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ҚЫЗЫЛОРДА ОБЛЫСЫНЫҢ ТҰЗДАНҒАН ТОПЫРАҒЫНДА ТҮЙЕЖОҢЫШҚА СОРТТАРЫНЫҢ ӨСІП-ӨНУІНЕ БИОТЫҢАЙТҚЫШТАРДЫҢ ӘСЕРІ

Аңдатпа

Көктемде әр түрлі тереңдікте тәжірибелік ұсақ танапты телімдердің топырағындағы суда ерігіш тұздардың құрамына зерттеу жүргізілді. Қызылорда облысының тұзданған топырағында түйежоңышқаның өсіп-өнуіне отандық биологиялық тыңайтқыштардың әсері зерттелді. Биологиялық тыңайтқыштар ҚР БҒМ ҒК «Микробиология және вирусология институты» РМК жасап шығарған «Фитобацирин» және «Ризовит АКС» болып табылады. Анықталғандай, тұқымды целлюлоза ыдыратқыш бактериялармен және нитрагинмен өңдегенде түйежоңышқаның жасыл массасының өнімділігін айтарлықтай арттырды. Биотыңайтқыштарды бірге қолданғанда олар өте жақсы нәтиже көрсетті. Өнімділігі тұқымды жеке өңдегенмен салыстырғанда айтарлықтай артты. Тұқымды «Ризовит АКС» және целлюлоза ыдыратқыш бактериялармен өңдегенде сабақ санының (367-841 шт/м^2) және өнімділігінің (293-347 ц/га) артуын қамтамасыз етті.

Кілт сөздер: Фитомелиорация, түйежоңышқа, биотыңайтқыш, ауыспалы егістік.

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THE INFLUENCE OF THE BIOFERTILIZER ON THE GROWTH AND DEVELOPMENT OF VARIETIES OF SWEET MELILOT ON SALINE SOILS OF KYZYLORDA REGION

Annotation

The content of water-soluble salts in different depths of the soil is studied in a shallow plots experiment in the spring period. The influence of domestic biological fertilizers on the growth and development of melilot varieties on saline soils of the Kyzylorda region has been studied. Biological fertilizers are "Phytobacirin" and "Rizovit AKS", developed in the RSE "Institute of Microbiology and Virology" of the CS MES RK. It has been revealed that the treatment of seeds with cellulose by decomposing bacteria and nitragin significantly increases the yield of green mass of varieties of sweet melilot. With the joint application of biofertilizer, they showed the best result. The yield in this case increases significantly compared to the separate treatment of seeds. Seed treatment with Rizovit ACS and cellulose-decomposing bacteria provides a reliable increase in the number of stems (367-841 pcs / m2) and yield (293-347 c / ha).

Keywords: Phytomelioration, melilotus, biofertilizer, crop rotation.

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ABOUT THE POSSIBILITY OF SOIL POLLUTION BY MICROELEMENTS DURING WATERING BY SEWAGE WATER

Abstract

A study was made of the chemical composition of the soil during watering by sewage water in the "Iliyskiy" farm in Almaty region. The influence of sewage water on soil properties were identified. It has been established that if the recommended parameters of the technology

and irrigation are observed when watering with prepared sewage water, there is no significant deterioration in the water-physical and chemical properties of the soil. Having all the negative phenomena, is seasonal and by conducting the normal agricultural technology, they do not pose a serious danger.

Key words: soil, pollution, sewage water, microelements, chemical analysis.

Introduction

Research on the microelemental composition of the soil was carried out in the "Iliyskiy" farm in Almaty region. In the initial state of the soil of the massif, according to the Institute of Soil Science of the Academy of Sciences of Kazakhstan, very poorly provided with mobile forms of zinc and molybdenum, satisfactorily - copper and cobalt, richly manganese, well - boron.

Irrigation with sewage water of Almaty with intake from collector did not lead to a significant accumulation of toxic elements like Pb, Mn, Cu, Mo, B, Co. Their content in the investigated soil does not exceed their average value in similar soils or is within the limits of the MPC.

It should be noted that the soil of this massif is characterized by a high content of plumbum. Even before the irrigation with wastewater (deposit), the plumbum content in the meter layer was 4,6 mg / kg. of soil.

Materials and methods

The data of numerous chemical analyzes of soil were used as research materials. Also calculations have been carried out to determine the concentration of microelements.

