Comparison of Extracellular Enzyme Activities in Everglades Stormwater Treatment Areas

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Stormwater treatment areas (STAs) have been constructed south of Lake Okeechobee, in the Everglades Agricultural Area. Mandated by the Everglades Forever Act, STAs were built to decrease phosphorus loading into the Everglades Protection Area. A total of 6 STAs are currently in use, each STA with varying types of vegetation cells, including emergent and submerged aquatic vegetation. This study compares the activities of 4 different enzymes, alkaline phosphatase, phosphodiesterase, β-glucosidase, and leucine aminopeptidase, with depth in STA 2 and STA 1W. Both STAs have been in use for 10 years and have a combination of emergent and submerged aquatic vegetation cells. We hypothesize that enzyme activity will decrease with depth and enzyme activity will vary in emergent and submerged aquatic vegetation cells. Also, we hypothesize that enzyme activity will differ between newly accreted and native soils. Newly accreted soil is material accreted after the creation of the STA and native soil is peat deposited before the construction of the STA. Enzyme activity with depth was quantified using the microplate fluorimetric enzyme assay using 4-methylumbellerone (MUF) and its conjugates for alkaline phosphatase, phosphate diesterase, and β-glucosidase. Leucine aminopeptidase was quantified using 7-amino-4-methyl coumarin and its conjugate. Results show that in general, floc has the highest enzyme activity while enzyme activity decreases with depth until native soil is reached. Native soil does not follow the pattern of enzyme activity of newly accreted soil.