МЕЛИОРАЦИЯ ПОЧВ

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MODERN STATE OF THE SIYAZAN-SUMGAYIT MASSIVE SOILS

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Abstract. The information about a state of the Siyazan-Sumgayit massive soils in Azerbaijan was given in the article. It is noted that a massive climate is subtropic and a level of the subsoil waters is lower than the river waters level. The salts quantity in the massive soils have been studied and it was defined that a salt composition exposed to the strong changes depending on the seasons.

Key words: massive, subsoil waters, salt composition, soil cover.

INTRODUCTION

Siyazan-Sumgayit massive is one of the foothill parts, joined the Caspean Sea and zoning at the heel of the Great Caucasus eastern end. It is situated in the coastline plain of Azerbaijan north-east. This massive has a plane weak inclination which stretches from north-west to south-east. Many large and small measured lagoon remains are observed in the Siyazan-Sumgayit massive. The ancient large lagoons are dry in most cases, at present they occupy a salty area. These depressions remain under water while filling with the surface waters at a rainy period. These lagoons spread in the Shurabad village, between Sitalchay and Yashma stations and also in Sumgayit and they are rich in salty deposits [1, 2].

The hydrogeological point of view is that most of the research area is located on the eastern and southeastern slopes of the Greater Caucasus Meganctiklinorium, where the rocks and seasons are regarded as a spatial distribution of underground waters. In the area of groundwater, very small amounts are encountered. The sediments in the Siyazan district are reduced to a small amount and average annual volume does not exceed 400 mm. According to the chemical composition, ground waters are sulfate-chlorine-natrium, chlorine-natrium and chlorine-sulphate-natrium type. Due to the mineralization degree, groundwater drainage varies from 2,120 g/l to 95,160 g/l and is about 21,159 g/l on average. The increase in dry foliage varies depending on year and hipsometric height. Consumption is no more than 0,1-1,0 l/sec, depending on the atmospheric sediments. Generally, the land is poor in terms of the spread of groundwater. A granulometric structure of the soils is heavy, weak for the water conductivity ability, weakly provided with the nutrient, salinized and solenetzificated to a different degree [3].

OBJECTS AND METHODS

The researches have been performed in the experimental area selected in the characteristic places of the Shurabad village in Khizi which is situated in the Siyazan-Sumgayit massive. The soil samples have been taken from the same area (0-100 cm) and the chemical analyses have been performed according to the method that is used in the republic [4].

RESULTS AND DISCUSSION

Investigation of saline soils and their reclamation status in recent years is one of the main challenges facing professionals. To determine the degree of degradation of soils in the territory of the Republic, to study changes in the preparation and use of their melioration methods, a number of scientists conducted research. Agrarian reforms in Azerbaijan have created conditions for the abundance of food and improve the material wellbeing of the population.

In the conditions of Azerbaijan almost saline soils have spread in all plains

and foothills. The salinization has developed in various natural conditions of migration of salts, mainly in alluvial-accumulative plains, deluvial-foothill plains in river delta.

Under the leadership of H. Aliyev, the agrarian reforms in the Republic of Azerbaijan in 1993-2003 were of great importance for the development of agriculture and production of products, the formation of new land relations. In those years, the irrigated lands of 400,000 hectares of irrigated lands were improved, capital repairs in 460 hectares, and major overhauling of 150,000 hectares. Since 1970, new achievements have been achieved in the country's agricultural production. Increasing the amount of irrigated land in 1983 was 265.1 thousand ha. At the same time, in many regions of the country, as a result of floods and floods in 1997, the national economy, land reclamation and water economy facilities were seriously damaged [5].

In the following years, the provisions of the State Program on Reliable Provision of Food in the Republic of Azerbaijan for 2008-2015 by the President of the Republic of Azerbaijan Mr. Ilham Aliyev, i.e., the effective use of land resources, their protection, improvement and fertility complex agromeliorative researches are required to achieve high productivity from agricultural plants.

An area of the Siyazan-Sumgayit massive is nearly 60000 hectares. The massive zone expose to the significant change in connection with the Caspean Sea level vibration. Thanks to I.F. Figurovsky [5] and A.M. Shikhilinisky's [6] for information about climate of the Siyazan-Sumgayit massive belongs to the subtropic type. Its climate is very dry, hot in summer, but mild in winter. According to the long-term information an average annual quantity of the atmospheric precipitations is 160-363 mm. The weather's relative humidity is 73-76 % in the zone (60 % in the summer, 84 % in the winter).