Results and discussion

From Table 1 follows that irrigation by sewage does not lead to the accumulation of mobile plumbum. On the contrary, for 6 years of irrigation its content decreased from 4,6 (deposit) to 2,9 - 4,13 mg / kg of the soil. This is explained by the migration of plumbum in the plant and in the deep layers of the soil.

The content of cadmium in the soil of all experimental fields, irrespective of the method of irrigation and the load norm, is almost identical.

Some increase in cadmium is not the result of irrigation by sewage water, as, according to the Kazmekhnobra laboratory, the cadmium content in sewage water is 0,0002 - 0,004 mg / l, while the MPC for drinking and domestic water uses is 0,001 mg / l.

The mobility of microelements like Co, Zn, Co, Mn, Mo varies little before and after irrigation. This gives the right to assume that they will not accumulate in significant quantities in plants, as evidenced by the quality of products from these fields.

Table 1 - Influence of irrigation by sewage waters of Almaty on the maintenance of microelements, mg / kg of soil ("Iliyskiy" farm)

Elements	MPC Ministry of Health	Experienced fields. Autumn for 6 years of irrigation				Deposit
		N 1	N 2	N 3-a	N 3-b	
Zn	23 m	1,9	2,1	2,1	2,3	1,2
Mn	1500 g	117	161	108	128	85
Cu	3,0 m	2,2	2,4	2,83	2,2	2,0
Co	5,0 m	1,8	1,4	1,6	1,8	-
Cd	3,0	0,7	0,7	0,8	0,8	0,71
Pb	30 g	3,9	2,9	3,9	0,8	4,6
Mo	0,5 m	0,12	0,12	0,14	0,12	-
B	1,7	0,17	0,63	0.46	0,48	0,66
Fe		157	211	239	245	130
m - mobile forms; g - gross forms.						

The most minimal mobility of microelements is noted where cultivated alfalfa, Jerusalem artichoke, nikandra, amaranth, safflower. Thus, in experimental field No.1, when alfalfa was cultivated for 2 years, the zinc mobility was 1,6; copper-1,0; cobalt -1,8; molybdenum – 0,11 and boron – 0,5 mg / kg, and when in this field the following years the rapeseed winter crop was cultivated, the mobility of zinc, copper, molybdenum of boron increased and accordingly was 1,9; 2,2; 0,12; 0,71 mg / kg of the soil.

Analyzing the data of numerous chemical analyzes of soil, it can be noted that the level of heavy metals in soils irrigated by sewage water of Almaty is in quantities that do not strictly monitor the accumulation of heavy metal ions in the soil. This accumulation can gradually approximate the amount of that other heavy metal to the maximum permissible concentrations. In these conditions, the controlling factor in determining the MPC becomes the time during which the accumulated amounts of pollutants reach MPC. By this we carried out calculations to determine the period of saturation of the soil without taking into account the transformation into plants to the level of the existing MPC. The calculations were carried out for the experimental plot No.4 of the "Iliyskiy" farm, irrigated with an average weighted irrigation rate of 5000 m/ha. The bulk weight of the soil is 1,2 g/cm. The determination was made in the following order:

1. The amount of one and the other heavy metals coming in annually with wastewater during irrigation (N):

$$N = 1000*C*M, \text{ mg}; \quad (1)$$

Where, C - heavy metal content in waste water, mg/l;
M - average irrigation norm, m/ha.

2. Entered into the meter layer of soil for 1 year:

$$B = 1000 * N/O, \text{ mkg/kg}; \quad (2)$$

Where, O – mass of the soil layer:

$$O = 10000 * 10000 * 100 = 12000000 \text{ kg}$$

here Y - the bulk weight of the soil 1,2 g/cm.

