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THE EFFECT OF THE DURATION OF FLOODING OF ESTUARIES FOR THE SIZE OF IRRIGATION NORMS OF AGRICULTURAL CROPS

Abstract

In improving the design of estuary irrigation systems there is a need to clarify the parameters of the rules, duration and depth of flooding of estuaries. This article studies to establish the effect of duration of flooding estuaries on soil moisture at the depth of the root thickness and size of irrigation norms. The studies were conducted on thawed soil.

Keywords: floodplain, estuary, salt regime of the soil, soil moisture, duration of flooding.

Introduction

In Kazakhstan, one of the reliable sources of building a strong food base is estuary irrigation, which occupies more than 900 hectares, of which 73% are engineering systems. However, their average productivity is very low, which does not exceed 8-11 kg / ha. However, you can increase the productivity of grasslands estuary 2-3 times and reduce water consumption per unit of crop in 1,5-2 times by improving the design and technology of flooding estuaries.

While improving the construction of systems of irrigation estuary there is a need to refine your rules, the duration and the depth of flooding estuaries. Therefore, employees of SRIWE conducted studies to establish the effect of duration of flooding estuaries on soil moisture at the depth of the root thickness and size of irrigation norms. The studies were conducted on thawed soil.

The results of studies on the natural grasslands showed that with increasing duration of flooding estuaries is a growth the size of irrigation rate (Table 1). At the same time, with the same depth of flooding estuaries largest irrigation rate obtained for the duration of 10 days of flooding. In this embodiment, irrigation rate was 2450 m3/ha.

In the embodiment where the duration of standing water was 7 days, there was a reduction in the size of irrigation rate of 330 m3/ha in 2120 and amounted to m3 / ha. Minimum dimensions irrigation rates obtained in the embodiment, where the duration of flooding was 4 days. In this case, irrigation rate was 1460 m3/ha.

Table I Effect of flooding estuaries on the size of irrigation rates

Variants	The duration of Hooding, day	fhe average depth of Hooding, cm	Irrigation rates	
			m3 / ha	3 variants regarding the %
1	10	30	2450	148
2	7	30	2120	128
3	4	30	1660	100

Submissions that in one embodiment, the size of irrigation rates in the 48% increase with respect to option 3, and in version 2 - 28%. However, the results of the study showed moisture reserves, that as a result of flooding estuaries on options investigations there was a slight change

in the growth of moisture in the root zone soil. This is confirmed by the results of the comparative analysis of stocks of moisture in soils before and after the flooding of estuaries (Table 2).

Table 2 - Changes in inventories of moisture in the core layer of the soil in the desert changing the duration of flooding estuaries (natural grasslands)

Aquifer, cm	Before flooding		After flooding					
	%	m3 / ha	1 variants (10 days)		2 variants (7 days)		3 variants (4 days)	
			%	m‘/ha	%	m^3/ha	%	m^3/ha
0-50	19,9	1390	32,9	2300	32,9	2300	32,3	2260
0-100	16,5	2500	27,7	4160	27,0	4100	26,8	4020
0-150	17,6	4040	25,1	5760	25,1	5760	24,1	5530

Analysis of the data shows, that in 1 variant at the rate of flooding estuaries 2450 m3/ha, increase soil moisture in the 0-100 cm layer was 1660 m3/ha, and in 2 versions - 1600 m3/ha, 3 version - 1520 m3/ha. From these data it follows that as a result of flooding estuaries in practically all embodiments moisture accumulation occurred in equal volumes. Similar patterns of accumulation of moisture in the soil pores occur in the 0-150 cm layer. In these layers, with 1 and 2 variants of the accumulation of moisture we have the same value of 1720 m3 / ha, and in variant 3 - 1490 m3/ha. The result has been an increase in reserves of soil moisture in the 100-150 cm layer (Figure 1).

The remaining volumes of spent irrigation water infiltration into the lower layers of soil. On the basis of balance calculations set the size of infiltration of water when you change the duration of flooding estuaries (Table 3).

