



Does biochar with organic amendments affect denitrification in an agricultural soil?

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In this laboratory experiment we investigated the influence of biochar (BC) application on dinitrogen (N₂) and nitrous oxide (N₂O) emissions from an agricultural soil in Austria.

We produced BC at 550°C from fiber sludge and husk, partly enriched with ammonium sulfate and mixed with garden green compost at a 50/50 ratio (w/w). The gleyic Cambisol originates from an experimental site in Kaindorf, Austria. For the incubation experiment we established three different treatments in 2014: K (control plots); T1 (1 % BC-compost mixture) and T2 (0.5 % BC-compost mixture enriched with 175 kg N ha⁻¹). We used the helium gas flow soil core technique to quantify N₂ and N₂O fluxes simultaneously. Therefore, we incubated soil cores at ambient air temperature (20 and 24°C) at 20 and 50% water filled pore space (WFPS).

Results show that before BC addition N₂ and N₂O fluxes were similar at all treatments. Measurements of pure nitrogen-enriched BC show very high gaseous losses in form of N₂ and N₂O. Raising temperature promotes N₂ production at all treatments. Application of N-enriched BC led to significantly higher N₂ fluxes compared to K.

N₂O fluxes increased significantly at fertilized BC plots (T2) compared to K and T1 at both water contents. Raising WFPS supports higher N₂ production at all treatments but lowers N₂ fluxes at BC plots.