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Contamination of Irrigated Soils with Toxic Substances and Protection of Them

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Annotation: Modernization of agriculture, irrigation and land reclamation, introduction of the latest achievements in crop production and agriculture, as well as the widespread use of fertilizers and pesticides, as well as the use of chemicals against pests and diseases require a rich and high yield of agricultural crops. . At the same time, the used chemical fertilizers and pesticides accumulate in the soil and form a dense layer under the plow, which impairs water, air permeability, metabolism, growth of microorganisms, and ultimately leads to deterioration of the ecological condition of soils.

Keywords: Agriculture, soil, pesticides, meadow-alluvial, permissible amounts, toxins, farming, fertilizers.

Introduction. It is known that each soil-climatic zone is in constant contact with natural and anthropogenic processes. Being in constant dynamics under the influence of a combination of different factors, they may retain or lose their properties and natural productivity as a result of the development of the desertification process or the accumulation of toxic substances within permissible limits. In the current agricultural conditions, intensive development of irrigation to achieve high yields from plants is achieved through the correct and moderate use of mineral fertilizers and yadochemicals. As a result, in the field of cotton growing, the application of fertilizers at high rates will increase cotton yields by up to 50%. However, in addition to the positive effects, the use of agrochemicals can lead to dangerous consequences, mainly against the background of environmental pollution and especially large-scale agricultural production. Accumulation of chemical residues in the environment leads to pollution of the atmosphere, soil, biosphere and groundwater. This situation is one of the main reasons for the sharp deterioration of irrigated land areas where cotton is grown. These soils are experiencing a heavy load due to the use of large amounts of minerals and various pesticides: insecticides, herbicides, defoliants and others are among them. As a result, not only the soil, but also the whole environment is polluted and the amount of toxins is increasing year by year. Most of the irrigated land, in particular,

One of the most important tasks of the Republic is to achieve high yields of agricultural crops and strengthen our economy in the conditions of independence and market relations. In this regard, it is important to study

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the use of irrigated lands in a comprehensive and in-depth manner, to conduct measures to increase soil fertility in a quality, timely and appropriate manner. In this regard, the gradual increase in soil salinity in irrigated lands, the decline in crop yields and the deterioration of the environment are among the current problems. Improving the ecological and reclamation condition of the soil, increasing its fertility, optimal management of water-salt regime, requires a correct analysis of key indicators that represent the processes currently taking place..

Object and methods of research. In order to identify changes in the ecological and reclamation of soils in the territory of some massifs of Karakul and Romitan districts of Bukhara oasis in the conditions of water shortage, field monitoring was carried out in the conditions of irrigation of agricultural crops and agro-technologies of their cultivation. Soil samples were taken from the selected base points of the massifs and analyzed in the laboratory, and the degree of contamination with pesticides, some metals, biogenic substances was assessed.

Research results. Soil samples were taken from 0–10 and 10–30 cm layers from selected base sections. These soil samples are ancient irrigated grassland-alluvial soils, the mechanical composition of which is mainly medium and light sandy. The soil profile consists of mechanical particles of various sizes. In the mechanical composition of soils from the particles of physical sand (greater than 0.01 mm) particles of fine sand (0.1-0.05 mm) 13.7 - 25.45%, coarse dust particles (0.05-0.01 mm) 30 , Fluctuates around 86-44.18 percent, the total amount of physical sand particles is 44.5-55.7 percent. In these soils, particles smaller than 0.01 mm predominate in the soil profile: medium dust (0.01-0.005) particles 17.78-17.94 percent, fine dust (0.005-0.001 mm) particles 15.38-15.44 percent oscillating around 0, the smallest 0, Particle size less than 001 mm is 6.12-8.68% in the soil profile, physical mud (<0.01 mm) fluctuates in the range of 21.30-42.00%. (Table 1)

