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The Amount of Different Forms of Iron Contained in Soils Formed in Tertiary Reddish Deposits

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Annotation: In this work, the amount of various forms of iron in soils formed on tertiary red-colored deposits is compared with typical serozems formed on lyossian deposits, by horizons and levels of erosion. It has been established that the gross, silicate and nocilicate forms of iron in the soil are determined as a percentage of the soil mass.

Keywords: Soil, ferrum, silicate, nosilicate, crystalline, amorphous forms of ferrum,, climate, rastitelnost, tretichnye krasnovatye otlojeniya, organic matter.

Relevance of the topic.

The most abundant element on the planet is iron. Iron makes up 4,65 percent of the Earth's crust's mass. Iron ores are made up of more than 300,000 minerals.

Iron (lot. Ferrum) is a chemical element from Mendeleev's VIII group. Atomic mass 55,847, ordinal number 26. 54 Te (5.84%), 56 Te (91.68%), 57te (2.17%), and 58 Te (0.31%) are the four stable isotopes of iron.

Pure iron is a white-colored, gleaming metal. Liquefaction temperature 1535°C, boiling temperature 2750°C. Density 7,874 g/ cm3, liquefaction temperature 1535°C. Normal conditions do not cause iron to melt in alkalis. Iron compounds are commonly utilized in manufacturing, agriculture, and construction.

The average result for animal beings and plants is 0.02 percent iron. It is a component of hemoglobin in the blood and has a role in oxygen consumption and oxidation. There are creatures (concentrators) that accumulate a substantial amount of Iron on their own (mas., iron collects up to 17-20 percent of iron bacteria). Proteins bind iron in the bodies of animals and plants. If plants lack Ferrium, development slows and chlorophyll creation diminishes; it also harms, if it multiplies, for example, rice grain yield drops and less grain is produced.

Research methodology

The following forms of iron in soils formed on Neogen reddish deposits were determined using the methods used to determine the iron content in the soil (Baskumba, Mer Jackson, Frantsmeyer, Tam): silicate, non-ferrous, crystalline, amorphous, iron-organic, amorphous, amorphous, amorphous, amorphous, amorphous, amorphous, amorphous, amorphous, amorphous, Iron that hasn't been mixed with organic substances, both weak and strong crystalline.

Results of the study

It is critical to investigate the iron forms found in soils and their relationship to soil formation conditions, which is both theoretical and practical. As a result, iron forms in various soil types, which are found around the world, have an impact on both general and specialized features of soil formation. The investigation of the effects of iron in soils on soil moisture content, agricultural usage, desertification, and other factors. It is covered in works by Karmanova (1975, 1978), Valiev and Bakanova (1979), Gafurova (1980), Tam (1934), Galabutskaya and Govorova (1934), Dyushofur (1970), Kononova and Titova (1961), Gorbunov and Erokhina (1971), Karpachevsky and Babanin (1972), Aristovskaya (1975), Frantsmeyer, Zonn (1976), Zonn (1982), (1994).

However, Ismatov (1989) acknowledged that the qualitative composition of iron compounds in dry area soils has been understudied in relation to soil-forming rocks, specific characteristics of soil formation conditions, and the duration of their desiccation disposal.

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The types of iron compounds have not been researched in any way, and no link has been established between them and the degree of erosion of soils developed on Neogene reddish deposits. As a result, we investigated the types of iron compounds in soils created in Neu-red deposits in terms of genetic horizons and attempted to identify the Iron proportions in the soil Genesis under investigation in our own research.

No one can deny that soil fertility is linked to the rocks that make up the soil. As a result, the genetic relationship of soil fertility with the qualities of soil-forming rocks is one of the most important markers for solving the problem of soil fertility, which is created on beds with a tertiary reddish color. The soil-forming rock on the soils investigated is a tertiary (Neogen) period-specific upper dressing that is most likely to have formed under harshly continental climatic conditions, as seen by the red color of all rocks.

According to paleoclimatologists, the kaynozoic phase is characterized by an extra dry climate in the Paleocene, a moderate dry climate in the Eocene, an exchange – moist climate in the Oligocene, and an exchange – dry climate in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the anthropogenic in the opposite direction.

