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Article

Salt Washing and its Importance in The Production of Agricultural Products

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Abstract: At the moment when new and intensive techniques and technologies are widely introduced in agriculture, the issues of effective use of soil and achieving high productivity are becoming urgent tasks. It is of great importance to improve the land reclamation and ecological condition, increase the efficiency of the use of land and water resources by applying agrotechnical, agro-meliorative and other measures on irrigated lands.

Keywords: Salt Washing, Water Salinity, Irrigated Lands, Agrotechnical Measures, Agro-Meliorative Measures, Weakly Saline Areas, Salt-Tolerant Crops

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1. Introduction

Our republic has a total of 4.3 million hectares of irrigated land, and almost 50% of this area is salted land of various degrees. Salinity is a process that determines the productivity, melioration and ecological status of irrigated lands, and as a result of this process becoming more active in cultivated areas, it creates difficulties for the effective use of agricultural lands for farming, prevents the normal growth of plants and the productivity of crops has a negative effect.

Due to global climate change, the constant increase in the population, as well as the expansion of economic sectors, the demand for water is increasing year by year, and the shortage of water resources is increasing. Since our country is located in the Aral Sea basin, its main water source is the transboundary rivers Amudarya and Syrdarya. In accordance with the schemes for the integrated use and protection of water resources in the basins of these rivers, the average multi-year water withdrawal limit for our country is 64 billion cubic meters. However, due to the global environment, as well as the problems of transboundary water use, the average annual amount of water used has decreased to 51-53 billion cubic meters. "Improving the reclamation status of irrigated lands and ensuring their stability, promoting land productivity, using effective technologies to reduce and prevent soil salinization, and reducing the area of saline irrigated lands by 226 thousand hectares"[1] were identified as priority tasks in the Decree of the President of the Republic of Uzbekistan No. PF-6024 dated July 10, 2020.

2. Materials and Methods

Comparative and comparative analysis, complex assessment methods were used in the study of the problem.

3. Results and Discussion

The There are a total of 4.3 million hectares of irrigated land in our republic, and an average of 90-91 percent of the total water resources are spent on agriculture, about 45.7 percent of this area is saline land of varying degrees. Due to the lack of natural drainage and the high level of mineralization of groundwater, a number of areas in our republic are "primary salinized". In addition, due to the inefficient use of water resources and the negative impact of other anthropogenic factors, "secondary salinization" of land is observed in some areas. Salinity is a process that determines the fertility, reclamation and ecological status of irrigated lands, and as this process becomes more active in cultivated areas, it creates difficulties in the effective use of agricultural land for farming, negatively affects the normal growth of plants and crop yields. Therefore, the restoration of saline lands is one of the important issues in agriculture. Soil salinization, especially in arid regions, can occur due to water regime violations, improper irrigation techniques and other factors [2].

Table 1. The level of salinity of the republic's territories.

No	Name of the area	Common irrigated lands	Unsalted area		Salted area		Including					
							Strong		Medium		Weak	
			Thousand hectares	%	Thousand hectares	%	Thousand hectares	%	Thousand hectares	%	Thousand hectares	%
1	Republic of Karakalpakstan	517.1	150.6	29.1	366.6	70.9	20.4	3.9	182.7	35.3	163.5	31.6
2	Andijan	271.1	264.9	97.7	6.2	2.3	0	0	2.5	0.9	3.7	1.4
3	Bukhara	276.3	41.8	15.1	234.5	84.9	5.5	2.0	56.6	20.5	172.4	62.4
4	Jizzakh	303.9	82.7	27.2	221.2	72.8	4.5	1.5	44.2	14.5	172.5	56.8
5	Kashkadarya	513.5	293.3	57.1	220.1	42.9	8.7	1.7	34.9	6.8	176.5	34.4
6	Navoi	131.9	36.3	27.5	95.6	72.5	0.7	0.5	10.1	7.7	84.8	64.3
7	Namangan	288.5	264.4	91.6	24.1	8.4	0.7	0.2	5.0	1.7	18.4	6.4
8	Samarkand	380.2	374.4	98.5	5.8	1.5	0	0	0.4	0.1	5.4	1.4
9	Surkhandarya	324.9	232.1	71.4	92.8	28.6	1.2	0.4	28.5	8.8	63.1	19.4
10	Sirdarya	287.5	10.3	3.6	277.2	96.4	6.9	2.4	63	21.9	207.3	72.1
11	Tashkent	400.2	391.1	97.7	9.1	2.3	0	0	1	0.2	8.1	2.0
12	Fergana	368.6	283.7	77	84.9	23	0.2	0.1	5.6	1.5	79.1	21.5
13	Khorezm	265.6	0	0	265.7	100	29.3	11	76.3	28.7	160.1	60.3
	Total	4329.3	2425.6	56	1903.8	44	78.1	1.8	510.8	11.8	1314.9	30.4

