Floating Treatment Wetlands with Biochar to Treat Nutrients in a Stormwater Pond

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Stormwater ponds are intended to mimic natural aquatic waterbodies and to treat urban runoff, prevent flooding by slowing stormwater surges, and filter nutrients that come from these landscapes. Floating treatment wetlands are a type of phytoremediation technique used to remove nutrients in stormwater ponds through biogeochemical processes. These systems allow plants to grow hydroponically in stormwater ponds. The plants take up nutrients from the water column through their roots and promote healthy rhizospheres, which transform nutrients. The purpose of this investigation was to see if the performance of Floating Treatment Wetlands in an urban stormwater pond were enhanced by mixing a perennial wetland plant called *Canna flaccida* (*Golden canna*) and a perennial grass called Fakahatchee grass (*Tripsacum dactyloides*). The study also investigated whether a mixture of the species removed more nutrients compared to monocultures. Additionally, a subset of floating wetlands had a planting media mixture of biochar and coir with plants to see if biochar increased nutrient uptake from the water column and promoted root growth compared to treatments without biochar. Nutrient monitoring of the surrounding pond water over time assessed water quality changes in the pond, and the plants were harvested after 4 months of installation. Total fresh mass and dry mass were measured to look at nutrient uptake by the plants. The coconut fiber was dried until constant weight and ground for combustion and colorimetric methods, and the 2M KCl extraction method was used to extract nutrients from biochar. Total nitrogen (TN), total phosphorous (TP), ammonia (NH3), and ammonium (NH4) were assessed in planting media after the single harvest event. We hypothesized that mixed species would perform better on removing nitrogen from the water column than monocultures and that mats with biochar incorporated into planting media would uptake more nutrients from the water column due to their efficient absorption capacity. We further hypothesized that biochar with coir would promote healthy root rhizospheres, enhancing nutrient uptake by plants and microorganisms at the stormwater pond. Results showed that the treatment with *Canna flaccida* and coir only performed best removing TN species down to 0.44 mg/L after a highest value of 0.75mg/L for a 42% removal difference, NH4-N (10%), NO3 (10%), DON (47%). The treatment with coir and biochar only with not plants was the second-best treatment for a removal of TN (66%), NH4-N (20%), NO3 (63%), DON (36%), indicating that biochar enhanced nutrient removal from the water column. Additionally, the treatment with Fakahatchee grass, coir, and biochar together performed best on removing P species from the water column with OP (7%), TP (8%). The research will help inform stakeholders, urban community members, and farmers about the role of floating treatment wetlands and their benefits in removing excess nutrients from surface water at stormwater ponds, the type of Florida Nativa plants they can use in the system, and the use of biochar to improve the absorption capacity of the system promoting sustainable ecosystems and more cleaned urban water systems.