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CHANGES IN THE AGROCHEMICAL STATE OF SALINATED SOILS DURING THE INTERCULTIVATION OF SUNFLOWER, MUSHROOM AND SOYBEAN CROPS

Sh.N.Nurmatov,
PhD, prof., PSUEA ITI, Tashkent,
J.Q.Shadmanov,
q.x.f.n, kix, PSUEA ITI, Tashkent,
X.T.Bekmurodov,
PhD, kix, Fine-fiber cotton growing research institute, Termez,
X.D.Chariyeva
PhD, Fine-fiber Cotton Research Institute, Termez.

Abstract: This article presents data on the impact of companion crops, namely sunflower, mung bean, soybean and alfalfa, on the agrochemical properties of the soil in saline soils of the central scientific experimental farm of the PSUEAITI.
Keywords: Saline soils, intercropping, sunflower, mung bean, soybean and alfalfa crops, agrochemical properties of soil.
Abstract: V dannoy state predstavleny svedeniya o vliyanii agrokhimicheskih svoystv pochvy na zasolennye pochvy tsentralnogo nauchno-opytnogo hozyyastva PGUEAITI pri vozdelyvanii kultur-partnerov - podsolnechnika, masha, soi i lucerny.
Key words: Zasolennye pochvy, soputstvuyushchie kultury, kultury podsolnechnika, masha, soi i lyutserny, agrokhimicheskie svoystva pochvy.
Abstract: This article presents data on the impact of companion crops, namely sunflower, mung bean, soybean and alfalfa, on the agrochemical properties of the soil in saline soils of the central scientific experimental farm of the PSUEAITI.
Keywords: Saline soils, intercropping, sunflower, mung bean, soybean and alfalfa crops, agrochemical properties of soil.

Introduction. There are saline and wind-eroded soils in the republic. In saline and wind-eroded soils, the productivity of agricultural crops decreases and the quality of the product deteriorates.
the Development of Agriculture of the Republic of Uzbekistan for 2020-2030 identifies "...improving the reclamation condition of irrigated lands, rational and economical use of water resources, and on this basis achieving sustainable agricultural production" as one of the important tasks **[** 1] .
In this regard, it is an urgent task in our republic to conduct scientific research on the joint planting of various crops on saline and wind-eroded lands, to make the most of the available land area, to maintain soil fertility, to fully provide the population with ecologically clean food products, and to obtain high-quality yields from agricultural crops [1] .
One of the most important land types in the economy of the Republic of Uzbekistan is arable land. The total area of arable land in the republic is 4064.7 thousand hectares, including 3307.3 thousand hectares of irrigated arable land or 16.2% of agricultural land types, and 757.4 thousand hectares of dry arable land or 3.0% of agricultural land types. Currently, 25% of all types of used land are severely degraded, 8% are moderately degraded, 36% are stable or very slightly degraded, and 10% are improving. Approximately 18% of land resources are vacant land, 2% are covered by inland waters [2] .

The fact that paragraph 72 of the Concept for the Effective Use of Land and Water Resources in Agriculture, approved by the Decree of the President of the Republic of Uzbekistan No. PF-5742 "On Measures for the Effective Use of Land and Water Resources in Agriculture" dated June 17, 2019, also sets out tasks for "accelerating scientific research aimed at increasing soil fertility and preventing soil erosion and degradation", requires conducting scientific research on a large scale in this regard and is an urgent task [2] .

According to HM Maksudov, the onset of erosion depends on the mechanical composition of the soil, the amount of humus, and the slope of the sloping land. In typical gray sandy soils, the slope is 1.5-2 ^{0}, In humus-rich black soils, erosion processes develop at 2-3 $^{\circ}C$ (Makhsudov, 1981) [3] .

In their scientific research, X.M. Maksudov and N.P. Kuchkarov noted that irrigation erosion is caused by the slope of the cultivated land, the tendency of the soil to leach, the amount of humus in it, the grain size of the soil, the amount of water distributed over the field, and a number of other factors (Makhsudov and Kuchkarov 2002) [4] .

In the scientific experiments conducted by EATurbanov in the fight against irrigation erosion, the following conclusions were reached: 1. With an increase in the slope, and thus with an increase in water consumption per plot, erosion processes intensify. For example, with a slope of 0.02 and a water consumption per plot of 0.1-0.5 l/s, soil washing out increases from 3.0 to 15.5 tons; with a slope of 0.070 and a water consumption of 0.1-0.4 l/s, soil washing out increases from 4.9 to 19.40 tons (Turbanov, 2010) [5] .