Table 3 - Dimensions infiltration losses when changing the duration of flooding estuaries (natural grasslands)

Variant	The duration of flooding, day	Irrigation rates, m3 / ha	Depth, cm			
			0-100		0-150	
			The volume of savings, m3Zha	Volumes infiltration losses, m3/ha	The volume of savings, m3/ha	Volumes infiltration losses, m3/ha
1	10	2450	1660	790	1720	730
2	7	2120	1600	520	1720	400
3	4	1660	1520	140	1490	170

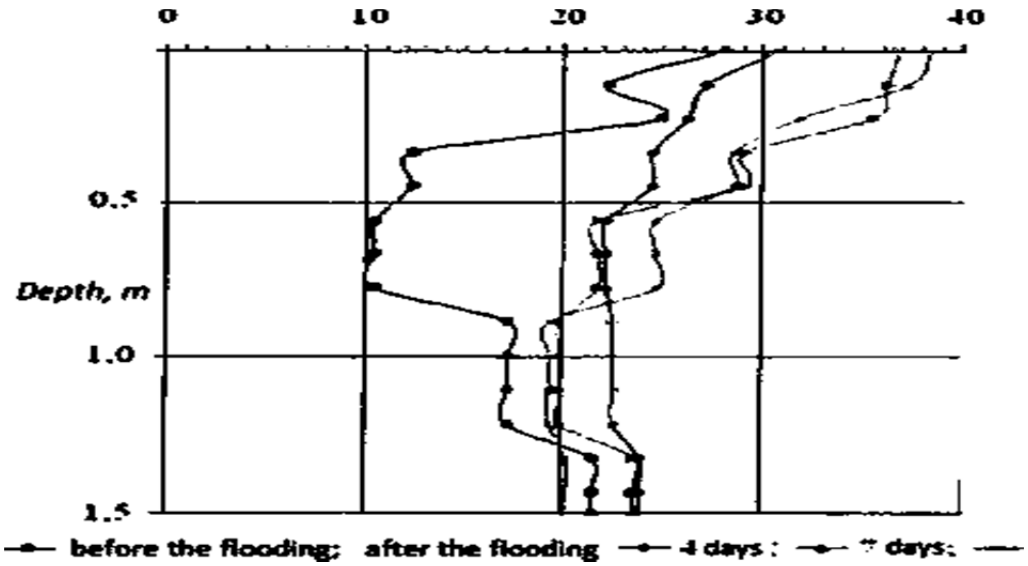

Figure 1 - Changes in inventories of soil moisture in the vadose zone when you change the duration of flooding estuaries

The dependence of seepage losses from the sizes of irrigation rates and soil moisture are confirmed by data obtained under irrigation scattered meadows. In this case, as in the natural meadows, changing the length of flooding estuaries determine different amounts of moisture accumulation in the root zone. This is confirmed by the study of the dynamics of soil moisture when you change the duration of flooding (Table 4).

Table 4- Changes in soil moisture when you change the duration of flooding estuaries on the green meadow,%

Aquifer, cm	Initial soil moisture	Variants			
		10 days	7 days	4 days	No flooding
0-10	25,9	36,2	42,6	36,0	27,7
10-20	24,6	37,6	36,2	34,2	20,3
20-30	20,1	32,4	31,3	29,1	20,7
30-40	15,3	33,7	29,5	22,7	14,8
40-50	15,3	33,7	29,5	22,7	14.8
50-60	17,1	26,0	21,6	23,2	15,1
60-70	17,1	26,0	21,6	23,2	15,1
70-80	17,1	26,0	21,6	23,2	15,1
80-90	17,3	21,1	19,5	20,7	17,7
90-100	17,5	21,1	19,5	20,7	17,7
100-110	17,3	21,1	19,5	20,7	17,7
110-120	17,5	21,1	19,5	20,7	17,7
120-130	25,3	26,1	25,7	20,7	23,9
130-140	25,5	25,8	24,7	26,5	23,9
140-150	25,3	26,2	25,7	26,5	23,9

From the submissions, it follows that as a result of flooding of estuaries is an increase in soil moisture in all variants. The maximum amounts of moisture accumulation occurs in the upper layers of soil strata of the root.