Most moisture deficiencies are observed in the year. In summer, sometimes even 1 mm of sediment is not observed. In the deluvial slopes, the soils with rainwater rarely reach 60-80 cm. Periodic moisture of the soils in the mountainous plains and their drying allows the salts to intensively exit the surface horizons through capillary streams. On the ground where the salts are collected on the land crossings, it is always possible to observe the migration horizons of salts.

The Siyazan-Sumgayit massif is dominated by strong winds from the north. In the winter, the winds are north and north-west, south and south-east in the summer, and north, west and north-west in the spring.

Wind speeds reach 20-40 m/sec in open airways and rarely 40 m/sec. The duration of Nord's stay is 2-3 days, sometimes up to a week. In the cold season of the year, the snow is cold, sometimes snow and bush, and in the summer, when the necessary measures are taken, the dusty storm is observed, causing dry soil and the destruction of plants [7].

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In the massive studies, winds in the northern direction, with high velocities, dry and dust, are commonly referred to as "nord" (Xazri) in all seasons of the year. According to perennial data, their average annual rate was 100 times (wind speed 6 and more). The average speed was 6-7 m/sec.

The researches show that subsoil and river waters possess double character.

The subsoil water level lies down lower than the river waters level in a large part of the inclined plain and a hydraulic relation between them is fulfilled by the river waters infiltration. The river waters filtration to the subsoil waters happens in the low part of the inclined plain of some places in the Caspean side plain upper part. All the rivers feed the subsoil waters in the lowest parts. The subsoil waters feed the rivers in the mean upland and foothill zone [8].

Samur-Absheron canal, Takhtakorpu -Jeyranbatan canal, Atacay and Gilgilchay rivers are in the hydrangea network.

The development of the maximum river network was caused by the fall of most atmospheric precipitation in the middle mountainous regions of the river basins. Reduced river network density in higher mountainous areas (over 2500 m), low rainfall, weak vegetation, rocky zone, low rainfall (less than 1000m), low levels of rainfalls, loss of water to alluvial sediments has a significant impactions.

Climate indicators, vegetation cover, relief of the soil, various moisture conditions (surface water) affect the formation and distribution of soils. At this time, the relief of the land plays a leading role. It is also important to note the soil-bearing rocks (sea and continental), their granulometric composition and degree of salinity.

While D.G. Vilensky [9] compiled a salinization map of the strait plain soils, he showed their geographical spreading, gave a characteristic of the salts in some deep cuts (bore pits) and defined a salt regime change in the soil.

İ.A. Shulga noted the significiant salinization of the strait plain in his work that the main sources of salts in the plain; are formed from: Sumgayit svita green and red gleys of eosin which is a main material of the accumulation that is rich, easily solving, not lying down in the depth, transferring from upland to the foothill zone; in the modern soil processes horizon of the salt deposits which are not in the depth more than 0,5m from surface [10].

N.A. Kachinsky and his associates performed researches in the strait plain of the Siyazan-Sumgayit maasive. It was determined that the soils granulometric content changes from the light loamy to heavy clayey structure from mountains towards east-sea [11].

The soil on the whole profile is carbonated and boils with severe chloride acid. M.R. Abduyev [2] noted that for the gray-brown soils, it is strongly boiling water from the surface, and this is due to the age of the soils.

Soils are carbonate. The carbonates are evenly distributed. The content of gypsum is insignificant. In the upper horizons it does not reach even 0,1 %. A small quantity of gypsum (0,44-0,86 %) is contained in the lower horizons. Soil salinity is high (in deep-lying soil horizons dense residue exceeds 1,2 %). Soils are characterized by high salinity. It is interesting to note that the number of absorbed Na is especially high not in those horizons where salinity is expressed morphologically, but below.

This is probably due to the predominance of sodium salts here. The content of absorbed sodium in some cases reaches 40 % or more of the amount of absorbed cations. The content of absorbed Mg in these soils is also high, which to some extent contributes to an increase in salinity.

