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ПНЕВМОВАКУУМДЫ (ЭРЛИФТТІ) СОРҒЫ ҚОНДЫРҒЫСЫН ЗЕРТХАНАЛЫҚ СЫНАУ

Аңдатпа

Мақалада пневмовакуумды (эрлифтті) сорғы қондырғысының тәжірибелік үлгісін зертханалық сынақтан өткізу әдісі қарастырылған және оның оң нәтижелі қорытындылары келтірілген.

***Кілт сөздер*:** су берілісі, ПӘК, эрлифт, салыстырмалы салмақ, пневмовакуумды (эрлифтті) сорғы қондырғысы, эжектор, аэрация, су көтеру, сығымдалған ауа.

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LABORATORY TESTS OF THE PNEUMOVACUUM (AIR-LIFT) PUMPING INSTALLATION

Annotation

The article considers the technique of conducting the laboratory tests of the experimental sample of the pneumovacuum (air-lift) pumping installation and also given the results of its positive tests.

***Keywords*:** feed (supply), efficiency, air-lift, specific weight, pneumovacuum (air-lift) pumping installation, ejector, aeration, water lift, compressed air.

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CHANGES IN FERTILITY OF MEADOW BOG SOILS WHEN WATERING WITH LIVESTOCK RUNOFF IN KYZYLORDA REGION

Abstract

The article presents the results of a research of the fertility of meadow bog soils during irrigation by livestock runoff. Studies in the Kyzylorda region have shown that watering with livestock runoff mixed with river water led to some improvement in both potential and effective soil fertility.

Key words: soil, watering, fertility, livestock runoff, river water.

Introduction

Livestock runoff is a valuable organic fertilizer that can significantly improve soil fertility and crop yields. The content of organic matter in livestock runoff for biological oxygen consumption (BOD) is three times or more higher than that of domestic and industrial wastewater. They contain a significant amount of biogenic elements (nitrogen, phosphorus, potassium), useful microorganisms, trace elements and other chemical compounds. It is established that the scientifically-based introduction of livestock effluents increases the yield of agricultural crops, reduces the consumption of natural water, reduces the amount of applied mineral fertilizers.

However, the introduction of livestock effluents as organic fertilizers has not been adequately studied. Therefore, their utilization in the soil-plant-water system is an urgent problem both for protecting water sources from pollution, and for increasing soil fertility and crop yields.

Materials and methods

The most cost-effective and environmentally safe technology for the purification of livestock waste is their use in a mixture with river water for fertilizing agricultural crops, where complete purification is achieved. When introducing effluents to irrigation fields, several tasks are simultaneously solved: soil cleansing is carried out and the effluents are not discharged into water sources, the soil is humidified, and nutrient elements of livestock wastes are used, which increases crop yields.

Results and discussion

Studies conducted in the Kyzylorda region have shown that watering with livestock runoff in a mixture with river water has led to some improvement in both potential and effective soil fertility. If at the beginning of the experiment the content of mobile nitrogen in the meter layer of soil was 4,1 mg/kg, phosphorus 1,73 and potassium 10,1 mg/100 g of soil, then after 3 years of irrigation on the control variant, the content of hydrolyzable nitrogen was 4,54, mobile phosphorus - 1,93 and potassium - 10,18 mg/100 g of soil. When watering with river water, they also increased, but as the mixing dose increased, it manifested itself to a lesser degree (Table 1).

There was an increase in the content of humus in all variants of the experiment. When watering with livestock runoff in a mixture with river water, the humus content increased from 0,96% to 1,08%. As the mixing dose increased, the growth was less pronounced.

The increase in both effective and potential soil fertility is the result of the positive effect of livestock effluents on the soil. The elements of mineral nutrition contained in the effluents are completely absorbed by the soil and enrich it with mobile forms.

Table 1 - Influence of livestock runoff on the fertility of meadow-bog soils (under the sowing of alfalfa)

Variant	Soil horizon, cm	Humus, %	Total nitrogen, %	Gross phosphorus, %	Mg / 100 g of soil:		
					hydrolysable nitrogen	mobile phosphorus	mobile potassium
The initial state	0-20 20-40 40-60 60-80 80-100 0-100	2,7 1,55 0,57 0,96	0,172 0,112 0,10 0,077	0,09 0,09 0,09 0,054	10,1 6,2 1,8 1,2 1,0 4,1	3,8 3,2 1,1 0,5 0,13 1,73	16,8 11,2 10,1 8,4 3,6 10,1
Variant I. Watering with river water	0-20 20-40 40-60 60-80 80-100 0-100	2,75 1,60 0,42 0,95	0,176 0,098 0,10 0,078	0,09 0,09 0,09 0,054	10,9 8,3 2,0 1,4 0,11 4,542	4,0 4,0 1,0 0,48 0,16 1,93	17,8 11,9 11,2 6,4 3,6 10,18

