0-30	2,4	0,6	32,3	35,7	14,4	7,5	7,1	29,0	light loamy
	30-50	3,2	0,8	26,5	47,3	7,0	11,8	3,4	22,2	light loamy
	50-82	0,8	0,2	16,2	59,9	7,6	10,8	4,5	22,9	light loamy

	82-135	1,6	0,4	22,5	55,0	6,7	9,7	4,1	20,5	light loamy
6	0-30	2,4	0,6	26,1	50,9	7,7	8,4	3,9	20,0	light loamy
	30-47	1,2	0,3	24,6	52,6	7,8	7,7	5,8	21,3	light loamy
	47-80	0,8	0,2	21,1	49,4	11,3	12,0	5,2	28,5	light loamy
	80-104	0,8	0,2	18,8	51,7	8,3	11,5	8,7	28,5	light loamy
	104-130	10,8	2,7	11,6	52,7	9,3	8,7	4,2	22,2	light loamy
7	0-32	1,6	0,4	23,1	47,0	7,6	14,2	6,1	27,9	light loamy
	32-50	1,2	0,3	22,3	49,8	8,5	12,3	5,6	26,4	light loamy
	50-78	0,8	0,2	21,0	54,7	8,9	10,2	4,2	23,3	light loamy
	78-140	0,4	0,1	18,7	51,9	9,5	10,7	8,7	28,9	light loamy
	140-150	0,8	0,2	14,2	49,9	11,7	13,8	9,4	34,9	medium loamy
8	0-30	4,0	1,0	20,0	46,6	10,9	13,2	4,3	28,4	light loamy
	30-48	0,8	0,2	19,0	51,6	10,9	12,0	5,5	28,4	light loamy
	48-80	0,8	0,2	17,6	57,6	9,3	9,5	5,0	23,8	light loamy
	80-138	0,4	0,1	14,9	58,6	9,0	11,5	5,5	26,0	light loamy

Mechanical particles of different sizes are distributed in the soil profile, the mechanical content of physical clay (<0.01 mm) in these soils is 20.4-29.0% in light sandy soils and 30.3-36.9% in medium sandy loam soils. forms.The mechanical composition of these soils is dominated by particles of physical sand (greater than 0.01 mm) and large dust (0.05-0.01) particles, the amount of which fluctuates around 31.7-68.4%. In these soils, particles of physical clay (less than 0.01 mm) vary in the profile of the key area soils, the highest rate is observed in the particles (7.0-20.2%) of mediumdust (0.05-0.01) which is the agroirrigation directly related to the mechanical composition and relief structure.

Based on the above data, it can be concluded that the mechanical composition of irrigated soils in key areas indicates light sandy soils with low nutrient and water reserves compared to heavy and medium sandy loam soils, but high filtration capacity and aeration process. The amount of soil fractions is important in determining the level of fertility, which is the sum of all the properties of soils. The presence of more of these fractions increases the ability of the soil to retain nutrients and moisture. The genetic horizons of the gray-meadow soils studied in the key areas are better in terms of mechanical properties of water - physical properties, water permeability. The fact that the genetic layers of the soil profile have a light sandy soil mechanical composition has a positive effect on water permeability [3, 8, 9].

In order to improve the reclamation of soils and increase soil fertility, it is possible to determine the amount of water-soluble salts, calculate the amount of salts for the genetic horizons and individual layers of soils, and make scientifically sound recommendations, taking into account other soil properties. [1, 5, 6, 7, 8].

According to the initial reclamation status of irrigated meadow-gray soils, it was found that the key area soils were mainly weakly saline and non-saline, the salinity type was sulphate, rarely chloride-sulphate. (Table 2). The amount of dry residue in the drive layer of non-saline soils of sulfate type is around 0.160-0.300%, of which chlorine ion is 0.007-0.014% and sulfate ion is 0.111-0.152%. In weakly saline soils of sulfate salinity the amount of dry residue is 0.305-0.545%, of which chlorine ion is 0.007-0.018% and sulfate ion is 0.134-0.288%, in weakly saline soils of chloride-sulphate type the amount of dry residue is 0.260%, of which chlorine ion is 0.028%. and sulfate ions were found to be 0.117%.

The amount of gypsum (SO4-2-gypsum) in the studied meadow gray soils was recorded in the range of 0.256-0.526%, which is 0.46-0.0.94%, respectively, when calculating the actual gypsum (CaSO4 * 2H2O) , were included in the group of non-gypsum soils. (Table 2).

Table 2. Amount of salts, gypsum and pH in samples taken in spring from irrigated meadow-serozem soils