Moreover for the soils of the Siyazan -Sumgayit massive maximum importance of absorbing Na more than 30 % from absorbing bases sum is characteristic for the soil upper layer of the train zone in the delluvial slopes, it is protected in the middle part of the profile in the slope rest parts from the given massive.

Here are mainly represented by gray -brown solonetzic soils. The power of horizon A of these soils is insignificant. There are clear forms of prismatic structure, falling on the plate separately. The horizon is characterized by a high density and a clear columnar structure. The other character of soils is occurred in the middle zone of the delluvial slopes.

Here the serozem-grey solonets is mainly presented. Horizon A thickness of these soils is insignificant. The distinct forms of the prismatic structure decayed to the plate-like separation are observed. Horizon B is characterized by high compactness and clear columnar structure. The thickness of columnar horizon raises 15-20 cm. Horizon C is characterized by the friable consistency, indistinct expressed structure, sulphate accumulation. The soil water permeability is very low (0,001- 0,004 mm/sec).

The plant cover in the Siyazan-Sumgayit massive concerns the semi-desert type which froms a condition for a strong salt collection in the soils. In connection with the climate aridity in the massive grungy -wormwood, ephemer plants spread.

Efemers usually do not cover a certain zone, and spread among wormwood and salmon. During the summer months, vegetation period begins with ephemeral plants, where atmospheric sediments are maximal. Ethemers don't usually occupy definite zone and spread among wormwoods and saltbushes.

There is no general legitimacy in salt supply distribution in the plain zones of the Siyazan-Sumgayit massive. But only the ancient lagoon deposits that make the surrounding zones rocks undergo strong salinization is an exception.

The grey-brown soils develop under ephemeras and wormwood –saline association plants. In the zones where the superior plants don't develop, the water-plants, rarely shabby are found.

Primarily primitive soils are spread in the smooth plains of the diluvia plain of Siyazan-Sumgayit massif. These lands are selected by some characteristics: almost no plant cover (saltwater only), multifunctional crack fracture, absence of profile in formed lands, density.

The massive plume zone is characterized by low humus content in the soil, which is due to the development of the salt-resistant plants. In deep horizons, the pH indicator is high. The characteristic soils have been developed in the valley sediments, also in the ravines.

The sulfate-rich layer lies in the form of crystalline gypsum vessels below the carbonate horizon. As a rule, in the depths of 35-45 cm, the gray eluvia-carbonate horizontally developed in all forms is mainly soft. In the Illuvial-carbonate horizon below is a gypsum horizon. Gray-brown soils with a thick layer of massive (40-50 cm) were subjected to severe salting. In the saline areas, dry residual is 2,5-2,8 %.

The soil profiles differ to some and other degree in the grey-brown soils. The porous bright-grey cover which is a reason for alkalinity, replace by the stratified-prism-form brownish horizon under layer, develop humus on the upper layer.

The humus quantity changes 1-2 % on the upper layers of the soil. On the lower layers it sharply reduces.

The humus quantity changes in 40-50 cm. Gypsum is little on the upper layers of the soil profile. Its quantity reaches 0,5-0,8 % at 100-200 cm layer. The soils are high calcareous, $CaCO_3$ number changes by 23-33 %. Hygroscopic humidity is high and forms 5-6 %. The granulometric analysis structure shows that if a quantity of physical gley is 57 % on the upper layers, then it reaches 63 % on B horizons (at 40-50 cm depth). An unlike character of the grey-brown soils in the Siyazan-Symgayit massive is that alkalinity is higher and 0,08-0,13 % on the upper layers.

The coastline of the Siyazan-Sumgayit massive is rich in sands. Sometimes these sands pass to the initial stage of soil formation. The soil grounds salinization is explained by the Caspean level change in this part of the plain. The sea level change in the coastline zone is connected with the soil salinization or filling the sea with the salty waters or transferring to the land again. The salinity intensification conditioned the meliorative measures realization [3].

The Siyazan-Sumgayit massive-IV period deposits consist of the complicated III period and Mesozoic rocks. IV period is divided into continental and sea deposits for its genesis in the massive. Contemporary and ancient alluvial-proleuvial sediments spread across the river valleys and cover the terraces of Sumgayit, Gilgil, and Atacay, and some also cover the skirts. Lithological composition consists of large rocks and gravel and sandstone sediments, in some places sandy clay and tile.