Variant II. Watering with livestock runoff with mixing 1: 4	0-20	3,01	0,188 0,28	0,10	12,85	4,2	19,0
	20-40	1,80	0,120	0,09	9,4	3,6	12,8
	40-60	0,60	0,118	0,09	2,8	1,6	9,6
	60-80	1,082		0,056	1,9	0,60	9,4
	80-100				1,21	0,19	3,9
	0-100				5,63	2,038	10,94
Variant III. Watering with livestock runoff with mixing 1: 6	0-20	2,85	0,190	0,09	12,2	4,4	18,8
	20-40	1,76	0,202	0,10	8,8	3,6	13,2
	40-60	0,68	0,110	0,09	3,2	1,8	10,4
	60-80	1,058	1,0094	0,056	1,85	0,68	9,1
	80-100				1,36	0,18	3,8
	0-100				5,482	2,132	11,06
Variant IV. Watering with livestock runoff with a mixing 1: 8	0-20	2,87	0,180	0,085	11,6	4,2	18,4
	20-40	1,70	0,120	0,09	8,4	3,8	12,6
	40-60	0,56	0,108	0,098	2,1	0,98	8,9
	60-80	1,026	0,082	0,055	1,8	0,70	9,6
	80-100	-	-	-	1,4	0,22	2,8
	0-100	-	-	-	5,06	1,98	10,46

The main condition for irrigation is the preservation of soil fertility. When irrigating with livestock runoff, as already noted, organic fertilizers come into the soil, and this leads to some improvement in the effective and potential fertility of the soil.

Balance calculations performed on the experimental plot No.2 on the nutrients (nitrogen and phosphorus) show that the overall balance is positive (Table 2).

If in the initial state the meter layer of soil contained 10,47 t / ha nitrogen and 7,34 t/ha phosphorus, then after 4 years of irrigation, their content in the variants which irrigated with mixed water (livestock runoff + river water) increased: nitrogen - to 11,52 – 16,05 t/ha,

phosphorus – 7,48 – 7,62 t/ha. At the same time as the dose of mixing livestock water with river water increased, the accumulation of nitrogen and phosphorus in the soil decreased. Some of the nitrogen and phosphorus migrated outside the meter layer of soil and accumulated in the lower layers. The high nitrogen absorptivity with a meter layer of soil was noted in variant III, where irrigation was carried out in a ratio of 1: 6, and phosphorus - in variant IV.

The lysimetric experiments of a number of scientists [1,2,3] have shown that the elements of the mineral nutrition washed outside the meter layer are absorbed and fixed in the next half-meter layer of soil.

The accumulation of nitrogen in the soil can sometimes cause the danger of migration of its oxidized forms to groundwater. In this connection, on the fields of irrigation control over the hydrochemical regime of groundwater is necessary. Therefore, as already mentioned, there is a need for the construction of drainage.

Table 2 - Balance of nutrients of the experimental plot No.2 (sowing of alfalfa, irrigation plot of the 4th year)

Variant of experience	Indicator	The initial content of elements in the soil, t / ha	Discharged volume into the soil for 4 years with water:		Removal of nutrients with the harvest, t / ha	The final content of nutrients in the soil, t / ha	Accumulation decrease, t / ha (+ ;-). V	Removal of nutrients beyond the meter layer, t / ha
			for 4 years water is supplied, t	total discharged volume, t / ha				

			/ha					
Variant I (river water)	N	10,47	24320	0,33	0,0074	10,60	+0,13	0,193
	P	7,34		0,18	0,0034	7,34		0,177
Variant II (a mixture 1: 4)	N	10,47	24320	6,03	0,026	16,05	+5,58	0,45
	P	7,34		2,10	0,002	7,62	+0,28	1,90
Variant III (a mixture 1: 6)	N	10,47	24320	2,89	0,024	12,78	+2,31	0,556
	P	7,34		2,67	0,0017	7,62	+0,28	1,39
Variant IV (a mixture 1:8)	N	10,47	24320	1,70	0,020	11,52	+1,05	1,63
	P	7,34		1,14	0,0018	7,48	+0,14	1,0

Conclusions

The use of prepared livestock runoff on irrigation fields as organic fertilizers will prevent their discharge into surface water sources and prevent contamination of these waters by nutrients and heavy metals. As a result of the studies, an increase in the humus content was noted in all the variants of the experiment. When watering with livestock runoff in a mixture with river water, the humus content increased from 0,96% to 1,08%. As the mixing dose increased, the growth was less pronounced.