If we pay attention to the data in the table, the total irrigated land of our Republic is 4.3 million hectares. Kashkadarya region (513.5 thousand hectares) ranks second in the country after Karakalpakstan (517.1 thousand hectares) in terms of irrigated land. 57.1% of the arable land of our region is non-saline land, while the remaining 42.9% of the arable land is salted land of various degrees. In the composition of areas with different levels of salinity, a large amount, i.e. 34.4% (176.5 thousand hectares) is made up of weakly saline areas.

Table 2. Dynamics of changes in salinity of irrigated lands in Kashkadarya region.

Years	Common irrigated area (thousand of hectares)	According to the degree of salinity									
		Unsalted areasr		From this							
				Common salted areas		Low salted		Medium salted		Strong salted	
		Thousands of hectares	%	Thousands of hectares	%	Thousands of hectares	%	Thousands of hectares	%	Thousands of hectares	%
2021	514.1	281.8	54.8	232.3	45.2	184.6	35.9	38.1	7.4	9.6	1.9
2022	514	286.3	55.7	227.7	44.3	182	35.4	36.4	7.1	9.2	1.8
2023	513.5	291	56.7	222.5	43.3	178.3	34.7	35.3	6.9	8.9	1.7
2024	513.5	293.3	57.1	220.1	42.9	176.5	34.4	34.9	6.8	8.7	1.7

Unfortunately, the problem of salinity of cultivated fields is considered one of the problems that have not been completely solved in the world. Therefore, systematic work is required to eliminate this problem. It is important that in agriculture, improper irrigation of crops, rise of flood waters, malfunction of collector-drainage systems, etc., can lead to the expansion of the problem of salinity. The depth of the underground water and its level of mineralization are of great importance in soil salinity. The reason is that when a crop is planted, salt in the soil damages its root system and prevents it from growing well [3]. Salt washing is used in practice to remove salts from the soil, which have a negative effect on the productivity of cultivated areas, and to reduce the mineralization of seepage waters. Here, it should be noted that salt washing represents the removal of harmful salts from the soil for a certain period of time.

Salt washing is carried out in two ways:

1. Basic saline wash. The main salt washing is carried out in the development of new lands and in strong and salty lands that are being used.
2. Current saline wash. This washing is carried out every year after the harvesting of crops in all used saline areas.

It is necessary to pay special attention to the determination of salt washing periods and norms according to the salinity level of the land and the soil-climatic conditions of the place. It has been proven in many studies that the productivity of relatively weakly saline soils can decrease by 15-20%, the productivity of moderately saline soils can decrease by 30-50%, and the productivity of strongly saline soils can decrease by 70-80%. . Therefore, improvement of land reclamation allows to increase the productivity of crops. Plowing, general and current leveling of the land on saline lands are carried out in a timely manner, depending on the degree of salinity of the soil, 2000-2500 m3 per hectare of weakly saline lands (1 time, in some sources 1000-1500 m3/ha), average saline land 4000-4500 m3 per hectare (2 times, some in sources 2000-3000 m3/ha), and highly saline lands are washed with 6000-6500 m3 (3.4 times, in some sources 3000-4000 m3/ha).

