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CHANGE OF MORPHOGENETIC, CHEMICAL AND PHYSICAL PROPERTIES OF SOILS OF VERTICAL ZONALITY OF WESTERN TIANG UNDER INFLUENCE OF EROSION

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ABSTRACT

Changes in the morphological parameters of mountain brown soils under the influence of erosion.

In the study regions, the following subtypes of mountain brown soils were identified: mountain brown carbonate, mountain brown typical, mountain brown leached. Brown soils entered the soil systematics as an independent type after the works of S. A. Zakharov and I. P. Gerasimov. The criterion for distinguishing subtypes was the thickness of the humus horizons, vegetation cover, and part of the profile leached from carbonates. This reflects the altitude position of the soil, i.e. the difference in the general climatic nature, part of the profile. This reflects the altitude position of the soil, i.e. climatic differences, frequent effects of exposure and humidity. These soils are characterized by a high humus content, a powerful humus horizon, a well-defined granular structure and accumulation of carbonates in the lower layers. Also forbrown soils characterized by the most pronounced obstruction of the entire thickness, especially the middle part.

They are found on slopes under sparse tree plantations or grassy cover, which is represented by the grassland-grassland, grassland-grassland steppe, and along the southern slopes they enter the belt of juniper woodlands. Soil-forming rocks, mainly loess-like loams, eluvium, diluvium of limestone and slate.

The morphological profile of indelible soils is characterized by a well-defined humus-accumulative horizon of a dark brown color and a pronounced transitional carbonate illvial horizon. Brown - carbonate medium washed soils are more common in steep hills. In them, the upper part of the profile is washed off to the carbonate horizon and the surface is enriched with larger CaCO3 nodules, the color is whitish-yellow, the horizon is highly densified. Brown carbonate reclaimed soils are confined to the slope plumes. They are characterized by a large thickness of buried horizons. Their properties depend on the composition and composition of overlying slopes. The thickness of the humus horizon of the washed soils is increased in comparison with the unwashed and washed away soils. In general, these soils are characterized by a well-formed humus-accumulative horizon of gray, dark gray color with a brown tint, high density of the entire profile and well-marked isolation of the carbonate horizon. The structure is nutty and lumpy; the mechanical composition is medium and heavy loam. On the slopes of different exposures, carbonate from the surface, an especially high carbonate content over the entire profile from 14.20 to 19.52% was noted on the slope of the southern exposure.

Mountain brown typical soils are distributed above brown carbonate soils at an altitude of 1500 to 1800 m above sea level. The parent rocks are represented mainly by a thick cover of loesslike loams, on which deepbrown soil profiles. Less commonly, limestone divisions and schists occur in this mid-mountain zone. In these soils, erosion processes are more pronounced.As the data showed, the studied mountain brown typical soils are characterized by deep humus content, as well as the presence of a rather powerful dark-colored (mainly gray or dark gray with a brown tint) humus horizon A.V. of the transition horizon B1, and even more so, B2 are more pronounced brown and dark - brown tones. From top to bottom, the color of the soil gradually brightens, from light brown to fawn, due to a decrease in the content of humus and the appearance of carbonates. Also, claying of the soil stratum is characteristic, especially in the middle part of the profile (horizons B1 and B2), with a pronounced increased content of physical clay.

As a result of prognosis, the density of this part of the profile of brown soils is high, the lumpy-nut structure of horizon VV is characteristic. The upper horizon A is a lumpy-dusty structure. The mechanical composition is heavy loam. Claying processes in brown typical soils are more developed than in brown carbonate soils. Mountain brown slightly leached soils are usually distributed above typical brown soils at an altitude of 1800 to 2250 m above sea level or in more humid areas.The parent rocks are the weathering products of shales, limestones, loess-like loams. The morphological features of the mountain brown, sludge-soaked soils have a powerful humus horizon, apparently, this is due to a change in the hydrothermal regime of soils, which conditions the equilibrium shift of the processes of humus formation and decomposition of humus towards the former, under conditions of higher humidity and lower temperatures. The brown color is also characteristic of these soils with a well-defined granular-dusty and lumpy-granular structure, the absence of a pronounced carbonate part of the profile with the appearance of individual carbonate precipitates. The study of the morphological features of soil-forming rocks, the state of vegetation and the location of soils in vertical zonality, this led to the formation of various subtypes of brown soils here. The main morphological features of brown soils are the presence of a transitional horizon of brown or dark brown color, on top of a grainy-lumpy structure, in the middle of a lumpy-nutty and noticeable clay. The parent rocks are loess and loess-like loams. By mechanical composition, brown soils are usually medium and heavy loamy. They are characterized by a high content of micronized fraction, a small amount of sludge content over the entire soil profile, with its accumulation in parts. It should be noted that in mountain-brown carbonate soils, the carbonate horizon lies close to the upper horizon or begins from the soil surface. Also, the profiles of the studied soils differ depending on the exposure of the slope. In the soils of the northern exposure, a certain accumulation of humus was observed; the upper boundary of carbonates fell. It should be noted that the studied soils differ in morphological indices and distribution above sea level from the soils of the Western spurs of the Chatkal ridge. The altitudinal boundaries of the distribution of serozem for the Western spurs of the Chatkal ridge varies from 500 to 1200 m. The parent rocks of the gray earths are represented by loesslike loams, locally proluvial and alluvial sediments of sedimentary rocks, and tertiary Neogene deposits. These soils, in comparison with the gray earth soils of the Turkistan Range, are formed in more humid conditions. The humus content is from 1.5 to 2-3%, the thickness of the humus horizons is 65-110 cm. According to the mechanical composition of

