

DETERMINATION OF RULES FOR IRRIGATION WHEN GROWING CORN (SILAGE) WITH WASTEWATER

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Abstract:

Over the course of 2 years, scientific and practical research was carried out to develop a regime (standard) for irrigation of the corn crop (silage) with wastewater from the city of Bukhara and the results obtained were highlighted. When the soil moisture before irrigation is 70-70% relative to the maximum field moisture capacity, seasonal irrigation in meadow-alluvial soils is 2725 m³/ha in the first year, the number of irrigations is 4 times, in the second year it is 2725 m³/ha. seasonal irrigation norm is 3358 m³/ha, and the number of irrigations is 5 times. Soil moisture before irrigation was 70-80% relative to the maximum field moisture capacity. In the first stagnant year, the seasonal irrigation norm was 2816 m³/ha. , the number of irrigations is 5 times, in the second year the seasonal irrigation norm is 3449 m³/ha, and the number of irrigations is 6 times.

Key words: wastewater, volumetric mass, specific gravity, irrigation regime (rate), seasonal irrigation, yield, corn (silage).

Introduction

Academician W.R. Williams created a universal law, which is defined as follows: - The living conditions of plants include: light, heat, air, water, and nutrients. Light, heat, and air are cosmic (universal) factors and are relatively controlled by man. Water and nutrients enter the plant through the soil and are nourished by human labor and knowledge. To obtain a high and high-quality yield from crops, it is necessary to provide them with constant water and nutrients throughout the entire period of operation. In our conditions, it is necessary to provide the corn (silage) crop with water and nutrients. To cultivate 1 hectare of land in Uzbekistan, 12-14 thousand m³ of water are used to grow high-quality crops. [8, p. 18;]

Sodium, magnesium, potassium, sulfate, and chloride salts are widespread in many regions of our republic. 86% of the districts of the Bukhara region have varying degrees of salinity. We can identify chlorine, sulfate, carbonate, and sodium salts in soil. The source of water is

delivered to the region from the Amu Darya through machine canals. During the year, 4232.4 million m³ of water is taken from the border of the Amu Darya. The filtration water leaving the field amounts to 2121 million m³ per year and is discharged through collectors - ditches. Water leaving enterprises, organizations and the population goes directly to treatment plants. After complete purification, this wastewater flows through collector and drainage systems into large lakes, and from the lake again into rivers. Currently, 1250 m³ of all wastewater from the city of Bukhara per hour enters the treatment plant. For 1 day, this figure averages 25-30 thousand m³, although wastewater also contains several useful substances.

Method

Water for irrigation in a water-stressed area costs gold. Throughout the year, billions of cubic meters of water are discharged from wastewater treatment plants into lakes and rivers. Water treatment plants in the city of Bukhara receive water only for the needs of the national economy. Due to the absence of industrial enterprises and production organizations in the city, wastewater does not contain harmful chemical elements and harmful toxins. In 2020-2021, scientific research was carried out on saline meadow-alluvial soils belonging to the Zarmanak district community of Bukhara region. Among the types of crops, the corn variety (silage) "Uzbekistan-400 BR" was selected as feed for livestock in the experimental field. The average annual groundwater level in the region is 2.0-2.5 m/ha. According to the task assigned to us, 4 options were chosen for our fieldwork: Before watering corn (silage), the maximum field soil moisture was determined as follows.:

- | | |
|-----------------------|-----------------------|
| 1) monitoring 70-70 % | 3) monitoring 70-80%; |
| 2) 70-70 % | 4) 70-80 %; |

The irrigation rate is calculated using the formula of S.N. Rizhov based on volumetric mass as follows.

$$M = (W_n - W_m) * 100d * h + k \text{ m}^3/\text{ha};$$

in that, M – seasonal watering, m^3/ha ; W_n – field moisture capacity relative to soil weight (%), W_m – pre-irrigation soil moisture (%), d – soil bulk density (gr/sm^3), h – calculated layer value (m), k – water used for evaporation during irrigation (m^3/ha , 10% moisture deficiency) [3, 32-45-p].

