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**THE PROCESS OF DEHUMIFICATION OF HUMUS
IN THE SOIL SARYKOL DISTRICT OF KOSTANAY REGION**

Abstract. In the presented article, the agrochemical soil map was compiled on a scale of 1: 500,000 according to agrochemical studies on the sown areas of the soil of the Sarykol district of the Kostanay region and significant values of the soil tracts of the cultivated soil on the area of 157,082 ha. According to the results, in the sown areas the content of humus in the composition of arable land varies from 2.13 to 5.67%. These figures show that over the past 30-40 years, the content of humus has decreased by 25-30% compared with the scientific literature of previous years. One of the soil-ecological problems of the region is the dehumification process of chernozem, which is the main source of natural resources of the Kostanay region. The composition of the soil in the field of sowing reflects low and average values depending on the technology of cultivation of agricultural crops on agricultural land, soil types.

Keywords: soil, acreage, agrochemical map, dehumification.

Introduction. The current state and prospects of development of agro-industrial complex of the Republic of Kazakhstan are inextricably linked with the proper use of soil [1]. Soil protection and preservation of fertility is one of the main environmental problems at present. Preservation and increase of soil fertility-the main condition for ensuring environmental sustainability of the entire biosphere on the planet [2].

The use of steppe massifs of Kostanay region in agriculture began in the middle of the 19th century. Especially in the period of "resettlement" in 1909-1918, people began to actively use the land in agriculture. Massive development of virgin and fallow lands of steppe regions of Northern Kazakhstan was carried out from 1954 to 1960. By 1990, the "worked Land" of the region amounted to 47 million us dollars hectares (\$36 million) arable land and 11 million area of land requiring General improvement) [3]. In the sixties in the Kostanay region after development of the southern chernozems with easy mechanical structure and carbonate, there were an erosion of soils, an imbalance of mineral nutrients and organic substances in the soil. Over the past 30-40 years, due to intensive menstruation of such processes, there have been significant changes in the content of humus and soil dehumification.

Due to the fact that in the region with extensive use of agricultural land is not established system of conservation agriculture, the soil is reduced from 8.6 to 27.7% [3]. One of the main causes of dehumification soil cover is prolonged use monochronic farming systems and the violation of the rotation.

Reduction of humification reserves in the soil leads to a decrease in the phytosanitary situation in the soil, deterioration of humification and water-physical properties, violation of nutrient regimes, compaction, neutralization [4-5]. Therefore, the reduction of humus content in the soil is one of the main causes of soil degradation.

Kostanay region is part of three grain provinces of Kazakhstan. In the field crops amounted to 3 million sown more than 10 hectares and produced a quarter whole grain.

Sarykol district, where the study is conducted, is one of the main areas in the provision of agricultural products. The total area of the district is 611 613 hectares of agricultural land 504 240 hectares, including

arable land 366 474 hectares, pastures 130498 hectares, forest lands 27 040 hectares. Mainly grown wheat, barley, oats, lentils, buckwheat and legumes and oilseeds[6]. Therefore, the study of the processes of soil dehumification Sarykol district, one of the main grain-producing districts of Kostanay region, the development of agrochemical cartogram for rational use of agriculture land is the source of the natural resources of the region, is very important and necessary.

Study area. Acreage of Sarykol District of Kostanay region. The coefficient of humidification in the area is characterized by the number of temperatures above 10 ° C in the range of 2200-2500 °C, which has a value of $K = 0,8-0,1$. The average annual rainfall is 250-300 mm [7]. All the territories of Sarykol District are located in the limiting half-life zone of the steppe zone of the usual ground field zone. In the Northern part of the region there are ordinary black soils, rooted in ordinary black soils and ordinary black soils, rooted roots, mixed species of meadow chernozems with roots. In the southern part, common chernozems, ordinary black soil, withered roots, as well as South-Chernozem soil formed on the depressions of lakes, which formed meadow-Chernozem soil, in the South-Western edge of which in the valley of the Ubagan river multiply southern chernozems [8]. The most common soils in the region are soil-forming rocks of heavy metals of four deposits [9, 10].

Methods. To determine the humus content in the soil, soil samples were taken from the soil layers of 0-25 cm of sown areas. The obtained soil samples I. V. were Determined by the method of determining the humus of Tyurin. And agrochemical map of soils developed on the basis of analytical cart mapping.

