CONTENT AND COMPOSITION OF HUMUS AND SOME PHYSICO-CHEMICAL PROPERTIES OF EROIDATED SEROZEM SOIL.

Nodira Raupova
Assistant professor Tashkent state agrar university
nodirahon69@mail.ru
ORCID **Id orcid.org/0000-0002-6682-2387**

Nozima Khodjimurodova
Master at Tashkent state agrar university
nozima.hod@mail.ru
ORCID **Id orcid.org/0000-0001-6144-0331**

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The article deals with the humus condition of the main types of soils of vertical belts. In general, our studies show that these ratios of Cga: Cfa correlate with soil susceptibility to erosion processes, depend on slope exposure and slope elements. The expansion of Cga: Cfa is accompanied by an increase in the optical density of humic acids. Differences in resistance to coagulation between humates of different soils, to varying degrees of susceptibility to erosion and anthropogenic factors, correspond to differences between them according to their optical properties.

Key words: organic matter, humus, eroded soils, fulvic acids, humic acids, carbon, hydrolysing fractional composition, optical density, physicochemical properties.

Decomposition of organic matter and the formation of humus occurs here under conditions that cause extreme regimes, as the erosion processes of the soil develop, are characterized by lower reserves of humus and nutrients. The study of humus formed under such conditions is of special interest for the development of the genetic and biohumus. In soils under extreme conditions, as the soil erosion processes develop, humus and nutrient reserves are less abundant, organic matter content is 1-10% of the total soil carbon. The amount of decalcinate substances varies from 5 to 16% of total carbon and in Most cuts increase with depth. This may be due to the leaching of sparingly soluble substances from the upper horizon. Eroded soils often contain less decalcinate substances than non-eroded soils, which can be due to both their leaching and rapid destruction by microorganisms.

In the medium-eroded soils of the northern slope, the content of organic carbon in the upper layers is somewhat elevated-0.568-0.504% and downward along the profile gradually decreases to 0.104-0.075%, and in the analogous soils of the southern slope it is contained in the upper layers 0.551-0.237% to the bottom, sharply decreases to 0.081%. In the group composition of humic substances of the investigated soils, fulvic acids predominate over humic acids. In washed soils on both sides of the slope, the ratio of Cga: Cfa in the sod horizon approaches unity 0.85-0.84, gradually decreases to 0.74-0.64.

Similar indices for the ratio of carbon of humic acids to fulvic acid carbon have been obtained in the arable horizons of non-washed soils, northern and southern slopes, where it varies between 0.67 and 0.72. According to the type of humus, the upper horizons of the undistorted and embedded differences of the investigated soils are referred to as fulvate-humate. This ratio decreases to 0.58-0.54 and 0.74-0.64, which is due to a noticeable decrease in the group of humic acids. With respect to Cga: Cfa, and consequently by the type of humus, the medium-washed soils are markedly different. Thus, in the arable horizon this ratio is 0.67 of the northern part of the slope 0.72 in the southern part of the slope and refer to the humate-fulvate type of humus. The lower horizons of the medium-washed soils of the northern and southern slopes refer to the fulvate type of humus, where Cga: Cfa limits of 0.490-38.

The highest hydrolysability of humic substances is characterized by the sod horizons of the washed soils of the northern and southern slopes, where the ratio Cga: Cfa is 1.94-1.68%. To the bottom, the hydrolysability somewhat decreases 1.46-1.09%, which is due to a decrease in the proportion of humic acids. Reduced hydrolysibility is characterized by the undistorted and mild-eroded differences of both slopes. In the upper horizon, Cga: Cfa varies within the limits of 1.29-1.33% of unleached soil, 0.92-0.89% in medium-washed soil.

In general, in the soils under consideration, the amount of humic acids is rather high in the upper horizons of the washed and soiled soils of 56.45-66.03% of the northern exposure, 57.1-62.8 in the lower layers of these soils, the amount of hydrolysable substances is less than 60% (from 36 , 56 to 56.94% in the soils of the northern slope and from 21.3 to 52.3% of the southern slope).

With respect to the yield of carbon from humic and fulvic acids, it is impossible to deduce a regular change in its profile along the soil profile, depending on the susceptibility to erosion processes, which is clearly manifested in the distribution of the amount of total soil carbon and humic acid carbon.

Analysis of the fractional composition of humus of soils formed on tertiary Neogene deposits, subjected to varying degrees of erosion processes, show some differences in the forms of connection of humic substances depending on the exposure of the slope, as well as the susceptibility to erosion, but nevertheless the general tendency for them remains, where the predominant fraction is the fraction 3 bound to clay minerals by stable forms of sesquioxides, as well as fraction 2 predominantly associated with calcium. The soils of the southern exposure to the content of the humic acid fraction differ from the northern one.

To determine the nature of the humic substances of serozems formed on the red-colored Neogene sediments, investigations were made of their optical density, the patterns of their variation were determined taking into account the degree of their erosion and exposure of the slopes. For this purpose, the method was used by MM Kononova (1951, 1963), NP Belchikova

(1951), E. Welte (1955), DS Orlova (1969), where the determination is made in the range 465-726 nm, which is a condition for revealing the genetic connection of humic acids to soil formation conditions.

