Can Woody Fiber from the Invasive Exotic Tree Brazilian Pepper (Schnius terebinthifolious) Be Utilized as a Filtration Medium to Remove Phosphate from Waste Waters?

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The purpose of my project was to evaluate if Brazilian pepper fibers could serve as adsorbent for phosphate removal, if fibers could be treated chemically to enhance adsorption, and test if solution pH affected adsorption. Phosphate concentrations of, 25ppm and 50ppm, at pH, 4, 7 and 10, were used as test solutions. Wood fiber test treatments were; untreated, 12% ferrous chloride, and 4% carboxymethyl cellulose (CMC)/12% ferrous chloride. Wood fibers were prepared to serve as filter media through a series of soak and dry processes to adhere treatment compounds. A test series consisted of 5 replicates for each combination of phosphate test solutions, and fiber treatment, resulting in 90 samples. The filtrate for each sample was evaluated for change in phosphate concentration. For the 25ppm and 50ppm phosphate test solutions, all wood fiber treatments resulted in a significant ($p = 0.05$) change in the filtrate phosphate concentration. Filtering through fibers treated with ferrous chloride and CMC/ferrous chloride resulted in a significant decrease in mean phosphate concentration of the filtrate, with a significantly greater reduction occurring with the CMC/ferrous chloride treatment. Filtering test solutions through untreated Brazilian pepper fibers resulted in an increase in phosphate concentration of the filtrate. For the 50ppm solution adsorption was significantly higher at pH 10 for the ferrous chloride fiber treatments. No pH effect was detected for the 25ppm solutions. Brazilian pepper fibers can be treated with an iron compound, which increases phosphate attachment sites, and thus increases adsorption potential to reduce phosphate from polluted waters.

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