Results and discussion. Agrochemical soil survey of the sown areas of Sarykol District with a total area of 366 474 hectares, including 157 082 hectares, which is 45.1%, was carried out. According to the obtained results the content of humus varies in the range of 2.13-5,67% on the sown area of the district where held agrochemical examination. The area with a relatively low humus content is 102.77 thousand hectares (65.1 %). The area with an average area of 55.1 thousand hectares of humus (34.9 %), and in acreage are not found acreage of high importance in soil content (table, figure).

Percentage of survey size of soil humus, carried out on areas of Sarykol area cultivated more widely

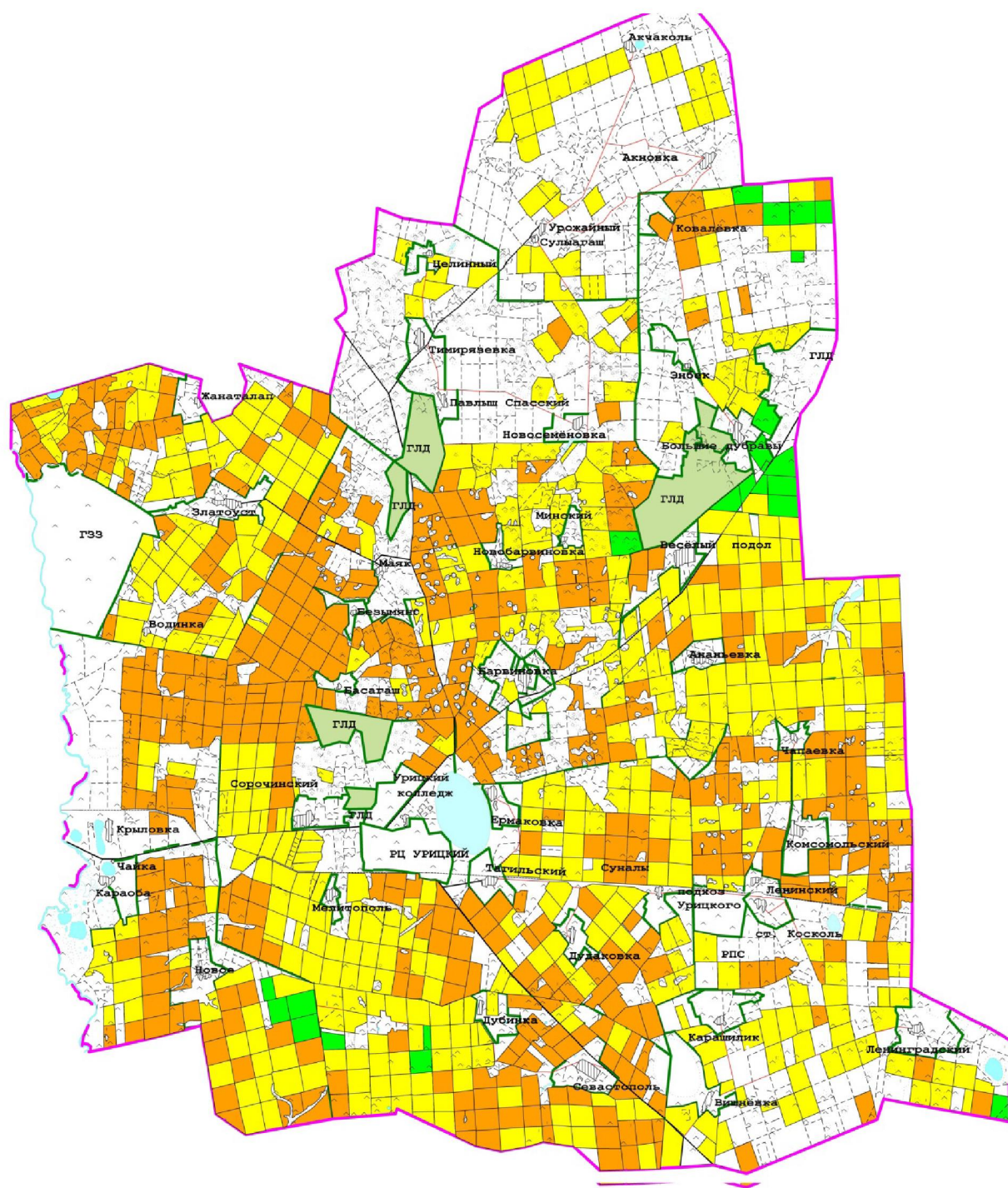
Humus content in the soil					
low		average		high	
Border grouping by percentage of humus content					
not exceed 4,0		4,1-6,0		more 6,0	
Thousand hectare	%	Thousand hectare	%	Thousand hectare	%
Arable					
102,8	65,1	55,1	34,9	–	–