The investigations were carried out with seven light filters with wavelengths of 726, 665, 619, 574, 533, 496, 465 nm on a universal photometer of the FM-56 model. To determine the optical density of humic acids, sodium humates were used, which were extracted during the analysis of the composition of humus. The solutions of humic acids are aligned with the carbon concentration, which is equal to 0.136 g / l. The thickness of the detectable liquid layer of the photometer is 1 cm. To determine the degree of condensation of the aromatic nucleus of humic acids, we also calculated the optical densities at wavelengths of 465 and 665 nm or the ratio E4: E6. Studies have shown that the nature of humic acids, their optical density is determined by the ecological and genetic characteristics of the soil cover, the susceptibility to erosion. Thus, a reduced ability to attenuate light and a wider ratio of E4: E6 (4.9-5.5) was revealed in humic acids of medium-eroded soils, which indicates a weak degree of their condensation of the aromatic nucleus of humic acids. In undiluted soils, this ratio is narrowed by E4: E6 (4.3-4.6), especially in E4: E6 (3.8-4.2) soiled soils, ie the most condensed aromatic nucleus can be traced in uncleaned and soiled soils. These values lower the soil layer expand from 4.2 to 5.5. The soils of northern exposures are characterized by somewhat narrowed values of the ratio E4: E6 than the soils of southern exposures, which indicates the complication of molecules of humic acids in connection with the characteristics of soil formation - large biomass reserves, better physical and physicochemical conditions, less erosion, etc. (Table 1).

The optical density of humic acids of eroded typical serozems formed on the reddish deposits of the Neogene

Table.1

Soil	Depth, sm	Wavelength, nm							$E_4 : E_6$
		726	665	619	574	533	496	465	
South exposure									
Unwashed	0-30	0.28	0.32	0.43	0.68	0.72	1.20	1.40	4.3

	30-50	0.23	0.28	0.39	0.65	0.69	1.12	1.31	4.6
The mid-washed away	0-30 30-50	0.25 0.15	0.27 0.23	0.38 0.32	0.57 0.51	0.65 0.60	1.45 1.09	1.34 1.28	4.9 5.5
Unwashed	0-30 30-50	0.30 0.26	0.38 0.33	0.51 0.47	0.72 0.69	0.85 0.83	1.28 1.15	1.45 1.40	3.8 4.2
North exposure									
Unwashed	0-30 30-50	0.25 0.20	0.34 0.31	0.45 0.40	0.66 0.64	0.74 0.69	1.25 1.20	1.42 1.38	4.1 4.4
The mid-washed away	0-30 30-50	0.26 0.16	0.28 0.24	0.36 0.31	0.50 0.47	0.67 0.64	1.17 1.14	1.35 1.30	4.8 5.4
Unwashed	0-30 30-50	0.35 0.30	0.39 0.37	0.55 0.51	0.75 0.70	0.91 0.84	1.31 1.27	1.52 1.56	4.0 4.2

Data on the optical density of humic acids of the studied soils, the ratio of E4: E6 correlates with Cga: Cfa. Thus, the narrowing of this ratio is accompanied by an increase in the optical density in the non-washed, especially optical, density in the medium-washed soils. The soils are washed, and the expansion is accompanied by a decrease Data on the optical density of humic acids of the studied soils, the ratio of E4: E6 correlates with Cga: Cfa Thus, the narrowing of this ratio is accompanied by an increase in the optical density in the non-washed, especially optical, density in the medium-washed soils. The soils are washed, and the expansion is accompanied by a decrease.

Clearly, in the conditions of high temperatures, lower humidity, less biomass and reserves of organic matter, increased alkalinity, density of medium-eroded soils, especially southern exposure, condensation of the aromatic nucleus of humic acids is difficult and simplification of their nature takes place. And in conditions of higher humidity, greater biomass, better physical, physico-chemical conditions of less alkalinity, in soiled soils or in soils of northern exposure, condensation of the aromatic nucleus of humic acids takes place.

It is known that the aromatic structure of the molecule of humic acids has hydrophobic properties, and the side chains contain groups with hydrophilic properties, respectively, the predominance of this or that structure determines the hydrophilicity of humic acids as a whole, which should be determined by the humic acid coagulation threshold, which serves to compare the nature and properties of humic acids.

Differences in resistance to coagulation between humates of different soils, to varying degrees of susceptibility to erosion and anthropogenic factors, correspond to differences between them according to their optical properties.

The optical density of soils depends on the ecological and genetic conditions of soil formation. As the degree of erosion increases, a decrease in the ability to attenuate light and an increase in the ratio E4 are observed; E6, which indicates a decrease in the condensation of the mesh of the aromatic nucleus. The soils of the northern exposition are characterized by narrower relations E4: E6, which "speaks" of the complication of molecules of humic acids, especially in the soils of plumes.

The coagulation threshold of soils formed on Neogene sediments corresponds to their optical properties, correlates with the ratio of Cga: Cfa and depends on the susceptibility of soils to erosion processes. The humates of northern exposures are less resistant to coagulation than the humates of soils in southern exposures, the humates of soiled soils are less resistant to coagulation than humates of non-washed and, especially, washed-away soils. The coagulation threshold of soils formed on Neogene sediments corresponds to their optical properties, correlates with the ratio of Cga: Cfa and depends on the susceptibility of soils to erosion processes. The humates of northern exposures are less resistant to coagulation than the humates of soils in southern exposures, the humates of soiled soils are less resistant to coagulation than humates of non-washed and, especially, washed-away soils.

Under the influence of erosion processes, the humus condition of soils is differentiated taking into account the degree of erosion, the slope element, and the slope exposition.According to the content and the reserves of humus, the soils are at a very low level; on the content of mobile humic acids are low, for humic acids associated with Ca ++ at a low and medium level, firmly bound humic acids at a very high level, humus-like fulvate type, by the optical density of the soil, are at a low level. Soils are characterized by an average and high level of humification, and the degree of humification increases from washed to undistorted and washed away soil, from the northern exposure to the southern one.

In conclusion, it should be pointed out that within the framework of one article it is impossible to cite all the results of a comprehensive study of the humus of eroded soils.

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