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Impact Of Salt Washing Rates On The Washing Of Soil Salts

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Abstract: This article determines the effectiveness of salt leaching in saline lands based on the soil conditions of the site, the depth of the seepage waters and the amount of salts they contain, the degree of land drainage (type, depth, distance between the ditches, the flow module of the ditch water), the technology of preparing the land for salt leaching (plowing, deep loosening, leveling, the size of the ridges, the relationship of the ridges with the ditches), and the duration of salt leaching.

Keywords: Salt washing rates, salinity levels, ditch module, salt content.

INTRODUCTION:

In a world where water resources are becoming increasingly scarce, developed countries such as the USA, Australia, Israel, Russia, China, and India are paying special attention to conducting large-scale research on dramatically increasing the efficiency of water use in agriculture, developing irrigation procedures for agricultural crops, water-saving irrigation technologies, zoning irrigation methods and technologies based on natural and economic conditions, identifying elements of optimal irrigation techniques, and so on.

METHODS

The research was conducted in the field and laboratory conditions, including “Methodology of conducting experiments in vegetable, olericulture and potato growing” T.: 2002 (2006).), “Methodology of experimental work in vegetable and olericulture” 1992, “Development of resource-saving technology for melon cultivation in the conditions of the Tashkent region” (T: 2022).

RESULTS AND DISCUSSION

The soil of the experimental area is light gray, saline and strongly saline, of average mechanical composition (in a 1 m layer), there are open-type ditches, seepage waters are located close to the surface of the earth (120-142 cm during salting), in preparation for salting, the land was initially plowed to a depth of 30 cm and plots of 10x20 m were taken, salting was carried out from November to the end of February 2020, with a total salting rate of 2232 m3/ha in variant 1 of the experiment, and 4800 m3/ha of water was used in variant 2 of the experiment (salting with drip irrigation).

The above-mentioned salting rates had different effects on the leaching of salts in the soil. The results of the scientific research on the leaching of salts from the soil are presented in Figure 1 and Table 1. As shown in the data of this table and figure, in the 1st variant of the experiment, as a result of salt leaching, the amount of dry residue in 1 m. layer of soil decreased from 2.314% to 1.322%, that is, by 57%. The decrease in salts mainly corresponded to the amounts of chlorine ion (from 0.639% to 0.087%) and sodium (from 0.671% to 0.201%), relatively less leached, calcium (from 0.278% to 0.222%) cation and sulfate (from 0.517% to 0.403%) anion were noted.

Changes in the ES index of salts under the influence of salt leaching were also observed in the experimental area. In this case, the ES index of the soil before salt washing in the 1st variant of the experiment was 3.228-3.970 ds/cm. on average in a 1 m. layer, which according to the accepted classification belongs to the category of saline soil. In this variant, the ES index of the soil after salt washing decreased from the saline soil level at points 1 and 2 to the average salinity level (2.12-2.26 ds/cm), at point 3, that is, the amount of salts in the soil before

salt washing was 3.670-4.350 ds/cm., and after salt washing it decreased to the level of 2.30-2.55 ds/cm (strong salinity).

In the 2nd variant of the experiment, i.e., when salt was washed by drip irrigation, the dry residue content of the soil decreased from 2.30 to 1.30%, the chlorine ion content from 0.639% to 0.061%, the sodium content from 0.671% to 0.172%, SO4- from 0.517% to 0.420%, and the calcium content from 0.222% to 0.187%, as in the 1st variant of the experiment.

When salt was washed by drip irrigation, the leaching of salts in the soil was observed mainly in a 100 cm. (50 + 50 cm) wide area around the drip irrigation pipe, with an average ES index of salts of 1 m. at a depth of 0.73-0.80 ds/cm., at a distance of 100 cm from the drip irrigation pipe this indicator was 1.41-1.51 ds/cm., and at a distance of 150 m. the salts were almost not washed out (2.65-3.35 ds/cm).

The main reason for this is that the water supplied through the drip irrigation system is distributed to a distance close to the drip pipes (100 cm), ensuring the washing out of salts of this width and depth (100x100 cm), and it was observed that the water supplied to further distances is filtered in a more vertical direction, without reaching it.

In general, the water standards given for salt leaching in the experimental area led to the leaching of salts from the soil, depending on the leaching methods (through the checkers and drip irrigation methods).

In the 1st variant of the experiment (through the checkers), 2232 m3/ha of water spent on salt leaching reduced the salts in the soil from the level of saline soil to the level of moderate and strong salinity. In the 2nd variant of the experiment (drip salt leaching), with a total salt leaching rate of 4800 m3/ha, the amount of salts in the soil was 100 cm (50+50 cm) wide and 100 cm deep around the drip irrigation pipes. The salts at a distance of 100 cm decreased to a weak salinity level, the salts at a distance of 200 cm (100+100 cm) decreased to a moderate salinity level, and the salts at a distance of 150 cm (150+150 cm) remained at a saline level without being washed away.