The increase in both effective and potential soil fertility is the result of the positive effect of livestock runoff on soil. The elements of mineral nutrition contained in the runoff are completely absorbed by the soil and enrich it with mobile forms.

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ҚЫЗЫЛОРДА ОБЛЫСЫНДА МАЛШАРУАШЫЛЫҚТЫҚ АҚАБА СУЛАРМЕН СУҒАРҒАНДАҒЫ ШАБЫНДЫҚ-БАТПАҚТЫ ТОПЫРАҚТАРДЫҢ ҚҰНАРЛЫЛЫҒЫНЫҢ ӨЗГЕРУІ

Аңдатпа

Мақалада малшаруашылықтық ақаба сулармен суғарғандағы шабындық-батпақты топырақтардың құнарлылығын зерттеу нәтижелері келтірілген. Қызылорда облысында

жүргізілген зерттеулер көрсеткендей, ақаба суларды өзен суымен араластырып суғаруға пайдаланғанда, топырақтың құнарлылығының артқандығы байқалған.

Кілт сөздер: топырақ, суғару, құнарлылық, малшаруашылықтық ақаба сулар, өзен суы.

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ИЗМЕНЕНИЯ ПЛОДОРОДИЯ ЛУГОБОЛОТНЫХ ПОЧВ ПРИ ПОЛИВЕ ЖИВОТНОВОДЧЕСКИМ СТОКОМ В КЫЗЫЛОРДИНСКОЙ ОБЛАСТИ

Аннотация

В статье приведены результаты исследования плодородие лугоболотных почв при поливе животноводческим стоком. Исследования, проведенные в Кызылординской области показали, что полив животноводческим стоком в смеси с речной водой привел к некоторому улучшению как потенциального, так эффективного плодородия почвы.

Ключевые слова: почва, полив, плодородия, животноводческий сток, речная вода.

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ЛЕСОВОДСТВЕННО-ЗООЗАЩИТНАЯ ОЦЕНКА ЛЕСОНАСАЖДЕНИЙ-ЗОНТОВ НА ПАСТБИЩАХ АРИДНОЙ ЗОНЫ ЮГО-ВОСТОКА КАЗАХСТАНА

Аннотация

В статье приведены результаты рекогносцировочных обследований территории, выявление лесонасаждений – зонтов, оценка соответствии их своему назначению на пастбищах аридной зоны юго-востока Казахстана

Ключевые слова: Зоозащитная оценка, лесонасаждения-зонты, пастбища аридной зоны, дневная температура, вязь приземистый, саксаул, биогруппа.

Введение

Казахстан занимает территорию равную 2 724 902 км². Свыше 170 млн га этой площади или около 80% под пастбищами. Они расположены в основном в зонах с очень жесткими климатическими условиями, и вполне естественно, что развитие животноводство на этой огромной территории связано не только с улучшением состояния пастбищ, но с улучшением содержания животных, в частности с защитой в жаркий период от прямых солнечных лучей путем содержания в тени зеленых насаждений, так называемых зеленых (древесных) зонтов. Целесообразность создания лесонасаждений-зонтов на пастбищах доказана их успешным использованием на юго-востоке России в Астраханской и Волгоградской областях, Калмыкии, Ставропольском крае.

Основой для проводимых разработок явились исследования Всероссийского (бывшего Всесоюзного НИИ агролесомелиоративных исследований [1, 2] и КазНИИЛХА по вопросу агротехники создания зеленых (древесных) зонтов на пастбищах засушливой зоны для защиты животных от летнего зноя [3,4].

Исследования выполнены на пастбищах засушливой зоны юго-востока. Практическое значение метеорологических факторов в засушливых районах, где температура воздуха летом бывает более 30^0С, а прямая солнечная радиация достигает 1,7 ккал/см^2 мин., для животноводства очень велико Л.И. Лопырин [5], установил, что в условиях Ставропольского края бараны – производители содержащиеся летом под открытым небом и не обеспеченные полноценными кормами, осенью неизбежно дают,