Geophysical Research Abstracts
Vol. 14, EGU2012-4889, 2012
EGU General Assembly 2012

Priming effects of biochar elucidated using stable isotope techniques.

R. Hood-Nowotny (1) and B Vanlauwe (2)

(1) Department of Terrestrial Ecosystem Research, University of Vienna, Austria (Rebecca.Clare.Hood-Nowotny@univie.ac.at), (2) 2. Tropical Soil Biology and Fertility Institute of the International Centre for Tropical Agriculture (TSBF-CIAT), Nairobi, Kenya.

Organic residues are routinely used in tropical agricultural systems; as mulches to reduce water losses and for their fertiliser value. The addition of high N content organic residues to soils has been promoted in tropical countries as a means to achieve sustainable intensification of tropical farming systems and increasing soil organic matter status on infertile low income farms. Improving the nutrient release from these materials could have positive feedback effects in terms of improved food security and increased organic matter return to the soil through improved crop yields. Unfortunately the fertiliser value of most organic residues is such that only 10 -20% of the available nitrogen in the residue is mineralised to plant available nitrogen and taken up by the plant in the first cropping year, dropping to less than 2% in the subsequent years; thus having marginal overall impact on crop yields. Improving the fertiliser benefit of residues by combining them with the biochar addition could lead to significant increases in crop yields, an immediately tangible benefit for farmers.

The addition of charcoal in boreal forest systems has been shown to increase the rate of soil organic matter decomposition, suggesting there is a priming effect of a biochar analogue on organic matter decomposition. The priming effect is the increase in soil organic matter (SOM) decomposition rate after the addition of fresh organic matter or other compounds to soil. The implication is that is biochar if addition leads to the loss of native SOM it negates the carbon benefit of adding biochar to soil. However there could also be potential benefits of priming effects of biochar under specific circumstances, for example if biochar addition leads to the priming of freshly added organic matter breakdown it may in turn improve nutrient synchronisation and overall nutrient use efficiency.

We conducted a series of experiments conducted in Kenya and Austria using stable isotope tools to look at the priming effects of biochar on the carbon and nitrogen turnover of organic residues added to soils. I will present the finding of these investigations and discuss their implications. Please fill in your abstract text.