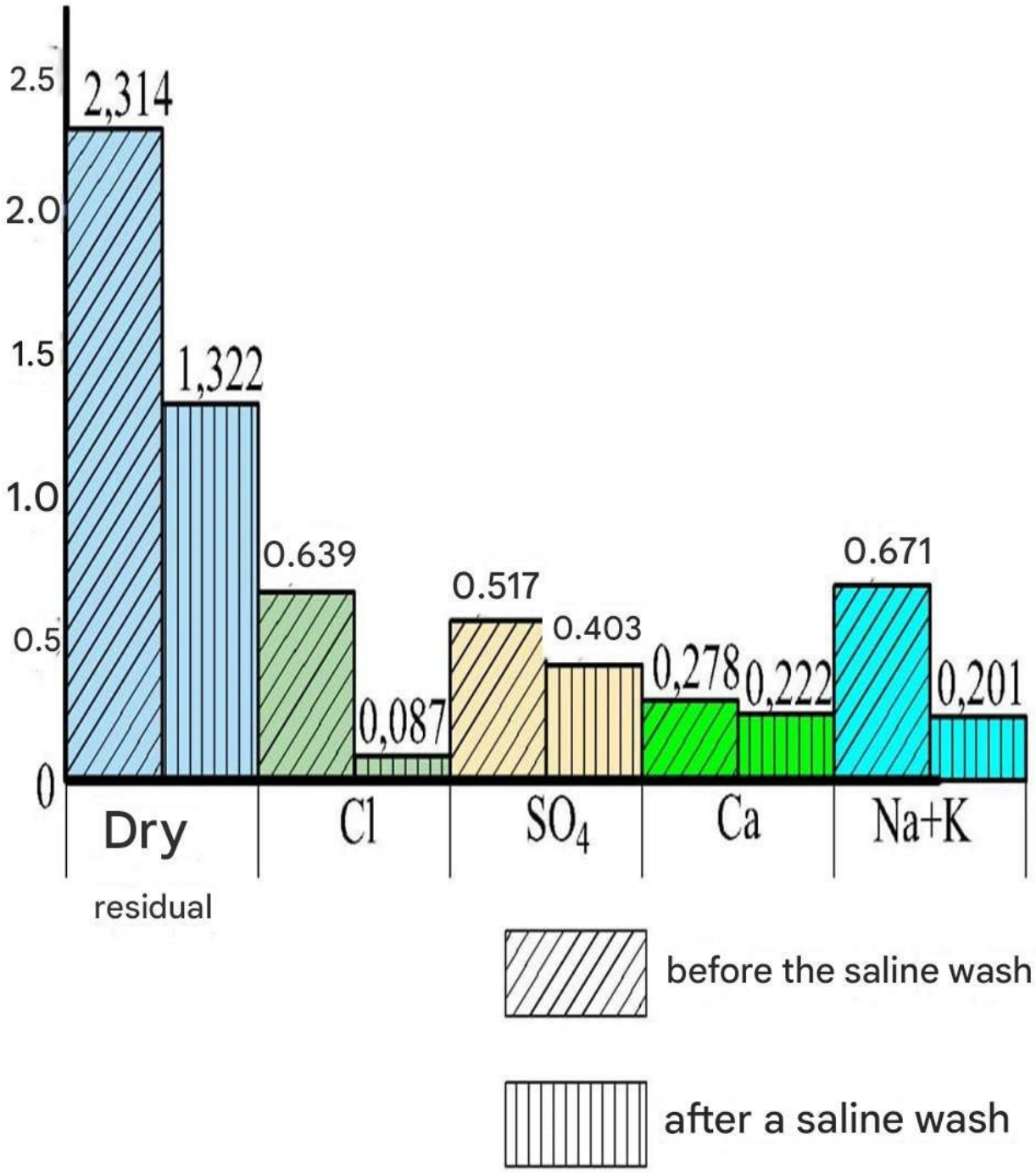

Figure 1. Leaching of salts from the soil in experiment 1

Table 1

ES indicator of soil salinity

Points	Soil layers	Before washing the salt	Salinity level	After washing the salt	Salinity level
1	0-30	4.12	salted	2.15	medium
	30-50	3.76	salted	2.00	medium
	50-70	3.55	salted	2.20	medium
	70-100	3.30	salted	2.13	medium

	average	3.68	salted	2.12	medium
2	0-30	3.47	salted	2.20	medium
	30-50	3.30	salted	2.25	medium
	50-70	3.14	salted	2.30	medium
	70-100	3.00	salted	2.30	medium
	average	3.228	salted	2.26	medium
3	0-30	4.15	salted	2.55	strong
	30-50	4.12	salted	2.48	strong
	50-70	3.78	salted	2.30	strong
	70-100	3.63	salted	2.35	strong
	average	3.97	salted	2.42	strong

CONCLUSION

1. In option 1, as a result of salt leaching, the dry residue content in a 1-meter layer of soil decreased from 2.314% to 1.322%, i.e. by 57%. The decrease in salts mainly corresponded to the amounts of chlorine ion (from 0.639% to 0.087%) and sodium (from 0.671% to 0.201%), with relatively little leaching observed in the calcium (from 0.278% to 0.222%) cation and sulfate (from 0.517% to 0.403%) anion.

2. In the 2nd variant of the experiment, i.e., when leaching salt by drip irrigation, it was found that, like in the 1st variant of the experiment, the dry residue content in the soil decreased from 2.30 to 1.30%, the chlorine ion content from 0.639% to 0.061%, the sodium content from 0.671% to 0.172%, SO4- from 0.517% to 0.420%, and the calcium content from 0.222% to 0.187%.

3. In the 1st variant (through the checks), 2232 m3/ha of water spent on leaching salt reduced the salts in the soil from the level of saline soil to the level of moderate and strong salinity. In the 2nd variant of the experiment (drip leaching salt), it was found that the total leaching rate was 4800 m3/ha.

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