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Књига сажетака

Симпозијум

„Земљиште у доба прецизне пољопривреде и информационих технологија”

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AGROGENIC EVOLUTION OF SODDY-PODZOLIC SOIL: FEASIBILITY OF REPEATED RE-INVOLVEMENT IN CULTIVATION OF THE FALLOW LANDS FORMED ON BAND CLAYS

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INTRODUCTION and OBJECTIVES: The hydrothermal regime of sod-podzolic gleyy clay soils formed on band clays is characterized by seasonal waterlogging and associated development of the gley process. During the cultivation its water-physical and chemical properties are improved mainly due to a drainage system and appropriate fertilization and liming. But at the same time, destruction of the colloidal complex and its loss from the arable horizon can occur. Draining excess moisture lead to the processes of iron reduction are attenuated. The study of the transformation of the soddy-podzolic gleyic clay soil in a long-term agricultural use (> 200 years) was carried out in Leningrad region, northwest Russia. The morphological structure, particle size distribution, content and ratio of ferrous and oxide forms of iron in the profile of virgin (indigenous forest) and arable drained soil were studied. In addition, changes in the organogenic-profile were traced in the course of long-term agrogenesis (> 200 years) with a pipe drainage system.
MATERIAL and METHOD: The method of cutting cylinders was used to determine the bulk density. The granulometric composition was determined following wet dispersion with the pipette method. The isolation of fine fractions was determined as follows: the fraction <0.001 mm was divided into precolloidal and colloidal (<0.0001 mm) phases using a C-100 flow-through centrifuge at 20 thousand rpm. The suspension was coagulated with an HCl solution. The content of soil humus was determined using the wet combustion method.
RESULTS and CONCLUSIONS: In virgin forest soil, during its pedogenesis the loss of fractions <0.01 mm from the eluvial layer was 877.4 kg m^{-2}, and the loss of <0.0001mm was 287.5 kg m^{-2}, as compared with parent material not affected by the processes of pedogenesis. However, long-term agrogenesis (>200 years) led to increased eluvial losses of fine earth particles. The loss of fraction <0.01 mm from the arable horizons was 1244.8, and < 0.0001 mm was 570 kg m^{-2}, respectively. This was due to multiple yearly tillage that increased the porosity of the soil and thus intensified lessivage, which led to increased leaching and eluvial losses. The total loss of colloids from the entire profile of virgin soil was 262.1 kg m^{-2}, and from the arable layer of drained soil - 290.1 kg m^{-2}. The humus enrichment of the colloids of the plough horizon of the arable soil was two times lower than that of the surface horizon of the virgin soil. The relative share of the participation of colloids in the fixation of humus by the soil was the same. Cultivation of this soil improved its physical properties, increased content of humus and decreased soil acidity. However, leaching of fine earth materials was accelerated. After withdrawn from crop production, the positive changes were gradually lost. Taking into account the high costs of re-cultivation of the former land and a high costs of re-installation and maintenance of an optimal hydrological regime (drainage network) we concluded that repeated ploughing and involvement of arable soddy-podzolic gleyic clay soil into cultivation is economically unreasonable.
KEY WORDS: soddy-podzolic clay soil; agrogenic evolution; fine-dispersed fraction; organogenic-mineral profile; colloids