Table 1. From ancient irrigated meadow-alluvial soils mechanical composition

Intersection number, location	Layer thick league, see	Particle size, in mm, in%.								Soil name by mechanical composition
		> 0.25	0.25-0.1	0.1-0.05	0.05-0.01	0.01-0.005	0.005-0.001	<0.001	Physical mud (<0.01 mm)	
1001 Uzbekistan arrays	0-10	0.29	0.80	33.81	32.38	9.76	16.84	6.12	32.72	Medium sand
	10-30	0.55	0.53	23.84	41.90	13.66	8.70	10.82	33,18	
1002 Uzbekistan arrays	0-10	0.21	0.74	18.83	48.92	7.98	12.40	10.92	21.30	Lightsand
	10-30	0.28	0.60	42.36	21,42	10.22	13.44	11.68	35,34	Medium sand
1003 Uzbekistan arrays	0-10	0.74	1.07	29,47	32.82	14.94	12.02	8.94	35.90	Medium sand
	10-30	1.31	2.16	22.37	41,44	13.68	9.90	9.14	32.72	
1004 Xalqobod arrays	0-10	0.56	0.70	19.96	41,26	11.52	15.72	10.28	37.52	Medium sand
	10-30	0.40	0.74	16.26	42.36	15.50	16.66	8.08	40.24	
1005 Khalkabad arrays	0-10	0.73	0.96	25.45	30.86	17.94	15.38	8.68	42.00	Medium sand
	10-30	0.33	0.62	13.47	44,18	17.78	15.44	8.18	41.40	

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It should also be noted that in the 10–30 cm layer of this soil profile, the amount of clay particles decreased compared to the 0–10 cm layer, and an increase in coarse dust (0.05–0.01 mm) particles was observed. The mechanical composition of these soils is also facilitated by the reduction and washing away of the soil particles in the upper driving layer.

The study also identified the amount of some pesticides used in agriculture in soil samples taken from selected areas in the study of the ecological condition of soils. Comparison of the results of laboratory analyzes shows that the composition of the studied pesticides during the analyzed period changed as follows: alpha-hexachlorocyclohexane (2016 and 2020 on the analysis of soil samples from section 1001 of the Massif of Uzbekistan)α-GXSG) in the amount of 0.013 - 0.010 mg/kg in the 0-10 cm layer and 0.062-0.056 mg/kg in the 10-30 cm layer. Also, gamma hexachlorocyclohexane (γ-GXSG) is high and ranges from 0.065-0.050 in the 0-10 cm layer and 0.025-0.020 mg/kg in the 10-30 cm layer. The amount of dichlorodiphenyldichlor (DDE) in the soils obtained from this section α-GXSG and γ-GXSGabove 0.072-0.064 mg/kg in the 0-10 cm layer and 0.058-0.031 mg/kg in the 10-30 cm layer. During the observation period, a similar process in the soil was observed inthe amount of approximately dichlorodiphenyltrichloromethylmethane (DDT), and the analysis showed that in the corresponding periods in the 0-10 cm layer in absolutely dry soil 0.040-0.025 mg/kg and in the 10-30 cm layer - 0.080-0.060 mg/kg (Table 2).

Table 2. From ancient times the irrigated meadow - a change in the amount of pesticides in alluvial soils

Cross-section number, place name	The layer is thick league, see	Pesticides, mg/kg							
		α-GXSG		γ-GXSG		DDE		DDT	
		2016	2020	2016	2020	2016	2020	2016	2020
1001 Uzbekistan arrays	0-10	0.013	0.010	0.065	0.050	0.072	0.064	0.040	0.025
	10-30	0.062	0.056	0.025	0.020	0.058	0.031	0.080	0.060
1002 Uzbekistan arrays	0-10	0.027	0.017	0.010	0.010	0.044	0.040	0.020	0.010
	10-30	0.057	0.035	0.020	0.015	0.043	0.028	0.030	0.015
1003 Uzbekistan arrays	0-10	0.080	0.068	0.0	0.003	0.058	0.033	0.040	0.027
	10-30	0.050	0.034	0.020	0.010	0.074	0.050	0.027	0.014
1004 Khalkabad arrays	0-10	0.072	0.070	0.210	0.160	0.042	0.037	0.035	0.029
	10-30	0.016	0.020	0.420	0.350	0.072	0.048	0.080	0.050
1005 Khalkabad arrays	0-10	0.085	0.080	0.075	0.050	0.042	0.029	0.040	0.040
	10-30	0.011	0.014	0.040	0.038	0.082	0.061	0.045	0.033