A comparative analysis of changes in soil moisture shows that as a result of flooding estuaries have occurred about the same amount of accumulated moisture in the root zone. For example, in 1 variant, where the duration of flooding was 10 days, the soil moisture in the 0-150 cm layer was 26.1%. In variant 2 there was a significant decrease in soil moisture and their figures were 25.4% and in 3 versions - 25.2%. While in the control variant, which is not flooded, soil moisture was the lowest value, which amounted to 19.8% (Table 5).

Therefore, in cases where the lagoons are flooded, regardless of the duration of soil moisture occurred to the depth of the active layer of the soil.

Table 5 - The volume of the accumulation of moisture in the 0-150 cm soil layer by flooding estuaries (seeded grassland)

Aquifer, cm	No flooding (control)		After flooding					
	%	m^J/ha	1 variants (10 days)		2 variants (7 days)		3 variants (4 days)	
			%	m^J/ha	%	m^J/ha	%	m^J/ha
0-50	20,2	1420	34,8	2450	34,8	2450	29,3	2060
0-100	22,6	3300	29,4	4290	27,8	4060	26,8	3800
0-150	19,8	4520	26,1	5950	25,4	5790	25,2	5750

The experimental data obtained by flooding estuaries on the green meadow confirm the data obtained by flooding estuaries with natural meadow. It was found that with increasing standards of flooding is an increase in the cost of water infiltration. Therefore, as in the previous case, the largest volumes of seepage losses obtained in the variant 1. In this variant a 0-100 cm layer of moisture accumulation volume was 990 m3/ha, and infiltration water - 1460 m3/ha. Therefore, about 60% was spent irrigation water infiltration. In variant 2, the amount of water infiltration below the 0-100 cm layer was 1360 m3/ha, ie, about 64% of irrigation water consumed infiltration. In variant 3, where the rate of flooding was 1660 m3 / ha, the amount of water infiltration was 1160 m3/ha.

Result and discussion

Infiltration of water below the 0-100 cm layer, moving to lower levels, soil moisture causes the growth. Therefore, in 1 embodiment, the amount of 0-150 cm layer of moisture accumulation was 1430 m3/ha, respectively, and decreased the size of infiltration losses. In this embodiment, the size of seepage losses later in 0- 150 cm layer it was 1,020 m3/ha, or 41.6% irrigation rate. In the second case there was a further decline in the infiltration of water. The volume of the accumulation of moisture in the 0-150 cm was 1270 m3/ha. The increase in the accumulation of moisture in the lower horizons of the estuaries has led to a decline in infiltration losses, which amounted to 880 m3/ha, or 40.9% of irrigation rate.

In variant 3 there was a further reduction in the size of infiltration losses. In the 0-150 cm layer of moisture storage size reached 1230 m3 / ha, and the volume of seepage losses - 430 m3/ha. This indicates that the 3 options to reduce the rate of flooding has reduced seepage losses to 25.9% of normal flooding estuaries.

In the context of the Karaganda region, where the soil and hydrological conditions make it difficult to drain groundwater and lead to intensive rise in their level of occurrence, is intense salinity of estuaries. Therefore, in the Karaganda region there is the problem of reducing the

volume of seepage losses and increase the rate of demineralization of the root soil strata. Therefore, using physical simulation, we have investigated the influence of flooding norms on the amount of infiltration losses.

Conclusion

The climatic conditions in Central Kazakhstan are characterized by high variability of climatic conditions where moisture deficit in the conditions of the Karaganda region ranges from 838 m3/ha (1.5% of the security) to 7415 m3/ha (95.8% probability).

2. The currently used design inundated estuaries in Central Kazakhstan differ imperfection and low technological justification. This predetermines the low productivity of estuaries and high costs per unit of agricultural production.

