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DETERMINATION OF TOTAL WATER CONSUMPTION AND WATER CONSUMPTION COEFFICIENT WHEN IRRIGATED WITH WASTEWATER IN THE GROWING OF CORN (SILAGE) CROP

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Abstract:
Efficient use of water resources in irrigated agriculture is one of today's global problems. In the territory of Uzbekistan, 12-14 thousand m3 of water is used to cultivate 1 hectare of land. [2] In our conducted scientific research work, the cultivation of corn (for silage) crops in wastewater as feed for livestock has been achieved and positive results have been achieved. When the water consumption of corn is 70-70% compared to limited field moisture capacity in the first irrigation (in 2020) regime (in irrigation with fertilizer and wastewater) 2723 m3/ha, productivity - 416 ts/ha and water consumption coefficient 8.2 m3/s*ha , in option 4 (irrigation with wastewater) when irrigation was 70-80% compared to limited field moisture capacity, water consumption was 2814 m3/ha, productivity was 432 tons/ha, water consumption coefficient was 8.0 m3/s*ha.

Keywords: wastewater, alluvial - meadow soils, water consumption, water consumption coefficient, fertilization, rate, irrigation rate, productivity

Introduction

According to the presidential decree of our country on July 10, 2020 - No. 6024 "On approval of the concept of water management development of the Republic of Uzbekistan for 2020 - 2030" [1], in recent years, obtaining high and quality products from agricultural crops, further improving the land reclamation condition, several measures are being developed and implemented for the correct and effective use of water resources. Effective use of water resources in irrigated agriculture is one of

the global problems of today. The reason for this is that the water source is not unlimited. In the territory of Uzbekistan, 12-14 thousand m3 of water is used to cultivate 1 hectare of land. [2] However, in some countries, for example, in regions with a shortage of water, it is allowed to be used after studying the composition of the collector-ditch and wastewater. Sewage and collector-ditch waters contain both harmful and useful substances. Reuse of wastewater is one of the urgent problems of today. The reason is to purify water from harmful substances while preserving useful substances. Irrigation of green areas with treated wastewater is very common in the USA, Israel, Latin America, Australia, Mediterranean and Arab countries, North Africa, and India. In several countries (Israel, Jordan, Peru, and Saudi Arabia), the direction of sewage irrigation is a state policy. [4,5,6,7,8].

Method

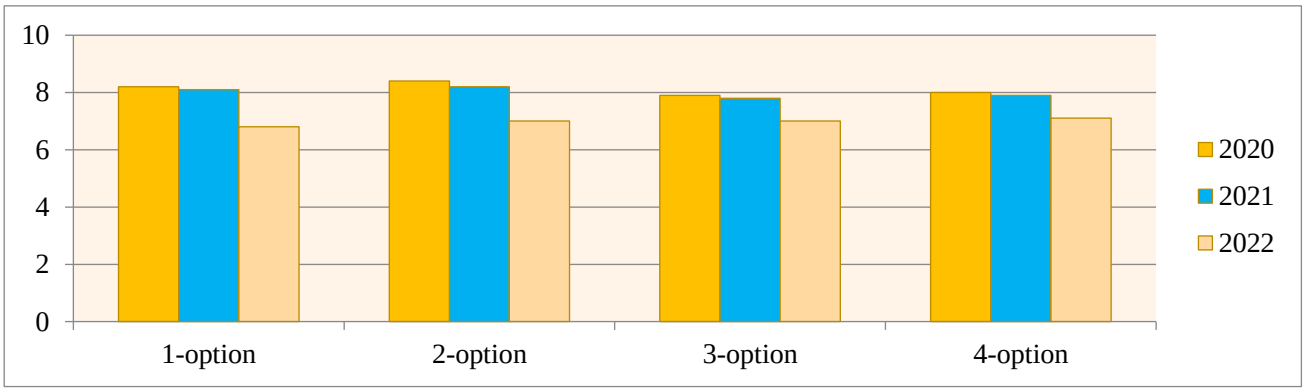
In our scientific research work, the cultivation of corn (for silage) crops in wastewater as feed for livestock has been achieved and positive results have been achieved. Corn (silage) water consumption and water consumption coefficient are presented in Table 1, and it can be seen that the yield of corn (silage) mainly depends on the irrigation regime and feeding. [3, 9, 10].