When washing the salt of the land, from the beginning of the field to the bottom, each floor is opened and filled with water separately, but it is not possible to open water from floor to floor. After each watering in moderately and strongly saline soils, after 2-3 days in light soils, 5-6 in medium soils, and 7-8 days in heavy soils, 2 more and if necessary. The salt of the land is washed away by flooding it 3 times. The most optimal period for washing the earth's salt is the period from the second decade of November to the first decade of February. ¾ of soil salt washing is carried out in November and December, and the remaining ¼ in February. When washing the soil salt, the soil temperature should not be

lower than -7-10 degrees. Usually, in the years when there is a shortage of water, in order to save river water, ditch collector water is used to wash the soil. When washing highly saline lands with saline water from the ditch, it can be washed until it reaches the concentration of this water (until the salt falls to the level of salinity of this water), and then it is advisable to use river water to wash the salt as needed [4]. The flatness of field areas is of great importance in leaching soil salt. The reason is that salt can be washed well only on a flat area, otherwise the salts will go up to the high places of the field and accumulate, which will cause the planted crops to become sparse. It should be noted here that 50% of the yield depends on fertilizers in non-saline lands, while in saline lands the effect of mineral fertilizers is less [5].

Despite the fact that salt washing measures serve to increase the productivity of crops to some extent, they can cause certain economic losses. Because about 5.5 million m3 of water is used for salt washing. At the same time, 40 million m3 of water is required for agriculture. Today, when there is a shortage of water, spending this amount of water every year for salt washing certainly limits the effective use of water resources that are already scarce. It is well known that highly saline soils cannot be converted to healthy soils overnight. amount of yield is lost [6].

It is known that there are two types of salinity: primary and secondary. Primary salinity refers to the rise of soil moisture due to heat and salinity leaving the surface of the earth, while secondary salinity occurs through the human factor, i.e. due to improper irrigation and improper agrotechnical measures. will come The main point of salinity in our country is considered to be the Arolboi region.

In addition to salt washing activities, salt-resistant plants are planted in order to improve the efficiency of using these lands. Genbank of salt-tolerant plants recommended by prof. Kushiyev, halophyte, autumn grain and leguminous grain, nutritious, oilseed and technical crop varieties selected as a result of studying the gene pool of plants in a saline environment, collection samples are kept. Examples of salt-tolerant plants include triticale, barley, and oat, among winter grains, soft wheat, rye, rye, and triticale. In order to improve the productivity of saline soils and increase the quality of feed, cultivation of plants such as sorghum, green peas, and vetch as intercrops in saline soil conditions allows for effective use of saline arable land and the development of beekeeping. Technical crops like cotton, oilseeds like sunflower, rapeseed (which is also a good fodder for livestock), sorghum and soybeans can be grown in saline soils. At the same time, corn, sorghum, African sorghum, potatoes, sweet potatoes, and pomegranates are among the nutritious crops that are suitable for saline soils.

4. Conclusion

At this point, halophyte plants are the main fodder for livestock in the desert region as salt-tolerant plants. In addition, it is ecophysiologically important as medicine, oil, decorative crop, fuel crop and biomeliorant crop. More than 700 species of halophytic plants grow in Central Asia.

In addition to the above, there are several other alternatives that can be used to reduce salinity. It is important to create an effective drainage system to prevent salinity and restore the soil. This system removes excess water and reduces soil salinity.

Drip irrigation, an innovative irrigation method, also helps to save water and prevent salinity. In this type of irrigation, water is delivered directly to the plant roots and excess water does not accumulate on the soil surface. Salinity can be reduced by reducing the interval between irrigations and not over-wetting the soil. In the restoration of saline lands, deep plowing of the soil can remove saline layers to the lower layers [7].

Covering the soil surface with organic materials can help retain soil moisture and reduce salinity. Restoration of saline lands is a long-term process and requires an

integrated approach. By using these methods together, it is possible to restore soil fertility and achieve sustainable results in agriculture.

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