Low-Energy Coal Remediated High Salinity Soil

Edwin Liem[1*], Mariana Cano[1], Paulo Verdi[1], and Mike Bates[2]
[1]*Canadian Humalite International Inc., Edmonton, Alberta, Canada*
[2]*Bates Farm, Gadsby, Alberta, Canada*

Low-energy coal as a source of organic matter (OM) was applied to remediate high salinity soil. Two products were evaluated: dry Product A (low-energy coal crushed into powder) and liquid Product B (Product A liquefied in water). Two trials were completed on a farmland with four areas of high soil sodium adsorption ratio (SAR) and electrical conductivity (EC). The farmland was seeded in the past four years, in which zero yields had always been recorded from these areas. During 2013 trial, the farmland was seeded with wheat and fertilized with urea at 110 lbs/acre. Product B was applied at 8.3 lbs OM/acre to three areas with SAR of 12.4, 29.6, and 62.9, and EC of 1.5, 7.0, and 38.3 dS/m, respectively. During harvest, 16.7 and 4.8 bu/acre yields were recorded from the first two areas, respectively. The third area was still unproductive. The rest of the field (SAR of 9.7 and EC of 0.8 dS/m) produced 27.7 bu/acre. During 2013-14 trial, three test plots were made on the fourth area (SAR of 15.2 and EC of 2.9 dS/m). This area was unseeded and unfertilized. Product A and Product B were applied to the first and second plots at 1,066 and 8.3 lbs OM/acre, respectively. The third plot was used as control. After 2 months, Product B reduced soil soluble sodium, calcium, and magnesium by 60, 67, and 34%, lowering SAR by 36% and EC by 58%. It took 9 months for Product A to achieve 15 and 57% reductions of SAR and EC, respectively, indicating that low-energy coal performed better when liquefied in water. In summary, low-energy coal remediated high salinity soil effectively, enhancing its productivity and quality.

* eliem@cdnhumaliteintl.com

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Presenter's biography: Edwin Liem, PhD (Environmental), PEng (Alberta) has been technical manager in the manufacturing of commercial organic-matter based products derived from low-energy coal, marketed in the mining and agriculture sectors, since 2004. He previously worked on various environmental projects at university (Alberta 1992-98) and engineering companies (Manitoba 1998-01 and Alberta 2001-04), most importantly pre-commercial low-energy coal projects with Luscar/Sherrit Coal (2001-04) including a full-time on-site assignment in 2002-03.