the gray earth, these are heavy and medium loams (Doshchanov, []. Mountain brown soils in the Western spurs of the Chatkal Range are found at an altitude of 900-1600 meters above sea level and are confined mainly to the midlands. As you know, the climate here is more humid. Mountain brown soils also differ throughout the morphological structure from the mountain brown soils of the described territory - they have a more powerful humus horizon (90-150 cm), a lower transitional thickness, darker tones, characterized by a lack of slumping, full thickness, characteristic presence of a walnut structure in the structure, a pronounced illuvial, clayed horizon and a deeper occurrence of a carbonate horizon (at a depth of 100-120 cm) in arable and deeper than 120-150 cm in virgin, and the form of carbonate micellar neoplasms oh, gypsum is not detected. Soil-forming rocks, mainly loess-like loams of eluvium and deluvium of limestone, schist, red-coloredclay and sandstone (Doshchanov, [3]; Makhsudov, [7]).

Thus, the regional features of the study area are reflected in the morphological indicators of soils, which lead to the development of erosion processes - reduction of soil thickness, destruction of the most fertile upper horizons and their replacement with a slightly fertile lower soil layer. as a result, the soil cover that has been forming over the centuries in a short time loses its diverse ecological functions and the most important of them productive power.

Morphological characteristics of the mountain brown soils of the Western Tien Shan

Index		Brown carbonate soils			Brown typical soil				Brown leached soil		
		P.18.	P.19.	P.20.	P.21	P.22	P.23	P. 24	P.25	P.26.	P.27.
		Upper flat part of the watershed, uncleaned soil	The upper part of the north clone, medium washed away soil	The middle part of the south slope, medium-washed away soil	On the upper part of the northern slope, unfinished soil	In the second part of the northern slope, poorly washed soi	On the second part of the southern slope, medium washed soil	In the middle of the northern slope, poorly washed away soil	n the second part of the northern slope, unwashed soil	The upper part of the north clone, medium washed away soil	The middle part of the south slope, medium-washed away soi
Slope in degrees and slope exposure		2-3^0	15-17^0	15-17^0	5-7^0	17-18^0	18-20^0	20-22^0	8-10^0	5-7^0	7-9^0
The power of the humus horizon (A+B_1+B_2), sm		75	70	43	68	70	48	49	75	70	75
The upper boundary of carbonates, sm.	Pseudomycelia	46	75	12	105	70	30	-	45-75 at	45-70 в	46-75
	Concretion gum	75	-	43	-	-	--	-	-	-	-
The boundary of the accumulation of gypsum, sm.		--	--	--	--	-	-	-	-	-	-
The color of the upper horizon		Dark brown	Dark brown	Light brown	Dark brown	Dun brown	Dun brown	Dun brown	Brown	Brown	Brown

The effect of erosion on the microaggregate and mechanical composition of mountain brown soils.

