

DYNAMICS OF AGRICULTURAL GREY SOIL BIOLOGICAL PROPERTIES AND ASSESSMENT OF IT'S SUSTAINABILITY DEGREE

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The paper presents the results of a study of the mineral fertilizers and belite flour influence on biological properties of an agricultural grey soil. The observations have been carried out at the field experimental plot of the Krasnoyarsk Research Institute of Agriculture. The experimental plot is located on the land of Zarechenskoe, within the zone of grass forests of Achinsk District (56° 41' N; 89° 25' E). The soil cover of the studied area is formed in the sharp continental climate. Soil organic matter is influenced by anthropogenic impact, and easily mineralized fractions (labile and mobile) are often present at a minimum. Microorganisms are deficient in energy and readily available organic carbon. In this regard, studies on the role of agricultural practices in the stabilization of organic carbon in soils are very relevant. The purpose of this research was to assess the agrobiological state of the studied soils and the degree of their resistance to anthropogenic influences in the conditions of the grass forests zone. The scheme of the experiment included the following treatments: virgin soil; permanent fallow; grain crops grown without fertilizers; grain crops grown with the use of mineral fertilizers and grain crops grown with the use of mineral fertilizers with preliminary liming. The soil under meadow vegetation produced more carbon dioxide than the soil of agricultural lands. The fallow area was characterized by the lowest values of biological activity. For the first time in the conditions of the studied area, the positive role of belite flour in the accumulation of the expenditure part of the carbon cycle budget in the agricultural gray soil was revealed. The content of C_{mb} was maximum in the soil of virgin land, a large proportion of C_{mb} in the composition of organic matter (9–17%) was also found there. C_{mb} dynamics was largely determined by the conditions of moistening, and to a smaller degree by the temperature and the level of microorganisms respiratory activity. The application of mineral fertilizers contributed to the enhancement of carbon immobilization by microbial cells.

Key words: carbon dioxide production, microbial biomass, water resistance of soil structure, metabolic rate coefficient.