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MINERALIZATION OF THE SUBSOIL WATER IN THE SOIL OF THE SIYAZAN SUMGAYIT MASSIVE

ABSTRACT. *The thorough information of the soil in the Siyazan-Sumgayit massive was given in the article. It was determined as a result of the investigation that grey-cinnamonic soil of the central and coastal zones.*

In the research period the water samples were taken from the drain paasing through the edge of the experimental area selected in the massif, from the channel of the Takhtakorpu Reservoir and the soil section and mineralization was determined in it. It was defined that mineralization in the same water samples was 5,75 g/l (for dry residue); 0,58g/l in the channel, but 2,16 g/l in the soil section. The salt type is chlorine in drain, but it is chlorine-sulphatic in the channel and soil section.

The groundwater spreading in the zones of the Khizi and Siyazan regions is sulphate- chlorine-natrium, chlorine-sulphate-natrium for a chemical composition. The long-term researches indicated that a level of groundwater in the Khizi region changes 1-18m from the surface, but it accordingly changes by 0.5-16.5m and 0.3-8.5m. In small areas the groundwater level changes by 0.5-16.5m, but mineralization rate changes from 0.8g/l to 69.3g/l. The soil over three regions is exposed to chlorine-sulphate, sulphate-chlorine salinization.

Key words: *subsoil water, mineralization, evaporation, salinization, irrigation*

МІНЕРАЛІЗАЦІЯ ҐРУНТОВИХ ВОД У ҐРУНТАХ СІЯЗАНСЬКОГО СУМГАЇТСЬКОГО МАСИВА

АНОТАЦІЯ. *У статті наведено вичерпну інформацію про ґрунти Сіязансько-Сумгаїтського масиву. В результаті досліджень встановлено, що сіро-коричні ґрунти центральної та прибережної зон.*

У період досліджень були відібрані проби води з дренажу, що проходить через край дослідної ділянки, виділеної в масиві, з русла Тахтакорпу водосховища та визначено в ньому розріз ґрунту та мінералізацію. Визначено, що мінералізація в тих же пробах води становила 5,75 г/л (по сухому залишку); 0,58 г/л в руслі, але 2,16 г/л в грунтовому розрізі. Тип солі – це хлор у стоці, але хлорно-сульфатний у руслі та ґрунтовій частині.

Підземні води, що розповсюджуються в зонах Хізінського і Сіязанського районів, за хімічним складом є сульфатно-хлорно-натрієвими, хлорно-сульфатно-натрієвими. Багаторічні дослідження показали, що рівень підземних вод в районі Хизи змінюється на 1-18 м від поверхні, але відповідно змінюється на 0,5-16,5 м і 0,3-8,5 м. На невеликих ділянках рівень ґрунтових вод змінюється на 0,5-16,5 м, але показник мінералізації змінюється від 0,8 г/л до 69,3 г/л. Ґрунт трьох районів піддається хлорно-сульфатному, сульфатно-хлорному засоленню.

Ключові слова: *грунтові води, мінералізація, випаровування, засолення, зрошення*

1. Introduction. The soil was subjected to salinization and solonetzification to a different degree as a result of intensive use of the soil in connection with the agriculture development. A level of the subsoil water gradually rises as result of irrigation, the salt in its content is collected in the upper layers and the same zones become saline. In order to prevent salinization that may occur in connection with this, high agrotechnical complex should be applied in irrigation agriculture, the irrigation networks should be correctly used and the irrigation rules must be correctly performed [10]. The soil in the Siyazan-Sumgayit massive is salinized to a various rate, and study of mineralization of the subsoil water is considered an actual issue.

