

Section 2. Agricultural sciences

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AGROCHEMICAL PROPERTIES OF GYPSUM SOILS OF JIZZAKH DESERT

Abstract. In article indicated comparative results agrochemical and chemical characteristic basic virgin and irrigated soils. The research shown, that explored ground are characterized by miscellaneous by degree and type salinity, gypsum, small contents of organic material and main element of the feeding the plants. The reason this is disadvantageous soil-climatic particularities of the object, which promote the quick accumulation of saline spare in soils at the depth of 0.5–1.5 m (that is connected with low atmospheric moistening) that brings reduction a level of fertilities of the main soils of the under investigation territory.

Keywords: Saline soils, low salinity, medium salinity, agrochemical property, organic material, gypsum soils, hard-to-reclaim soils, gypsum content, sierozem-meadow, meadow solonchaks.

Introduction. Protection and protection of lands, restoration and reproduction of fertility of hard-to-reclaim land saline soils are the primary tasks of the modern farming system. In recent ears, in some regions, an intensive development of salinization and salt accumulation processes in soils has been observed, while agrochemical, chemical, agro physical, biological features and melioration and ecological state of soils are deteriorating [1; 3; 5; 7].

It known that the agrochemical indicators of the soil determine many of the most important features, such as the physical condition and fertility of the soil. In the process of soil development, one of its main properties is formed – fertility, which is closely related to the content of humus and nutrients. Analyzing the role of humus in soil formation, one cannot fail to recognize it as the most characteristic and essential part of the soil, with which, first, its fertility is associ-

ated. As the obtained data of the analysis showed, the described soils are not very rich in humus. The distribution of humus along the soil profile has a certain regularity. In all soil types, a greater amount of humus is contained in the upper horizons, and below the humus, content becomes very insignificant [4; 5; 8].

Objects and methods of research. The object of the study was the soils of the Jizzakh steppe (typical sierozems, sierozem-meadow, meadow solonchaks) of varying degrees of salinity and gypsum content.

Sample analyzes were indicated according to generally accepted methods of the analytical center of the State Research Institute of Soil Science and Agrochemistry.

Research results. The obtained results indicate that among the studied soils of the studied region, virgin typical sierozems, sierozem-meadow, meadow soils characterized by a higher content of humus than

irrigated light sierozems, sierozem-meadow, meadow-sierozem, and marsh-meadow and meadow soils. The content of humus in the upper horizons of all virgin soils studied different from 1.13 to 2.38% in the aisles, from 0.49 to 1.21% in the subsurface horizon, and naturally decreases with depth along the profile. The high moisture content of the soil, the proximity of mineralized groundwater (there used to be water here), high salinity and gypsum content apparently did not contribute to the active development of soil microorganisms and vegetation. With a decrease in the degree of groundwater, due to the conduct of drainage reclamation (conduction of a collector), virgin soils were subjected to drainage and used as pastures. In these soils, the amount of nitrogen is low throughout the profile – from 0.1 to 0.01%. The content of exchangeable potassium is also low throughout the profile of the gray earth soil. In meadow-serozem and sierozem-meadow soils, the content and profile distribution of mobile forms of phosphorus and potassium are similar to serozem soil, that is, low and very low, with the exception of the surface layer of 0–30 cm, where the content of mobile potassium is at the level of medium availability. In the meadow solonchak, there is little mobile phosphorus, and the content of mobile potassium in the upper part of the soil along the profile, with the exception of 0–17 cm, is quite high at the level of average supply (200–240 mg/kg).

Thus, these soils characterized by a low supply of mobile forms of phosphorus and potassium. Only in individual soil layers, the amount of mobile forms of phosphorus and potassium is contained in quantities at the degree of average supply. It can be said that there is no definite regularity in the content and distribution of these nutrients.

Since irrigated meadow-sierozem, sierozem-meadow, bog-meadow, meadow soils and light sierozems developed in the lower parts of the relief, they are more often composed of soils heavy in mechanical composition. They are not rich in humus, the maximum amount of humus here is concentrated in the

plow horizon 0.60–1.45% and in the subplow horizon, it sharply decreases to 0.56–0.97%, below which its amount gradually decreases, due to the small annual growth of organic matter due to high salinity.