4. The period of saturation of soils with these or other heavy metal ions. Calculations are given in Table 2.

Table 2 - Time of saturation of soil with heavy metals during irrigation by sewage water of Almaty (experimental field of the "Iliyskiy" farm)

Elements	MPC in soil, mg / kg	The initial content of heavy metals in the soil, mg / kg	MPC in soil after deduction of the period, mg / kg LAK-H	The content of heavy metals in waste water, mg / ls	Contributed with sewage water for 1 year kg / ha	Accumulation in soil for 1 year, mkg / kg	Time of saturation of the soil in the 1 m layer in 1 year
Zn	23,6	1,2	21,8	0,0129	0,065	5,38	4052
Mn	1500	85	1415	0,0363	0,182	15,10	94300
Cu	3,0	2,0	1,0	0,0135	0,068	5,63	17,0
Co	5,0	-	5,0	0,0031	0,016	1,29	3870
Pb	30	4,6	25,4	0,0467	0,234	19,45	1,05
Ca	3,0	0,4	2,29	0,0021	0,001	0,88	2600
Mo	0,5	-	0,5	0,0025	0,001	1,04	500

Their accumulation up to MPC, depending on the nature of the element, is measured from 500 years for molybdenum, up to 94300 years of manganese. If we assume that the MPC for mobile forms of manganese, plumbum and cadmium is 10 times less than the MPC for their gross content, then the saturation period remains at least 130 years.

It should be taken into account that, in addition to accumulation in the soil, decomposition can take place, as well as the removal of heavy metals from it, as a result of their migration to other media, for example, in a plant or in the deeper layer of the soil.

So this calculation is conditional, nevertheless, it predicts the expected time of saturation of soils with heavy metals.

For serozem soils in the south and southeast of Kazakhstan, compactness is characteristic in the presence of irrigation. From the above field materials for only two experimental sites (Table 2), it can be seen that irrigation has led to some changes in the water-physical properties of soils. There is a tendency to increase the bulk mass at the end of vegetation. This is especially noticeable in the upper soil layer. The increase in the bulk mass at the end of the vegetation period is expressed in those cases, where there was frequent watering. With increasing bulk mass, as is known, deterioration of soil aeration occurs. To prevent this, in the experimental fields, inter-irrigation was systematically carried out until the interchain leaves were closed.

Annually, the determination of the bulk mass of the soil at the beginning and at the end of the growing season made it possible to reveal the dynamics of its change. It is seasonal in nature. By the end of vegetation, the bulk mass increases, and at the beginning of the next season restores.

According to Musayev A.I. (1985), in the conditions of the Almaty region, the cultivation of alfalfa in one field for three years resulted in a decrease in the volumetric mass of the layer 60-100 cm 1,41 to 1,35 tons/m, while on corn silo (irrigation systems using wastewater), the bulk mass of the same layer increased from 1,35 to 1,37 t/m. Therefore, on the fields of irrigation, a large place should be given to perennial grasses [1,2,3].

The lowest moisture capacity (LMC), characterized by the amount of water retained in a sedentary state, in typical serozems in the South Kazakhstan region of the soil remained unchanged, and in the meadow-serozem soils of the Zhambyl region it increased from 19,1 to 20,1% of the weight of dry soil.

The water permeability of the soil decreases by the end of the vegetation. Each watering affects its magnitude. It is subject to the same pattern as the bulk mass, ie, its changes throughout the year are seasonal in nature.

Table 3 – Changes in the water-physical properties of meadow-gray soils for 6 years of irrigation, ("Tastoba" farm in Zhambyl region)

Horizons, cm	Bulk weight, t/m		Porosity,%		The lowest moisture capacity in % to weight	
	initial	for 6 years	initial	for 6 years	initial	for 6 years
0-10	1,35	1,32	46,6	45,9	21,4	21, 8
10-20	1,32	41,34	46,2	45,7	20,5	21,1
20-30	1,36	1,36	45,4	44,6	19,2	20,4
30-40	1,32	1,39	46,7	45,8	18,5	19 6
40-60	1,43	1,45	46,2	46,0	19,2	20,4
60-80	1,46	1,46	45,8	44,2	17,3	18,6
80-100	1,46	1,47	44,3	44,1	17,8	18,2
0-100	1,39	1,44	46,0	45,2	19,1	20,1

For example, at the farm "Akzharsky", in South Kazakhstan region at the beginning of the growing season (in the spring), the soil had a water permeability per hour of 7,8 cm/h. And by autumn it was 7,0 under the crops of alfalfa; under maize crops for silage 7,2; under barley crops of 7,4 cm/h. The water permeability of the soil is affected by irrigation methods.

Table 4 - Changes in the water-physical properties of typical serozem soils ("Akzharsky" farm, South-Kazakhstan region.)

