Phosphorus Partitioning and Recovery from Riverbed Sediment Obtained from a Eutrophic Watershed in Southwest, MI

McDowell, Savannah

The goal of this study was to determine the variation in total phosphorus content and the fraction of each inorganic phosphorus species in riverbed sediments obtained from seven locations in the eutrophic Macatawa watershed located in Southwestern Michigan. Understanding inorganic phosphorus speciation in sediment is beneficial for the process of attempting phosphorus recovery as it allows for better analysis of the outcomes of various phosphorus recovery techniques. Inorganic phosphorus species quantified include loosely-sorbed, iron-bound, aluminum-bound, calcium-bound, and reductant soluble phosphorus. For the evaluation of the types of phosphorus standard methods were utilized. These include the determination of total, inorganic, and organic phosphorus (Aspila et al,1976), the fractionation of soil phosphorous (Chang & Jackson, 1957), and the colorimetric assay method used for phosphorus content quantification (Murphy & Riley, 1962). Our results show that sediment that had silty characteristics had higher total and inorganic phosphorus content than those with sandy characteristics. It was also found that each sampling location had a unique distribution of the inorganic phosphorus fractions. Sites 1 and 7 show high levels of phosphorus, while sites 2-6 show low phosphorus levels. Both sites that showed high phosphorus are surrounded by wetland, which may introduce organic matter to the water system. We can conclude that phosphorus extraction and recovery from sediments will most likely produce diverse outcomes even in the same watershed. Therefore, phosphorus recovery techniques such as the use of phosphorus-solubilizing fungi mediated treatment should be flexible enough to process and extract phosphorus from sediments with different bound phosphorus characteristics.

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