Depth of layer, cm	Dry residue, %	HCO_3	Cl	SO_4^{-2}	Ca^{+2}	Mg^{+2}	Anion and cation	Na		Sum of components	Salinity	
								mg. equ	%		type	degree
0-30	0,285	0,046	0,007	0,119	0,02	0,003	3,43	2,182	0,05	0,222	sulphate	Non saline
		0,75	0,197	2,483	0,998	0,25	1,248					
30-46	0,545	0,037	0,014	0,288	0,025	0,006	6,997	5,253	0,12	0,473	sulphate	Low saline
		0,609	0,395	5,993	1,25	0,494	1,744					
46-77	0,285	0,03	0,011	0,134	0,025	0,006	3,584	1,84	0,042	0,233	sulphate	Non saline
		0,492	0,31	2,782	1,25	0,494	1,744					
77-102	0,270	0,033	0,011	0,117	0,015	0,009	3,3	1,81	0,042	0,21	sulphate	Non saline
		0,55	0,31	2,44	0,75	0,74	1,49					
0-30	0,355	0,037	0,018	0,165	0,025	0,015	4,541	2,058	0,047	0,289	sulphate	Low saline
		0,609	0,508	3,424	1,25	1,233	2,483					
30-48	0,445	0,037	0,014	0,226	0,015	0,006	5,713	4,469	0,103	0,383	sulphate	Low saline
		0,609	0,395	4,709	0,75	0,494	1,244					
48-78	0,385	0,037	0,018	0,185	0,01	0,006	4,969	3,976	0,001	0,329	sulphate	Low saline
		0,609	0,508	3,852	0,499	0,494	0,993					
78-110	0,320	0,04	0,011	0,148	0,02	0,009	4,041	2,303	0,053	0,261	sulphate	Low saline
		0,649	0,31	3,082	0,998	0,74	1,738					
110-134	0,300	0,04	0,014	0,129	0,01	0,006	3,741	2,748	0,063	0,242	sulphate	Non saline
		0,649	0,395	2,697	0,499	0,494	0,993					
0-33	0,430	0,043	0,014	0,216	0,02	0,003	5,595	4,374	0,1	0,373	sulphate	Low saline
		0,705	0,395	4,495	0,998	0,25	1,248					
33-50	0,290	0,04	0,014	0,123	0,01	0,006	3,612	2,619	0,06	0,233	sulphate	Non saline
		0,649	0,395	2,568	0,499	0,494	0,993					
50-84	0,390	0,03	0,014	0,197	0,015	0,003	4,996	3,996	0,092	0,336	sulphate	Low saline
		0,492	0,395	4,109	0,75	0,25	1,0					
0-28	0,365	0,030	0,007	0,185	0,02	0,006	4,541	3,049	0,07	0,303	sulphate	Low saline
		0,492	0,197	3,852	0,998	0,494	1,492					
28-48	0,300	0,037	0,018	0,134	0,025	0,012	3,897	1,657	0,038	0,246	sulphate	Non saline
		0,607	0,508	2,782	1,25	0,99	2,24					
48-76	0,365	0,033	0,014	0,175	0,025	0,003	4,583	3,083	0,071	0,304	sulphate	Low saline
		0,55	0,395	3,638	1,25	0,25	1,5					
76-102	0,305	0,043	0,014	0,134	0,015	0,009	3,882	2,392	0,055	0,248	sulphate	Low saline
		0,705	0,395	2,782	0,75	0,74	1,49					
102-135	0,380	0,033	0,011	0,185	0,01	0,006	4,712	3,719	0,085	0,314	sulphate	Low saline
		0,55	0,31	3,852	0,499	0,494	0,993					

In order to determine reclamation measures for key field soils, re-field soil surveys were carried out in key areas in November after vegetation and the amount of water-soluble salts in the soil samples was determined. According to the results, the key area soils are mostly weakly salted, and in some layers of the partial soil profile, medium-salted or unsalted separations also occur. Salinity type is sulphate and chloride-sulphate, the amount of dry residue in weakly salted soils of sulfate type is 0.320-0.615%, of which chlorine ion is 0.011-0.035% and sulfate ion is 0.146-0.377%, the amount of dry residue in weakly salted soils of chloride-sulphate type is 0.210 -0.300%, of which chlorine ion is 0.018-0.025% and sulfate ion is 0.070-0.123%. Also, in medium-salted soils of chloride-sulphate type, the amount of dry residue in the drive layer of unsalted soils is less than 0.300%, while the amount of dry residue is 0.305-0.530%, which chlorine ion is 0.021-0.042% and sulfate ion is 0.138-0.271%, of which chlorine ion was found to be around 0.011–0.014% and sulfate ion around 0.103–0.125% (Table 3). From years of research and literature, it is known that cotton yield in weakly salted soils decreases by 20-30% compared to unsalted soils, by 40-60% in medium salted soils, and by 60-80% in strongly salted soils [2, 20, 21, 22, 23]. This is why the salinity process in soils is one of the most pressing issues to be regularly monitored. As a result of irrigation during the vegetation period, groundwater levels rise, and due to the hot temperature, soil moisture rises and evaporates through capillaries, resulting in the accumulation of moisture-moving salts in the upper layers of the soil. Therefore, it was found that the amount of easily soluble salts in the autumn in the composition of the key area irrigated soils is higher in the upper layers of the soil than in the spring. (Table 3).

From the above data, it can be seen that the studied irrigated meadow-gray soils in the initial state before planting have a mechanical composition mainly light sandy soils, in some cross-sectional soils medium sandy soil layers occur. Physical clay (<0.01 mm) particle size is 25.5-28.4% in light sandy loam soils and 36.9% in medium sandy loam soils. According to the total amount of water-soluble salts, it was found that mainly unsalted and weakly salted in the lower and middle layers of some cross-sectional soils, mainly sulfate, in some cases chloride-sulfate, according to the salinity type.