Table 1 Corn water consumption elements and water consumption coefficient by year (in m3/s*)

Indicators	Options											
	(control) Fertilizing corn with wastewater irrigation at 70-70% relative to TTV			Irrigation of corn with wastewater when it is 70-70% relative to TTV			(control) 70-80% compared to TTV, fertilized corn and irrigated with wastewater			Irrigation of corn with wastewater when it is 70-80% relative to TTV		
Years	***2020***	***2021***	***2022***	***2020***	***2021***	***2022***	***2020***	***2021***	***2022***	***2020***	***2021***	***2022***
Humidity at the beginning of the operation period, m3/ha	1660	1850	1790	1660	1850	1790	1660	1850	1790	1660	1850	1790
Moisture at the end of the operation period, m3/ha	1560	1700	1680	1590	1780	1700	1590	1780	1700	1590	1780	1700
Moisture during full operation, m3/ha	100	150	110	70	70	90	70	70	90	70	70	90
Annual rainfall, mm	580	14	290	580	14	290	580	14	290	580	14	290
Seasonal irrigation rate, m3/ha	2723	4044	4030	2723	4044	4030	2814	4071	4217	2814	4071	4217
Water consumption, m3/ha	3403	4208	4430	3403	4208	4430	3464	4155	4597	3464	4155	4597
Productivity, ts/ha	416	518	647	407	510	633	439	529	658	432	522	651
Water consumption coefficient, to m3/s*	8.2	8.1	6.8	8.4	8.2	7.0	7.9	7.8	7.0	8.0	7.9	7.1

In 2020, the water consumption of corn in the 1st and 2nd options was 3403 m3/ha, the water consumption coefficient in the 1st option was 8.2 m3/s*, and in the 2nd option - 8.4 m3/s*; In options 3 and 4, water consumption was 3464 m3/ha, while the water consumption coefficient in option 3 was -7.9 m3/s*, and in option 4 - 8.0 m3/s*. In 2021, the water consumption in the first and second options is the same (because the control and experimental options have the same seasonal irrigation rate) 4208 m3/ha, the water consumption coefficient in the 1st option - 8.1 m3/s*, in the 2nd option - 8.2 m3/ha s*gani; In options 3 and 4, water consumption was 4155 m3/ha, water consumption coefficient in option 3 – 7.8 m3/s*, in option 4 – 7.9 m3/s*.

In 2022, water consumption in options 1 and 2 will be 4430 m3/ha, water consumption coefficient in option 1 – 6.8 m3/s*ha, in option 2 – 7.0 m3/s*ha; In options 3-4, water consumption was 4597 m3/ha, water consumption coefficient in option 3 - 7.0 m3/s*, in option 4 - 7.1 m3/s*.



Picture 1. 2020-2022 Maize (silage) water consumption rate chart.

As can be seen from the above, the water consumption is the same in the experimental and control options for irrigation regimes, and the water consumption coefficient is different in all four options. As the water consumption ratio varies depending on the yield, the result is different.

Explanation: The main reason for the difference in the years is that the cultivated area in the first year produced less than in the second year, and in the second and third years, the crop yield increased due to the increase in water-physical properties and fertility of the soil.

In conclusion, we can say that it is appropriate to grow corn crops (for silage) only as feed for livestock in water-scarce areas. The water consumption of corn according to the irrigation regime when irrigated with wastewater was 3403 m3/ha, and the

water consumption coefficient was equal to 8.2 m3/s* in the first option of 2020 (irrigation of corn with fertilizer at 70-70% compared to TTV). In option 2 (irrigation of corn with wastewater at 70-70% compared to TTV), water consumption was 3403 m3/ha, water consumption coefficient was equal to 8.4 m3/s*. In both options, the same amount of irrigation is given, and the coefficient of water consumption is also the same, only the coefficient of water consumption is 0.2 m3/s* more in option 2 than in option 1. The main reason for this is the difference in productivity between the options. The same is true for the third and fourth options.

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