Mountain brown carbonate soils of the watershed are characterized by a homogeneous heavy loamy mechanical composition. The sod horizon is lighter than the sub-sod. Here, in the distribution of mechanical elements, some layering is observed along genetic horizons. The content of physical sand in the upper horizons is quite significant, so they have good water permeability. The mechanical composition of mountain brown soils is mainly medium, heavy and light loamy, the average content of physical clay (<0.01 mm) is 43.78-60.61%. According to the content of physical clay, the mountain-brown leached northern slope is characterized by a lighter mechanical composition. Some weighting of the mechanical composition due to an increase in the clay fraction is observed in cm layers, where the content of physical clay exceeds 40-50%, a high content of fine sand is also observed (0.1-0.01). Comparing the data of the mechanical analysis of mountain brown and gray earth soils, the following conclusions were drawn:

The mechanical composition of the soil profile of the soils under consideration is mainly related to the steepness and nature of the slope location. In all sections, the mechanical composition is light loamy compared to the underlying horizons, this slightly improves soil water permeability. Due to leaching of fine fractions by atmospheric precipitation from the upper horizon and their accumulations in the underlying illuvial horizon, the mechanical composition becomes heavier (appendix)

Numerous studies have established that erosion negatively affects the agrophysical properties of soils. Cheremisinov G.A. [9]; V.B. Gander [2], H.M. Makhsudov [7], Gafurova L.A [4,5] ; Abdullaev C., and others [1]. The mechanical composition of soils largely determines its chemical, physical, biological, and other properties. Soil erosion is closely related to the content of silty and colloidal fractions. According to Tashkuzev M.M. [10] and others with a decrease in the size of silty particles, the amount of humus and nitrogen decreases. So on typical sierozems, 60-75% of humus and 57-79% of nitrogen are concentrated in the silty and finely dusty soil fraction. Our studies have shown that the mechanical composition of serozems formed on different parts of the slope is quantitatively different and depends on the mechanical compositionparent rock and soil erosion.Sierozems are formed on eluvial-deluvial, loess, loess-like, proluvial, proluvial-deluvial deposits on foothill broad-wave and piedmont plains, flat-level adyrs. The mechanical composition is mostly medium, heavy and, in some cases, light loam. In the soil mechanical composition, the content of physical clay (<0.01 mm) is 32.70-52.75%, in the middle part of the profile of dark and typical gray soils, an increase in silt particles is observed, and, accordingly, the weighting and weak agglomeration of the mechanical composition are observed. In the mechanical composition of gray soils developed on loamy loesses, eluvial and deluvial deposits, the content of physical clay decreases under the influence of flushing. The data in Table 3.3.1.1 show that with an increase in erosion, the mechanical composition of soils is facilitated. If on the arable horizons of typical, dark gray-earth soils, the content of physical clay varies within 34.2%; 41.1%, then in the lower horizons it decreases to 34.4%; 40.2-42.2%

The most vivid idea of the effect of erosion on the mechanical composition of the soil gives a change in the amount of silty and finely dusty fraction. In the washed away differences of

typical, dark gray-earth soils, a decrease in the content of physical clay occurred, mainly due to a decrease in the content of silt and fine dust.

Thus, the effect of erosion processes on the mechanical composition of washed away typical, dark gray soils developed on loamy eluvium, There were no significant changes in deluvium and loesses, however, a significant washout in the middle part of the slopes, marked by morphological indicators and relatively low humus content, the mechanical composition of the soil underwent some relief, due to the diversity of the mechanical composition of parent rocks (Makhsudov H.M. [7]).

Agrochemical properties of eroded mountain brown soils.

Mountain brown soils.

The study of agrochemical properties is an important indicator for clarifying the types and differences of soils, when assessing the comparative potential soil fertility. Studies have shown that in the process of flushing the upper, most fertile horizons, significant changes in its chemical and agrochemical properties occur.

