Effect of Charcoal Earth Kilns Construction and Firing on Soil Chemical Characteristics

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Abstract

Assessments of localized ecological and environmental impacts of charcoal production including effects on soils at kiln sites is seldom undertaken, with more emphasis being placed on the global effects of the practice such as forest degradation and deforestation. A study was undertaken in Narok, Eldoret, Moiben, and Turbo in Kenya on known charcoaling sites to investigate the impact of charcoal production on the soil chemical characteristics. Composite soil samples from 12 sampling points for all study sites were taken randomly at a depth of 0–15 cm. The samples were conditioned and analyzed for pH, particle size, Cation Exchange Capacity (CEC), extractable phosphorus, organic carbon, nitrogen, and exchangeable bases. A comparison of the soil properties between undisturbed sites and charcoaling sites showed significant differences for all chemical properties except CEC, Mg, and K. For the Moiben site, only the pH showed no significant difference ($p < 0.05$). The observed high carbon content reduced with time for the one year following charcoaling activity and was attributed to soil erosion since charcoal production activities reduced the sites vegetation cover. Most chemical changes positively enhanced the nutrients content and availability, but were short lived probably due to soil erosion. These results demonstrate the need to adopt technologies with minimum impact on the soil, or a shift to centralized production sites outside forest ecosystems or farmlands.