Serozem-meadow soils considered semi-hydromorphic soils; in the soils of this subtype, residual features of sierozem soils and newly emerging features of meadow soils combined. Compared to virgin meadow soils, they are poorer in humus and nutrients. The humus horizon is shortened; deeper along the profile, the amount of humus decreases very sharply, which is associated with the complex structure of the mechanical composition of irrigated soils.

From numerous studies, it is known that for the normal growth and development of plants, optimal nutritional conditions are necessary, which are created by the composition, quantity and ratio of essential nutrients. At the same time, the change in the content of gross forms of soil nutrients is primarily associated with the content of humus. Based on the data obtained, due to the poverty of the studied soils in humus, the content of gross nitrogen in them is also low. According to our data, in all the studied soils, the greatest accumulation of them is noted in the uppermost horizons, and this indicator gradually decreases with the depth of the profile.

For example, in irrigated sierozem-meadow soils, the content of total nitrogen in the upper layer is 0.098–0.126%, in the subsurface layer its amount decreases to 0.076–0.087%, depending on the humus content and mechanical composition. Here, the phosphorus content is 0.743%, and in the middle of the profile, it naturally decreases to 0.593%.

Due to the high degree of salinity, the irrigated sierozem-meadow soil is characterized by the lowest content of humus and nutrients. Here, the humus content in the upper horizons is 0.56–0.60%, in the lower horizons it ranges from 0.25 to 0.39%, the amount of gross nitrogen, respectively, is 0.070%, and with depth its content decreases to 0.031–0.062%, which indicates a relatively weak soil enriched with humus and nitrogen. In irrigated meadow-serozem

soils, the humus content in the upper horizon is 0.80–1.21%; its minimum content was 0.22–0.31%. In these soils, the total nitrogen in the upper horizons, depending on the content of organic matter, ranges from 0.084 to 0.120%, decreasing down the profile to 0.028–0.042%.

In plant nutrition, along with nitrogen, a significant place occupied by the content of phosphorus. Characterized soils have a relatively high content of total phosphorus. As our studies have shown, total phosphorus in soils varies within a very wide range of 0.077–0.743%. Some of its fluctuations along the profile are associated with the mechanical composition of the rocks and the content of humus.

The upper horizons often contain more total phosphorus, which is associated with biological accumulation. In irrigated sierozem-meadow soils, the content of gross phosphorus in the upper horizon ranges from 0.176 to 0.743%, with depth this indicator decreases to 0.077–0.065%. In addition, in irrigated bog-mulberry soil, the content of gross phosphorus in the plow horizon is 0.243%, and in the lower horizons 0.142%, and, accordingly, in terms of humus content and mechanical composition, it changes along the soil profile. For example, in more humus horizons and heavy interlayers, its content reaches maximum values, and vice versa, in horizons with low humus and lighter in mechanical composition, it decreases to the minimum values.

The main source of plant nutrition with phosphorus is its mobile forms. Their quantity in the upper horizons of the studied irrigated soils ranges from 18.93 to 30.0 mg/kg; the least amount of mobile phosphorus is contained in irrigated bog-meadow soils and light gray soil. In the studied soils of the region, the content of gross potassium is 1.62–3.20%, the amount of mobile potassium is 127–380 mg/kg of soil.

In the studied soils, there is a certain dependence of the content of nutrients on the humus content and mechanical composition of the soil. The dependence of the content of nutrients on the mechanical composition of soils clearly expressed: there are more of

them in heavy loamy varieties than in light loamy and sandy varieties. In addition, with an increase in the degree of salinity, the content of humus and nutrients drops sharply to the minimum values.