2. Research object and method. The experimental areas have been selected in the Gilazi and Shurabad villages of the Khizi district which is situated in the Siyazan-Sumgayit massif. The water samples were taken from the drain passing through the edge of the experimental area selected in the massif, from the canal of the Takhtakorpu Reservoir and soil selection and the chemical analyses were implemented according to the widespread method in the republic. [4]

3. Discussion and Analysis. Some scientist performed researches in the Siyazan-Sumgayit massif which has delivial plain. Firstly, S.I.Tyuremnov showed that there is salinized soil with deluvial origin in Azerbaijan. Later, V.R.Volobuyev, V.A.Kovda, A.N.Rozanov, V.V.Yegorov and others investigated salinization of the soil in Azerbaijan plains. The researches noted that the chestnut, grey-cinnamonic soil (Calcic Cypsisols) spreaded in the Siyazan-Sumgayit massif. The deluvial and salinized soil in the foothill plains of Azerbaijan was subjected to partial absorption and irrigation. The soil of the appropriated zones is used under cereal plant, but a little areas are used under the orchard plants in the Siyazan-Sumgayit massif. The soil over the whole profil is calcareous, it boils with chloride acid to a strong, M.R.Abduyev (1966) noted that from the surface, boiling from acid is very strong for grey-cinnamonic soil. The grey-cinnamonic soil in the thin dense layer (40-50cm) of the massive soil is subjected to strong salinization. Dry residue is 2,5-2,8% in the saline soil. The plume zone of the massive is distinguished with the shortage of humus, and this related to the development of the salttolerant plants. pH index is higher in the deep horizons. The characteristics soil develop in the deluvial sediments collecting in the plumes and in the ravines.

The porous greenish (palevo-)-grey crust is observed on the upper layers of the grey-cinnamonic (Calcic Cypsoils) soil. Absorbed Na is 30-50% in the saline horizons of the Siyazan-Sumgayit massive, a sum of the absorbed bases is 17-24 mg.eq. Such cases indicate beginning of the solonotzefication process [12].

A color of the humus layer in the grey-cinnamonic (calcic Cypsisols) is grey-cinnamonic, greyish and it is observed at 40-50cm. Depth of the subsoil water in this soil is 2-5 meters and mineralization changes by 3.0-17.6 g/l.[6].

Formation of crust in the grey-cinnamonic (Calcic Cypsoils) soil is connected with the high dispersion of the organic part and contrast in hydrothermic regime if the soil. The meadow-desert-grey-cinnamonic soil spreads in the small areas of the zone with the same soil [5]. They develop under cereal-wormwood plants in the depression area. This soil becomes differently leached or salinized to a various degree depending on character of the soilforming rock location in the relief.

Within grey-cinnamonic soil, it is possible to find soil with all types of granulometric composition, from sandy soils to loamy soil. This soil belongs to chloride-sulphatic type and weak structure is characteristic for the same soil and the humidity supply isn't more [9].

Kuloshvili N.S. divided the subsoil water into two are as for its location depth as a result of his researches in the massif in 1948. The first area is situated near the sea and forms the terrace of the ancient Caspian Sea, here the groundwater is located at a depth of 6-10 m from surface. The groundwater is observed at a depth of 7.5 m in the southeast of Zarat settlement. But the groundwater is revealed at a depth of 8-9m in the area joining the middle zone of the deluvial-proluvial plain. [2]

Akbarov I.A. [3] studied water-salt regime in the irrigated soil of the Siyazan-Sumgayit massif. It was determined as a result of the consequences that slow decline of the salt supply in the soil of the experimental area in the research years.

Ismayilov B.N. [7] studied an impact of irrigation on dynamics of the soil processes in the meadow-grey soil of the Samur-Davachi massif and he determined that the profile was subjected to the strong morphogenetic changes as a result of intensive use of the various agricultural plants and irrigation with silly river water for a long-term irrigation of ameliorated species leached from salt in meadow-grey soil.

Suleymanov N.R. [11] performed long-term researches in the massif, and determined that the heavy gleyey soil with natural origin of the Siyazan-Sumgayit massif widespread in the plain

part of the coastal zone. Absolute maxima and minima of the hydrothermal regime create a condition for formation of takyr-like morphological structure in the upper layers of the soil.

The hydrogeological condition of the region is various, waterpermeability of the ground stratum that is located near the surface is small and very small depending on geomorphological structure of the ground [8].

The useless water-physical character of the soil in the zone doesn't allow to get high crop from agricultural plants. At the same places of these zones forms crust in the gleyey soil, this demands conduction of the special agrotechnical measures in the same soil. A chemical composition of the groundwater in the Khizi and Siyazan regions is sulphate-chlorine-natrium, chlorine-sulphate-natrium.

