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Research Article

REASONS FOR CHANGES IN THE SOIL-AIR REGIME AS A RESULT OF IRRIGATION OF CROPS WITH MINERALIZED WATER

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ABSTRACT

This article describes the weather regime of the soil, the methods of its management, the changes that occur as a result of the use of mineralized water in crop irrigation.

KEYWORDS

Soil air, solonetzic-saline, secondary salinization, chloride, sulfate-chloride.

INTRODUCTION

Soil air is of great importance for soil processes and plant development. Soil air participates in chemical and biochemical processes in the soil, affects oxidation-reduction conditions, their reaction and solubility of chemical components. Soil air provides oxygen to plant roots and soil-dwelling organisms, and is also an important factor in plant carbon nutrition. Note that more than half of the carbon dioxide used for crop production is provided by the plant from the soil. Soil air composition varies significantly over time and across the soil profile, depending on biological activity, hydrothermal conditions, gas adsorption, soil solids, and the intensity of gas exchange between soil and atmosphere. With normal gas exchange between the soil and atmospheric air, as a number of authors have noted, the concentration of CO_2 in the upper horizon layer of the soil under various crops usually does not exceed 1-2%.

Soil temperature and humidity have a strong influence on the intensity of gas exchange and the composition of soil air. It should be noted that the gas regime of the saline soils of our republic and its changes during the

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irrigation period and the implementation of melioration measures have not been sufficiently studied. There are some data in the literature describing soil air composition in irrigated light gray soils exposed to secondary salinity. As noted by A.N. Sokolovsky, changes in the composition of soil air strongly affect the activity of microorganisms and the dynamics of soil processes, as well as soil fertility. Due to excessive water saturation, plants begin to suffer from lack of air in the soil. Thus, in cotton plants, when overwatered, the active roots die, they are renewed only after the soil moisture decreases. According to A.G. Bondarev's observations, under conditions of normal gas exchange of the soil profile, the amount of oxygen decreases and CO2 increases, but their sum is close to the sum of these gases in the atmosphere, i.e. around 21%.

Research conducted by A.V. Veretennikov showed that in June, the irrigation water level is usually close to the soil surface, and unfavorable weather conditions usually occur in these months, because the roots of stem plants are less supplied with oxygen. . During long-term flooding, due to the slow dissolution of oxygen in the water and its increase, pine and spruce roots experience a lack of oxygen at certain times of the year. This is confirmed by the facts of mass death of roots. In addition, he notes that in May, the amount of carbon dioxide in the soil water ranged from 18 to 40 mg / l. Later, a gradual increase in the amount of carbon dioxide was observed during the growing season: in June - up to 79, in July - up to 80, and in August - up to 131 mg / l. At the beginning of September, the amount of carbon dioxide decreased to 62 mg/l, and in October to 42 mg/l.

The study of the dynamics of O2 and CO2 in the soil air of gray soils with a light mechanical composition during the experiments showed that the concentration of CO2 and the intensity of O2 absorption directly depend on the mineralization of irrigation water. It can be seen from the presented data (table 1) that in the control option, before the first watering and at the end of the growing season, the amount of O2 in the upper layers of the studied soils is almost unchanged and slightly reduced. The amount of carbon dioxide is 0.3-0.6%, and their amount increases with depth. In the third year of irrigation with mineralized water, the amount of oxygen in the upper layers of the soil (0-45 cm) is 18.5%, in the depth it decreases to 17.7%, and the amount of carbon dioxide increases from 1.2% to 2.2%. The determinations made after the first watering revealed a significant decrease in oxygen in the soil throughout the profile, but the most important are its lower layers. The amount of carbon dioxide has increased dramatically. However, despite this, by the beginning of the second growing season, the oxygen content is usually returned to the original level with a sharp decrease in carbon dioxide in the soil. A similar situation continues until the end of the irrigation period. At the same time, the amount of carbon dioxide is slightly higher compared to the original. It

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can be seen that this process is associated with the increase in the intensity of soil respiration with the release of carbon dioxide due to irrigation and the activation of biological processes. By summer, as the soil warms (up to 26-28C) and dries up, as well as the growth period of cotton grows, a further increase in CO_2 occurs in the studied layers. It is clear that irrigation of cotton with mineralized water contributed to the increase of carbon dioxide and the decrease of the amount of absorbed oxygen with such a general change of the soil air. When irrigated with water with a mineralization of 3 g/l, as a rule, carbon dioxide in the soil tends to increase from the beginning of the irrigation period to the end of the growing season, as the amount of oxygen decreases.

