Waste-Based Runoff Pollutant Biosorptive and Ion Exchanging Permeable Barriers

Vashi, Aksal

Near domestic and commercial agricultural settings, fertilizer runoff is a threat to freshwater ecosystems. Research by scientist Milena Beniolo and previous testing found that banana and orange peels effectively absorbed positively charged ions in aqueous solution. While Beniolo's focus was primarily metal ions, this project expands the scope by including all other areas. This project, titled Waste Based Pollutant-Biosorptive Permeable Barriers, examines the effect of ground banana peel, orange peel, pectin extract, and mollusk shells on ammonia, nitrate, and phosphate concentration in runoff. If water with all three pollutants passes through permeable blocks that have various natural waste powder additives (5 of each- control, orange/banana, pure pectin, mollusk shell, pectin/shell, and orange/banana/shell), then all three pollutants will be reduced the most by the orange/banana/shell additives. After contaminated runoff was passed through multiple blocks on the second trial, the orange/banana/seashell group reduced [NH4+] by 80%, [NO3-] by 80%, and [PO4-3] by 83.5%. Calculations showed that with all p-values comparing results to controls being significant and variation remaining low, results were likely not due to chance. The blocks with Orange-Banana and Mollusk shell additives had the ion-exchange and biosorptive strength of the blocks with pectin powder, and the consistency and physical strength of the blocks with Mollusk shells: this experiment poses the possibility to fight fertilizer and industrial contamination at the source.

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