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CHANGES IN LITHOPHILIC ELEMENTS OF SOIL ON VARIOUS BACKGROUND OF MINERAL FERTILIZERS IN AGROCENOSIS OF TRITICALE

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Introduction

Triticale (Triticosecale) is a new generation of grain crops obtained by crossing wheat (Triticum) and rye (Secale). This crop was first bred in the late 19th century by scientists from Scotland and Germany. Triticale combines the quality of wheat grain and the resistance of rye to adverse conditions. In Uzbekistan, it is considered a promising food and forage crop. However, triticale is not recommended for sowing on highly saline soils. To obtain a yield of 50-60 c/ha, it is recommended to apply organic fertilizers in combination with 180-200 kg/ha of nitrogen, 100-160 kg/ha of phosphorus and 60-70 kg/ha of potassium. Systematic use of mineral fertilizers enriches the arable soil layer with available forms of nitrogen, mobile compounds of phosphorus and potassium. Increasing the doses of fertilizers contributes to the natural accumulation of these elements in the soil.

According to research, the total nitrogen content of the soil is directly related to the amount of humus and phosphorus. Soils rich in organic matter have a higher nitrogen content. The amount of potassium mainly depends on the granulometric composition of the mineral part of the soil and the original rock. According to scientific data, carbonates, sulfates, nitrates, chlorides and phosphates of calcium (Ca), magnesium (Mg), potassium (K) and sodium (Na) are found in soils. Water-soluble salts of potassium and sodium are present in soil in small quantities, while calcium and magnesium carbonates, as well as calcium sulfate (gypsum), are poorly soluble and make up a significant part of the solid phase of the soil.

Methodology of the study

The study was conducted in conditions of irrigated typical sierozems. Most of these soils were formed on loess rocks. The upper agro-irrigation layer of such soils has a

thickness of 0,5-1 m to 1,5 m. It is characterized by a light gray color in the upper part of the profile, turning into a light brown shade as it goes deeper.
In this horizon, there are a significant number of traces of earthworms, a loose aggregate structure, and fragments of fired brick and ceramics are also found. There are practically no carbonates in this layer, yellowish loess lies below.
The humus content in the soil is average, while its amount decreases with depth. According to the mechanical composition, the soils are classified as heavy loamy and medium loamy.

Results and their analysis

All agricultural crops, including triticale, extract a certain amount of nutrients from the soil during the formation of the crop. The following chemical elements predominate in the earth's crust: O, Si, Al, Fe, Ca, Na, K, Mg, Ti and H, which together make up about 99% of its mass.
Today, there are several geochemical classifications of elements, but the most widely used is the Goldschmidt classification. According to it, all elements of the earth's crust are divided into five groups depending on their ability to accumulate in the biosphere: atmophilic, lithophilic, siderophilic, biophilic and chalcophilic.
In the triticale agrocenosis, a change in the content of 14 lithophilic elements was revealed. The studies were carried out in conditions of irrigated typical sierozems, which have their own specific formation features.
This study examined the effect of mineral fertilizers on soil geochemistry under conditions of natural fertility. The experiment found that in the control variant, the soils contained: 3,5-7% Fe and Al, 0,15-2% Ti, K, Na, Mg, 0,03-0,06% Sr, P, Ba, and 0,0001-0,002% Cr, Zr, Li, V, Be. When growing triticale with mineral fertilizers, changes in the content of chemical elements in the soil were observed. In the control variant, the Al content was 7%, with the introduction of $N_{200}P_{100}K_{100}$ it increased to 8%, but with $N_{300}P_{150}K_{150}$ it decreased to 7,5%. The Na content in the control variant was 2%, with the addition of $N_{200}P_{100}K_{100}$ it decreased to 1,5%, and with $N_{300}P_{150}K_{150}$ it again reached 2%. The amount of K in all variants remained at the level of 1,5%. The Fe content in the control variant was 3.5%, with the addition of $N_{200}P_{100}K_{100}$ it decreased to 3%, and with $N_{300}P_{150}K_{150}$ it increased to 4%. Mg

remained unchanged in all variants (2%). P in the control variant was 0,04%, with the addition of $N_{200}P_{100}K_{100}$ and $N_{300}P_{150}K_{150}$ it increased to 0,06%. The content of Ba and Sr did not change (0,06% and 0,03%, respectively). V in the control variant was 0,008%, with the introduction of $N_{200}P_{100}K_{100}$ it decreased to 0,006%, and with $N_{300}P_{150}K_{150}$ it was 0,007%. Ti in all variants remained unchanged (0,15%). Cr in the control variant was 0,002%, and in the fertilized variants it decreased to 0,001%. Be changed slightly, remaining at the level of 0,0001%. Li in all variants remained stable (0,006%). The Zr content in the control variant was 0,005%, and in the fertilized variants it increased to 0,006%.

Conclusion

Our results show that phosphorus (P), iron (Fe), and barium (Ba) contents in the soil increased with fertilization. Aluminum (Al) and sodium (Na) contents varied with fertilization. Potassium (K), magnesium (Mg), titanium (Ti), strontium (Sr), and lithium (Li) contents remained virtually unchanged with fertilization. Chromium (Cr), vanadium (V), and beryllium (Be) contents decreased with fertilization. Fertilization increased the contents of some elements in the soil, while others either decreased or remained unchanged. These changes depend on the soil chemistry, element mobility, and fertilization effects.

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