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4.1.3. Агрохимия, агропочвоведение, защита и карантин растений (сельскохозяйственные науки)

К ВОПРОСУ О СОСТАВЕ ОРГАНИЧЕСКОГО ВЕЩЕСТВА ЧЕРНОЗЁМА ОБЫКНОВЕННОГО НИЖНЕГО ДОНА

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Статья содержит сведения, о составе органического вещества чернозёма обыкновенного степной зоны Нижнего Дона, на основании чего определяется гумусное состояние почв в условиях степной зоны Ростовской области. Выявлено то, что падают запасы гумуса, ухудшается его качественный состав. Сравнение содержания гумуса и его состава в чернозёме обыкновенном целины и пашни показало снижение содержания гумуса по всему профилю пахотной почвы, наиболее очевидным и существенным оно было в верхних слоях почвы, соответственно 3,42 и 2,37 % органического С. Констатируемая особенность подтверждается количественными показателями пассивного и активного гумуса, а также величиной детрита обеспечивающего биоэкологическую активность почвенных процессов с точки зрения агрономических свойств почвы

Ключевые слова: ЧЕРНОЗЁМ ОБЫКНОВЕННЫЙ, ГУМУС, СОСТАВ ГУМУСА, ЦЕЛИНА, ПАШНЯ, ДЕТРИТ, ГУМУС АКТИВНЫЙ, ГУМУС ПАССИВНЫЙ

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4.1.3. Agrochemistry, agro-soil science, protection and plant quarantine (agricultural sciences)

ON THE COMPOSITION OF ORGANIC MATTER IN ORDINARY CHERNOZEM OF THE LOWER DON REGION

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The article contains information about the composition of organic matter of ordinary chernozem in the steppe zone of the Lower Don, on the basis of which the humus state of soils is determinedin the conditions of the steppe zone of the Rostov region. It was revealed that humus reserves are falling, its qualitative composition is deteriorating. Comparison of humus content and its composition in ordinary chernozem of virgin and arable lands showed a decrease in humus content throughout the arable soil profile, it was most obvious and significant in the upper soil layers, respectively 3.42 and 2.37% organic C. The stated feature is confirmed by quantitative indicators of passive and active humus, as well as the amount of detritus providing bioecological activity of soil processes from the point of view of agronomic properties of the soil

Keywords: ORDINARY CHERNOZEM, HUMUS, HUMUS COMPOSITION, VIRGIN SOIL, ARABLE LAND, DETRITE, ACTIVE HUMUS, PASSIVE HUMUS

Introduction. The organic part of the soil is a complex system consisting of a number of groups of compounds that determine the main morphometric, morphological, physical and chemical properties of soils. But the predominant part of it - up to 85-90% - is humus itself, formed as a result of numerous

transformations of the soil-forming process and is its consequence [2].

The ecological functions of humus are varied and its importance is great not only for the soil, but also for plant communities [3,4].

Humus increases the resistance of plants to adverse weather conditions, reduces eutrophication of the hydrosphere and local oxygen deficiency, and activates the ecological component of the pedosphere.

The colloidal component of humus has a very valuable property - increased absorption capacity provides the most important ecological property of the soil to counteract the negative impact of toxicants, normalizing the overall ecological health of the soil.

Conditions and methods. The research work was carried out in the Rostov region. The object of the study is ordinary chernozem, medium-deep, heavy loamy. In the cultivated soil horizon, organic carbon was 2.54%. Gross nitrogen - 0.25%. The amount of exchangeable potassium was average. The amount of mobile phosphorus was low.

Determined: humus and its composition (Practical guide to soil chemistry), detritus using the method of U. Shringer [1].

Results.

Chernozems of the South of Russia are characterized by deep penetration of humus along the soil profile, but its relatively low content. In the arable ordinary chernozem of the Rostov region, the carbon content was 2.55% with a decrease to 0.37% in the C horizon (Table 1).

It should be noted that, as can be seen from the results of the determination, a significant part of the humus is represented by non-hydrolyzable residue; the content and ratio of humic and fulvic acids varies across the profile.

The upper horizons are dominated by the humic acid group, while the lower horizons are dominated by fulvic acids. This circumstance is due to the fact that the carbonate horizon of chernozem serves as a chemical barrier to the

penetration of humic acids into the depths. The intersection point of the relative content of humic and fulvic acids is the lower boundary of the humus horizon. In general, the humus of ordinary chernozem belongs to the fulvate-humate type.