So, in terms of Siazan-Sumgayit massif soils of cultivated areas mainly used for grain crops, a small area under melons. The practice of the method of irrigation (by overlap of large amounts of water) leads to the fact that water stagnates due to the strong alkalinity and compaction of the soil and forms a shallow Bank. At high temperatures, the upward movement of salt solutions begins, which leads to acute salinity of the surface horizons of the soil.

Depending on humidity an amount of the salts distribution is differently observed in the soil profile. Excess irrigation water, temporarily lingering in a saline less permeable layer, dissolves easily soluble salts available and turns into a more concentrated solution, which later serves as a source of capillary salt currents to the soil surface. After watering, the bumps are released from the water, which, when dried, act as a dry drainage, to which capillary salt currents are directed from the surrounding more humidified depressions.

The middle layer of the soil in General is characterized by high moisture content.

The high moisture content in some periods of the year covers almost the entire profile, especially in the autumn-winter season, when evaporation from the surface is noticeably reduced and a relatively large amount of precipitation falls. This contributes to an increase in the level of groundwater and thereby increases the moisture content in the soil profile.

The thickness of the sediments is not stable, and in the upper part of the river is less than 1-2 m down to 10-14 m. The upper layer of the area from Ataçay to Keşçay consists of alluvial-diluvia sediments 5-10m thick. From the lithological point of view, these rocks are composed of clay rocks, which have crushed rock fragments [12].

The soil-cover in the Siyazan-Sumgayit massive is very various and it is mainly represented by grey-brown, grey, takyr and solonchaks. The soil researches were performed by VM. Smirnov-Loginov [12], N.A. Kachinsky [11], I.A. Shulga [10], E.M. Salayev [8], M.R. Abduyev [1], R.G. Mammadov [7].

The explored (Siyazan) territory is geomorphologically attractive to the Dohshi-Gilazi geomorphological zone. This is a geomorphological unit with a low and lowland. Tire and mountains in the region are mainly composed of Miocene and Pliocene sediments. Some of the surfaces and old terraced north-eastern slopes with good seabed surfaces. The river valleys are cut in perpendicular and diagonal directions. In the area where the anticline is cut, the valleys are narrow and deeper, and the sinklinal structures are extensively widened. Arid-denudation relief forms, including wounds and boars, are widely spread in the territory located in the south-eastern part of the territory of Atacay.

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The broken upland relief is observed in the north-west part of the Siyazan-Sumgayit massive and genetically is closely connected with an upland system surrounding a north-west part of the plain. It was defined according to the salt regime observations in the Siyazan-Sumgayit mas-

sive that the salt content expose to sharp changes depending on the seasons. In general case these changes cause the salt content increase. For this purpose the salts quantity change in the research zone soils was given on the table 1.

Table 1 – The salts quantity change in the soils of Khizi, Shurabad (2017)

Number of section	Depth, cm	HCO_3		Cl		Dry residue, %	Degrees of salinization
		Mg-ekv	%	Mg-ekv	%		
K-1	0-25 25-50 50-100	0,80 0,40 0,60	0,049 0,024 0,037	8,30 9,30 10,40	0,291 0,326 0,364	0,380 0,850 0,760	Salinized to a mean degree
K-2	0-25 25-50 50-100	0,40 0,50 0,40	0,024 0,031 0,024	9,90 9,60 10,60	0,347 0.336 0,371	0,625 1,290 1,285	Salinized to a strong degree
K-3	0-25 25-50 50-100	0,60 0,40 0,30	0,037 0,024 0,018	12,00 15,20 14,80	0,420 0,532 0,518	0,655 1,200 1,600	Salinized to a strong degree
K-4	0-25 25-50 50-100	0,50 0,40 0,40	0,031 0,024 0,024	18,40 20,20 25,60	0,644 0,700 0,896	1,795 1,985 2,235	Salinized to a strong degree
K-5	0-25 25-50 50-100	0,70 0,70 0,40	0,043 0,043 0,024	1,40 3,20 3,80	0,049 0,112 0,133	0,600 0,300 0,565	Salinized to a mean degree
K-6	0-25 25-50 50-100	1,20 0,50 0,60	0,073 0,031 0,037	3,00 1,40 1,00	0,105 0,049 0,035	0,215 0,465 0,215	Salinized to a weak degree
K-7	0-25 25-50 50-100	0,40 0,60 0,60	0,024 0,037 0,037	9,20 7,60 15,20	0,322 0,266 0,532	1,490 0,550 1,770	Salinized to a strong degree
K-8	0-25 25-50 50-100	0,40 0,40 0,60	0,024 0,024 0,037	8,40 9,00 5,20	0,294 0,315 0,182	0,870 1,675 0,950	Salinized to a strong degree
K-9	0-25 25-50 50-100	1,20 1,20 1,20	0,073 0,073 0,073	1,60 3,00 2,00	0,056 0,105 0,070	0,200 0,390 0,360	Salinized to a weak degree
K-10	0-25 25-50 50-100	0,80 0,40 0,60	0,049 0,024 0,037	9,80 11,80 10,80	0,343 0,413 0,378	0,590 1,105 1,970	Salinized to a strong degree
K-11	0-25 25-50 50-100	1,00 0,80 1,20	0,061 0,049 0,073	2,80 6,60 4,20	0,098 0,231 0,147	0,240 0,855 0,340	Salinized to a mean degree