From the data obtained, it found that the virgin soils of the study area more enriched in humus content, gross and mobile forms of nitrogen, phosphorus and potassium than irrigated soils. In general, the low supply of humus and nutrients to these soils can be explained by a smaller supply of root residues, the climate of this region, where high summer temperatures contribute to intensive evaporation of moisture from the soil. This, in turn, causes intense soil salinization and a high need for irrigation of plants, and contributes to the accumulation of a small amount of humus in the object under study.

The irrigated soils of the Jizzakh steppe characterized by such features as high gypsum content, as well as salinity and insufficient supply of humus and basic nutrients in horizons. According to the content of carbonates, the characterized virgin and irrigated soils do not differ from each other. The content of carbonates in all soils, depending on the mechanical composition of the soil profile, ranges from 2.86 to 10.30%.

In the studied soils, a variegation of gypsum content observed, as in the profile of soils, manifesting itself as an alternation of different degrees of gypsum content. When developing the degree of gypsum content, the depth of the gypsum horizon and the thickness of the gypsum horizon of soils, the content of gypsum in them taken into account. Depending on the content and distribution of salts along the profile, the following subdivisions of soils are distinguished. The studied soils do not have a definite regularity in terms of gypsum content. If in some soils, the content of gypsum is higher in the surface of the profile, then in others, it increases in the middle of the profile, and sometimes its addition observed in deep horizons. However, it should note that even such types of soils encountered that throughout the profile hold a high content of gypsum.

The content of gypsum in the composition of the studied soils, based on the classification of I. E. Pankova, divided into the following 4 categories [2]:

- *Soils with low gypsum content* (gypsum content is 2–10%), including virgin soils (5, 6 sections), the gypsum content in these lands in the plow horizon was 2.37–9.1%;
- *Soils with an average gypsum content* (10–20%), including virgin soils (sections 1, 2, 12), irrigated soils (sections 13, 14), the gypsum content in the plow horizon of these soils was 11.47–19.05%;
- *Soils with a high content of gypsum* (20–40%), including virgin soils (sections 3, 4, 7, 8, 9), the content of gypsum in the plow horizon of these soils was 26.04–37.62%;
- *Soils with a very high content of gypsum* (> 40%), including sierozem-meadow soils of the studied territories, can be attributed to this category and the maximum content of gypsum in these soils was 41.31–43.74%;

It should be noted that in the upper horizons of some studied irrigated soils (sections 15, 16, 17, 18) the gypsum content does not exceed 2%.

In the studied soils, the reaction of the soil is a very characteristic and sensitive sign of it; it reflects the most significant features of the chemical composition of the soil. The reaction of the soil – its acidity, neutrality or alkalinity – is of great importance for the chemical characterization of soils. The results of soil pH determination show that the reaction of the studied irrigated soils is mainly slightly alkaline, the pH value in

these soils ranges from 7.5–7.7, and in virgin soils, soil pH values are slightly lower compared to irrigated soils.

Conclusions. The given materials on the agrochemical properties of the studied soils show the difference in the quantitative content of humus and nutrients in the main types of soils of the Jizzakh steppe. Unfavorable soil and climatic features of the object, especially observed over the past 10–15 years, contribute to the rapid accumulation of salt reserves in soils at a depth of 0.5–1.5 m, which leads to a deterioration in the basic properties that identify soil fertility.

The upper 0–200 cm layer of most soils is medium to high gypsum. The horizon with a high content of gypsum falls mainly on the upper meter layer (15–40%) of the soil profile of virgin soils and they belong to the category of soils with a high and medium content of gypsum. In irrigated soils, a low content of gypsum observed.

The upper soddy horizon of the studied virgin soils is rich in humus, but is characterized by a low content of nitrogen, which is due to the high content of gypsum in the soils, salinity and long-term moisture to a high degree. In addition, these soils characterized by a low supply of mobile forms of phosphorus and potassium. In general, desertification of the territory and salinization of soils have a negative impact on the basic features of the studied soils and lead to a decrease in their fertility, while the agrochemical properties and nutrient regime of the soils deteriorate. A small amount of precipitation, high air temperature, low humidity, an abundance of winds and the resulting high.

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