DOI: 10.25695/AGRPH.2018.03.05

# BIOLOGICAL PROCESSES IN THE RHIZOSPHERE OF BARLEY AND RED CLOVER ON LOAMY SAND SPODOSOL SOIL

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Biological processes taking place in the rhizosphere of cereals and legumes have been studied in a small-scale field experiment on sod-podzolic sandy loamy soil. The aim of the study was to evaluate the emission of carbon dioxide ($CO_2$) and nitrous oxide ($N_2O$) from the soil as well as intensity of mineralization and immobilization processes in the rhizosphere of barley (*Hordeum Vulgare* L.) and red clover (*Trifolium pratense* L). The content of carbon and nitrogen labile forms, the dynamics of organic matter mineralization (for $CO_2$ production), the intensity of nitrogen fixation and denitrification processes in the rhizosphere of the cultures, and direct emissions of $N_2O$ and $CO_2$ from the soil have been measured in the experiment. It was found that the amount of labile carbon in the rhizosphere of clover increased during the phase of seed maturation, and in the rhizosphere of barley – during the stem-extension stage. The nitrogen content in the labile organic matter in the rhizosphere of both clover and barley decreased from the beginning of vegetation to the end. The intensity of immobilization processes in the clover rhizosphere was significantly ($p < 0.05$) higher than that in the barley rhizosphere. A high positive correlation was found between the indicators of mineralization and immobilization of organic substances in the rhizosphere of the cultures and direct emission of the greenhouse gases ($r = 0.96–0.98$ for $p < 0.05$). During the observation period, the main contributor to the nitrous oxide emission was the process of denitrification, up to 70–80%, while the contribution of nitrification was 20–30%. The contribution of the rhizosphere of the studied crops to the emission of greenhouse gases from soils was on average 52 and 71% for barley and clover, respectively.

***Key words:*** rhizosphere, mineralization, immobilization, labile organic matter, labile organic nitrogen, emission, greenhouse gases.