possible influences of the enhance of CEC in the banana nutrition and production will be presented.

Black C contribution to nutrient retention and carbon sequestration in laboratory incubations

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Biochar is a high surface-area, variable-charge organic material that may improve nutrient retention and soil C sequestration but its general beneficial properties have yet to be quantified in many soil types. Biochar has the potential to increase soil water-holding capacity, cation exchange capacity (CEC) and surface sorption capacity which decrease the leaching losses of nitrate and ammonium, and reduce the emission of N_2O. Despite these properties, the magnitude of soil benefits will depend on the size, quantity, and individual characteristics of both the biochar and the amended soil. In order to determine the relative contribution of biochar to: 1) nutrient retention and 2) soil C stabilization versus losses through soil respiration, we established a relatively long-term (3 years) laboratory experiment. We added two sizes (>250 and <250 µm) of C3-derived biochar to two C4-soils (sandy, silty-clay loam) with and without fertilizer addition, and measured over time C and N losses trough respiration and leaching, respectively. At occasional destructive harvests, the contribution of char to soil organic matter fractions, separated by size and density, is quantified, and the potential for biochar to contribute to long term soil C stabilization assessed. Stable C isotope mixing model is applied to partition SOC versus biochar C in the measured C pools. Data from this experiment will be reported and results discussed in the context of the potential for biochar to promote soil organic carbon sequestration.

Biochar in rice-based systems: Impact on paddy soil and yield

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To study the effect of biochar input paddy soil, biochar was added to cultivated field of Qianyanzhou ecological station, Southern China. We used 30 plots (3m×3m), in which we fertilized three plot replicates per treatment with control, biochar, straw, inorganic fertilizer, biochar plus inorganic fertilizer and biochar plus straw. The biochar and straw were used as two levels (3000kg ha^{-1} a^{-1} and 6000kg ha^{-1} a^{-1}). After one growing season, soil carbon increased in the plot with straw and biochar, and pH of soil increased slightly with biochar and straw. The plot with biochar plus inorganic fertilizer got highest yield. The yield of plot with biochar was higher than that of control plot. Overall, our result shows that biochar can enhance the soil carbon content, the use of biochar can decrease the use of inorganic fertilizer.

Influência da incorporação de carvão nos atributos químicos e físicos do solo num plantio de *Eucalyptus benthamii*

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A utilização de subprodutos florestais nos solos surge como alternativa para a minimização de custos, proporcionar altos rendimentos à produção e benefícios ao meio ambiente. O carvão pode melhorar a qualidade do solo, gerando aumentos significativos na produtividade e resolvendo o problema da destinação final desse produto. O objetivo desse trabalho foi verificar as mudanças iniciais ocorridas nos atributos do solo quarenta dias após a incorporação de finos de carvão, num plantio de *Eucalyptus benthamii*. O experimento sob delineamento em blocos ao acaso está instalado na Universidade Estadual do Centro-Oeste (UNICENTRO) em Irati – PR, Brasil. No preparo do solo foi realizada a limpeza da área, controle de formiga, calagem (2,5 t ha^{-1}) e incorporação de finos de carvão. O plantio foi manual num espaçamento 3 x 2 m. Quarenta dias após a incorporação de finos de carvão foram coletadas amostras de solo de 0-20 cm nos seguintes tratamentos: T1 = testemunha; T2 = 10 t ha^{-1} de carvão; T3 = 20 t ha^{-1} de carvão; T4 = 40 t ha^{-1} de carvão; T5 = 200g/muda de NPK 4-14-8; T6 = 10 t ha^{-1} de carvão + 200g/muda de NPK 4-14-8; T7 = 20 t ha^{-1} de carvão + 200g/muda de NPK 4-14-8; T8 = 40 t ha^{-1} de carvão + 200g/muda de NPK 4-14-8. Foram realizadas as análises químicas de pH, matéria orgânica, K^+, Na^+, Ca^{2+},Mg^{2+}, P, Al^{+3}, H^++ Al^{+3} e determinação da saturação por bases; e as análises físicas de granulometria, densidade real e aparente, umidade e porosidade. Para os atributos matéria orgânica, teor de Mg^{2+}, granulometria, densidades real e aparente e porosidade não foram observadas diferenças estatísticas entre os tratamentos a um nível de 95% de probabilidade. Foram observadas diferenças estatísticas entre os tratamentos que receberam carvão e os que não receberam (testemunha e T5), quanto ao pH, teores de K^+, Ca^{2+} e Al^{+3}, V% e umidade. A adição de carvão aumentou o pH, os teores de K^+ e Ca^{2+}, a saturação por bases e a umidade, e diminuiu o teor de Al^{3+}. Esses resultados sugerem que a aplicação e incorporação de finos de carvão ao solo promovem a melhoria de alguns atributos químicos e físicos, podendo favorecer a produção florestal.

