Geophysical Research Abstracts
Vol. 14, EGU2012-10369-1, 2012
EGU General Assembly 2012

Soil-plant-biochar interactions and effects on soil C and N cycling in a wheat greenhouse pot experiment.

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Biochar is carbon rich material, able to modify soil qualities and increase soil carbon sequestration. We investigated the benefits, interactions and mechanisms observed when adding biochar (from Miscanthus feedstock) to soil. In a greenhouse experiment with wheat grown in pots under simulated natural conditions, biochars pyrolysed at 360˚C and 450˚C were applied at 10, 25, and 50 tha^{-1}, with or without nitrogen (urea). These pots were subjected to different water regimes (400 and 800 mm per year) according to a randomised block design. Growth rate, grain yield and total biomass will be related to the biochar production temperature and application rate. The effect of biochar on water availability and C and N cycling will be tested by direct measurements of CO_2, CH_4 and N_2O fluxes from soil using closed dynamic and static chamber methods. Different natural ^{13}C abundance in biochar ($\Delta^{13}C \approx$-13‰) and soil organic matter (SOM; ($\Delta^{13}C \approx$-27‰) will be used to calculate the relative contribution of biochar to total soil respiration and the potential priming effect of the biochar on SOM. In addition a labelling experiment with $^{13}CO_2$ will be used to trace C from the atmosphere through the plant, revealing how biochar affects C allocation in plant biomass, rhizodeposition and root respiration. Preliminary results will be presented.