1-table

Changes in soil air composition, %

Experience options	Indicator	Depth, cm								
		0-45			45-70			70-90		
		spring	autumn	autumn	spring	autumn	autumn	spring	autumn	autumn
Control	CO_2	0,3	0,6	1,2	0,7	1,3	1,1	0,9	1,1	2,2
	O_2	19,3	21,4	18,5	18,8	20,3	18,2	18,6	20,3	17,7
3 g/l	CO_2	0,3	0,5	2,01	0,7	1,4	1,9	0,7	0,9	2,6
	O_2	19,4	19,3	18,3	19,1	18,8	17,1	20,1	19,1	14,7
5 g/l	CO_2	0,2	0,6	2,2	0,5	1,3	2,2	0,5	1,2	3,4
	O_2	20,1	19,2	16,8	19,4	18,9	11,3	20,2	18,9	10,9
7 g/l	CO_2	0,3	0,8	2,4	0,5	1,9	2,8	0,5	3,8	4,7
	O_2	19,8	18,9	14,9	19,6	12,7	11,5	20,3	15,9	9,7

In the first year of irrigation with mineralized water, the amount of carbon dioxide in the 45-70 cm soil layer is 0.5%, and in the third year of irrigation, at the end of the vegetation, it is in the range of 19.3-19.2%. , and in lower horizons it decreases to 14.9% (Table 1). A sharp increase in humidity in certain soil horizons (after watering vegetation), especially in variants irrigated with mineralized water, a strong violation of gas exchange was noted. So, if in the first and third years of the experiment in the control option, the concentration of carbon dioxide in the autumn in the 70-90 cm soil layer was 1.1-2.2%, in the options of

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irrigation with mineralized water, in the first and third years of the experiment, at the end of the growing season increased to 0.7-2.6%, 1.2-3.4% and 3.4-4.7%, and the oxygen content, on the contrary, from 18.6-17.7% in the control to 19.1- Decreased to 14.7%, 18.9-10.9 and 15.9-9.7% on options. A comparison of the results of the analysis of the selected experience by options allows us to come to the following conclusion.

CONCLUSION

The amount of carbon dioxide in the soil air of gray soil largely depends on the mineralization of irrigation water and soil moisture (in the upper horizons of the soil at a depth of 0-45 cm, the oxygen content does not fall below 14.9. -18.5%, the amount of carbon dioxide gas is in the range of 1.1-2.2%;

the amount of carbon dioxide in the soil air increases with depth, especially in the 70-90 cm soil layer, the maximum amplitude value is equal to 5%;

with the increase in the mineralization of irrigation water, especially in the lower layers of the studied soils, the amount of carbon dioxide increases, and the absorption of O2 by the soil decreases.

REFERENCES

1. Kholboev B., NamazovKh. Soil-ameliorative features of the Djizak steppe // European Science Review. –Vienna, 2018. № 9-10. – P.143-148
2. Kholboev B. E. Amount of Easily Soluble Salts in Water, Type and Level of Salinity in Irrigated Meadow-Gray Soils of Zomin Cone Spread and Its Effect on Soil Melioration. Texas Journal of Agriculture and Biological Sciences. https://zienjournals.com/index.php/tjabs/about/editorialTeam
3. Turdimetov Sh., Khudoyberdiyeva Z., Tadjibayev A. Quality Assessment of Gypsum Soils of Mirzachol Oasis. Journal of Population Therapeutics and Clinical Pharmacology, 2023. 30(12), pp. 295–301.
4. Ахмедов А.У. Почвенно-мелиоративные условия восточной части Джизакской степи и основные пути ихулучшения. Автореф. дисс... канд. с/х. наук. – Ташкент, 1983. 24-с.
5. Ахмедов А.У., Номозов Х.К., Холбоев Б.Э., Тошпулатов С.И., Корахонов А.Х. Проблемы засоления и мелиорации земель Узбекистана (на примере Голодной степи).-Журнал Почвоведение и агрохимия. – Алматы.
6. Бондарев А.Г. Физические и физико - механические свойства в проблеме устойчивости почв к физической деградации: тезисы докладов III съезд Докучаевское общество почвоведов. (11-15июля 2000. Суздаль) Книга 1. М., 2000.С.222.
7. Веретенников А.В. Физиология растений : учебник для вузов. – Изд.- 3-е. - М. : Академический Проект, 2006. – 479 с.
8. Намозов Х.К. Почвенно-мелиоративные условия Джизакской степи и их изменения под влиянием орошения. Автореф.дис... канд.биол.наук. –Ташкент: 1996. 24-с.

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9. Панкова Е.И., Голованов Д.Л., Соловьев Д.А., Ямнова И.А. История формирования и особенности почвенно-литолого-геоморфологического строения Джизакской степи как основа ее природного районирования // Бюллетень Почвенного института имени В.В. Докучаева. 2021. Вып. 107. С. 33 -60. DOI: 10.19047/0136-1694-2021-107-33-60
10. Сокловский А.Н Избранные труды. - Киев: Урожай
11. Холбоев Б.Э. Происхождение засоленных почв и солей устойчивость сельскохозяйственных культур в зависимости от степени и химизма заселения // Innovations in Technology and Science Education. – 2023. – Vol. 2(9). – P. 1674-1683.
12. Холбоев Б.Э. Происхождение засоленных почв и солей устойчивость сельскохозяйственных культур в зависимости от степени и химизма заселения // Innovations in Technology and Science Education. – 2023. – Vol. 2(9). – P. 1674-1683.