

# A Study on the Correlation Between Mangrove Height and Exoenzymatic Hydrolysis

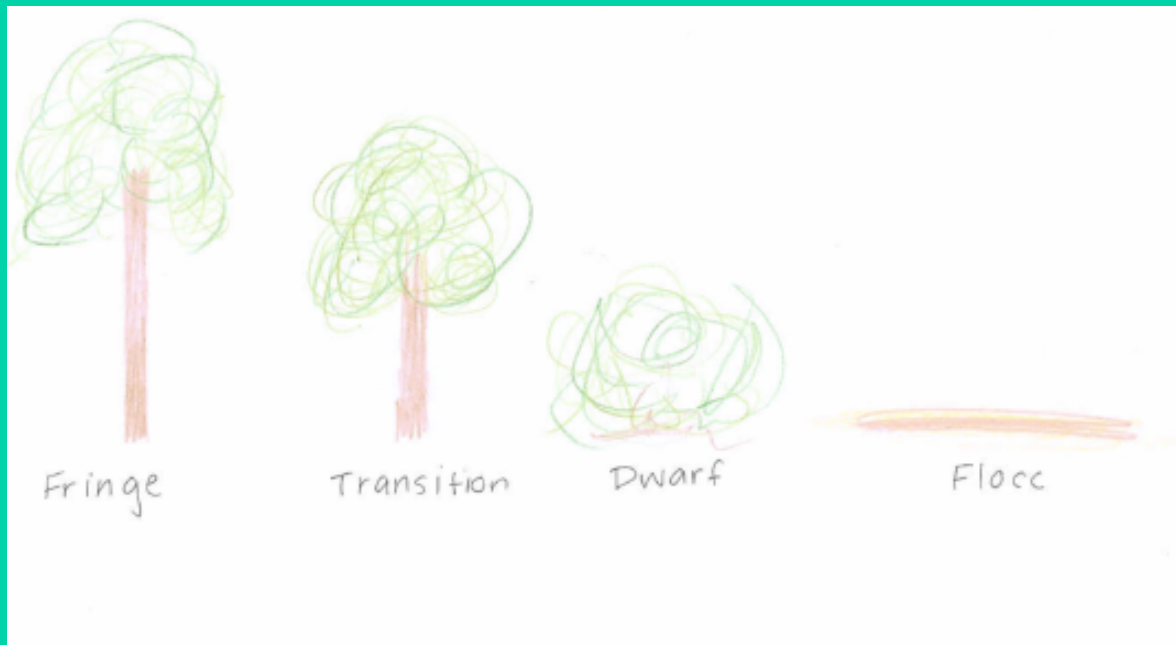
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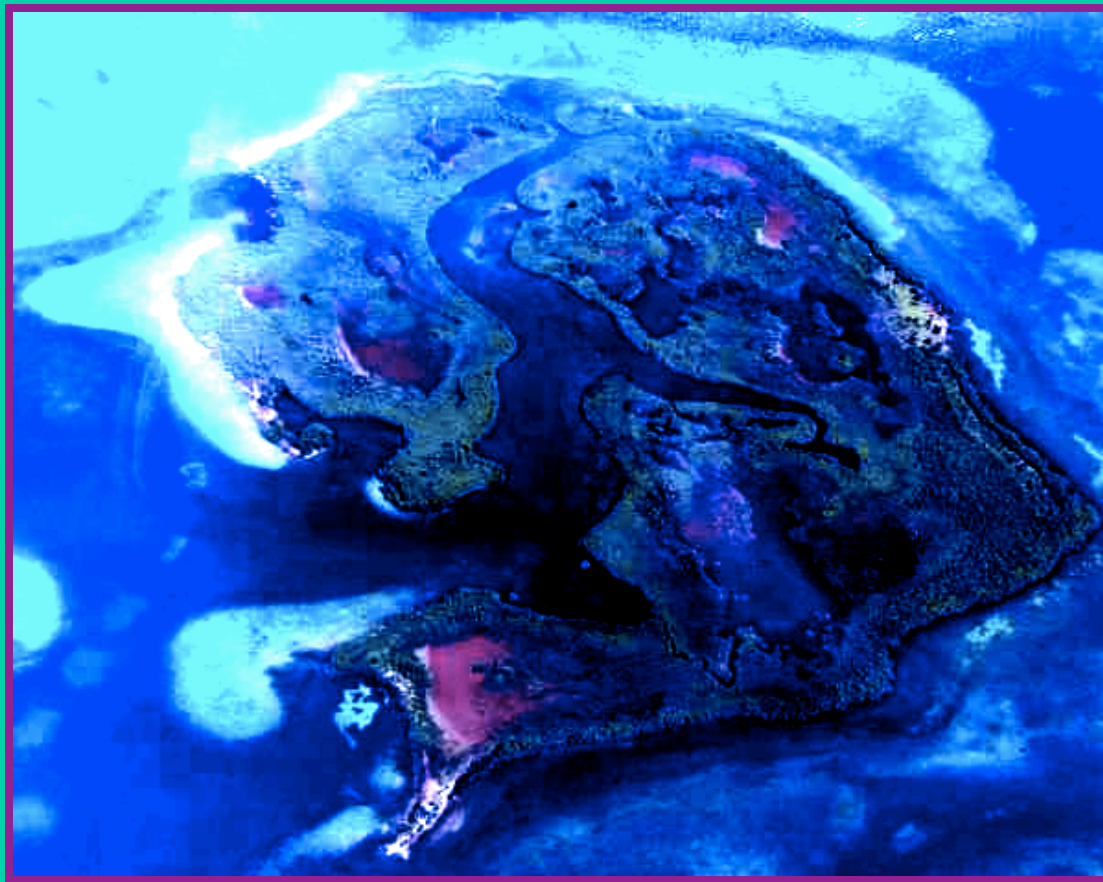
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# Characteristics of the Mangrove System