Table 1. Fractional-group composition of humus of ordinary chernozem, % of soil

Go-ri-umbrella	Com-mun.	Humic acids				Fulvic acids					Os-ta-current
		1	2	3	sum	1a	1	2	3	sum	
Up	2.55	0.04	0.59	0.24	0.87	0.05	0.06	0.20	0.14	0.45	1.23
A1	2.00	0.02	0.37	0.22	0.61	0.04	0.03	0.15	0.15	0.37	1.02
B1	1.36	0.01	0.13	0.09	0.23	0.04	0.03	0.17	0.10	0.34	0.79
B2	0.65	0.01	0.09	0.04	0.14	0.02	0.02	0.11	0.05	0.20	0.31
VS	0.50	0.01	0.03	0.03	0.07	0.01	0.01	0.10	0.04	0.15	0.27
WITH	0.37	-	0.03	0.01	0.04	0.01	0.01	0.07	0.04	0.13	0.20

If we pay attention to the qualitative composition of humus, then the composition of humic acids contains mostly black acids of fraction 2, associated with exchangeable calcium. Under certain conditions, this fraction is capable of migrating in the soil layer. In ordinary chernozem, the migration process is expressed in a peculiar form, where it is limited by the limits of horizon A, and without disturbing the gradual decrease in humus content down the profile, characteristic of chernozems. Below horizon A, the content of fraction 2 decreases insignificantly, but the upper boundary of the carbonate horizon is emphasized by a sharp decrease in this fraction.

In general, the organic matter of chernozem is characterized as stable.

Fulvic acids, like humic acids, contain the most calcium-related compounds – almost half of the total amount.

It should be noted that it is important that the ongoing transformation of the fractional-group composition of humus of arable chernozems and, in particular, ordinary chernozems of the Rostov region has the same genetic features that are inherent in chernozems.

A comparison of the humus content and its composition in ordinary chernozem of virgin and arable land showed a decrease in humus content throughout the entire soil profile, although it was most significant in the upper horizons (Table 2).

Table 2. Fractional-group composition of humus in the 0-30 cm layer of ordinary chernozem of virgin and arable land, % of the soil

Ugo-die	Sobsh	Humic acids				Fulvic acids					Os-ta-current
		1	2	3	sum	1a	1	2	3	sum	
Oktyabrsky district											
Virgin land	3.42	0.06	0.94	0.45	1.45	0.06	0.09	0.32	0.19	0.66	1.31
Arable land	2.74	0.06	0.75	0.34	1.15	0.07	0.09	0.27	0.15	0.58	1.01
Peschanokopsky district											
Virgin land	2.76	0.05	0.73	0.33	1.16	0.06	0.08	0.26	0.18	0.58	1.01
Arable land	2.37	0.08	0.68	0.24	1.00	0.07	0.09	0.22	0.15	0.53	0.34

This decrease was mainly due to a decrease in the amount of humic acids. In their composition, the relative content of fulvic acids increased in the profile as a whole. The ratio of Cgc: Cfc became narrower.

In arable soil, the content of non-hydrolysable residue decreased compared to virgin soil. This is in good agreement with the data on the content of passive humus, which significantly decreases in the upper soil layers (Table

3).

Table - 3 Content of organic matter in the soil of virgin and arable land, %

Ugo-die	Soil layer, cm	Organic substance	Humus proper	Detritus, from		Humus		Active to passive
				soils	organ inva	assets-ny	pass-gray	
Oktyabrsky district								
Virgin land	0-30	5.90	3.83	2.07	35	1.35	4.55	0.30
Arable land	0-30	4.71	3.53	1.18	25	0.94	3.77	0.25
Peschanokopsky district								
Virgin land	0-30	4.74	3.13	1.61	34	1.23	3.51	0.35
Arable land	0-30	4.10	3.02	1.08	26	1.18	2.92	0.40

However, in the studied soils the content of not only passive but also active humus decreased.

A similar conclusion can be made based on the analysis of its division into humus proper and its detrital part, the still unhumified, semi-decomposed part.

In the cultivated soil, the content of detritus decreased, although in most cases the content of humus itself also fell, since with long-term agricultural use of soils without significant application of fertilizers, the supply of energy material - fresh organic matter - is small, and accordingly little detritus is formed, and the processes of mineralization of non-humified and humified compounds increase.

Conclusion. The studies conducted by us give grounds to state a significant drop in humus reserves in the cultivated soil, deterioration of its qualitative composition in comparison with virgin soil. The revealed regularity is confirmed not only by data on the content of passive, but also active humus. In the arable soil, little organic matter was formed and accumulated in the form

of detritus in comparison with virgin soil.

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