When developing the irrigation norm, the active soil layer of 0-60 cm from the corn seedlings (silage) to the emergence of the plume (spikelet), then 0-100 cm (mainly the root layer) is taken into account. the entire period of operation. The experiments were repeated 4 times. Plots were created 60 meters long, 2.40 m wide (4 rows of 60 cm), with a total area of 144 m². The area of the control option is 144 m².

Table 1. Information on the irrigation procedure based on the maximum field moisture capacity on the area sown with corn (silage).

Options	Indicators	Years	Number of waterings						Total irrigation rate and irrigation scheme:
			1	2	3	4	5	6	
Fertilize and irrigate corn with wastewater at a maximum field moisture content of 70-70%. (control option) And Irrigation of corn with wastewater at 70-70% of the maximum field humidity.	humidity before watering,(%)	2020	72	69	70	69			
		2021	71	70	68	70	72		
	watering period, date	2020	3.V	28.V	20.VI	14.VII			2-2
		2021	25.IV	21.V	15.VI	10.VII	3.VIII		2-3
	watering interval, day	2020	0	25	23	24	24		
		2021	0	26	25	25	18		
	irrigation rate (m3/ha)	2020	641	702	680	702			2725
		2021	679	686	666	686	641		3358
	watering duration (hours)	2020	8	9	8	9			
		2021	9	9	9	9	9		
Fertilize and irrigate corn with wastewater at a maximum field humidity of 70-80%. (control option) And Irrigation of corn with wastewater at 70-80% of the maximum moisture capacity of the field.	humidity before watering,(%)	2020	72	69	75	80	80		
		2021	72	72	73	73	80	80	
	watering period, date	2020	28.IV	15.V	1.VI	20.VI	19.VII		2-3
		2021	20.IV	10.V	29.V	17.VI	7.VII	27.VII	2-4
	watering interval, day	2020	0	18	17	19	17		
		2021	0	20	19	18	19	20	
	irrigation rate (m3/ha)	2020	641	702	567	453	453		2816
		2021	656	641	618	618	458	458	3449
	watering duration (hours)	2020	8	9	7	7	7		
		2021	9	8	9	9	7	7	

From experience, this island has been developed for the first time, and no agricultural work has been carried out here before. When calculating the water flow in the upper part of the line, in all options a Chipoletti water meter with a diameter of 25 cm is installed. In the first year of seasonal irrigation, the soil moisture before irrigation is 2725 m³/ha, the average irrigation rate is 545 m³/ha, and the irrigation scheme is 2-2 irrigations 70-70% compared to the outlying field. moisture capacity. quantity 4 times; In the second year, irrigation was 3358 m³/ha, the average irrigation rate was 672 m³/ha, the number of irrigations was 5 times, the irrigation scheme was 2-3, before irrigation the soil moisture was 70-80% relative to the maximum field moisture capacity, and in the irrigation options with fertilizing wastewater it was seasonal the irrigation rate is 2816 m³/ha in the first year, the average irrigation rate is 563 m³/ha, the irrigation scheme is 2-3 waterings 5 times; In the second year, irrigation was 3449 m³/ha, the average irrigation rate was 575 m³/ha, the number of irrigations was 6 times, the irrigation

scheme was 2-4.) that the differences in the maximum field moisture capacity of the soil (the moisture content before irrigation increased over the years). Fertilizers in wastewater change soil fertility, bulk density, density, and porosity.

Due to the use of wastewater for irrigation, there was no overfeeding of the soil and there was no need for local chemical fertilizers. The target corn (silage) yield has been achieved. During the experiment, the conditions for land reclamation were also studied. Every decade, groundwater seepage water was monitored and its composition was analyzed. The experimental plot was re-examined and it was noticed that the amount of humus in the soil had increased. Based on the results of the experiment, it can be determined that the targeted and efficient use of wastewater leads to the saving of additional water.