The main data obtained from scientific experiments, in studies conducted to study the effect of sunflower, mung bean and soybean crops grown in a planned cooperative manner in the experimental system on the total forms of humus, nitrogen and phosphorus in saline soils, showed that at the beginning of the period of application, the humus content in the top layer of the soil (0-30 cm) was 0.553%, nitrogen 0.056%, phosphorus 0.046%, humus 0.467%, nitrogen 0.048%, phosphorus 0.040% in the subsoil layer (30-50 cm) of the soil. When the mobile forms of nitrogen, phosphorus and potassium were studied, the amount of nitrogen in the subsoil layer (0-30 cm) of the soil was 10.1 mg/kg, phosphorus 18.2 mg/kg, potassium 60 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 7.6 mg/kg, phosphorus 12.5 mg/kg and potassium 50 mg/kg.

In the experiment, at the end of the cultivation period of the cultivated crops, i.e., in the first variant (control) where alfalfa was planted at a rate of 22-24 kg per hectare, the humus content in the top layer (0-30 cm) of the soil was 0.556%, nitrogen 0.063%, phosphorus 0.048%, humus 0.468%, nitrogen 0.050%, phosphorus 0.041% in the subsoil layer (30-50 cm) of the soil. When the mobile forms of nitrogen, phosphorus and potassium were studied, the amount of nitrogen in the subsoil layer (0-30 cm) of the soil was 10.5 mg/kg, phosphorus 18.4 mg/kg, potassium 60 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 7.8 mg/kg, phosphorus It was found that 12.6 mg/kg of potassium was 50 mg/kg.

In variant 2 (control), where alfalfa was planted and maintained at a rate of 16-18 kg per hectare of seedling density, the humus content in the top layer (0-30 cm) of the soil was 0.558%, nitrogen 0.065%, phosphorus 0.049%, and in the subsoil layer (30-50 cm) of the soil, humus 0.469%, nitrogen 0.052%, and phosphorus 0.043%. When studying the mobile forms of nitrogen, phosphorus and potassium, it was found that the nitrogen content in the subsoil layer (0-30 cm) was 10.7 mg/kg, phosphorus The content of potassium in the soil is 18.6 mg/kg, 60 mg/kg, and the nitrogen content in the subsoil (30-50 cm) layer is 7.9 mg/kg, and phosphorus is 1.1 mg/kg. It was observed that the concentration of iron was 12.7 mg/kg, and potassium was 50 mg/kg.

When the planting density of sunflower was 42 thousand plants per hectare and that of mung bean was 150 thousand plants per hectare, and mineral fertilizers were applied at the rate of N 1 2 0 , P 80, K 60 kg per hectare, the humus content in the top layer of soil (0-30 cm) was 0.553%, nitrogen 0.060%, phosphorus 0.050%, and in the subsoil (30-50 cm) layer of the soil, humus was 0.468%, nitrogen 0.050%, and phosphorus 0.042%. When studying the mobile forms of nitrogen, phosphorus and potassium, the amount of nitrogen in the subsoil (0-30 cm) layer of the soil was

10.2 mg/kg, phosphorus 18.2 mg/kg, potassium 60 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 7.6 mg/kg, phosphorus It was found that the amount of iron was 12.6 mg/kg, and potassium was 50 mg/kg.

Even when the planting density of sunflower is 56 thousand plants per hectare and that of mung bean is 250 thousand plants, and mineral fertilizers are applied at the rate of N 1 8 0 , P 120 , K 90 kg per hectare, the humus content in the top layer of soil (0-30 cm) is 0.561%, nitrogen 0.067%, phosphorus 0.061%, humus 0.470%, nitrogen 0.055%, phosphorus 0.045% in the subsoil layer (30-50 cm). When studying the mobile forms of nitrogen, phosphorus and potassium, the nitrogen content in the subsoil layer (0-30 cm) was 10.6 mg/kg, phosphorus 18.4 mg/kg, potassium 65 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 8.0 mg/kg, phosphorus It was observed that the amount of iron was 12.7 mg/kg, and potassium was 53 mg/kg.

