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Investigations of the Application of Black Carbon for the Retention and Stabilization of Nonylphenol in Soil

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We used black carbon (BC) to absorb and stabilize nonylphenol (NP) that was present in soil samples. BC is an efficient material for absorbing and stabilizing hydrophobic organic compounds because this material has a high absorption capacity and strongly binds organic molecules. Thus, black carbon has the ability to retain NP in the soil minimizing loss to runoff while providing microbes with longer times (up to several hundred years) to metabolize the NP to less hazardous compounds. NP is both an endocrine-disrupter and a toxic pollutant. It also serves as a model compound for the study of stabilization of organic compounds in soil. In our studies, we spiked multiple soil samples with known amounts of NP and then incubated them to mimic NP-contaminated soil. Variable amounts of NP were then added to aliquots of the various soil samples and the samples were again incubated to mimic natural conditions, allowing the NP to be absorbed to the BC. The NP absorbed by the BC was then extracted from the BC and the resulting solution was analyzed utilizing solid-phase extraction (SPE) with "Magic Chemisorber" (MC) in conjunction with high-performance liquid chromatography (HPLC) to determine the amount of NP. Our results showed a correlation of increased NP concentration as BC levels were increased. These results indicated that BC was fixing the NP. We also observed variable absorption efficiency depending on the amount of NP in the soil and the amount of BC added, suggesting that there is an optimum amount of BC to use depending on the amount of NP present in the soil. These tests are being repeated to improve reproducibility and to obtain data that will be used to develop and fit models for predicting the absorption characteristics of the BC.

Information about the Authors:
Before this fellowship occurred in China, Kelly Belisle, Laura Mattson, and Caitlin Soley studied water quality in the Dune Park area. It was a nice way to experience laboratory comparisons and difference.

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