Conclusion

To summarize, we can say that targeted and efficient use of water resources during periods of water scarcity is one of the main requirements of our time. According to the results of the experiment, river water was saved through irrigation according to a regime where corn was irrigated with wastewater. Instead of throwing 25-30,000 m³ of water into landfill in 1 day, we can achieve better results if we use it effectively.

References

1. I. Islamov. The combination of irrigation regimes and mineral nutrition and the accumulation of alfalfa root mass in the conditions of alluvial meadow soil in the Bukhara region. Agrosience of agriculture of Uzbekistan, journal. Special issue. Tashkent – 2019 – From 94-95 (06.00.00 No. 1)
2. Islamov I. Influence of the regime of destruction and mineral nutrition of alfalfa on the dynamics and balance of fertility elements in gray-brown stony soils. Journal Agrochemical Bulletin MSX, Russia. Moscow No. 5 2019, pp. 37-41
3. Islamov I. Water consumption of alfalfa on alluvial meadow soil of the Bukhara region. Journal “Agriculture and Water Resources of Uzbekistan” Tashkent 2019 P 42-43.
4. I. Islamov The influence of 3 years of alfalfa on the yield of cotton in alluvial-meadow soils of the Bukhara region. Journal of Agrochemistry and Plant Quarantine. Tashkent No. 2 C 7-8
5. Kostyakov A.N. “The basis of land reclamation. Peasant Moscow. 1960. 411.6
6. Ryzhov S.N., Agapova M.I. Water regime of plants. Moscow - 1963. Publishing house A.N. USSR 354-st.
7. Khamidov M., Joraev U. Agricultural magazine of Uzbekistan No. 3 issue. 2015 (35-37 b).

8. Gamidov M., Shukurlaev Kh., Mamataliev A. Textbook “Agricultural hydraulic reclamation”, publishing house “Sharq” - Tashkent - 2008, p. 18.
9. Zakirov A.G. The influence of changes in water level on the environmental status of water consumption: Diss. ... candies. those. science Kazan, 2001. 167 p.
- 10 Korneva L.G. Regular changes in the structural organization of phytoplankton during eutrophication and acidification of fresh waters // Abstracts. doc. SSB RAS at the VIII session. Kaliningrad. 2001. T. 1. 167-169.
- 11 Mustafaeva Z.A., Mirzaev U.T., Kamilov B.G. Methods of hydrobiological monitoring of water bodies of Uzbekistan // Methodological manual. - Tashkent: Navruz. – 2017. – 112 p.
- 12 Mustafaeva M.I. Bioindicator - studying the steppe of water pollution using the algal flora of ponds. National Association of Universities (NAU). Monthly scientific journal. No. 4(20). 2016. pp. 102-104.
- 13 Fedorov V.D., Kapkov V.I. Practical hydrobiology of transnodic ecosystems. – Moscow, MSU, 2006. – 365 p.
- 14 Khalilov S.A., Shoyakubov R.Sh., Temirov A., Tozhibaev T.Zh., Kazirahimova N.K. Ulotrix algae of Uzbekistan. – Namangan, 2012. – 216 p.
- 15 Khalilov S.A., Shoyakubov R.Sh., Mustafaeva Z.A., Ergasheva Kh.E., Karimov B.K., Tozhibaev T.Zh., Alimzhanova Kh.A. Key to Volvox algae of Uzbekistan. – Namangan, 2014. – 215 p.
- 16 Mustafoeva M.I., Khakimova Z.Z. “Studying the ecology of wastewater algae as biotechnological disciplines” - International Conference EUROPE, SCIENCE AND WE ISBN 978-80-907845-4-3 DOI: http://doi.org/10.37057/CH_5 Conference Proceedings available at virtualconferences.press 2020 y . From 9-13
- 17 Mustafoeva M.I., Khakimova Z.Z. “The development of phytoplankton depending on the season in ponds of treatment facilities” - Agroprocessing ISSN 2181-9904 Doi Journal 10.26739/2181-9904 6-son 2-zhil 2020 yil. C 35-40.