VARIABILITY OF CHEMICAL PROPERTIES OF MOUNTAIN BROWN SOILS

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Anatatsiya This article studies the morphological structure, physical and mechanical composition, agrochemical properties and productivity potential of mountain brown soils typical of the mountainous regions of Uzbekistan. Studies have shown the variability of the amount of moisture, humus, nutrients (nitrogen, phosphorus, potassium) in mountain brown soils, depending on the vegetation cover of the lands located in mountainous regions, climatic conditions and leaching processes. The prospects for increasing the fertility of these soils through land reclamation and agrotechnical measures are also discussed. The article substantiates the importance of soils in the production of agricultural products and the need for their rational use.

Keywords: mountain brown soils, soil properties, humus, nutrients, soil fertility, leaching, agroecological condition, physical and mechanical composition.

Introduction. Mountain brown soils are the main soil type of the mountain region, and are the most fragile subtype of brown soils, immediately after dark brown soils, starting at an altitude of 1000-1150 m above sea level. Here, of course, mountain soils differ from all other soils, including dark brown soils, distributed on the plains, by their structure, chemical, physical properties, and natural soil formation processes.

We will give the morphological characteristics of brown demineralized soils on the example of section 17.

Section 17. May 18, 2024. R.S. Bobonorov, (L.Tursunov). Located on the northern slope of the mountain, approximately 1 km west of the middle part of the villages of Bodomzor and Varganza. Slope 5-80. The vegetation is diverse - grasses (broad-leaved), shrubs, (broad-leaved), and junipers are abundant. The soil surface is soft, with granular aggregates, and almost no stones, despite being well-moistened. There are no signs of erosion. The soil is brownish-alkaline.

$A_{\text{чим}}$ 0-6 cm. very firmly packed dark brown, darkened by rain, medium loam, granular, well-crushed aggregates, many "soil corals" are found, there are no signs of erosion on the soil surface, no stones, only the soil surface is denser due to the presence of 1-2 cm thick roots, consisting of grass and tree leaves and trunk remains, insect nests are not well visible, the transition to the next layer is gradual through the number, color and density of plant roots.

$A_{\text{ч.о}}$қ 6-10 cm. deep, brownish-brown in color, well-moistened, loose, medium-grained, with lumps of various sizes and shapes, especially around the roots "soil corals", well-crumbling aggregates, there are roots of shrubs and trees with a diameter of 10-30 mm., there are many burrows of soil insects, filled with debris, small stones are not found, gradually changing color to the next layer.

Bқ 10-29 cm. brownish-gray, slightly grayish-blackish, with well-absorbed walnut-like lumps, slightly compacted compared to the upper layer, heavy clay with a large number of plants, shrub and tree roots and "soil corals" are moistened, there are no stones at all, the soil is well worked by insects, does not boil under the influence of 10% HCl, there are vertical small cracks in the layer, the transition to the next layer is gradual through color.

$B_2к$ 29-53 cm. lighter brownish-brown, the moisture content decreases compared to the upper layer, heavy clay, there are lumps of various sizes and shapes, they are well crushed, the layer is well worked by a large number of insects, the roots of plants, shrubs, trees of various sizes, they are full of waste, the number of "soil corals" decreases sharply, the middle and lower parts of the layer boil under the influence of 10% HCl acid. The subsequent transition occurs gradually through the color.

$B_3к$ 53-86 cm. Light brown, slightly grayish, not very moist, heavy loam, aggregate-loamy structure that crumbles quickly, the number of roots is significantly reduced, there are many insect nests, but in the middle, especially in the lower parts of the layer, white streaks and "white eyes" appear, it boils well under the influence of 10% HCl acid, sometimes small stones are found, the transition to the next layer is gradual through the blanching color.

