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ABSTRACT BOOK

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# Feasibility of re-involvement of the fallow soddy-podzolic soil in cultivation

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## ABSTRACT

Transformations of the soddy-podzolic gleyic clay soil in a long-term agricultural use (> 200 years) was studied in Leningrad region, northwest Russia. This feasibility study investigated the possibility of re-cultivation of these soils after long term fallowing. 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 analysed. In addition, changes in the organogenic-profile were traced in the course of long-term agrogenesis (>200 years). 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 (P) horizon of the arable soil was two times lower than that of the surface (AY) horizon of the virgin soil. The relative share of the participation of colloids in the fixation of humus by the soil was the same (11.6 and 10.9%, respectively). In the subsurface horizons, the absolute content of humus in the colloids decreased, and the share of participation in the fixation of humus increased. When soddy-podzolic gleyic clay soil is brought to cultivation then the water-air regime is improved, content and composition of humus, depth of arable horizon is increased and the soil acidity decreased. At the same time the leaching of fine earth materials is accelerated. When this soil was withdrawn from crop production, the positive changes achieved as a result of cultivation were gradually lost. For the first time we could qualitatively calculate the losses of the fine earth fractions for the given soil from top soil. Taking into account the high costs of re-cultivation of the former land and a high cost 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**:

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