One of the urgent problems was the dehumification of soils of Kostanay region due to intensive compliance with the technology of cultivation of crops. The results of scientific research [11-19] show that every year the reserves of humus in the amount of 400-600 kg of one hectare of cultivated area are lost. One example of the fact that high values of humus with the intensity of water erosion decrease from year to year, amounting to low and very low values of humus (3.0%), low and medium (4.2%) in most of the region is Sarykol district, where the study is conducted. These indicators show a decrease in humus content to 25-30% over the past 30-40 years compared to the data in the scientific literature of previous years.

Conclusions. In Sarykol District after the development of virgin and fallow lands, especially over the past 30-40 years, the humus content in the soil decreases to 25-30% and undergoes significant changes. The process of dehumification have an intense place.

Humus content in soils of cultivated areas is classified into two groups with low and medium content. Neskorumny composition of 2.13-3,6 % (4,0%) and middle 4,13-5,67 % (4,1-6,0 %) values.

Below the percentage occupied by the size of humus, the value of 65.1% (4.1-6.0 %) < the average value of 34.9% (0-2-4 %).



Agrochemical cartograms scale 1:500 000 on the composition of Caprica Sarykol district of Kostanay region

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ҚОСТАНАЙ ОБЛЫСЫ САРЫКӨЛ АУДАНЫ ТОПЫРАҚТАРЫНДАҒЫ ҚАРАШІРІНДІНІҢ ДЕГУМИФИКАЦИЯЛАНУ ҮРДІСТЕРІ

Анотация. Ұсынылып отырған бұл мақалада Қостанай облысы Сарыкөл ауданы топырақтарының дегумификациялану үрдістері және топырақтың қарашірінді құрамының егіс алқаптарындағы мәндік көрсеткіштері бойынша 157 082 гектар көлеміндегі егіс алқаптарына жүргізілген агрохимиялық зерттеулер нәтижелері негізінде құрастырылған 1:500 000 масштабтағы топырақтың агрохимиялық картаграммасы келтірілген. Алынған нәтижелер бойынша қарашірінді құрамы ауданның агрохимиялық зерттеу жүргізілген егіс алқаптарында 2,13-5,67 % аралығында ауытқиды. Бұл көрсеткіштер соңғы 30-40 жыл ішінде бұрынғы жылдардағы ғылыми әдебиеттердегі мәліметтермен салыстырып қарағанда 25-30 %-ға дейін қарашірінді мөлшерінің азайғанын көрсетеді. Қостанай облысының табиғи ресурстарының негізгі қайнар көзі саналатын қара топырақтың жылдан-жылға дегумификациялану үрдістеріне ұшырауы облыстың топырақ-экологиялық проблемаларының бірі болып саналады. Егіс алқаптарында топырақ қарашіріндісінің құрамы егіншілікте ауылшаруашылық дақылдарын өсіру технологиясына, топырақ типтеріне қарай төмен және орташа мәндегі көрсеткіштерді көрсетеді.

Түйін сөздер: дегумификация, топырақ, агрохимиялық картаграмма, егістік алқап, қарашірінді.

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ДЕГУМИФИКАЦИОННЫЕ ПРОЦЕССЫ В ПОЧВЕ САРЫКОЛЬСКОГО РАЙОНА КОСТАНАЙСКОЙ ОБЛАСТИ

Абстракт. В представленной статье агрохимическая карта почвы составлена в масштабе 1 : 500 000. Агрохимические исследования посевных площадей проводились в Сарыкольском районе Костанайской области на площади 157082 га. Согласно результатам исследований содержание гумуса в составе пахотных земель варьируется от 2,13 до 5,67 %. Эти цифры показывают, что за последние 30-40 лет по сравнению с научной литературой предыдущих лет содержание гумуса снизилось на 25-30 %. Одной из почвенно-экологических проблем региона является дегумификационный процесс черноземов, которые являются основным источником природных ресурсов Костанайской области. Состав почвы в области показывает низкие и средние значения гумуса в зависимости от технологии возделывания сельскохозяйственных культур и типов почв.