According to the analysis of soil samples taken from section 1004 of the Khalkabad massif in 2016 and 2020 α-GXSG0.072-0.070 mg/kg in the 0-10 cm layer, 0.016-0.020 mg/kg in the 10-30 cm layer, gamma hexachlorocyclohexane (γ-GXSG) is high, 0.21-0.16 mg/kg in the 0-10 cm layer and 0.42-0.35 mg/kg in the 10-30 cm layer. The amount of dichlorodiphenyldichlor (DDE) in the soils obtained from this section is 0.042-0.037 mg / kg in the 0-10 cm soil layer and 0.072-0.048 mg / kg in the 10-30 cm layer. The dichlorodiphenyltrichloromethylmethane (DDT) content in the soil showed 0.035–0.029 mg/kg in the 0–10 cm layer and 0.080–0.050 mg/kg in the 10–30 cm soil layer at appropriate intervals. From the above, it was found that gamma hexochlorocyclohexane from pesticides in soils obtained from section 1004 (γ-GXSG) can be observed to be several times higher than the allowable amount.

Alpha-hexochlorocyclohexane (2016 and 2020) from the analysis of soil samples from section 1005 taken from the "Khalkabad" array (α-GXSG) was recorded at 0.085-0.080 mg/kg in the 0-10 cm layer and 0.011-0.014 mg/kg in the 10-30 cm layer. The results of the analysis showed that gamma hexachlorocyclohexane

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(***γ***-GXSG) amounts to 0.075-0.050 mg/kg in 2016 and 2020 in the 0-10 cm layer and 0.040-0.038 mg/kg in the 10-30 cm layer. The amount of dichlorodiphenyldichlor (DDE) in the soils obtained from this section was 0.042-0.029 mg/kg in absolutely dry soil in the 0-10 cm layer and 0.082-0.061 mg/kg in the 10-30 cm layer. During the observation period, a similar process in the soil was observed in approximately dichlorodiphenyltrichloromethylmethylmethane (DDT) and in the corresponding periods in absolutely dry soil in the 0–10 cm layer was detected in 2016 and 2020 in the same amount, i.e., 0.035–0.045 mg/kg.

The analysis of the studied data shows that today the irrigated meadow-alluvial soils of the Bukhara oasis are mostly***α***-GXSG,***γ***-GXSG, Pesticides such as DDE and DDT are lower than the allowable amount (0.1 mg/kg) and in general their negative impact on the environmental situation in the plant-soil-water system is relatively small. Gamma hexachlorocyclohexane from pesticides in soils obtained only from section 1004(***γ***-GXSG) can be seen to be several times higher than the allowable amount. This is due to the fact that they violated the conditions and norms of use on irrigated lands in order to eradicate agricultural pests and diseases, and were used in large quantities.

Conclusion. It should be noted that there is a general trend of decrease in the amount of pesticides studied in the study areas during the observation period, which is to some extent related to the decrease in their use in irrigated lands and economic performance of farms. From this we can conclude that chemicals used in the control of diseases and pests of agricultural crops and plants remain in the soil for years and, of course, cause a certain degree of soil pollution and deterioration of the ecological condition. With this in mind, we recommend the widespread use of organic farming and biological methods in the future to ensure the sustainability of agroecotisms and to protect irrigated lands with less use of chemicals.

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