



Effects of biochar addition to soil on nitrogen fluxes in a winter wheat lysimeter experiment

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Biochar is a carbon-rich, porous residue from pyrolysis of biomass that potentially increases crop yields by reducing losses of nitrogen from soils and/or enhancing the uptake of applied fertiliser by the crops. Previous research is scarce about biochar's ability to increase wheat yields in temperate soils or how it changes nitrogen dynamics in the field. In a lysimeter system with two different soils (sandy/silt loam) nitrogen fluxes were traced by isotopic ^{15}N enriched fertiliser to identify changes in nitrous oxide emissions, leaching and plant uptake after biochar addition. 20t/ha woodchip-waste biochar (pH=13) was applied to these soils in four lysimeters per soil type; the same number of lysimeters served as a control. The soils were cropped with winter wheat during the season 2012/2013. 170 kg-N/ha ammonium nitrate fertiliser with 10% ^{15}N was applied in 3 events during the growing season and ^{15}N concentrations were measured at different points in time in plant, soil, leachate and emitted nitrous oxide. After one year the lysimeter system showed no difference between biochar and control treatment in grain- and straw yield or nitrogen uptake. However biochar did reduce nitrous oxide emissions in the silt loam and losses of nitrate leaching in sandy loam. This study indicates potential reduction of nitrogen loss from cropland soil by biochar application but could not confirm increased yields in an intensive wheat production system.