The climatic conditions of the Tertiary period created conditions for the formation of deposits and soils of the tertiary reddish hue. In their formation, there is a high probability that the following consonants played an important role:

-olizolization and separation of iron in the wet season;

- mineralization of organic substances and fixation of iron in the dry season;
- exchange of these processes in turn will give the final result;
- the development of plants, the intensification of gouliz and the separation of iron depending on the wet season and the duration of the temperature regime;
- the cleavage of organic materials and the dependence of the red hue of soils on the duration of the dry season (Zonn, 1974).

Thus, during the rainy periods of the Tertiary period, iron was separated (released) during the irradiation process, and it moved into a hydrated form under the effect of moisture. During dry periods, the dehydration process has stopped, and the soil has turned red. During the wet era, iron oxide forms a complex compound with Silicon (II) oxide as a result of high irradiation of soil-forming rocks. However, during the dry season, it decomposes, and as a result of increased evaporation, the concentration of the soil solution rises, crystallization of iron oxide occurs, giving grills a reddish hue. As is well known, reddish-tinged soils can be found all throughout the Mediterranean Sea. With a sharp dry season and intense sunshine, the climate of the Mediterranean Sea created favorable conditions for the preservation of reddish-tinged soils (Dyushofur, 1970).

Zonn (1970) wrote that "degradation of structure, decomposition of flocculated loamy - humusly Complex lead to the decomposition of colloidal iron gidro oksides and the soil passes into a bright oxygenated-yellow color."

When dissolved organic compounds react with iron, they can produce crystalline forms (creating concretions) or false solvents. Solid concretions form as a result of iron dioxide enveloping relatively big particles in a film. The color of the soil is determined by the mineral from which it is generated and the degree to which it is hydrated. Stilposiderite ($Fe2O3x\ 2H2O$) is an ocher-colored mineral that forms in a humid environment. Hematite, oligystic, and angiocytes, all minerals found in dry microclimate soils, have a reddish-brown tint when weakly hydrated, whereas gethite, oligystic, and angiocytes have a red color. Iron deposition-occurs on the basis of an increase in the RN, an increase in the ions of kaltsium in the soil solution, an aeration and other causes that cause the oxidation of iron.

It's vital to remember that iron and its forms have a minor role in biological circulation. As a result, the distribution of iron reflects the modern dynamics of soil formation qualities in many ways (Karmanova, 1975). Only a little amount of data on the amount of different types of iron in burlap is currently available in the literature. However, in the burlap soils created in tertiary nests, work on the differentiation of iron by degree of crystallization (forms of iron in the form of amorphous and not mixed with organic matter) does not appear.

Iron is categorized into two groups in the studies: silicate and nosilicate. The crystalline and amorphous forms of the non-ferrous group are introduced. The crystalline Iron was separated into weak and strong crystalline forms, and the amorphous iron - eksex iron - was separated into forms that were not coupled with organic molecules or organic components.

In 1and 2 tables, the amount of iron forms in the soils examined is reported. According to our research, the gross quantity of iron in soils produced on tertiary reddish-tone deposits ranges from 4.0 to 6.0 percent, with more than three percent in the middle and lower regions of the soil profile.

In these soils, the main part of the iron is in silicate form, accounting for 77-84% of its gross volume. The analysis of the silicate-shaped iron shows that it is less in the upper layers, more in the lower layers three, which exactly corresponds to the distribution of the gross iron along the soil profile. The wide distribution of iron in the form of silicate, and its formation is associated with natural conditions. Another reason for its wide spread is due to the hydrogen city of the soils studied. As you know, the higher the carbonate content, the free forms of iron become insoluble carbonate compounds, and the mobility is limited.

