

Evaluating Potato Growth Response to High Copper Soils

Megan Satterwhite¹, Amber Moore¹ and James Ippolito², (2012)
<http://scisoc.confex.com/scisoc/2012am/webprogramcd/Paper74524.html>

A rising concern with the application of dairy wastes to agricultural fields is the accumulation of copper (Cu) in the soil. Copper sulfate (CuSO₄) from cattle footbaths is washed out of dairy barns and into wastewater lagoons. Potato growers are concerned about this issue, as many of the predominant dairy producing areas in Southern Idaho are also in Idaho's established potato production regions. The objective of this project is to evaluate potato growth and copper plant uptake for potatoes grown under low, moderate, and excessively high soil copper concentrations. This study was conducted in 2011 in a greenhouse setting at the USDA ARS Kimberly Research Station. To establish an effective copper response curve, 6 rates of copper sulfate (0, 100, 200, 300, 400, and 500 mg Cu/ kg soil) were applied to either a Portneuf silt loam or a Wolverine sand. Treatments were replicated four times in a complete randomized block design. Based on means only, root copper concentrations increased rapidly at relatively low soil copper concentrations for the Wolverine sand to upper copper limits established for younger age groups (1-13 years old). In contrast, root copper concentrations appear to level off at soil copper concentrations of 100 ppm for the Portneuf silt loam, suggesting that copper toxicities are likely a much greater issue on sandy soils than on silty soils. This study was repeated in 2012 and we are currently processing that data.