When sunflower seedlings are planted at a density of 42,000 plants per hectare and soybeans at a density of 150,000 plants per hectare, the humus content in the top layer of soil (0-30 cm) at the end of the growing season is 0.554%, nitrogen content is 0.554%, and the 0.059%, phosphorus 0.052%, and in the subsoil (30-50 cm) layer of the soil, humus was 0.468%, nitrogen 0.048%, and phosphorus 0.043%. When the mobile forms of nitrogen, phosphorus and potassium were studied, the nitrogen content in the subsoil (0-30 cm) layer of the soil was 10.3 mg/kg, phosphorus 18.3 mg/kg, potassium 60 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 7.6 mg/kg, phosphorus It was found that the amount of calcium was 12.5 mg/kg, and potassium was 50 mg/kg (Table 1).

Table 1

Changes in the amount of total and mobile forms of humus, total nitrogen and phosphorus in the soil when sunflower, mung bean and soybean plants are planted together on saline soils

In saline soils										
Option	**Soil layers, cm**	**Seedling thickness, thousand bushels/ha**	**Seed consumption kg/ha**	**Mineral fertilizer rate, kg/ha**	**Common forms, %**			**Moving shapes, mg/kg**		
					Humus	**N**	**P**	**N-NO3**	**P2O5**	**K2O**
At the beginning of the period of validity 10.04.2024										
In the general background	0-30	-		-	0.553	0.056	0.046	10.1	18.2	60
	30-50	-		-	0.467	0.048	0.040	7.6	12.5	50
At the end of the validity period 15.10.2024										
1 (control) Alfalfa	0-30		22-24	N-100, P-150, K-100	0.556	0.063	0.048	10.5	18.4	60
	30-50				0.468	0.050	0.041	7.8	12.6	50
2 (control) Alfalfa	0-30		16-18	N-100, P-150, K-100	0.558	0.065	0.049	10.7	18.6	60
	30-50				0.469	0.052	0.043	7.9	12.7	50

Sunflower+mushroom	0-30	Sunflower 42.0 thousand bush, moss 150.0 thousand bush		N-120, P-80, K-60	0.553	0.060	0.050	10.2	18.2	60
	30-50				0.468	0.050	0.042	7.6	12.6	50
Sunflower+mushroom	0-30	Sunflower 56.0 thousand bush, moss 250.0 thousand bush		N-180, P-120, K-90	0.561	0.067	0.061	10.6	18.4	65
	30-50				0.470	0.055	0.45	8.0	12.7	53
Sunflower+shade	0-30	Sunflower 42.0 thousand bush, shade 150.0 thousand bush		N-120, P-80, K-60	0.554	0.059	0.052	10.3	18.3	60
	30-50				0.468	0.048	0.043	7.6	12.5	50
Sunflower+shade	0-30	Sunflower 56.0 thousand bush, shade 250.0 thousand bush		N-180, P-120, K-90	0.563	0.069	0.063	10.8	18.6	65
	30-50				0.471	0.056	0.46	8.1	12.8	53

the planting density of sunflower was 56 thousand plants per hectare, and soybean was 250 thousand plants, and mineral fertilizers were applied at the rate of N 1 8 0 , P 120 , K 90 kg per hectare, the humus content in the top layer of soil (0-30 cm) at the end of the application period was 0.563%, nitrogen 0.069%, phosphorus 0.063%, humus 0.471%, nitrogen 0.056%, phosphorus 0.046% in the subsoil layer (30-50 cm) of the soil. When the mobile forms of nitrogen, phosphorus and potassium were studied, the amount of nitrogen in the subsoil layer (0-30 cm) of the soil was 10.8 mg/kg, phosphorus 18.6 mg/kg, potassium 65 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 8.1 mg/kg, phosphorus It was found that the amount of iron was 12.8 mg/kg, and potassium was 53 mg/kg.

Therefore, the effect of the combined planting of sunflower, mung bean and soybean on the amount of nutrients in the soil on soils prone to wind erosion is that at the beginning of the growing season, the humus content in the top layer of the soil (0-30 cm) is 0.342%, nitrogen Phosphorus was 0.048%, humus was 0.274%, nitrogen was 0.034%, and phosphorus was 0.047% in the subsoil (30-50 cm) layer of the soil. When the mobile forms of nitrogen, phosphorus, and potassium were studied, the nitrogen content in the subsoil (0-30 cm) layer of the soil was 7.2 mg/kg, phosphorus was 0.048 mg/kg, and 9.3 mg/kg, potassium 50 mg/kg, and in the subsoil (30-50 cm) layer of soil, the nitrogen content is 6.4 mg/kg, phosphorus 7.9 mg/kg, potassium 40 mg/kg.

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