Biochar properties and its influence on plant growth and GHG

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Properties of biochar pyrolyzed under various temperatures, plant growth and GHG mitigation effects were investigated. Results showed that biochar recovery rates decreased with rising temperature: y = -0.0446T + 59.614, R^2 = 0.8927. Similar water soluble P contents were found in biochar pyrolyzed under 250 as under 350, and under 400 as 450, respectively. Water soluble P in biochar under 400 and 450 was significantly 67% higher

than those under between 250 and 350, however when temperature was 500, water soluble P was significantly lower than those under 400 and 450, but still higher than those under 250 to 350. pH increased with rising temperature, but water absorb capacity decreased with rising temperature. Maize height was significantly shorter at high biochar amendment treatment 144 g kg^{-1} dry soil than low (7.2 g kg^{-1} dry soil) and zero biochar amendments on day 13 after sowing, along with experiment going on, the impeding effect disappeared. However no stimulation effects of biochar on maize growth were found till now.

Composting of food waste containing biochar as biological medium and carbon sequestration by using the compost for the field

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Composting factory in a suburban area of Tokyo deals 100 tons of food industry waste a day added with charcoal. Undesired materials such as plastic, steel and aluminum materials are separated from food garbage with a separator. Then, charcoal of several % and returned compost are mixed to the garbage, and the mixture is thrown into the top of a fermentation tank. The temperature of the mixture increases to 60-70^{o}C, because aerobic microorganisms proliferate on the surface of the charcoal. After 2 weeks, the first fermented compost is pull out of the tank. After two months the matured compost is prepared. Finaly, the compost contains ca. 10 wt% of biochar. Biochar and the compost were used for the field; 2 kg/m^2 of biochar 2 kg/m^2 of the compost for 5 a, 2 kg/m^2 of the compost for 5 a and no use of biochar and the compost: Yield of the spinach was 1.9 kg/m^2, 1.6 kg/m^2 and 1.3 kg/m^2, respectively. The total carbon, the total nitrogen and the carbon sequestration amount in the field was measured. Green house gases of CO_2, CH_4 and N_2O emitted from the field were also measured.

Salt grass biochar and combustion residue as factors in the fixation of P in a saline soil

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The "hot" or combustion "in situ" of plant residues from harvesting and pruning, as well as weed is considered one of the most traditional and universal exerted on the ground in the field of agriculture. This process contributes to the overall increase and local air pollution as it generates among other greenhouse gases like CO_2, particulate matter such as coal and other substances that can be regarded as harmful, so it is necessary to explore alternatives that minimize this problem, but at the same time means a contribution to the benefit of farming. In this perspective appears pyrolytic production of biochar with plant debris, replacing the combustion product properties in aqueous media involve a basic pH and release of alkali cations. In this scenario, we propose that the residue of combustion (RC), da do the chemical process of collection, including roasting, and given the nature of the plant material, when incorporated into soil, in the same proportions that biochar, generated in its interaction with water, chemical changes and physical-chemical processes in the soil more firmly in favor of phosphate by the mechanism of precipitation reaction with calcium in an alkaline medium

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