Horizons, cm	Bulk weight, t/m		Porosity,%		The lowest moisture capacity in % to weight	
	initial	for 6 years	initial	for 6 years	initial	for 6 years
0-10	1,28	1,22	56	54,6	23,6	23,8
10-20	1,34	1,30	55	53,8	23,0	23.4
20-30	1,36	1,32	53	52,6	22,4	22,2
30-40	1,39	1,35	52	51,4	22,0	22,3
40-60	1,41	1,40	49	48,2	21,0	21,5
60-80	1,42	1,42	46	44,6	19,6	20,1
80-100	1,34	1,43	44	42,4	18,0	19,4
0-100	1,29	1,35	51	49,7	21,5	21,8

Watering on the strips leads to a greater decrease in water permeability by the end of the vegetation period than watering by furrows. According to Musayev A.I. (1985), when watering by stripes of alfalfa, the water permeability for the first hour was 13,9 at the first 10,34 at 8,4 in the third and 7,5 cm/h in the fourth watering, while irrigation by furrows were 11,0; 9,9; 6,5; 6,4 cm/h. Seal consolidation in the Kyzylorda region is much lower than in other areas.

Conclusion

Thus, if the recommended parameters of the technology and irrigation are observed when watering with prepared sewage, there is no significant deterioration in the water-physical and chemical properties of the soil. Having all the negative phenomena, is seasonal in nature and in the conduct of normal agricultural technology, they do not pose a serious danger.

Materials of recent studies also confirmed the results of earlier studies. In the meadow-bog soils of the Kyzylorda region, the changes in soil processes were seasonal [4].

The determination of the bulk weight of the soil, at the beginning and at the end of the growing season, made it possible to reveal the dynamics of its changes throughout the year. In the field occupied by alfalfa, significant changes in the water-physical properties of the soil weren't occurred. Alfalfa, developing a powerful root system, somewhat reduces the bulk weight of the upper horizons of the soil (Table 5).

Table 5 - Influence of irrigation on the water-physical properties of soils in the experimental plot (sowing of alfalfa)

Horizons, cm	Bulk weight, t/m		The lowest moisture capacity in %	
	Initial condition, in spring 2010	in autumn 2010	Initial condition, in spring 2010	in autumn 2010
0-20	1,2	1,28	26,1	26,4
20-40	1,3	1,29	27,4	27,2
40-60	1,3	1,31	26,0	26,1
60-80	1,3	1,31	26,0	25,9
80-100	1,3	1,31	25,4	26,4
0-100	1,28	1,21	26,0	26,4

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ТӨГІНДІ СУЛАРМЕН СУҒАРҒАНДА ТОПЫРАҚТЫҢ МИКРОЭЛЕМЕНТТЕРМЕН ЛАСТАНУ ЖАҒДАЙЫ

Аңдатпа

Бұл жұмыста Алматы облысының "Илийский" шаруа қожалығында төгінді сулармен суғару кезіндегі топырақтың химиялық құрамы зерттелді. Төгінді сулардың топырақ қасиеттеріне әсері анықталды. Егер де дайындалған төгінді сулармен суғару кезінде суғарудың технологиясы мен ұсынылатын параметрлері сақталса, топырақтың су-физикалық және химиялық қасиеттерінде айтарлықтай теріс өзгерістер орын алмайтындығы айқындалды. Ал орын алған жағымсыз әсерлер тек қана маусымдық сипатта болып және дұрыс агротехникалық жұмыстар жүргізілген жағдайда, олардан ешқандай қауіп болмайтындығы анықталды.

Кілт сөздер: топырақ, ластану, төгінді сулар, микроэлементтер, химиялық анализ.

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О ВОЗМОЖНОСТИ ЗАГРЯЗНЕНИЯ ПОЧВ МИКРОЭЛЕМЕНТАМИ ПРИ ПОЛИВЕ СТОЧНЫМИ ВОДАМИ

Аннотация

Проведено изучение химического состава почвы при орошении сточными водами в ПК "Илийский" Алматинской области. Выявлено влияние сточных вод на свойства. Установлено, что при соблюдении рекомендованных параметров технологии и орошения при поливе подготовленными сточными водами не происходит существенные ухудшении водно-физических, химических свойств почвы. Имевшее весь негативные явления, носит сезонный характер и при проведения нормальной агротехники, они не представляют серьезной опасности.

Ключевые слова: почва, загрязнение, сточные воды, микроэлементы, химический анализ.