CONTRIBUTION OF NITRIFICATION AND DENITRIFICATION IN THE NITROUS OXIDE FORMATION IF THE PROFILE OF AGRICULTURAL SOD-PODZOLIC SANDY LOAN SOIL

I.M. Mukhina, E.Y. Rizhiya, N.P. Buchkina, E.V. Balashov

Agrophysical Research Institute,
14 Grazhdansky prospect, St. Petersburg, 195220,
E-mail: muhinairina1989@gmail.com

In a laboratory experiment, a quantitative assessment of the contribution of nitrification and denitrification in the emission of nitrous oxide (N_2O) from the profile of sod-podzolic sandy loam soil was conducted. The experimental results showed that denitrification was significantly higher ($p < 0,001$) than nitrification (in average – 25–40 times) and depended on the depth of the investigated soil profile. When soil water content was increased by 5%, the amount of N_2O released through nitrification was, on average, 1,4 times higher and the resulting denitrification – 1,9 times higher. When the soil temperature was increased by 5°C, for both, nitrification and denitrification, the amount of N_2O produced was, on average, 1,7 times higher. Denitrification increased down the soil profile while nitrification decreased with depth. The intensity of the nitrification and denitrification processes in all the variants of the experiment significantly ($p < 0,001$) increased with the increase of the soil mineral nitrogen content ($p < 0,001$) – on average was 2 times higher – in comparison with a variant without application of mineral fertilisers.

Keywords: nitrous oxide, nitrification, denitrification, sod-podzolic sandy loam soil, temperature, soil water content, mineral fertilisers.