



Effect of soil temperature and moisture on emission of N₂O

M. Rey (1), C. Trasar-Cepeda (2), M.C. Leirós (1), F. Gil-Sotres (1)

(1) Dep. Edafología y Química Agrícola, Universidad de Santiago de Compostela, Spain, (edgils@usc.es/ Phone: +34-981-563100), (2) Dep. Bioquímica del Suelo, IIAG-CSIC, Spain.

The role of soil as a greenhouse gas source and sink is one of the most current topics in research into the effects of climate change on soils. It is assumed that climate change will generate modifications in temperature and in patterns of precipitation, which means that soils will be subject to different temperature and moisture regimes in the future. To study the extent to which changes in soil moisture and temperature affect the emission of N₂O, a controlled laboratory experiment was carried out in which three soils from Galicia (NW Spain) subject to different types of use (forest, grassland, crop growing) were incubated for 42 days under different conditions of temperature (between 10 and 35 °C) and moisture (between 40 and 100 % of the field capacity).

In all three soils, N₂O emissions were low, which indicates that denitrification scarcely occurs under aerobic conditions. Variation in the soil moisture content (always under aerobic conditions) did not have any appreciable effects on emission of this gas. In contrast, the variation in temperature had a noteworthy effect on all three soils, and the emission of N₂O increased clearly between 10 and 35°C. The increase in temperature caused a fivefold increase in N₂O emission in the grassland soil, and a threefold increase in the cropped soil. Despite the higher organic matter content of the forest soil, the emission of N₂O increased only twofold within the range of temperature considered.

The above results suggest that although emissions of N₂O will change very little in forest areas as a result of climate change, areas dedicated to grassland will be converted into hotspots of emission of this greenhouse gas.