The groundwater of the Siyazan-Sumgayit massif is located at a depth of 1.6-2.0m from the surface in the coastal part. Mineralization of the groundwater over the seasons vibrates by 35-45g/l. The salt type belongs to chlorine-sulphate, sulphate-chlorine in the groundwater of the massive.

Table 1. Analysis results of the water samples taken from the channel and Takhtakorpu water reservoir passing from the zone of the experimental area

Number of the section	Mg.eq/g/l							Salt sum, g/l	Dry residue, g/l
	CO_3	HCO_3	Cl	SO_4	Ca	Mg	Na+k		
N-2 drain (doesn't work)	No	5,20 0,317	90,8 3,178	13,49 0,648	10,5 0,21	88,5 1,062	10,49 0,242	5,75	5,97
N-3 TWR Irrigation canal	No	3,20 0,195	1,60 0,056	3,997 0,192	3,00 0,06	4,50 0,054	1,297 0,029	0,58	0,71
N-2 soil H=1.80	No	8,00 0,488	9,40 0,329	13,99 0,672	2,50 0,050	4,25 0,051	24,64 0,566	2,16	2,16

As it is seen from the table, CO_3 ion wasn't observed in the water sample taken from the drain. A quantity of HCO_3 in anion composition was 0.317g/l, a quantity of Cl was 3.178g/l, a quantity of SO_4 ion was 0.648g/l. A quantity of a Ca in cation content was 0.219g/l. The water mineralization in the drain (for dry residue) was 5.75g/l.

A quantity of HCO_3ion in anion content in the water sample taken from the water reservoir of Takhtakorpu was 0. 195g/l, a quantity of Cl was 0.060g/l, but an amount of SO_4 ion was 0.192 g/l. An amount of Ca in cation content was 0.060g/l, a quantity of Mg was 0.054g/l,but a quantity of Na+k ion changed by 0.029g/l. Mineralization(for dry residue) was 0.58g/l in water sample taken from the water reservoir of Taktakorpu

Table 2. Assessment of water for mineralization rate

Number of the section	Names of the samples	Mineralization of water,g/l	Usefulness for irrigation
1	N-2 drain (doesn't work)	5.75	Completely useless
2	N-3 TWR Irrigation canal	0.58	useful
3	N-2 soil H=1.80	2.16	Less useful

HCO_3 ion is 1.60g/l, Cl-0488g/l, SO_4 ion is 0, 329g/l in anion content of the water sample taken from section 2(depth H=1.80m), in the channel of the Takhtakorpu Water reservoir. In cation

content a quantity of Ca is 0,050g/l, Mg-0,051g/l, Na +K ion is 0,566g/l. Mineralization (for dry residue) is 2,16g/l in the water sample taken from channel of the Takhtakorpu Water reservoir.

It was determined that the water samples taken in the research period are useful for irrigation.

If SAR<10 the water is considered completely suitable for use, if SAR=10-18 it is suitable, if SAR>26 it is considered unsuitable for use. As it is seen from Table 2, the water in the drain is dangerous for irrigation 5,75g/l; it is suitable in the Water reservoir of Takhtakorpu (0,58); it is less suitable in the water sample taken from the soil section (2,16).

The salt type was determined in the same samples according to V.R.Volobuyev's [1] classification.The salt type according to Cl/SO_4ratio in the drain is chlorine ,but it is chlorine –sulphate in the water sample taken from TakhtakorpuWater reservoir (Table 3).

Table 3. Definition of the salt type salt typefor $Cl:SO_4$ in the drain, in the water of the Takhtakorpu Water Reservior and section

Sections	**$Cl:SO_4$**	**Salt type**
Drain	4.90	Chlorine
Takhtakorpu Water Reservoir	0.90	Chlorine- sulphate
Section 2	0.48	Chlorine-sulphate

4. Conclusion. As a result of the researches it was determined that the water mineralization in the Siyazan-Sumqayit massif was 5.75 g/l in the drain, 0.58g/l in the channel and 2.16g/l in the soil section.

The result indicated that it was dangerous and less suitable for irrigation accoding to usefulness.The salt type is chlorine in the drain, but chlorine-sulphate in the channel and soil section.

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