- Highly productive Tropical or Sub-Tropical environments
- Characterized by gradation of tree height



# Twin Cays, Belize



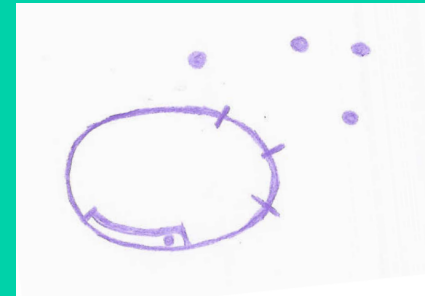


# Exoenzymes

- Bacteria can transport compounds  $< 600$  Da through Membrane
- Bacteria needs method to access larger particles-primarily organic molecules
- Exoenzymes exist outside the cell

# Factors Affecting Rates of Hydrolysis

- Bacterial Association
  - Pore water or Particulate
- Vertical Profile
  - Decreased enzyme and substrate with depth
- Substrate Quality
  - refractory, labile, affinity for enzymes
- **Substrate presence**



# Reason for Release of Exoenzymes

- Response to Presence in environment, need, or both?
- Requires energy expenditure.
  - Not evolutionarily sound to release if there is no need
  - also not efficient to release large amounts when nutrient is not present
- **Hypothesis:** Bacteria release exoenzymes when there is a need and nutrients are present. This would likely involve a positive feed back mechanism or receptors in the cell membrane

# Methods

- Utilize a fluorescent substrate to measure the amount of hydrolysis that occurs in 30 minutes





