Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Effect of Bio-char Amendment on Retention and Leaching of Nitrogen, Phosphorous, Potassium and Soil Organic Matter in a Sandy Loam Soils

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Abstract

Deterioration of physical, chemical and biological properties of agricultural soils lead to nutrient leaching, water pollution, low fertiliser use efficiency and low productivity of soil. Application of bio-char has been proposed as a means of reducing nutrient leaching and improved fertiliser use efficiency of soil. Agricultural waste can be used as feedstock to produce bio-char. The objective of this research was to evaluate the potential of bio-char to reduce leaching of nutrients and increase fertiliser use efficiency of soil, amended with bio-char made from different sources and different rates of application. Bio-char made from *Gliricidia sepium*'s mature stem, Guinea grass (*Panicum maximum*), coir waste and refused tea were applied in three different rates as 1 t/ha, 5 t/ha, 10 t/ha. The study was conducted organically using compost made from agricultural waste as the only source of fertiliser and Water spinach (Ipomoea aquatic), as the indicator crop. Organic matter content of soil, Nitrogen, Phosphorous and Potassium content of soil and the leachate were monitored over three months with the crop yield. All treatment combinations significantly revealed that soil amended with biochar has an ability to retain N, P and K while improving the organic matter content. Out of four different bio-char sources and three different rates of applications, bio-char made from tea waste and guinea grass at the rate of 5 t/ha recorded the highest N, P and K retention capability and organic matter improvement. Use of bio-char made from Guinea grass; a invasive species in Sri Lanka and refused tea; waste material in Sri Lanka with less decomposability, are recommended due to their availability and low cost.

Keywords: Agricultural waste, Biochar, Leachate, Nutrient retention, Soil

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