Table 3. Aqueous absorption content of samples taken from irrigated meadow-serozem soils in autumn (in % of abs. dry soil weight)

Section №	Depth of layer, cm	Dry residue	HCO_3	Cl	SO_4	Ca	Mg	Anion ва cations	Na		The set of components	Salinity		PH
									mg / ekv	%%		type	degree	
1A	0-31	0,615	0,027	0,035	0,337	0,09	0,036	8,457	1,007	0,023	0,534	sulphate	Low saline	7,11
			0,45	0,987	7,02	4,49	2,96	7,45						
	31-48	0,305	0,024	0,021	0,138	0,045	0,012	3,854	0,614	0,014	0,242	Chloride/ sulphate	Medium saline	7,22
			0,394	0,592	2,868	2,25	0,99	3,24						
	48-80	0,410	0,024	0,018	0,204	0,03	0,03	5,14	1,173	0,027	0,321	sulphate	Low saline	7,53
			0,394	0,508	4,238	1,497	2,47	3,967						
	80-115	0,340	0,03	0,018	0,160	0,025	0,021	4,339	1,359	0,031	0,27	sulphate	Low saline	7,24
			0,492	0,508	3,339	1,25	1,73	2,98						
	115-150	0,430	0,024	0,018	0,236	0,02	0,045	5,825	1,127	0,026	0,357	sulphate	Low saline	7,35
			0,394	0,508	4,923	0,998	3,7	4,698						
2A	0-32	0,300	0,027	0,025	0,123	0,035	Sign	3,709	1,963	0,045	0,241	Chloride/ sulphate	Low saline	7,6
			0,45	0,691	2,568	1,746		1,746						
	32-50	0,210	0,027	0,018	0,070	0,03	0,009	2,413	0,176	0,004	0,144	Chloride/ sulphate	Low saline	7,25
			0,450	0,508	1,455	1,497	0,74	2,237						
	50-80	0,290	0,03	0,014	0,123	0,025	0,006	3,455	1,711	0,04	0,222	sulphate	Low saline	7,48
			0,492	0,395	2,568	1,25	0,494	1,744						
	80-112	0,260	0,033	0,014	0,107	0,025	0,015	3,171	0,688	0,016	0,193	sulphate	Low saline	7,27
			0,55	0,395	2,226	1,25	1,233	2,483						
3A	0-32	0,320	0,033	0,014	0,146	0,035	0,009	3,984	1,498	0,034	0,254	sulphate	Low saline	7,24
			0,55	0,395	3,039	1,746	0,74	2,486						
	32-56	0,360	0,037	0,021	0,164	0,04	Sign	4,623	2,627	0,06	0,304	sulphate	Low saline	7,32
			0,607	0,592	3,424	1,996		1,996						
	56-87	0,475	0,024	0,021	0,249	0,035	0,012	6,165	3,429	0,08	0,408	sulphate	Low saline	7,45
			0,394	0,592	5,179	1,746	0,99	2,736						
4A	0-30	0,250	0,024	0,021	0,091	0,02	0,006	2,869	1,675	0,038	0,188	Chloride/ sulphate	Low saline	7,48
			0,394	0,592	1,883	0,998	0,494	1,492						
	30-54	0,310	0,03	0,021	0,132	0,02	Sign	3,823	2,825	0,065	0,253	Chloride/ sulphate	Medium saline	7,2
			0,492	0,592	2,739	0,998		0,998						
	54-87	0,360	0,03	0,018	0,169	0,015	0,006	4,51	3,266	0,075	0,298	sulphate	Low saline	7,49
			0,492	0,508	3,510	0,75	0,494	1,244						
	87-121	0,270	0,033	0,018	0,105	0,02	0,003	3,241	1,993	0,046	0,208	Chloride/ sulphate	Low saline	7,22
			0,55	0,508	2,183	0,998	0,25	1,248						
	121-157	0,460	0,03	0,025	0,236	0,035	0,012	6,106	3,37	0,077	0,400	sulphate	Low saline	7,11
			0,492	0,691	4,923	1,746	0,99	2,736						

The amount of humus belongs to the group of medium-rich in agrochemical classification, very low in mobile nitrogen and phosphorus, and low-rich in the amount of exchangeable potassium (Table 4).

Table 4. Results of initial chemical analysis of irrigated meadow-gray soils

Depth of layer, cm	Humus, %	General %			C:N	mobile, mg/kg		
		nitrogen	phosphorus	potassium		NO_3	P_2O_5	K_2O
0-30	1,12	0,105	0,162	1,64	6,2	19,6	11,2	158
30-50	0,97	0,092	0,16	1,59	6,1	17,6	8,0	132
50-82	0,48	0,043	0,14	1,52	6,5	14	7,04	89
82-135	0,41	0,037	0,128	1,49	6,4	10,6	4,0	91

The selected areas were irrigated meadow gray soils. Seeds of Porloq-4 cotton variety were treated with various biological preparations, as well as without treatment (control), nitrogen fertilizer in the form of urea (ammonium nitrate) by the farm in the form of urea (ammonium nitrate) at a rate of 200 kg / ha of nitrogen at the time of sowing of cotton (30%), weeding (35%) and flowering (35%), phosphorus fertilizer in the form of ammophos at the rate of 140 kg / ha was applied to the autumn plow at the rate of 70% of the annual norm and 30% during the flowering period, potassium fertilizer in the form of 60% potassium salt was applied to the autumn plow and mineral fertilizers at the rate of 50%.

The following are the results of studies on the control of cotton at the end of weeding, flowering and vegetation, the change of humus and nutrients in the soils of land plots where various biological preparations and NPK are applied.

