Wood ash, not lime, is beneficial to soil and crops in the long run!

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Some of the area growers prefer lime to wood ash to ameliorate soil acidity, because they find it difficult to spread the bulky wood ash even though solid dairy manure spreader comes in handy to apply wood ash. I am not sure if they realize that liming adds only calcium (calcitic lime stone) or at the most calcium and magnesium (dolomitic lime stone), whereas wood ash application adds a lot more nutrients to the soil, especially sulphur (S) and micronutrients, which are becoming deficient due to application of S/micronutrients free NPK fertilizers. In an earlier note, I had mentioned that 10 tonnes of wood ash could supply:

335 Kg Calcium
33 Kg Magnesium
Up to 10 Kg Sulphur
12 Kg Phosphorus (P) = 27.5 kg P_2O_5
48 Kg Potassium (K) = 57.6 kg K_2O
15 Kg Sodium
580 Gram Zinc
12 Kg Manganese
56 Kg Iron
180 Gram Copper
42 Gram Cobalt-considered essential for some crops, especially legumes and cereals
< 25 Gram Molybdenum (important for alfalfa)

A long term experiment on the use of lime and wood ash was initiated at TBARS Thunder Bay in 2004 with alfalfa as the first crop in the rotation. Mean alfalfa yield (2005-'07) increase by application of lime was only half a tonne/ha/year as compared to over one tonne/ha/year by wood ash application. Lime improved the protein content in the first cut only by one percent point as compared to nearly 2 % point improvement by wood ash. Apart from increase in soil pH and addition of nutrients, wood ash helped to keep surface soil (0-5 cm) temperature one degree Celsius higher than the check/or lime plots in early spring. Between 2004 and 2007, available nutrient contents in the soil declined much more in lime plots as compared to the wood ash plots. Initial (2004) soil tests before lime/or wood ash application were 18 ppm P, and 133 ppm K. By 2007, the soil tests came down to 7 ppm P and 95 ppm K in lime plots, and to 11 ppm P and 105 ppm K with wood ash when lime/wood ash were applied at a gap of 4 years. Application of lime every two years didn't improve the soil tests as compared to its application every four years. On the contrary, application of wood ash every two years raised the P and K soil tests to 14 and 127 ppm. Liming appeared to improve the soil manganese availability only marginally, whereas wood ash increased the available manganese (Mn) in the soil by 2.5 times. Application of lime/or wood ash every two years was required to raise the soil pH from 5.9 to absolute neutral (i.e. 7.0). Mn availability decreases in the soil with the increase in soil pH. While both lime and wood ash increase soil pH, only wood ash adds Mn to the soil.

It may be important to mention that the P and K contents in the soil came down in 3-4 years even though alfalfa received recommended amounts of P and K each year as per OMAFRA recommendations. This indicates that P and K fertilizer recommendations by OMAFRA need to be validated by location specific research. Alfalfa was followed by barley from 2008 onwards. In

barley during 2008, wood ash, but not lime, increased the grain yield by ~600 kg/ha and straw yield by ~1.5 tonne/ha. Contrary to the generally held belief/fear, wood ash didn't increase the heavy metals content in the soil. In another experiment, we found that wood ash could substitute dairy manure. Wood ash is delivered free of charge by Bowater on farms, whereas lime costs money and has to be imported from southern Ontario, which has an environmental impact as well. The dollar value of P and K alone in 10 tonnes of wood ash, at current fertilizer prices, is $105.00, whereas, there is no such value in lime. Why not to use wood ash then?

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OMAFRA = Ontario Ministry of Agriculture, Food and Rural Affairs
TBARS = Thunder Bay Agricultural Research Station

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