C+ 86-16 cm. A layer of yellowish, slightly brownish, poorly moistened, loose, medium loamy, very quickly eroded "pseudo-aggregate" fragments, occasional white grains, very few small roots (but also roots of trees and grasses) are found, and the activity of soil animals is also rarely manifested, consisting of a uniform structure of lechsimon beds.

We have seen that the morphological characteristics of the above-mentioned carbonate, typical and alkalized soils differ slightly from each other. The formation of these soils is mainly determined by the relief conditions, especially the solar energy of the mountain slopes. However, it should be noted that alkalized brown soils are rarely distributed in the Kitab-Shakhrisabz basin.

The amount of humus and its distribution along the cross-section are different in typical and alkalized soils. The geographical location of typical brown soils (mainly the northern and northwestern sides of the mountain slopes), the richness of grass plants, firstly, leads to the formation of a large and well-developed turf layer, secondly, a thick humus-rich fine-grained layer that gives the soil a dark color, and thirdly, to a low degree of erosion. In the turf layer of typical brown soils, humus fluctuates between 4.0-4.5%, in the subsoil layer - 2.9-3.0%, and in the lower layers - 0.4-0.2%. Changes in the humus content in such a genetic layer primarily cause the distribution along the cross-section of total nitrogen, and to a lesser extent - total phosphorus and potassium. These soils are also considered carbonate soils. Humus saturation leads to a sharp increase in the physicochemical indicator - absorption capacity. In the sod layer, the absorption capacity is 22-23, in the turf layer - 18-19, and in the following layers - 7.0-16.0 mg.eq. per 100 g of soil. This, of course, is the main indicator expressing the positive chemical properties of these soils. If we compare the amount of humus in typical and carbonate brown soils at a depth of 10-30 cm, that is, after the subsoil layer (excluding 10 sections with low and moderate erosion), the amount of humus in this layer of typical soils is 2-2.5 times less. This, according to our data, leads to an increase in the total humus reserve in the 0-50 cm layer to 145-150 tons, that is, more than 2 times (Table 1).

Table 1.

Chemical indicators of mountain brown soils

Depth in cm	Rotten %	General %			In carbonate CO_2	Absorption capacity mg/eq 100 gr	Protection, t/ha		
		Nitrogen	phosphorus	potassium			layer	Chirin Di	nitrogen
1	2	3	4	5	6	7	8	9	10
Section 1. Brown, carbonate, yrta sand, rough, strongly eroded, south slope 5-70.									
0-4 4-11 11-26 26-50	2,63 1,92 0,83 0,43	0,186 0,142 0,075 0,045	0,170 0,130 0,110 0,090	2,211 1,970 1,830 1,942	8,6 9,30 11,0 12,0	17,23 14,46 10,11 7,82	0-30 30-50 0-50	47,9 12,4 60,3	4,4 1,3 5,7
Section 10. Brown carbonate, sandy loam, rough, moderately eroded southwest slope 3-50.									
0-5 5-17 17-43 43-78	3,16 2,01 1,86 0,72	0,283 0,172 0,123 0,095	0,215 0,149 0,120 0,090	2,110 1,835 1,730 1,700	8,3 8,9 9,3 19,0	18,03 12,06 10,11 9,13	0-30 30-50 0-50	89,8 31,3 121,1	7,1 3,1 10,2
Section 12. Brown carbonate, yrta sand, rough, strongly eroded southern slope 5-70.									
04 4-11 11-35 35-64	2,15 1,60 0,80 0,55	0,170 0,093 0,072 0,040	0,163 0,108 0,090 0,085	1,930 1,855 1,705 1,700	9,5 9,7 11,1 11,2	16,25 11,13 9,16 8,55	0-30 30-50 0-50	49,1 17,2 66,3	3,6 1,2 4,8
Section 13. Brown typical, yrta sand, rough, less eroded, north-east slope 3-50.									
0-6 6-14 14-31 31-69 69-110	4,48 3,11 2,16 0,82 0,46	0,345 0,290 0,195 0,072 0,043	0,240 0,170 0,113 0,098 0,090	2,33 2,013 1,980 1,837 1,715	8,6 9,0 9,5 11,5 10,0	23,6 19,00 16,26 10,11 7,82	0-30 30-50 0-50	120,8 24,8 145,6	10,1 2,2 12,3
Section 15. Brown typical, yrta sand, rough, less eroded, west slope 4-60.									
0-6 6-13 13-42 42-76 76-95	4,16 2,95 1,82 0,95 0,80	0,313 0,192 0,110 0,098 0,075	0,235 0,171 0,120 0,100 0,025	2,355 2,115 1,930 1,800 1,750	5,0 6,2 7,8 8,2 9,0	22,15 18,10 15,26 12,00 10,05	0-30 30-50 0-50	107,1 43,7 150,8	7,1 3,0 10,1
Section 3. Brown, yrta sand is decalcified, the northern slope with little erosion is 2-30.									
0-6 6-14 14-44 44-77 77-98	5,46 3,55 1,98 0,86 0,50	0,422 0,303 0,175 0,072 0,046	0,240 0,180 0,130 0,100 0,090	2,431 2,121 1,983 1,901 1,786	0,5 1,5 3,0 6,0 7,0	29,15 21,00 16,25 10,19 8,16	0-30 30-50 0-50	140,0 46,0 186,0	10,9 4,0 14,9
Section 17. Brown, coarse sand, decalcified, moderately eroded northern slope 3-50.									
0-6 6-10 10-29 29-53 53-86	5,26 3,15 1,92 0,98 0,83	0,410 0,298 0,112 0,095 0,079	0,246 0,193 0,155 0,140 0,105	2,420 2,010 1,950 1,909 1,803	1,0 1,5 4,5 6,1 7,2	24,15 20,40 15,25 12,70 10,90	0-30 30-50 0-50	117,2 27,4 144,6	8,4 2,7 11,1