It is known that mountain-brown soils are characterized by a high content of organic substances, therefore, they have an increased level of fertility. The results show that the humus content of the upper horizon of mountain-brown carbonate soils is 2.49-3.49%, decreases to 1.30-1 towards the bottom. thirty%. Gross forms of nitrogen, phosphorus and potassium inthe upper horizons are larger than the lower ones; a decrease is observed towards the bottom. The carbonate content in brown-carbonate soils along the profile varies in the range of 8.39-10.9% in non-washed soils, 10.8-11.2% in weakly washed soils and 10.4-11.8% in medium-washed soils. CO2 carbonates in mountain brown carbonate soils are 8.39-11.8%, in typical brown soils 3.69-11.61% and on leached brown soils 3.06-9.20%, and high amounts of carbonates reclaimed in the lower horizons of soils. In the arable horizon of these soils, the humus content on carbonate non-eroded mountain-brown soils was 3.49%, on weakly eroded soils - 2.90%, average eroded soils - 2.49%; on non-eroded typical brown soils - 3.79%, on weakly eroded soils - 3.57%, on average eroded soils - 2.96%, on washed soils - 4.36%; 4.50% on leached brown non-eroded soils, 3.75% on weakly eroded soils, –2.51% on medium-eroded soils. The content of gross nitrogen on carbonate non-eroded mountain-brown soils amounted to 0.260 %, on weakly eroded soils - 0.165%, average eroded soils - 0.154%; 0.238% on non-eroded typical brown soils, 0.311% on weakly eroded soils, 0.268% on average eroded soils, 0.227% on washed soils; 0.235% on leached brown non-eroded soils, 0.182% on weakly eroded soils, and 0.175% on mid-eroded soils. The composition of leached mountain-brown soils showed a low content of carbonates, the pH of carbonate mountain-brown soils and typical soils is slightly acidic (pH in the range of 6.4-6.8). The C: N ratio in soils ranges from 9.3–12.9, in typical brown soils- 7.5-13.1, in leached brown soils- 9.3-14.0.The C: N ratio in mountain brown carbonate soils varies with the degree of susceptibility to erosion. So, the C: N ratio, that is, the enrichment of humus with nitrogen according to the level of the attribute, uncleaned ones belong to a high degree 1, and weakly and blurred differences of a middle I and II degree. The results of determining the pH of the soil show that the reaction of the soil medium in all differences is slightly alkaline (pH about - 7.3).

An analysis of the agrochemical properties of mountain brown typical soils suggests that there is a more powerful humus horizon in these soils than in mountain brown carbonate soils.

The humus content in the upper layer of unwashed and slightly washed soils is 3.79% -3.57%, and decreases to the bottom. And in medium-washed soils in the upper layer, humus is 2.96% and decreases down to 0.85%. In the upper horizon of unwashed soils, gross nitrogen is 0.23%, in weakly and medium-washed soils 0.311% -0.268%, and gradually decreases down the profile. The phosphorus content in the upper horizons ranges from., 183 to 0.135%, as the degree of erosion increases, their content decreases. In the studied soils, the content of gross potassium also varies depending on the degree of leaching (table 1.),

Studies have shown that erosion processes also affect the distribution of carbonates along the profile. The carbonate content in the studied soils along the profile is from 3.5 to 11.6%. Mountain brown typical soils differ from mountain brown carbonate in a lower carbonate content. The C: N ratio in these soils, according to the level of their characteristics, refers to unwashed and slightly washed to a medium degree, and medium washed to a high degree, the pH of the soil is slightly alkaline. According to the analysis of mountain-brown leached soils, it can be seen: that in these soils the humus content is higher than mountain-brown carbonate and mountain-brown soils, 4.50-3.75% humus is contained in the upper horizon of unwashed and slightly washed soils, down the profile decreases to 1.60-1.72%. In medium-washed soils in the upper horizon, the humus content is 2.5% and down the profile decreases to 0.85%. In the upper horizon of unwashed soils, gross nitrogen is 0.235% in weakly and moderately washed soils 0.182% and 0.175% down and the profile decreases. The phosphorus content in the upper horizons ranges from 0.290 to 0.184% and decreases in degree of washing from 0.195% to 0.054%. The most important genetic properties of serozems, as pointed out by A.N. Rozanov [8], is the carbonate content. The nature of the distribution of carbonates reflects not only the current situation, but also the history of soil development and depends both on hydrothermal conditions, especially the water regime, and on the biological factor of soil formation (A.M. Mamytov, [6]).

It is known that the process of soil formation in brown mountain soils occurs under conditions of carbonic weathering. According to this, one of the characteristic features of the chemical composition of these soils is the presence of lime carbon dioxide (CO2 carbonates) in them.

Mountain brown weakly leaching, and therefore the location of the carbonate-illuvial horizon, depends on the strength and depth of soil wetting, the degree of carbonation of the soil-forming rocks and the terrain. The relief is a redistributor of precipitation and solar insolation. The temperature of the soil, its heating and drying, and, consequently, the pulling up of soil solutions, including carbonates, or their lowering, depend on this. In the leveled areas of the study area, soil washing is deeper and carbonates are lowered to a considerable depth. On the slopes of the southern exposures, they are closer to the surface, and if, moreover, the slopes of considerable mire and erosion of the upper horizons of the soil are eroded to different degrees, carbonates are in the upper horizon. In rainfed eroded carbonate-brown soils, the content, in addition to humus and nitrogen, of some other nutrients, in particular gross forms of phosphorus and potassium, decreases. The data show that the differences in the content of gross phosphorus and potassium in the arable horizons of poorly washed and unwashed soils are not very large, but a slight decrease in their total amount is observed on average washed-out differences. This is explained by the approach to the surface of the lower soil horizons, poor in phosphorus and potassium. The effect of water erosion on the content of phosphorus and