According to the last researches it is seen that the salts quantity in the zone soils was 0,200-1,795 % at 0-25cm of soil layer, 0, 215-2,235 % at 50-100cm layer (for a dry residue). HCO_3 number was 0,024-0,073 % on the upper layer, but 0,018-0,073 % on the lower layers.

A quantity of Cl ion was 0,056-0,644 % on the soil upper layer, but 0,035-0,896 % on the lower layers. pH value changed by

7,8-8,8. As is seen, the soils are salinized to a weak, mean and strong degree.

It is seen from the table that the weakly salinized soils are in the 6-9th sections, i.e. an average quantity of the salts changed 0,25-0,50 % at 0-100 cm. The averagely salinized soils are in the 1,5 and 11th sections, an average quantity of salts changed by 0,50-1,00 % at 0-100 cm. the strongly salinized soils are in the rest 2, 3, 4, 7, 8, 10th sections, i.e. the salts mean quantity changes 1,00-2,00 % at 0-100 cm.

For the carbonates ($CaCO_3$) quantity the soils degree is mean and high. Cl-quantity is more than the permissible limit (0,01). The soils sometimes change till chloride-sulphate and sulphate-chloride the salt type. The soils are inclined to the alkaline environment for pH quantity, i.e. its value is <7,0 % and changes by 7,8-8,8. The physical gley value changes by 50-80 % in these soils. For gradation the soils are light gleyey, mean and heavy gleyey.

CONCLUSION

The researches show that the soils in the Siyazan-Sumgayit zone are weak, mean and strong. The salts quantity in the zone soils is 0,200-1,795 % at 25cm of soil layer, 0,215-2,235 % at 50-100cm of layer (for the dry residue). pH value changes by 7,8-8,8. It is necessary to fulfill agromeliorative measures system to improve a meliorative state of the same soils.

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ТҮЙІН

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ТӘЖІРИБЕ ТЕЛІМІНІҢ ТОПЫРАҚТАРЫНЫҢ ТҰЗДАНУ ҮРДІСІНЕ ӘСЕРІ (ШИРВАН ДАЛАСЫ МЫСАЛЫНДА)

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Мақалада Әзірбайжандағы Сиязан-Сумгаит алқабының жағдайы туралы мәлімет келтірілген. Алқап климаты субтропикалық, ал жерасты суларының деңгейі өзен суларының деңгейінен төмен. Алқап топырақтарындағы тұздардың мөлшері зерттеліп, тұздың құрамы жыл мезгіліне тәуелді қатты өзгеріске ұшырайтыны анықталды.

Түйінді сөздер: алқап, жерасты сулары, тұздың құрамы, топырақ жамылғысы.

РЕЗЮМЕ

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СОВРЕМЕННОЕ СОСТОЯНИЕ ПОЧВ СИЯЗАНЬ-СУМГАИТСКОГО МАССИВА

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В статье представлены результаты исследований состояния Сиязань-Сумгаитского массива Азербайджана. Отмечено, что климат массива субтропический, а уровень грунтовых вод ниже уровня речных. Изучено количество солей в почвах массива. Определено, что состав солей подвергается сильным изменениям в зависимости от времен года.

Ключевые слова: массив, грунтовые воды, солевой состав, почвенный покров.