The humus condition of brown decalcified soils is considered to be better than that of other soils. Here, of course, the soils of the slopes of the mountains are fertile, with little solar energy, rich in plants (various species), shrubs and juniper trees. ташкил топган географик ландшафт хос былади. Албатта бундай шароитда The soil is not far from being rich in plant residues, both above and below the soil surface, compared to the other soils described above. On the other hand, the temperate climate creates the opportunity for the formation of humus. This is probably why the humus content in the sod layer of alkalized soils is less than 5%, and in the subsoil it is 3.0-3.5%, and in the first 0-50 cm it fluctuates around 2.0%. Total nitrogen is stored in these layers in the ratio of 0.4-0.7%. The richness of humus and total nitrogen leads to their large total reserves. In particular, the humus reserve in the 0-30 cm layer of alkalized soils is 117-140 t. ha, 30-50 cm 27-40, and 0-50 cm 144-186 t. ha. Total nitrogen is also in the range of 8-10, 3-4 and 11-14 t. ha in these layers. These indicators are much higher than the humus and nitrogen reserves characteristic of these layers of the above-mentioned carbonate and typical alkaline soils (Table 41). The absorption capacity of humus in the upper layer is 24-26, and in the subsoil layer 20-21 mg.eq. per 100 g of soil. The absorption capacity indicator in the second half-meter layer of the section is 8-10 mg.eq. 100 g of soil, approaching the indicator characteristic of typical soils (Table 1). In conclusion, it can be said that alkalized brown soils differ from other mountain soils in the amount of CO2 in carbonates in the trace profile. If the upper layer of carbonate and typical brown soils boils vigorously under the influence of 10% HCl acid up to the mother rock, then the 20-25 cm layer of these soils does not boil under the influence of this acid, boiling (stirring) usually begins at a depth of 30-40 cm and boils vigorously at the end of the second half-meter depth (Table 4.5.2). This, of course, is a morphogenetic feature characteristic of these soils for the section. In the formation of this sign, of course, the level of humidity keeps the pus.

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