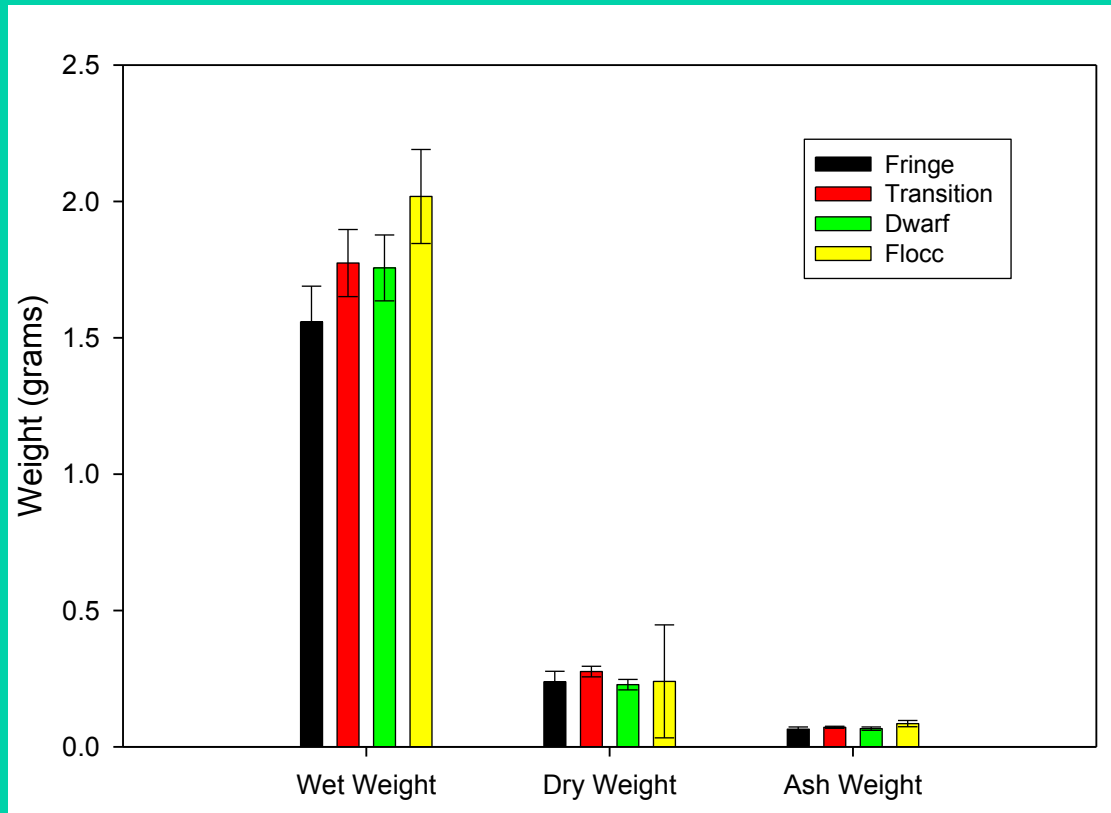
# The Goals

- Develop a method for measuring rates of hydrolysis of P,C and N substrates
- Establish points of saturation for each of the chosen substrates

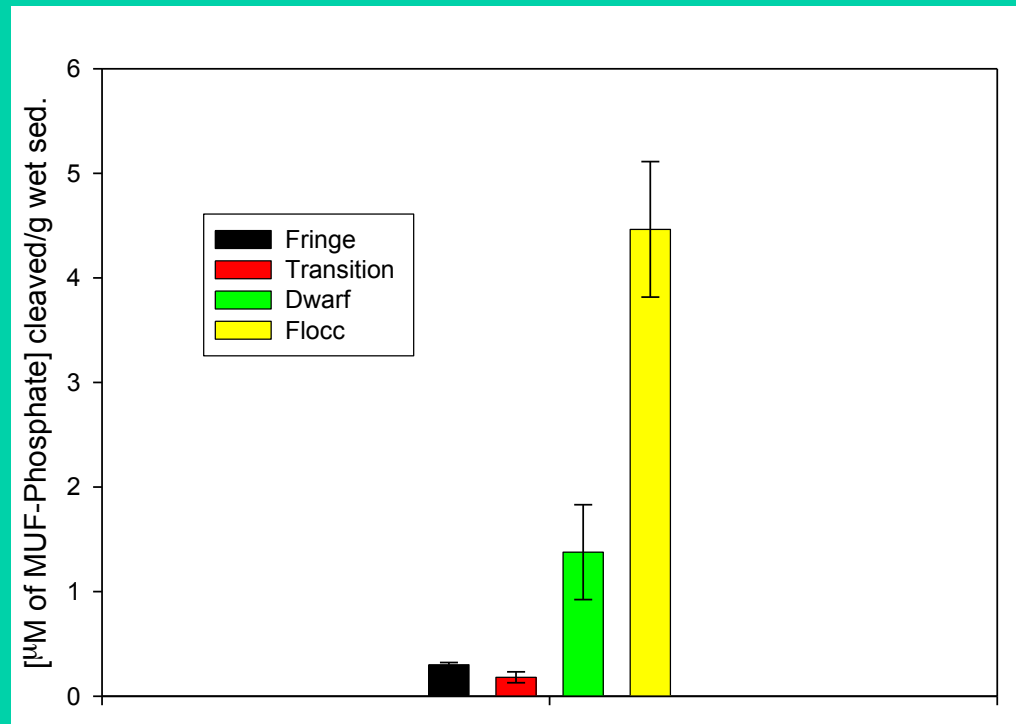
# What Weight Data Means

- Ratio of Dry to Wet.
  - Lowest ratio in Flocc, followed closely by Dwarf
  - This indicates flooding. Flooding is typically indicative of higher concentration of nutrients
- Ratio of Ash to Dry
  - Highest ratio Flocc, followed by Dwarf
  - This shows highest carbon content. It does not take into account nature of the carbon

