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Soil Charcoal Amendments Maintain Soil Fertility and Create a Carbon Sink

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Abstract

Soil nutrient and carbon contents are generally low in the highly weathered and acid upland soils of central Amazônia. In agro-ecosystems, high precipitation and temperature lead to a loss of soil organic matter (SOM) as carbon dioxide into the atmosphere and nutrients into the sub-soil. Patchily distributed anthropogenic soils (*Terra Preta do Índio*) of Brazilian Amazônia make an exception. These soils are rich in stable SOM and nutrients. SOM is especially important to the cation exchange capacity of soils. Recent investigations of GLASER et al. (2002) presented evidence that charcoal from incomplete combustion of organic material is a key factor in maintaining high levels of SOM. *Terra Preta* contains high concentrations of charcoal. In a series of experiments, we are studying the use of charcoal in agricultural praxis and management of a highly weathered Xanthic Ferralsolon terra firme north of Manaus. In a randomized complete block design with five replicates 15 amendment combinations are being tested on sorghum (*Sorghum bicolor*). During the second growing period a significant difference between NPK plus lime-fertilized plots and NPK, lime, and charcoal plots was observed. Charcoal amendments alone had no effect. These results are evidence of charcoal's nutrient retention and/or sorption capacity and its positive effect on crop productivity. Slash and char as alternative to slash and burn could be a further step toward sustainable agriculture in the tropics as well as toward the management of the carbon cycle by simultaneously transferring carbon to stable pools.

Keywords: Agroecology, alternative technologies, Amazonia, Brazil, carbon acquisition and nutrient fluxes, climate change, indigenous knowledge, nutrient retention, organic and inorganic fertilizer, slash-and-burn agriculture, soil C, soil fertility, Terra firme