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## Nutrient Leaching in Urban Agriculture, Effects of Waste Water Irrigation and Biochar Application to a Petroplinthic Cambisol in N-Ghana

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### Abstract

Urban Agriculture (UA) in development countries can contribute significantly to food security and diversity. Excessive use of fertilizers, manures and waste water is well documented in the literature. This may lead to high losses of nutrients through leaching especially when irrigation exceeds the demands. Until today very little work was done to measure nutrient leaching, ways to prevent it and consequently increase nutrient use in UA. Biochar (BC) as a soil amendment received considerable attention in recent years for its potential to increase soil carbon stocks, crop yields and reduce nutrient leaching. Since production of BC is inexpensive and does not require sophisticated technology it may be a good strategy to improve soil fertility and reduce nutrient losses.

We tested the effects of biochar and waste water on nutrient losses from soil through leaching with lysimeters on a Petroplinthic Cambisol in an UA field trial in Tamale, Ghana for two years. 32 wick lysimeter were installed in Control (no amendment), Biochar (20 t ha<sup>-1</sup>), NAP (fertilisation according to normal agricultural practice) and NAP + Biochar plots. Lysimeter were sampled weekly, when irrigation or rainfall took place and total amount of leachates were recorded. The samples were analysed for NO<sub>3</sub>-N, NH<sub>4</sub>-N, PO<sub>4</sub>-P, basic cations (K, Ca, Mg, Na) and pH.

The data show a reduction of water use efficiency through waste water irrigation, which is likely attributed to soil water repellency and therefore higher conductivity. Furthermore, N losses through NO<sub>3</sub>-N leaching were found to amount to 50–100 kg ha<sup>-1</sup> per season when irrigation was appropriate. When plots were over irrigated NO<sub>3</sub>-N leaching reached up to 250 kg ha<sup>-1</sup>. BC application did not reduce leaching losses of nutrients.

**Keywords:** Biochar, nutrient leaching, urban agriculture, waste water