1-table
The amount of different forms of iron
(in percentage terms of soil mass)

Soil	layer depth, sm	Gross	Silicate shape	How in the form	Crystalline forms			Amorphous forms		
					Gross	strong Crystal	Without strength crystal	Gross	compound with organic matter	not combined with organic matter
Typical burlap soil formed in lyoss (Karmanova, 1978)	0-30	4,90	3,21	1,69	1,58	0,28	1,30	0,11	0,06	0,05
	30-40	4,90	3,47	1,43	1,34	0,17	1,17	0,09	0,06	0,03
	40-70	4,60	3,23	1,37	1,29	0,11	1,18	0,08	0,06	0,02
	70-100	4,70	3,53	1,17	1,11	0,12	0,99	0,06	0,05	0,01
	100-150	4,10	2,82	1,28	1,23	0,07	0,07	1,46	0,05	0,01
	150-200	4,20	2,96	1,24	1,18	0,01	1,17	0,06	0,03	0,03
Soils, formed on tertiary reddish deposits(not eroded)	0-4	4,60	3,81	0,79	0,708	0,675	0,032	0,083	0,042	0,041
	4-16	5,33	4,52	0,80	0,717	0,689	0,028	0,083	0,032	0,051
	16-36	5,10	4,23	0,87	0,795	0,694	0,101	0,075	0,091	-
	36-80	5,12	4,27	0,85	0,769	0,725	0,044	0,081	0,057	0,024
	80-130	5,24	4,43	0,81	0,713	0,684	0,029	0,097	0,055	0,042
Soil Lar (eroded), formed on the tertiary reddish deposits	0-2	4,88	4,14	0,74	0,641	0,582	0,059	0,099	0,084	0,015
	2-16	5,16	4,36	0,80	-	-	-	-	0,036	-
	16-71	5,07	4,15	0,82	0,756	0,716	0,040	0,064	0,024	0,040

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	71-125	4,89	4,07	0,82	0,658	0,707	-	0,162	0,040	0,122
Soils formed on the tertiary reddish deposits (washed)	0-5	5,58	4,77	0,81	0,625	0,691	0,034	0,085	0,046	0,041
	5-14	4,77	3,89	0,88	0,706	0,775	0,028	0,074	0,025	0,049
	14-28	3,85	2,97	0,88	0,689	0,773	-	0,191	0,020	0,171
	28-41	4,00	3,08	0,92	0,893	0,807	0,036	0,081	0,042	0,039
	41-56	4,37	3,45	0,92	0,859	0,817	0,042	0,061	0,025	0,036
	56-97	5,59	4,70	0,89	0,800	0,796	0,006	0,080	0,022	0,068
	97-115	5,15	4,31	0,84	0,647	0,730	-	0,193	0,036	0,151

In the upper section of the profile, the free joints of the iron are more than three times that of the lower parts. Non-ferrous iron is substantially less abundant than iron in the form of silicate, accounting for just 15-20% of the total iron content. The nobility corresponds to crystalline iron with a strength of 78-79 percent. As is well known, amorphous iron forms in excessively humid conditions, and crystallization requires a high temperature, as well as the changing of periods of moistening and drying of the soil. The same hydrothermic conditions existed during the formation of the Tertiary Red Feather Beds, which influenced the amount of iron and the distribution of these forms throughout the soil profile. Strong crystals make up 11-20 percent of the crystalline forms of iron in the soils investigated, while weak crystals make up 0,1-2,0 percent. Amorphous compounds that are not coupled with organic substances have a modest advantage in the amorphous forms of iron. In these soils, the contribution of iron-organic compounds is greater than in the top half of the profile, with 5-11 percent at 0-30 cm compared to 4-6 percent for amorphous compounds connected with organic components.

Amorphous chemicals that are not associated with organic matter prevail in other layers of this soil (Table 1).

Accordingly, in the soils under study, the amount of non-ferrous iron does not exceed 15-23% of the gross iron content, and the maximum amount of it is observed in washed, less often in non-eroded and least eroded soils (Table 2).

