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Interim Report on the Effects of Wood Ash Addition in Select Muskoka Sugar Bushes

To determine if residential wood ash additions could mitigate the long-term damage done to Muskoka forests by acid rain, we collaborated with Trent University researchers and three participating Muskoka sugar bushes. We added two doses of residential wood ash (4 and 8 tonnes/ha; 1.6 and 3.2 tonnes/acre) in the summer of 2019, and tracked changes in soil chemistry and the nutritional status of the sugar maple by looking at the foliar chemistry of mature and seedling sugar maple over the next two growing seasons (2020 and 2021). After 1 year we saw big improvements in soil chemistry at all 3 sites, with pH and concentrations of many nutrients being higher in ash treated plots compared with controls. However, in the first year after application there were few differences in foliar chemistry and only potassium levels increased in the leaves, a result of potassium being the most mobile cation present in the ash.

Year two produced quite a different and more exciting set of responses showing that the beneficial responses to ash take time. Surface soils were a bit less acidic than they were after one year, as neutralizing components in the ash dissolved and migrated down into the soil. Levels of calcium and magnesium were much higher in the litter and underlying fibrous humic (FH) layer of the soil than they were in year one, while the soil potassium response to ash additions appeared to have diminished. It's a rapid but short-lived signal. Levels

of several metals increased somewhat in the litter and FH layers of the soil; however, metal levels were still orders of magnitude below government targets that would prevent the use of ash as a forest soil amendment.

Two years after ash additions, there were real benefits in foliar nutrition. Calcium levels increased somewhat in foliage of mature trees and sugar maple saplings, while levels of the macro-nutrients potassium, magnesium and phosphorus increased substantially in the foliage. Levels of the critical micronutrient Boron also increased in the foliage, but levels of all the truly problematic metals, especially arsenic, cadmium and lead did not increase with additions of ash, even at the higher dose of 8 t/ha. On balance, the soil and foliar chemical evidence suggests that additions of ash at doses of 4 or 8 tonnes/ha is beneficial for the nutritional health of sugar maple and the chemical quality of soils in Muskoka sugar bushes. Whether there are benefits for maple syrup production, tree growth or carbon sequestration, is yet to be determined and is currently being studied.



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