THE OHIO STATE UNIVERSITY

Environmental Science Graduate Program Student Seminar Series

Long-term effects of a single biosolids application on soil organic matter

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March 27, 2020 | 2:00-3:00pm

Zoom Meeting ID 515-427-066

https://osu.zoom.us/j/515427066

Abstract

As the US is becoming less industrialized, thousands of acres of brown-fields are left barren and ecologically damaged. My research focuses on the utility of biosolids on soil health, and its application for restoring degraded landscapes. In particular, analyzing how high input of organic matter can encourage efficient storage of carbon within the soil. I began by obtaining long-term, proof of concept data from re-sampling a past biosolids experiment at Waterman Agricultural and Natural Resource Laboratory. In 1990, this site was applied once with 11 different rates of Class B biosolids (0, 7.5, 15, 30, 60, 90, 120, 150, 188, 225, and 300 Mg ha-1). By comparing the results of organic matter stabilization and overall soil health, I was able to test the soil carbon saturation theory with the application of biosolids. In context of this study, the carbon saturation theory argues that as biosolids application rate increases, there will be an application treatment rate in which no change in carbon levels is observed in higher treatment application rates; thereby reaching a plateau or saturation point. In order to measure this phenomenon, I separated five carbon fractions from each sample using a modified method from Zimmerman et al., 2007. From my initial findings, biosolids application rate has a significant impact on overall carbon storage; while, resistant organic carbon and silt+clay stabile aggregate bonded carbon are the driving fractions of this increase in carbon storage. More research is needed to discover if there is a limiting carbon storage effect from large biosolids application. The goal in this research is to develop recommendations for treatment rates of biosolid application on degraded landscapes to improve soil health.