

Characterization of Exchangeable and Total Recoverable Elements in Soils Treated with Ash Residuals

Abstract

Wood chips and chunks, bark and wood fiber, also known as hog fuel, are the by-products of an engineered wood facility. By burning the hog fuel in biomass power plants, electricity is generated, steam is processed and a byproduct, ash residuals, is produced. In Canada, even though the ash residuals are high in nutrients, they are still considered as waste product, and normally stored at an onsite landfill of the wood facility or disposed to a permanent landfill. In order to prevent the build-up of ash residuals in landfills from creating an environmental hazard and to reduce the costs associated with disposing of ash residuals in landfills, the environmental potential of ash residuals as a fertilizer in agricultural fields are evaluated. In this study, done in collaboration with a biomass company and an agricultural research company based in British Columbia, nutrient-rich ash residuals are agriculturally pH-treated with elemental sulfur and then applied to the agricultural fields. The quantities of the exchangeable and total recoverable elements will be monitored in the soil samples that are collected in the fields throughout the growth season. Mehlich-3 extraction and wet digestion will be applied on each soil sample to obtain two samples for quantifying exchangeable elements and total recoverable elements, respectively, in the soil samples by using flame atomic absorption spectrometry (FAAS), capillary electrophoresis (CE) and inductively coupled plasma-mass spectrometry (ICP-MS). The changes of the elements over the growth season and each year will be compared to evaluate the potential use of the ash residuals as a fertilizer in agricultural fields.