Magnetic Susceptibility – Variance of Magnetic Particles of Urban Soils in Tacoma, WA

Timothy Wahlstrom, Dr. Peter Selkin, Ph.D.

The magnetic makeup of our soils is important in monitoring changes in soil chemistry and allows us to make accurate predictions on the health of our soils - which subsequently affects the biodiversity and abundance of life around us. This study examined frequency-dependent magnetic susceptibility of soil samples from two urban gardens in Tacoma, WA to determine the relationship between iron oxide mineral content and soil health. Frequency-dependent magnetic susceptibility is a measurement sensitive to the composition, grain size and shape of iron-bearing minerals. It was determined that magnetic susceptibility differences between natural soils at the two sites were smaller than differences caused by the addition of compost. The magnetic susceptibility differences could have been attributed to several factors including: material sources, water content, microbial activity, and contaminants. A more detailed elemental analysis from an inductively coupled plasma mass spectrometry (ICP-MS) machine, or even particle analysis using scanning electron microscopy (SEM) could help pinpoint more specific identification into which factors had the greatest impact in determining magnetic susceptibility differences. This in turn gives us greater accuracy in predicting the health of our soils, now and in the future.