In the control variant of *cotton fertilization phase* (Fig. 1), in which only mineral fertilizers applied, the amount of nitrates in the tillage layer of the soil was 25.0 mg/kg, with mobile phosphorus 25.1 mg kg, exchangeable potassium 270 mg/kg soils found to be low in mobile nitrogen and phosphorus and moderately supplied with potassium.

It was noted that seeds of Porloq-4 cotton variety were treated with RIZOKOM-1 biopreparation, planted and applied mineral fertilizers (NPK+RIZOKOM-1) mobile nitrogen 35.0 mg/kg, mobile phosphorus 26.7 mg/kg and exchangeable potassium 275 mg/kg, respectively in NPK+DAG-1 N-45.0 mg/kg, P-30.5 mg/kg, K- 300 mg/kg, in NPK+BIODUX N-32,0 mg/kg, P-30,7 mg/kg, K-276 mg/kg, in NPK+MIKRO-1 N-43,0 mg/kg, P-33,0 mg/kg, K-285 mg/kg, in NPK+MIKRO-2 N-34,0 mg/kg, P-32,8 mg/kg, K-279 mg/kg and in the latter variant, where NPK + HARVEST was used, it was found that N-334.0 mg/kg, P-30.5 mg/kg, K-280 mg/kg, and the soil was mainly moderately supplied with nutrients.

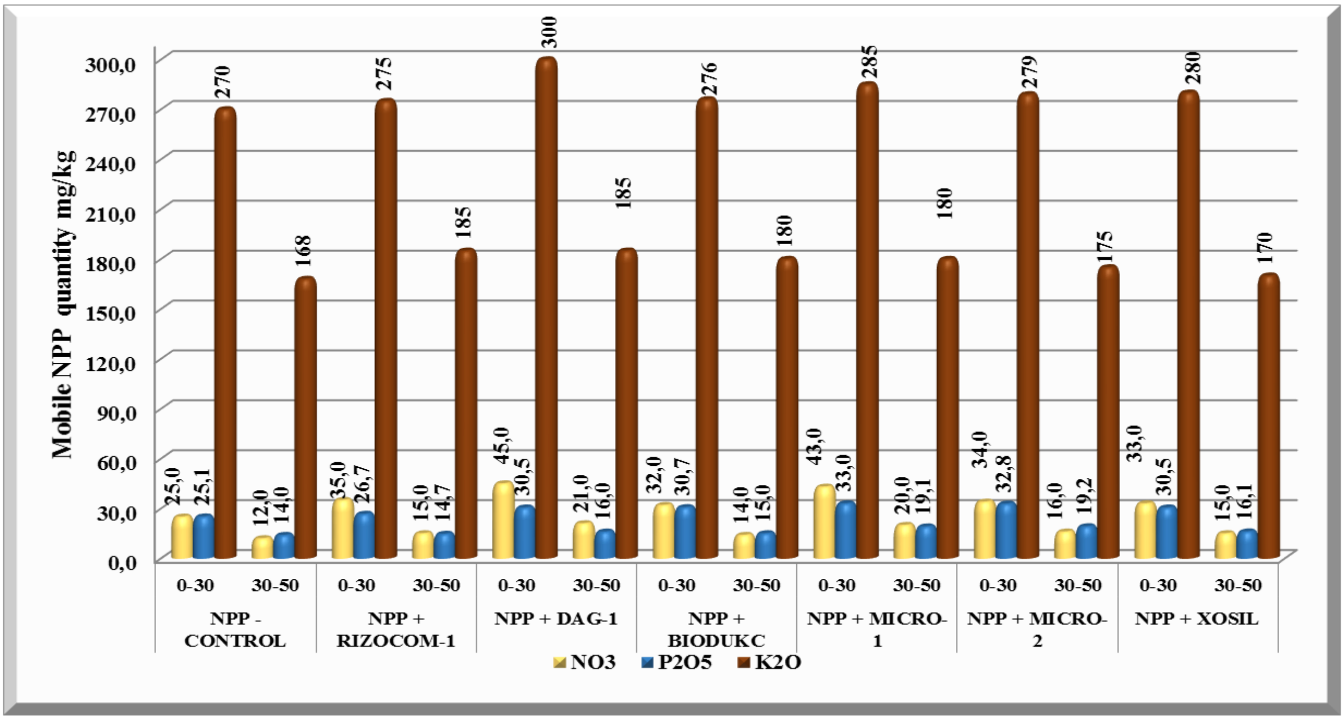

Figure 1. The amount of nutrients in the mobile form in the soil during the ginning phase of cotton

In the control variant in which mineral fertilizers were applied during the *flowering phase of cotton (Fig. 2)*, the amount of nitrate in the topsoil was 22.0 mg/kg, mobile phosphorus was 36.1 mg/kg, and exchangeable potassium was 260 mg/kg, low with mobile nitrogen. moderately supplied with phosphorus and potassium.