2-table

The amount of different forms of iron (in percentage terms of gross)

Soul	layer depth, cm	Gross	Silicate shape	Pump in the form	Forms of crystal			Forms of amorf		
					Gross	Strong crystal	Without strength crystal	Gross	organic matter combined with	not combined with organic matter
Typical burlap soil formed in lyoss (Karmanova, 1978)	0-30	4,90	65,54	34,49	32,24	5,71	26,53	2,24	1,22	1,02
	30-40	4,90	70,82	29,18	27,35	3,47	23,88	1,84	1,22	0,61
	40-70	4,60	70,22	29,78	28,04	2,39	25,65	1,74	1,30	0,43

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Date of Publication: 17-03-2022

	70-100	4,70	75,11	24,89	23,62	2,55	21,06	1,28	1,06	0,21
	100-150	4,10	68,78	31,22	30,00	1,71	28,29	1,22	0,24	0,98
	150-200	4,20	70,48	29,52	28,09	0,23	27,86	1,43	0,71	0,71
Soils formed on tertiary reddish deposits (not eroded)	0-4	4,60	82,83	17,11	15,37	14,67	0,70	1,80	0,91	0,89
	4-16	5,33	84,99	15,01	13,55	12,03	0,53	1,56	0,60	0,96
	16-36	5,10	82,94	17,06	15,58	13,61	1,98	1,47	1,78	-
	36-80	5,12	83,40	16,60	13,48	14,16	0,86	1,58	1,11	0,47
	80-130	5,24	84,54	15,46	13,61	13,05	0,55	1,85	1,04	0,80
Soils, formed on tertiary reddish deposits (eroded)	0-2	4,88	84,84	15,16	13,14	11,93	1,21	2,03	1,72	0,31
	2-16	5,10	84,50	15,50	-	-	-	-	0,69	-
	16-71	5,07	81,85	16,17	14,91	14,12	1,79	1,26	0,47	0,78
	71-125	4,89	83,23	16,72	13,46	14,46	-	3,31	0,82	0,45
Soils formed on the tertiary reddish deposits (washed)	0-5	5,58	85,48	14,52	11,20	12,38	0,61	1,52	0,82	0,73
	5-14	4,77	81,55	18,45	14,80	16,25	0,61	1,55	0,52	1,03
	14-28	3,85	77,14	22,86	17,90	20,08	-	4,96	0,52	4,44
	28-41	4,00	77,00	23,00	20,97	20,18	0,98	2,02	1,05	0,98
	41-56	4,37	78,95	21,05	19,66	18,70	0,96	1,40	0,57	0,82
	56-97	5,59	84,08	15,92	14,31	14,24	0,11	1,91	0,39	1,22
	97-115	5,15	83,69	16,31	12,56	16,94	-	3,71	0,69	3,05

In typical burlap soils (Ovaova, 1978), the percentage of gross iron in a layer of 0-30 cm generated in the lyoss reaches 4.90 percent, decreasing to 4.20 percent in the lower layer. The gross quantity of iron in the layer of 0-36 cm increased from 4.60 percent to 5.10 percent in the non-erosion soils developed on the tertiary reddish deposits, according to the results of the analysis. This scenario can be seen as follows: the eroded soils in the upper layer are 4,88 percent less, the intermediate layer is 5,07 percent more, and the lower layer is 4,86 percent less. The top layers of washed soils climbed by 5,58 percent, fell in the intermediate layers, and grew marginally in the lower layers, according to the findings.

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Conclusions

Weak crystals of iron by crystal formations increased 1-1,5% lyusses in the lowest layer compared to the top layers. In non-erosion soils formed in tertiary reddish deposits, gross 15 percent and strong crystal iron decreased by 14 percent in the upper layer, while weak crystal decreased by 0.70 percent in the form of weak crystal, which increased by 5-6 percent in the middle layer, and a decrease in the upper and lower layers.

The presence of irradiation, significant hydration during the washing process, and erosion all contribute to the high amount of this biomarker in washed soils. In addition, while comparing non-ferrous iron to the elluvial section, the soil profile under examination was highly stratified. In contrast to the burlap soils formed in the lyosss, the amount of non-ferrous iron in the studied soils decreases slightly in the upper layers and increases in the lower layers, which is associated with ancient Neogen soil-forming rocks and their gomorphism, which was subjected to relatively strong irradiation.

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