Ключевые слова: почва, посевные площади, агрохимическая карта, дегумификация.

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REFERENCES

- [1] Zhildikbayeva A.N., Sabirova A.I., Pentayev T.P., Omarbekova A.D., Virginia Gurskienė (2018) Estimation of the efficient land use in the limits of land plots of acting agri businesses // News of the National academy sciences of the Republic of Kazakhstan. Series of agricultural sciences. 2018. Vol. 5, N 47. P. 20-24. http://nauka-nanrk.kz/ru/assets/%D0%B6%D1%83%D1%80%D0%BD%D0%B0%D0%BB%202018%205/%D0%90%D0%B3%D1%80%D0%B0%D1%80%D0%BD%D0%B0%D1%8F_05_2018.pdf. ISSN 2224-526X.
- [2] Korzhova S.I. Biological indicators of Chernozem fertility assessment [Text]: article / S. I. P. Korzhov, T. A. Trofimova, V. A. M.: Publishing house KAZ. Herald of Michgau, 2010. N 2. P. 86-92.
- [3] Malinin S.N., Malanina A.S., Kulagin I.P. the change in the humus state of arable soils of Kostanay region // Materials of Intern. science. - prakt. conf. "Regional problems of NTP in agriculture". Kostanay: Shi, 1999. M.: publishing house of KAZ. 2. P. 163-169.
- [4] Kiryushin V.I.P. Change of humus content of chernozems of Siberia and Kazakhstan under the influence of agricultural use [Text] // Reports of VASHNIL / V. The Dictionary Implemented Two-way Translation. I. M. P. Lebedeva. 1984. N 5. P. 20.
- [5] Antropov V., M. P. Prediction of the productivity of soils of Northern Kazakhstan // Materials of 2nd All-Union Conf. Conf. on the application of mathematical. methods and computers in soil science / M. V. P. Antropov. Pushchino, 1983. P. 2.
- [6] <http://sarykol.kostanay.gov.kz/ucheniya-rayona/gosudarstvennye-uchrezhdeniya/id/145>.
- [7] agro-Climatic resources of Kostanay region scientific and applied reference book. Astana. 2017. P. 40-75.
- [8] Evstifeev Yu.G. Astana Soils of the Kazakh SSR. Issue.6. Kustanai region. Alma-Ata: AN KazSSR, 1966.
- [9] Soil of the Kazakh SSR. Alma-Ata: Publishing house on science, 1983. 238 p.
- [10] Durasov S.M., Tazabekov T.T. Soils of Kazakhstan. Alma-Ata: Kainar, 1981. M.: publishing house of KAZ.
- [11] Amerguzhin H.A. Agroecological assessment of soils of Kostanay region of Kazakhstan. Astana, 2004. 438 p.
- [12] Amerguzhin H.A. Agroecological characteristics of soils of Northern Kazakhstan. Thesis. Moskova, 2003. 465 p.
- [13] Aldamzhar Z.A., Murzalin S.K. Kostanay region. Encyclopedia. Almaty: Publishing House "Arys", 2006. 128 c.
- [14] Bildebaeva R., Jalonkatu T. Changes of soil fertility of Northern Kazakhstan as a result of their development // Soil-Agrokhim. a committed environmentalist, problem goods. high product. agrocenoses: Abstracts of the all-Union. conf. Pushchino, 1988. 112 p.
- [15] Akhanov Zh.U., Kozybaeva F.E. Soil Formation in anthropogenically-technogenic conditions of Kazakhstan // in SB. "Problems of anthropogenic soil formation. M.: Soils, in-t them. V. V. Dokuchaeva, 1997. P. 263-266.
- [16] Sultanbaev E.A. Mineralogy of chernozems of Northern Kazakhstan. Alma-Ata, 1987. 216 p.
- [17] Thanatos I.S. System of soil tillage in grain-fallow and grain-prospec crop rotation in arid steppes. "Ways of intensification of cultivation of agricultural crops in Kostanai region". Alma-Ata, 1988. P. 60-76.
- [18] Tleuov S.S. Water erosion of soils in the Northern agricultural regions of Kazakhstan // in the sat. "Science of agriculture", Kostanay agricultural Institute "Zarechny", 1982. P. 94-95.
- [19] Shilova I., Shilov M.P. Humus state of developed and virgin chernozems of Kustanay region // in the sat. "Science of agriculture", Kustanay agricultural in-r, p. "Zarechny", 1992. P. 19-20.