It was noted that seeds of Porloq-4 cotton varieties were treated with RIZOKOM-1 biopreparation, planted and in the variant with application of mineral fertilizers (NPK + RIZOKOM-1) during the flowering phase, active nitrogen in the tillage layer of the soil was recorded at 32.0 mg/kg, mobile phosphorus 38.8 mg / kg and exchangeable potassium 265 mg / kg, relatively in NPK+ДАГ-1 N- 42,0 mg/kg, P- 44,5 mg/kg, K- 280 mg/kg, in NPK+BIODUX N is- 30,0 mg/kg, P- 38,7 mg/kg, K- 270 mg/kg, in NPK+MIKRO-1 N- is 41,0 mg/kg, P- 43,0 mg/kg, K- 280 mg/kg, in NPK+MIKRO-2 N- 32,0 mg/kg, P- 36,6 mg/kg, K-270 mg/kg and in NPK+harvest N- 33,0 mg/kg, P- 37,6 mg/kg, K-270 mg / kg was moderately supplied with NPK.

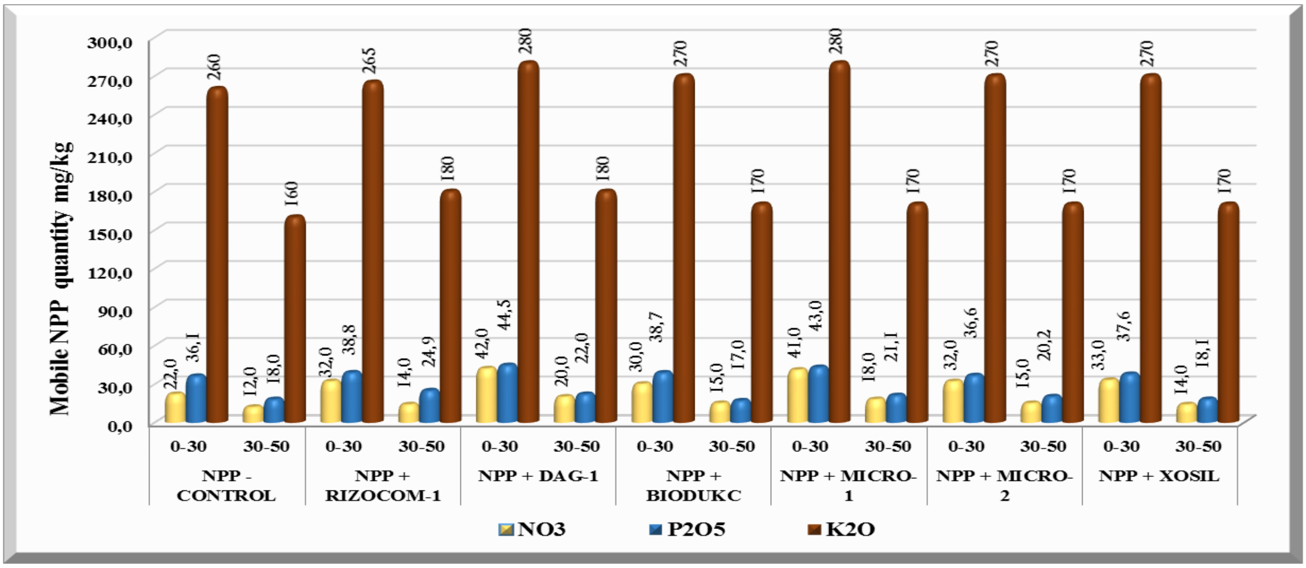

Figure 2. The amount of nutrients in the mobile form in the soil during the flowering phase of cotton, in mg/kg

At the end of the cotton growing season, (Fig. 3) in the control variant with mineral fertilizers, the amount of humus in the topsoil was 1.11%, total nitrogen 0.095%, total phosphorus 0.160% total potassium 1.62%, nitrate content 20.0 mg/kg, mobile phosphorus 20.1 mg/kg, and exchangeable potassium around 250 mg/kg. Humus found to be moderately active, low in mobile nitrogen and phosphorus, and moderately potassium-rich.

Seeds of Porloq-4 cotton varieties were treated with RIZOKOM-1 biopreparation and planted with mineral fertilizers (NPK + RIZOKOM-1), the amount of humus in the tillage layer of the soil is 1.12%, the amount of mobile nitrogen is 22.0 mg / kg, the amount of mobile phosphorus is 21.2 mg / kg and the amount of exchangeable potassium is 255 mg/kg, humus in NPK + DAG-1 was 1.13%, N-24.0 mg / kg, respectively, P- 22,1 mg/kg, K- 255 mg/kg, in NPK+BIODUX Humus is 1,12%, N-23,0 mg/kg, P- 21,3 mg/kg, K- 250 mg/kg, in NPK+MIKRO-1 Humus is 1,12%, N-24,0 mg/kg, P- 21,2 mg/kg, K- 250 mg/kg, in NPK+MIKRO-2 Humus is 0,994%, N-24,0 mg/kg, P- 21,2 mg/kg, K- 250 mg/kg and in NPK+HARVEST Humus is 0,988% , N-24,0 mg/kg, P- 21,1 mg/kg, K- was found to be 250 mg/kg and moderately supplied with humus and mobile nutrients.