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КӨЛТАБАНДЫҚ СУ БАСУ МӨЛШЕРІНІҢ АУЫЛШАРУАШЫЛЫҒЫ ДАҚЫЛДАРЫНЫҢ СУАРУ НОРМАЛАРЫНА ӘСЕРІ

Аңдатпа

Бұл макалада гелтабандык су басу мөлшерінің ауылшаруашылығы дақылдарының суару нормаларына әсері каралды. Табиғи жағдайда жасалған зерттеу нәтижелері су басу мөлшерінің артуынан жайылымдық қолтабаңмен суару нормасы көбейетінін көрсетті. Су басу мөлшерінің өсуінен көп мөлшерде су шығыны топырақ бойына сүзінуге кетеді. Дш және бұл су жер асты суына қосылатыны, вегетациялық кезеңде жоғары ылғалдылықты топырақтың тамыр кабатында ұстап тұратындығы орнатылған.

Кілт сөздер: жайылымдык, қолтабан, топырақтың тұздылығы, топырақ ылғалдылығы, су басу ұзақтығы.

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ВЛИЯНИЕ ПРОДОЛЖИТЕЛЬНОСТИ ЗАТОПЛЕНИЯ ЛИМАНОВ НА РАЗМЕРЫ ОРОСИТЕЛЬНЫХ НОРМ СЕЛЬСКОХОЗЯЙСТВЕННЫХ КУЛЬТУР

Резюме

В этой статье было рассмотрено влияние продолжительности затопления лиманов на размеры оросительных норм сельскохозяйственных культур. Результаты исследований, проведенных на естественных лугах, показали, что с ростом продолжительности затопления лиманов происходит рост размеров оросительной нормы. Установлено, что с ростом норм затопления происходит увеличение затрат воды на инфильтрацию, что в свою очередь ведет к тому, что инфильграционные потери оросительных вод поступая в грунтовые воды, приводят к подъему уровня грунтовых вод, который в вегетационный

период, поступая в зону аэрации, поддерживает высокие влажности почв в корнеобитаемом слое.

Ключевые слова: пойменный, лиман, солевой режим почвы, влажность почвы, продолжительность затопления.

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ПРИРОДНАЯ И АНТРОПОГЕННАЯ НАРУШЕННОСТЬ ЗЕМЕЛЬ ЖОНГАР-АЛАТАУСКОГО ГНПП

Аннотация

В статье приведены данные природной и анторопогенной нарушенности территории Жонгар-Алатауского ГНПП в следствиии выпаса скота, рубок ухода, распашки территории и других факторов

Ключевые слова: Жонгар-Алатауский государственный национальный природный парк, экология, природная и антропогенная нарушенность, выпас, распашка, пожары, рубки.

Введение

Территория Жонгар-Алатауского государственного национального природного парка является одним из уникальных уголков нашей республики. Обилие флоры, в том числе редкой, разнообразие фитоценозов, уникальность ландшафтов, с одной стороны и антропогенного пресса, который ведет к трансформации почвенно-растительного покрова с другой, указывают на необходимость организации Жонгар-Алатауского государственного национального природного парка. Пояс горных еловых лесов, лесных лугов и луговых степей 1700 (1750) - 2200 (2250) м. Этот пояс является комплексом трех отличных друг от друга типов растительности: лесного, лугового и степного. Лесной пояс в свою очередь состоит из двух типов: хвойные леса и лиственные леса.

Материалы и методы исследований

В ходе исследований были использованы биологические, таксационные, биометрические методы исследований для изучения состояния лесного фонда в наиболее типичных участках [1,2].

Результаты и обсуждение

Важными факторами, постоянно изменяющими природные комплексы, являются современные физико-геологические процессы: водная и ветровая эрозии. Как для горных, так и для равнинных участков долин рек водная эрозия постоянно формирует береговую линию, наблюдается подмыв берегов, свежие эрозионные врезы, образование стариц и островов. При использовании данной территории в рекреационных целях необходимо особое внимание. В данном случае вопрос стоит не только о сохранении объектов показа, но и о безопасности пребывания рекреантов вблизи камнепадов и разрушающихся склонов. Природная нарушенность ландшафтов практически отмечается по всей рассматриваемой территории, которая выражена в образовании оврагов и размывов дорог после ливневых дождей и грязево-селевых потоков (особенно в долине реки Сарыкан), что