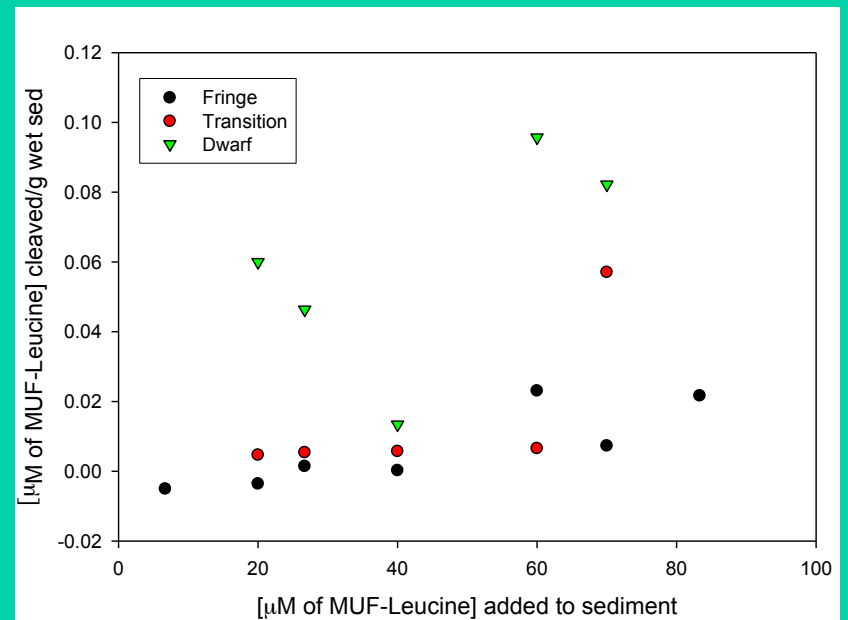
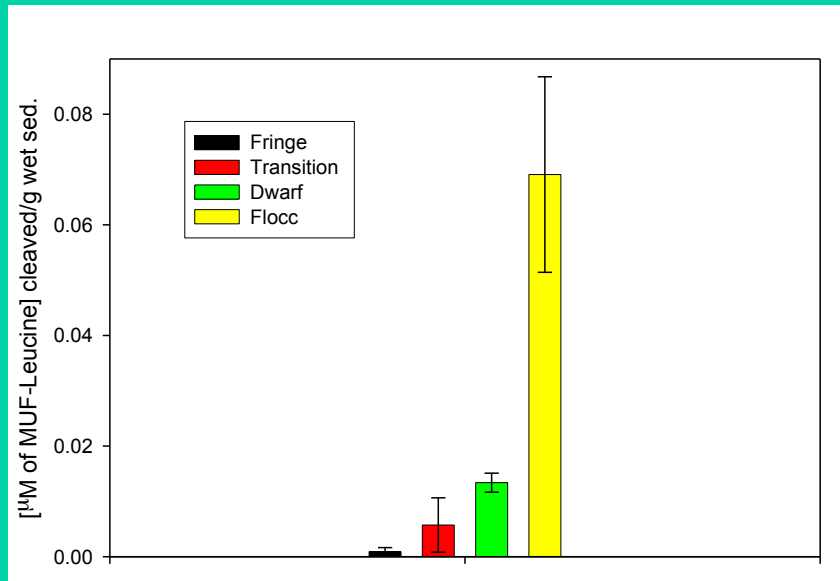
# Weights



