

Agrogenic transformation of soil organic C in conditions of southern-taiga zone, European Russia

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The principal regional features of soil organic carbon (SOC) agrogenic transformation and water-soluble organic substances (WSOS) genesis and environmental functions have been investigated in the Podzols and Podzoluvisols of the representative natural and agro- ecosystems in the southern taiga subzone of the European part of Russia. Especial attention has been done to the role of SOC agrogenic degradation and WSOS with acidic and ligand properties in soil carbon dioxide emission.

The long-term agroecological investigations run in the regional set of representative agrolandscape monitoring stations in the educational farm "Mikhailovskoye" (Podolsk district, Moscow region), Field experimental station and Forest experimental station (RTSAU campus, Moscow) and in the Central Forest biosphere reserve (Nelidovo district, Tver region).

Field research methods include sorption lysimetry and radioactive tracers. The laboratory ones – chromatography and spectrophotometry. There were used activated charcoal brand "Carbolite", chemically purified quartz sand and barley plant residues (2-3 mm), totally labeled with ^{14}C in the soil-horizontally distributed sorption columns.

Obtained results became useful for quantitative assessment of the principal stages and processes in soil CO_2 emission, including the water-soluble organic substances formation (3.0 g of SOC per 100 g of plant litter or 60-75 g of SOC per square meter of the organo-mineral horizon A0 per year) and CO_2 emission. In the middle taiga ecosystem conditions (with relatively low soil biological activity) the highest emission of CO_2 ($83,0 \pm 4.1\%$ of the newly formed WSOS) was in case of arable Podzoluvisols, and lowest one ($32,4 \pm 2,5\%$) – in their semihydromorphic versions.