MIGRATION AND ACCUMULATION OF IRON, ALUMINUM, SILICON IN DIFFICULTLY AMELIORATED MEADOW SOILS

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Annotation The article provides an assessment of the current content of gross iron, aluminum, silicon in the arzyk shoch soils of the lacustrine - alluvial plains of Central Fergana. As a result of the research, it was established that the concentrations of Fe, Al, Si and their ratios vary depending on the degree of destruction of the cemented arzyk shoch horizon in the studied soils. The radial distribution of these elements has features depending on the thickness and degree of destruction of the arzyk shoch horizon. The Fe:Al, Al:Si, Fe:Si ratios are close to each other in these soils. The radial distribution of bulk forms of Fe, Al, Si in the soils of the studied areas is uneven, but the minimum content of Fe, Al in all areas coincides with the groundwater horizons.

Keywords: Iron, aluminum, silicon, arzykshoch, lacustrine - alluvial, cementation, mechanical destruction

Maintaining: Compounds of iron, aluminum, and silicon play a significant role in the soil-forming process of the arid zone. Oxides of iron, aluminum, and silicon are the most important components of almost all soils of Uzbekistan and other arid, partly humid regions. The ability of iron and aluminum to adsorb phosphate ions and some others is known. Information on the distribution of atoms of oxides and hydroxides of Fe, Al, Si along the soil profile is necessary for diagnostics and classification, the development of pedogeochemical processes.

In hydromorphic soils and in irrigated lands, the redox potential, electrokinetic potential in the wet state of the soil decreases, and in these conditions, that is, in that wet state, Fe_2O_3, FeO are almost always constantly present in the soils, while the theoretical predominance is FeO, that is, divalent iron .

Fe, Al, Si are framework elements and nearby reserves, which are quickly and first of all involved in soil-forming processes.[1]

The transformation and migration of these elements and their compounds significantly influence the formation of the soil profile, through which they actively influence the physical, chemical and pedogeochemical properties of soils and soil-forming rocks. Despite this, similar information on irrigated, difficult-to-reclaim soils is limited and ambiguous.

Fe, Al, Si take part in the formation of a cemented arzyk - shokh horizon in soil conditions with saz regimes, where mineralized pressure groundwater and evaporative pedogeochemical conditions predominate in desert conditions such as Central Fergana, Fergana region of the Republic of Uzbekistan. Under such conditions, precipitation occurs more often in the form of oxides and hydroxides, resulting in a relative enrichment of certain soil horizons and soil-forming rocks. Area of accumulation of Fe, Al, and Si compounds; wide solutions interact and can form secondary accumulations in pedogeochemical barriers, especially in the capillary fringe zone of hydromorphic soils.

Evaporation of groundwater with relatively high contents of Fe, Al, Si is accompanied by hydrogenous formations of concretions, interlayers, individual slabs, with the participation of gypsum and carbonates of Arzyk - Shokho horizons in desert soils. Under these conditions of Central Fergana, in cemented Arzyk - Shokho horizons of the surface or deep position, the amount of cemented substances in them ranges from a few to tens or more percent. Ferrous cements are characteristic of the continental regime of lake waters.

The composition of cemented substances and elements determines a number of physical, mechanical and chemical biogeochemical properties of the cemented horizon. Silica, that is, chalcedony or opal cements determine high hardness and strength, low compliance to all types of weathering. Gypsum, carbonate and marly cement create medium hardness.

Materials and methods In order to study the behavior of chemical elements in the migration and accumulation of silicon, aluminum, iron and other elements, field production experiments were carried out from 1920 to 1923 on the territory of the Mukarramkhon farm in the Yazyavan district of the Fergana region of Uzbekistan. The total area of the experimental plot is 10.2 hectares, where the Polovchanka variety of wheat has been sown in recent years. The experience is located in one tier, with options:

I-variant, control (the Arzyk - Shokh horizon with a thickness of 26 cm is not disturbed), section-3

II-option, loosening the Arzyk-Shokhovo horizon with a special ripper, section-2

III-option, arzyk - the shokhovy horizon of 25-30 cm is destroyed by a ripper and the slabs, which are formed as a result of loosening, ranging in size from 10 to 20-50 cm2 with a thickness of 5-10 cm, are taken outside the experimental area, section-1.

Each option is 0.5-0.7 hectares, repeated 3 times. Elemental analysis of soil samples was carried out using a Perkin Elmer AvioTM 200 optical emission spectrometer with inductively coupled plasma.

The discussion of the results Along with these, in general, in irrigated meadow saz soils with cemented arzyk - shokho horizons, the same elements generally predominate as in the lithosphere. This situation once again proves the inheritance of Fe, Al, Si from parent rocks, which are formed as a result of weathering.

Silicon, aluminum, and iron in the studied soils, along with calcium, sodium and other alkali and alkaline earth elements, are typomorphic. The higher the concentration of a chemical element in soils, the higher its content in soil solutions, and therefore, the greater the likelihood of precipitation and accumulation. But this order depends on a number of factors.

The migration of Fe, Al, and Si leads to a significant redistribution of these elements in the soil profile. The ability to accumulate and distribute the studied elements in individual soil horizons depends on the chemical properties of silicon, aluminum, iron and the clarke of the element in the soil environment, as well as geochemical barriers such as the Arzyk-Shokhovo horizon. Iron - aluminum - silicate - gypsum horizons are mainly cemented with silica, the content of which in our experiments ranges from 27.7-38.1%. Moreover, the highest content of SiFe and Al coincides with the Arzyk - Shokho horizons (section-1).

With the destruction of this horizon and the removal of the destroyed material outside the areas, a clear decrease is observed, both Si and Fe, Al, at a depth of 33-59 cm, silicon is 29.6, aluminum 7.8, iron 2.94% in the option where arzyk is the shokho horizon is only destroyed; the contents of Fe, Al, Si occupy intermediate positions between options 3 and 1.

In groundwater in the desert zone and soil solutions, mobile compounds of iron, silicon and aluminum are almost always present; as a result, intensive accumulation occurs during the process of soil formation, especially in the capillary fringe zone. At the same time, under the influence of aluminum, iron, and silicon compounds, chemogenic formation occurs in individual soil horizons.

The accumulation of these elements and their combination occurs against the background of sulfate - type salinity, the color of which is due to iron sulfates and the smell of hydrogen sulfide.

Fresh irrigation water, which is supplied to irrigate wheat at a rate of 800-1000 m3/ha, can increase the flow of oxygen into the soil. Iron sulfates are released with a light yellow color, which gives the soil a yellowish color.

Conclusions Thus, Fe, Al, Si accumulate in soil horizons. In general, the pedogeochemistry of Fe and Al, and partly silicon, are close to each other, but there are also distinctive features. The aluminum content in groundwater of the studied options reaches 0.5-0.6 mg/l. Research shows that the main factor in the relative migration of aluminum in waters is the low concentration of phosphate ions and silica. Silicon, in turn, easily captures hydroxides and oxides of Fe, Al and forms aluminosilicate, ferrosilicate and alumino - ferrosilicate minerals. This effect is often observed in the capillary fringe zone or in the Arzyk - Shokho horizons of arid soils of the meadow-saz regime.

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