

pH according to the presence of char and RC on the ground, and the phosphate binding capacity generated by the RC can be up to three times the fixation of phosphate generated by the char.

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Effect of biochar amendment on carbonate chemical processes in soil

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Soil in-organic carbon is an important C pool in semi-arid and arid zone. In arable soil, intensive input of irrigation water and fertilizer make the transformation process of soil calcite quicker. Biochar, with high CEC, nutrients in mineral form, micro-pores, active reacting groups, and special macro-molecules, will be affect the carbonate processes when be added to soil. With 2 hypotheses, 1) high CEC meaning strong absorbance for cations will have impact on fractionation of Ca²⁺ and Mg²⁺ between free ion (in solution) and absorbed ion (exchangeable), and 2) biochar, with slow decomposition and absorbing to CO₂, will result in decrease of CO₂ pressure in soil, and change the balance of solubility and precipitation of Ca²⁺ and Mg²⁺, a laboratory experiment was conducted. Different proportion of biochar (made from wheat straw) and wheat straw was added to soil and incubated at 25, 50-60% WHC, and free air exchange with atmosphere. In situ soil CO₂ concentration and pH was measured periodically. Water soluble and exchangeable Ca²⁺ and Mg²⁺ was also measured by chemical method. Primary result showed that, 1) Biochar alone did not decomposed in soil, 2) Biochar reduced in situ soil CO₂ concentration in straw-amended soil up 40%, 3) Biochar amendment to soil increased both the water soluble Ca²⁺ and Mg²⁺ and its ratio to exchangeable Ca²⁺ and Mg²⁺, 4) Biochar amendment to soil increased the saturation degree of Ca²⁺ and would changed chemical behavior greatly. The current result gave more clue to explore on soil carbonate chemistry under biochar amendment.

Caracterização dos Macronutrientes e a Dinâmica dos Resíduos de Lâmina de Madeira em Terra Preta Nova

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A Terra Preta Arqueológica possui alta fertilidade devido ao acúmulo de material orgânico depositado nas aldeias indígenas na pré-história, como prática cultural daqueles povos. Na tentativa de replicar estes solos, procurando-se alternativas para minimizar a incineração e acumulação em locais inadequados de resíduos de madeira das serrarias de Tailândia- PA, tida como um dos maiores pólos madeireiro do país, foi implantado o Projeto Terra Preta Nova. Experimento de longa duração, conta com 17 tratamentos resultantes da combinação de Carvão, Resíduos de pó de serra, Resíduos de lâmina triturada,

Resíduos de ossos e Sangue + gordura. Os resultados preliminares, após seis anos, indicam uma relação positiva no incremento dos macronutrientes principalmente P, Ca, Mg e K.

Field trials in Québec, Canada: report on 2 years of biochar effect on crop productivity, and multiple biochar material testing

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We will report on a 2-year old commercial-scale biochar trial, as well as show preliminary results for a new experiment established in 2010. A biochar field trial was established on a farm in Québec, Canada in May 2008 on a clay loam soil. Biochar from fast pyrolysis was applied using farm machinery at approximately 3.9 t/ha. Biochar was applied in a single, 1,000 m² swath and compared to an adjacent, unamended control swath, thus this is not a standard replicated experiment. Soybean was grown in 2008 and mixed forage species in 2009, and a large dataset was gathered including monthly data on soil physical parameters, soil chemical fertility, soil micro- and macrofauna, crop morphology, quality and yield. Yield increases in soybean averaged 19% over the control, and forage biomass was doubled by biochar application, compared to the control. In soybean, yield improvements arose from greater plant population density, as opposed to greater seed production per plant. Yield differences cannot clearly be attributed to chemical soil fertility differences among treatments. Surface soil infiltration was greater when biochar had been applied, but no differences were found in soil temperature, moisture content, and resistance to penetration. The number of nodules per soybean plant was not affected by the biochar treatment, but root colonization by ectomycorrhizae in the forage crop was greater when biochar was applied. Earthworm density was generally greater with biochar, and data on fungal and microbial grazers, and microbial and fungal biomass seem to support the hypothesis that biochar can serve as a refuge for soil microbes. Total soil carbon, soil respiration and potential organic matter mineralization were not measurably different in the biochar-amended plot. This is the first report on results from commercial scale biochar field trials in Canada.

In April 2010, two additional replicated and randomized field experiments were established on a nearby farm. The goal of these experiments is to assess the impact of three different biochar materials and the effect of soaking biochar in dairy manure prior to soil application, on crop production and soil fertility in the field, and to study the form and availability of phosphorus (P) in soil, under the various treatments. Phosphorus management in agricultural soil is seen as key for reducing eutrophication problems in this watershed, and biochar is a potential tool for decreasing P export from soil into surface water.