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"Solidarity in a competing world — fair use of resources"

Effect of Biochar and Waste Water Irrigation on Crop Production in Urban Horticulture of Tamale, Ghana

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Abstract

Little is known about the effects of biochar in waste water irrigated urban vegetable production of West Africa. We therefore established a two-year field experiment comprising 12 crops in Tamale, Ghana, on an area underlain by a petroplinthic combisol. A split block design with four treatments (Farmer Practise (FP), NFP + biochar, biochar, and an unfertilised control) were factorially combined with two water qualities (clean water and untreated waste water) and two water quantities (usual irrigation quantity and two-thirds of the usual volume). The 16 treatment combinations were replicated four times on plots of 8 m^2. At the onset of the experiment, rice husk biochar was applied at a rate of 20 t ha^{-1} at 0–20 cm depth.

Biochar increased dry matter yield of the vegetables grown in the first four cropping cycles in both clean water and waste water irrigated plots whereby the effect of waste water was more pronounced. During the dry season, waste water increased crop dry matter yields of unfertilised plots between 10 to 20 fold compared with a four-fold increment in the wet season. For fertilised plots, this increment was 1.5-fold for the wet and two-fold for the dry season. This was explained by the higher concentration of nutrients and the more frequent irrigation during the dry season. Biochar tended to increase yields in the first year (16 % on fertilised plots), but effects were not statistically significant in any year. Fertigation with waste water contributes significantly to plant nutrition and efficient resource use.

Keywords: Biochar, Ghana, Tamale, waste water

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