

Assessment of physicochemical properties on NL podzolic soil amended with wood ash, paper sludge and biochar.

Muhammad Farhain*, Mumtaz Cheema, Bilal Javed, Yeukai Katanda, Raymond Thomas, Lakshman Galagedara

School of Science and the Environment, Memorial University of Newfoundland, Corner Brook, NL, A2H5G4, Canada.

Abstract

Organic amendments influence soil physicochemical properties, and consequently plant growth and development. Wood ash (WA), and Paper sludge (SL) waste products produced by Corner Brook Pulp & Paper Mills Ltd., Newfoundland and Labrador (NL), have lower bulk density, porous structure and high pH that may improve the physicochemical properties of Podzolic (acidic) soil. We evaluated the physicochemical properties of amended sandy loam soil with WA, SL and biochar (BC). Soil was collected from 0-15 cm depth from the Wooddale research station, NL. Two composite samples of WA and SL were prepared from 30 grab-samples collected twice daily over a 15-d period. Treatments carried out in triplicate included Control (C), WA, SL, WA+SL, C+BC, WA+BC, SL+BC and WA+SL+BC. Applications rates were calculated on calcium carbonate equivalent basis, WA= 17.25 Mg/ha, SL=55 Mg/ha, WA+SL= 14 Mg/ha + 11 Mg/ha and BC=20 Mg/ha. Results showed significant ($p=0.000$) treatments effects on bulk density (BD), total porosity (TP), field capacity (FC), pH, electrical conductivity (EC), cation exchange capacity (CEC). WA did not show a significant effects on BD and TP, but SL alone and in combination with BC significantly decreased the BD and increased the TP of amended soil. SL with combination of BC increased the maximum water holding capacity of amended soil at FC level than other treatments. WA and SL alone and in combination with BC significantly increase the chemical properties of amended soil relative to control. Based on the soil measured properties, these amendments are feasible for field application as liming materials and organic sources that may reduce the cost of production for farmers and enhance the local food production in the province.

Key Words: Physicochemical properties, Corner Brook Pulp and Paper Mill, Wood ash, Paper sludge and Biochar.

* **Corresponding Author:** mmfarhain@grenfell.mun.ca