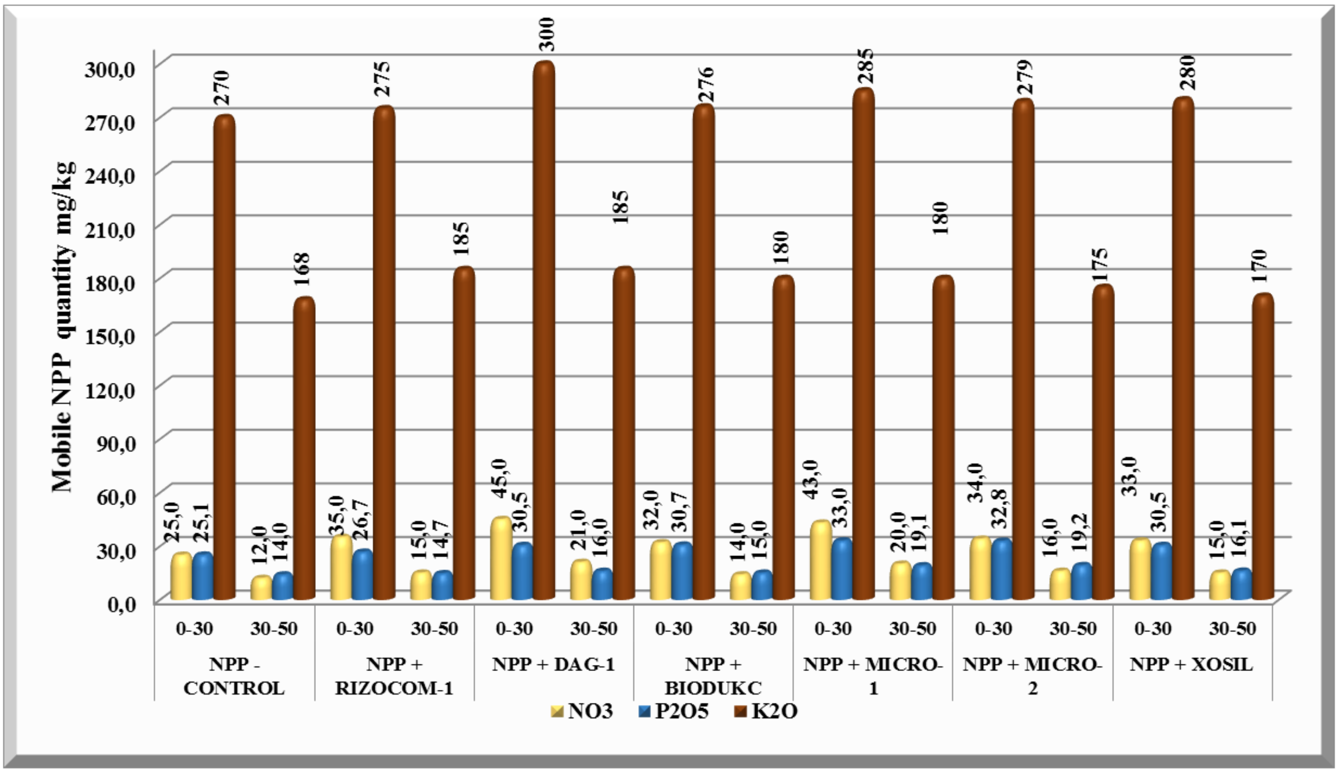

Figure 3. The nutrients amount in the mobile form in the soil at the end of the growing season, in mg/kg

In the control variant (NPK + Control) the HARVEST yield of Porloq-4 cotton variety planted on the key areas of meadow gray soil in Boyovut district of Syrdarya region was 43.0 s/ha, 3.0 s/ha in the variant using NPK + RIZOKOM-1, 9.0 ts / ha in the variant using NPK + DAG-1, 4.0 s / ha in the variant using NPK + BIODUX, 5.0 s / ha in the variant using NPK + MIKRO-1, 2.0 s / ha in the variant using NPK + MIKRO-2, In the variant using the biological drug NPK + HARVEST, an additional 4.0 s/ha of HARVEST was obtained (figure 4).