potassium in the soil is most pronounced on medium-washed brown-carbonate soils and, therefore, a decrease in gross and mobile phosphorus due to an increase in the content of calcium carbonates in washed soils that form hardly solublephosphorus compounds. This is explained by the fact that, as erosion increases, lower layers containing more carbonates come to the surface. So, if in the upper horizon of poorly washed brown - carbonate and typical soils, the content of CO2 carbonates is 5 - 2, then the average washed out 9-7%. As can be seen from the table, the increase in carbonate content in the upper horizons of washed brown-carbonate soils manifests itself more sharply than on weakly washed brown-typical soils since carbonates are washed deeper on typical brown soils.

The influence of water (storm) erosion on the position of gypsum neoplasms of virgin rainfed brown carbonate and typical brown soils of the studied object is not clearly manifested in all cases.

Thus, erosion processes significantly changed the chemical, agrochemical properties of mountain brown soils. With an increase in the degree of erosion, the content and reserves of humus and nutrients decreased; accordingly, this physical parameter worsened some physical properties, in particular the soil structure, and reduced the amount of moisture in the soil.

CONCLUSION

1. The morphogenetic characteristics of the soil cover of the Western Tien Shan region are formed in direct connection with the relief features of the area, soil-forming rocks, vegetation cover, climatic conditions, erosion processes. The high erosion susceptibility of the western Tien Shan mountain brown soils is due to the slope of these mountain slopes, the sparse vegetation cover, and the absence of forest vegetation in much of the area, although the erosion resistance of these soils is higher than in the gray soil zone. As a result, the thickness of the soil decreases, the highest fertile top layers are destroyed and their fertility is replaced by the lowest soil layer, as a result, the soil cover formed over centuries loses its various ecological functions and most important productive power in a short time.

2. From light-colored, typical gray soils to dark-brown and mountain-brown soils, the activity of the studied oxidation-reduction enzymes increases with increasing total microbiological activity, the amount of humus and nutrients. The greatest activity of enzymes is manifested in the upper layer of the soil and their sharp decrease in the lower layers, which is especially observed in eroded soils, and in non-eroded and eroded soils, the stability of enzymes is significantly lower than the profile of microorganisms. changes in carbonates, aggravation of mechanical composition, soil density, genetic layers of soils. A close link has been established between humus substances in soils and respiration and enzymatic activity.

REFERENCES

1. Abdullaev C., Parpiev G., Akhmedov A., Zokirova S. The Republic of Sida foolishly controls the legalization of parasites, their types and relevance. Land management and evaluation: new approaches and innovative solutions Materials of the Russian-Uzbek scientific-practical conference dedicated to the 100th anniversary of the National University of Uzbekistan named after Mirzo Ulugbek. Moscow-Tashkent. 2019.

2. Gander R. A method of measuring capillary tension of soil moisture over a wide moisture range / R. Gander // SS. - 1937. - v. 43. -pp. 238-277.
3.Doshanov M.B. Soil erosion and its control in the Western Tien Shan, Abstract of doctoral diss. Tashkent, 1965.
4. Gafurova L.A - Soils formed in tertiary red deposits, their ecological status and fertility. Dissertation doctor's abstract. Tashkent, 1995, pages 25-45.
5. Gafurova L. A., Maxsudov H. M., Adele M.Yu. - The biological activity of the eroded soils in the eroded Neogene deposits. Uzbekistan, Tashkent, 1999, pages 29-75.
6.Mamytov A.M. Soils of the Central Tien Shan. Frunze: Publishing House of the Academy of Sciences of the Kirg.SSR, 1963. - 557 p.
7.Makhsudov H. M., Gafurova L.A Erosion science . textbook Tashkent, 2013, pages 272.
8.Rozanov A.N. Significance of irrigation sediments for the genesis, fertility and melioration of irrigated soils. "Soil Science", 1959, No. 2.
9.Cheremisinov G. A. Water regime of soils in connection with the relief and ongoing erosion processes: Abstract of the thesis. for the academic step. cand. s.-x. Sciences. –M.: Vsesoyuz. scientific research in-t of fertilizers, agrotechnics and agrosoil science. Gedroits, 1949. - 8 p.
10.Tashkuziev M.M. Guidelines for the use of the amount of total humus and mobile humus substances in the soil as an indicator of its productivity. - Tashkent. 2006. - 48 p.