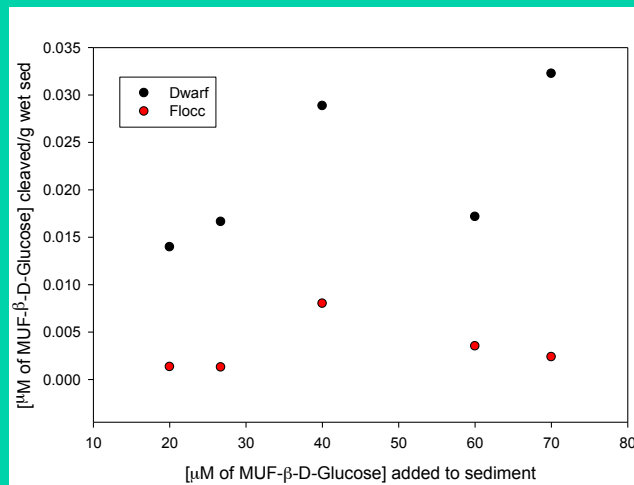
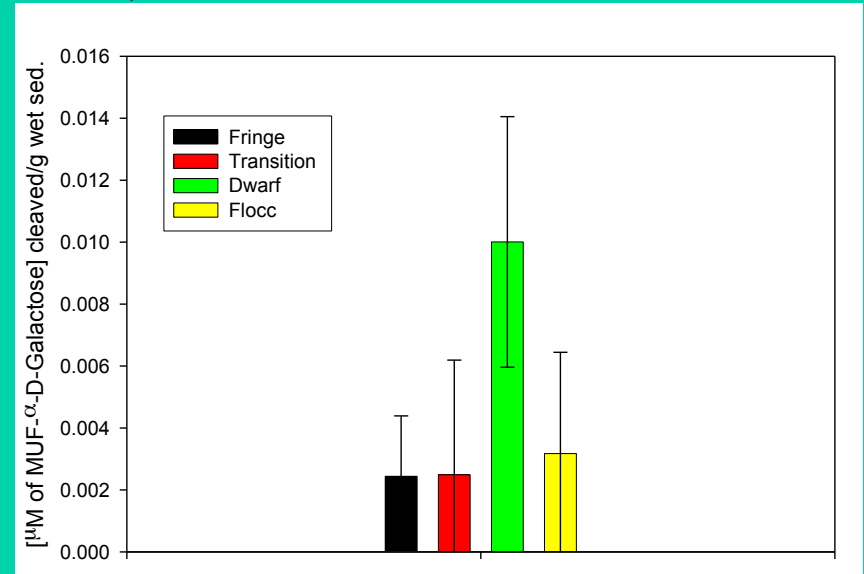
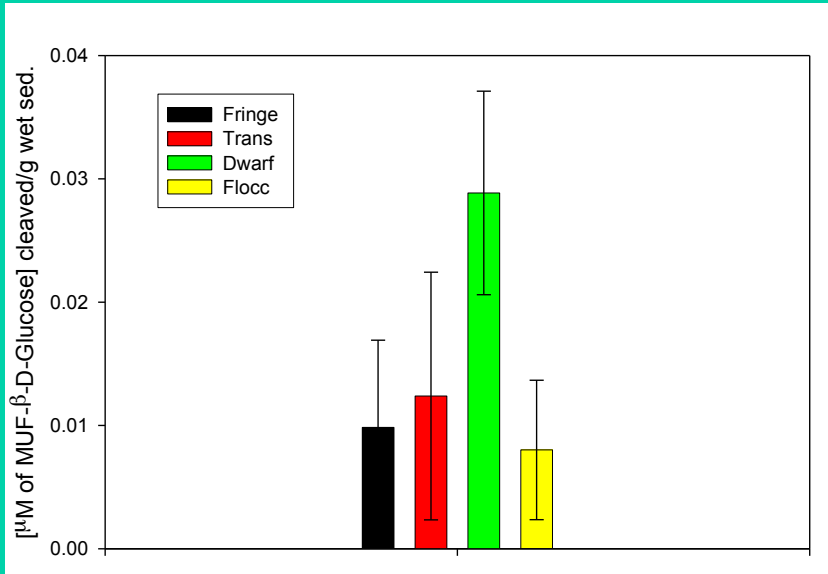
# Phosphorus Data (MUF-Phosphate Substrate)



# Nitrogen(MUF-Leucine Substrate)



# Carbon (MUF-Glucose and Galactose Substrates)



# Future Plans

- Find saturation points for Leucine, Glucose and Phosphorus(already in progress)
- Run incubation experiments with a cellulase, fatty acid reductase?
- Pick favorites and design experiment

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