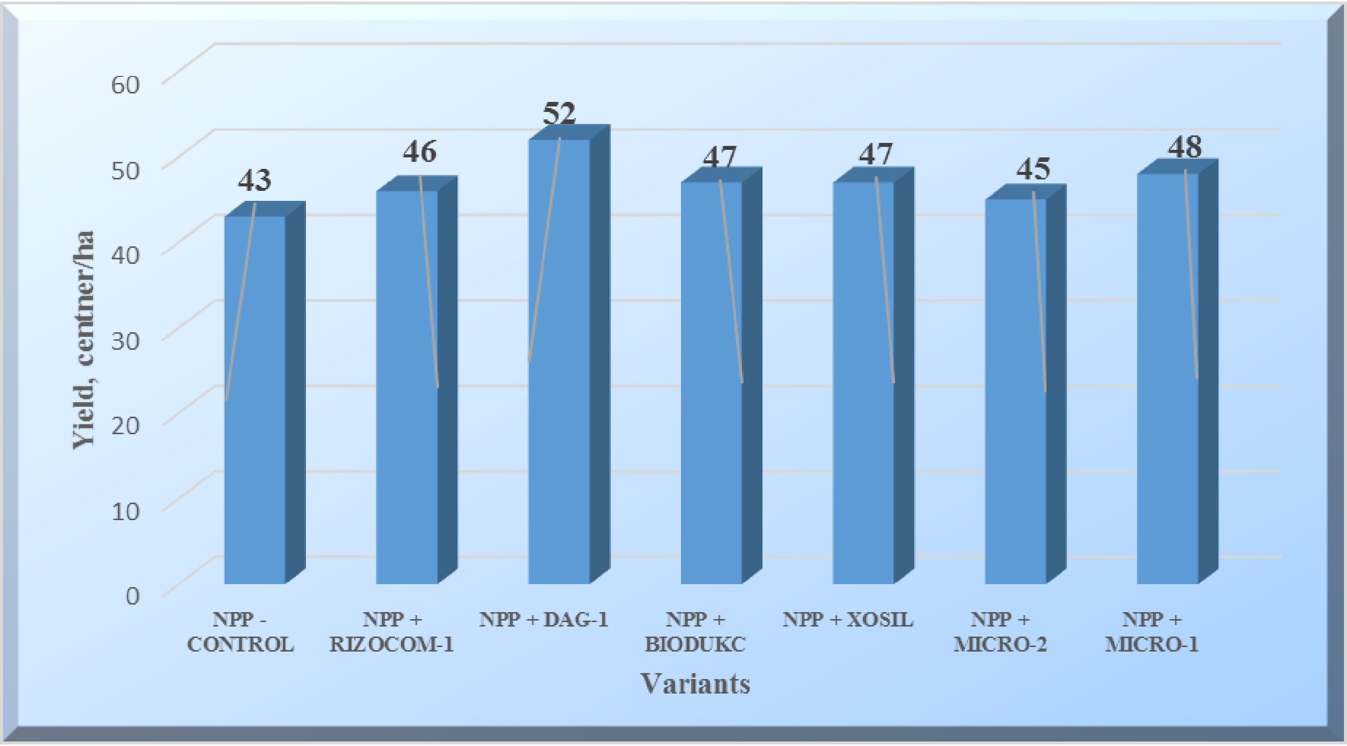

Figure 4. Changes in the yield of Porloq-4 cotton cultivars planted on irrigated meadow-gray soils under the influence of biological preparations

Conclusions. The reclamation condition and fertility of soils are directly related to the mechanical composition, the mechanical composition of the studied irrigated meadow-gray soils is mainly light sandy loam, in some areas medium sandy loam, light sandy loam is low in nutrients and water reserves compared to heavy and medium sandy loam soils. , but the filtration capacity and aeration process are good.

Salinity processes that lead to deterioration of soil reclamation and decrease in fertility are mainly weakly salted and partially unsalted in spring before planting in grassy-gray soils, mostly weakly salted at the end of vegetation in autumn, some layers of soil profile are medium salted, salinity type sulfate and chloride-sulphate. The humus amount in the spring in the plowed layer of irrigated meadow gray soils in the key area of Boyovut district is 1.12%, total nitrogen 0.105%, phosphorus 0.162% and total potassium 1.49-1.64%, mobile nitrogen 19.6 mg / kg, phosphorus was 11.2 mg / kg and potassium was 158 mg / kg.

The study found that soil fertility degrees and nutrient regimes had a strong impact on the effectiveness of the biological drugs used. Therefore, at the end of the mowing, flowering and vegetation period of each cotton, there was a tendency to increase the amount of active nitrogen, phosphorus and potassium in the soil in the variants using different biological drugs compared to the control option. Compared to the control variant, where the seeds of Porloq -4 cotton variety were planted without treatment with biological preparations and fertilizers were applied, the seeds were treated with different biological preparations and mineral fertilizers were found to have a positive humus and nutrient content. Although no significant changes were observed in the amount of humus in the soil, positive changes were noted during the growing season and at the end of the growing season in the mobile forms of nutrients in the soil relative to control and initial state before planting. One of the main reasons for this can be explained by the increase in biological activity of the soil as a result of the effect of biopreparations in the variants in which mineral fertilizers and biopreparations are used. As a result, the nutrient regime was optimized due to the increase of nutrient elements in the key field soils relative to the control variant, as a result, the cotton yield was higher in the variants using different biological preparations relative to the control.

The irrigated meadow-gray soils were relatively fertile, and the harvest yield of the planted Porloq-4 cotton variety was 43.0 s/ ha in the control variant with NPK mineral fertilizers, in variants treated with different biopreparations was achieved when using the drug DAG-1 (52 s / ha), which has a better nutritional regime than the highest harvest, compared to the control, and an additional 9 ts / ha harvest was obtained compared to the control. When using MIKRO-1, harvest, RIZOKOM-1 and BIODUX, the additional harvest content was 3.0-5.0 ts / ha, while MIKRO-2 was less effective among the drugs studied for these soils. The results of research show that the effective use of not only organic and mineral fertilizers, but also biological drugs in the cultivation of agricultural crops, obtaining quality and high harvest.

REFERENCES:

1. **Abdurakhmonov N.Yu., Ismonov A.J., Sobitov U.T., Koraev A.Kh.** Irrigated soils of farms of Syrdarya region and their assessment // Soils and land resources of Uzbekistan: a collection of materials of the scientific-practical conference on their rational use and protection. -Tashkent, 2008. –p. 152-154.
2. **Akhmedov A.U., Abdullaev S.A., Parpiev G.T.** Irrigated soils of Syrdarya and Jizzakh regions / Monograph. - Tashkent: UzRAS "Science" pub. house, 2005. Chapter V.-p. 122-157.
3. **Akhunova B.B.** Soil-physical characteristics of irrigated lands of the Golodnaya Steppe: (for example, in the zone of action of the Southern Golodnaya Steppe) Author's abstract. diss. ... Cand. of agricultural sciences. - Tashkent, 2006. -26 p
4. **Zimina N.I.** Agrochemical properties of the soils of the Hungry Steppe. "Soils of the Hungry Steppe and their agronomic characteristics" Tashkent, 1961.-C.15
5. **Ismanov A.Zh., Sektimenko V.E.** Irrigated soils of Syrdarya and Jizzakh regions / Monograph. - Tashkent: "Science",2005. Chapter I. - 6-20 p.
6. **Kuziev R., Yuldashev A., Bobomurodov Sh., Abdurahmonov N.** Irrigated soils of Syrdarya and Jizzakh regions. / Monograph. - Tashkent: ЎзР ФА «Science» publ. house, 2005. 242-250 p.
7. **Kuziev R.K.** Evolution and fertility of irrigated soils. Collection of reports and abstracts of the Scientific-practical conference on rational use of land resources and soil protection, Tashkent, 2001. – p.5-8
8. **Kuziev R.K., Abdurakhmonov N.Yu.** Evolution and fertility of irrigated soils. Tashkent "Navruz", 2015. 208 p.
9. **Kurvontoev R., Abdullaev S., Alikulov B.** Water properties of irrigated serozem-meadow soils of the Golodnostep oasis. // Agricultural science to agriculture. International scientific and practical conference. Digest of articles. Book1. Barnaul, 2006. p.126-128.
10. **Sobitov U.T.** Evolution and fertility of the soils of the formerly developed areas of Mirzachul. Autoref. diss. ... PhD, Tashkent, 2018. 20 p.
11. **Sobitov U.T., Abdurakhmonov N.Yu.** Fertility of Mirzachul's ancient lands // UzMU news. - Tashkent, 2011. -№1/1. – p. 145-147.
12. **Sobitov U.T.,** Humus in the ancient irrigated gray-meadow soils of Mirzachul, the amount of nutrients and their changes // Proceedings of the V Congress of the Society of Soil Scientists and Agrochemists of Uzbekistan. -Tashkent, 2010. –p. 183-185.
13. **Abdurakhmonov N.Yu., Sobitov U.T, M.M. Mirsodikov.** Influence of DAG-1 biological preparation on some properties of irrigated meadow-gray soils // UZBEKISTAN ZAMINI («Land of Uzbekistan», Scientific-practical and innovative magazine. Uzbekistan, Tashkent, 2020. -№2. p-27-30
14. **Kuziev R.K., Sobitov U.T. Abdurakhmonov N.Yu., Mirsodikov M.M.** Changes in soil properties in irrigated agriculture // Journal of Scientific Review. Biological Sciences. Russia, 2020. №3, p. 49-55
15. **Teshaev Sh., B.Khalikov, R.Kuziev, N.Abdurakhmonov, A.Boirov, U.Sobitov and others.** Recommendations on agro-technologies for placement and cultivation of agricultural crops in low-fertility soils of Syrdarya region. Tashkent, 2017, 64 p.

16. **Kuziev R., Abdurakhmonov N., Ismonov A., Omonov A., Menglikulov E.** Guidelines for conducting soil surveys and compiling soil maps for maintaining the state land cadastre. Tashkent, 2013. - p 48.

17. **Jabborov O.A., Ismonov A.J., Kalandarov N.N.** Irrigated gray-meadow soils of the Pakhtakor district of the Jizzakh region. Scientific Review. Biological Sciences - Russia, 2019.-№ 3. p: 57-62.

18. Speech by President of the Republic of Uzbekistan Shavkat Mirziyoyev at the Consultative Meeting of Central Asian Leaders. People's Word newspaper.-Tashkent, March 16, 2018. https://xs.uz/uzkr

19. **Abdurakhmonov N.Yu., Mansurov Sh.S., Kalandarov N.N., Sobitov U.T, Pulatov M. K.** Effects of various biopreparations on soil agrochemical properties and cotton harvest // Namangan State University Scientific Bulletin No. 10, 2020, 172-177 p.

20. **Ismonov A.J., Abdurakhmonov N.Y., Kalandarov N.N., Tursunov Sh.T., Mamajanova O.X., Sobitov U.T.** Soil-meliorative state of irrigated soils of the intermountain basins of central Asia (On the example of the Fergana region of the Fergana valley) // International Journal of Botany Studies Volume 5; Issue 6; 2020. No.781-788

21. **Narbaeva Kh. Babina A.** Improving the fertility of saline soils and productivity of cotton plant // Soil-Water Journal – Vol. 2, No. 2 (1), Spec. Issue for “AGRICASIA’2013”. – Turkey, 2013. – P. 1-8.

22. **A.E. Babina, G.I. Dzhumaniyazov, Kh.S. Narbaeva, S.I. Zakiryaev, A. Mirsagatova.** Content of MIKROelements in saline soil and cotton plants when using biological products RIZOKOM-1 and SERHOSIL // International Scientific Journal “The Way of Science”, 2017.- No 2(36).- P.28-31. (Global, IF =0,543).

23. **Yunjiao Zhu, Yuncong Chen Md, Azahar Ali, Liang Dong, Xinran Wang, Sotirios V.Archontoulis, James C. Schnable, Michael J. Castellano.** Continuous *in situ* soil nitrate sensors: the importance of high-resolution measurements across time and a comparison with salt extraction-based methods // Soil Science Society of America Journal. 29 January 2021. https://doi.org/10.1002/saj2.20226

24. https://www.fao.org.