

Competition Between Bulrush and Algae

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Abstract

A study between green algae and aquatic plants in limited nitrogen has shown an inhibition of phytoplankton by aquatic plants because of competition (Fitzgerald, 1969). Speculation has been made as to whether this was caused by nutritional or antibiotic factors. The objective of this experiment is to study the effects of competition on the biomass of green algae and bulrush. Based on this study, our research should have yielded results favoring the bulrush. The experiment was composed of three concurrent trials over a four week period. Each trial contained three mesocosms with water from cell one. The bulrush ranged from 70 to 100 grams. Due to the larger size of bulrush, algae was reduced to one-tenth the amount of bulrush. Mesocosm's one and two were controls. The bulrush and algae from mesocosm three were compared to the controls to determine the final growth results. After the data had been collected from each trial, averages were taken to determine overall change in growth. Bulrush showed more growth and outcompeted the algae.

Introduction

A study between green algae and aquatic plants in limited nitrogen has shown a decrease in phytoplankton by aquatic plants because of competition (Fitzgerald, 1969). Based on this study, our experiment looked at the effects of competition between bulrush and green algae on their biomass. Bulrush is capable of growing between 1-2 meters tall (City of Waco, 2005). Unlike bulrush, which is a part of the plant kingdom, algae is a part of the protist kingdom and may be suspended in water or attached to the bottom. Some algae are sublittoral; which means they are constantly submerged and, depending on turbidity, may grow at depths as great as 100-200m (Bold, 1978). The primary nutrient used by green algae and bulrush is nitrogen, which may be supplied as NO_3 , NO_2 , and NH_4 .



Bulrush only Mesocosms



Robert and Porscha getting dirt

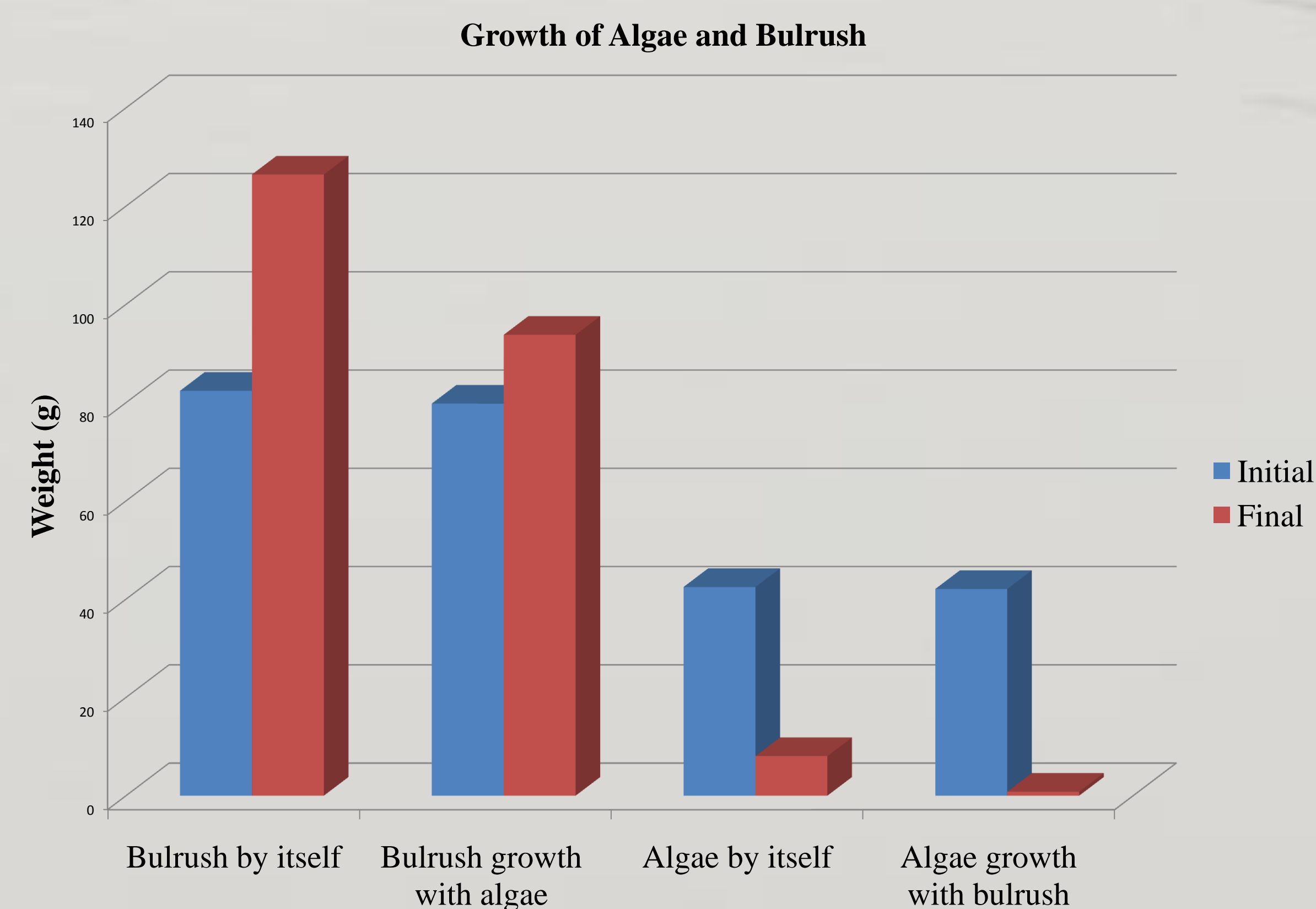
Methods and Materials

The study took place at the Lake Waco Wetlands, which is composed of several cells of water, which drains into the wetlands from the North Bosque River.

- Algae was collected from various locations in the Lake Waco Wetlands.
- Bulrush were dug up from the same cluster of bulrush located in cell 2.
- The Bulrush was trimmed and weighed. Weights ranged from 70 to 100 grams.
- The algae was strained and weighed. Weights ranged from 37 to 50 grams.
- 56.7 liters of water was added to each mesocosm.
- Dirt from cell 2 was added to the mesocosms that contained bulrush.
- Bulrush was planted in the mesocosms and algae was added. Mesocosms were labeled according to trials.
- Mesocosms were checked once a week, observations were recorded, and water was added to make up for evaporation.
- After four weeks, the bulrush was dug up and algae was collected from all trials.
- Drying and weighing processes were repeated, data recorded, and averages were taken.

Results

Statistically there was no significant difference between the bulrush only and the algae only compared to both growing together. Which means that neither was more competitive than the other. Based on observation, Bulrush showed more growth weekly than algae, which began to die after two weeks.



Conclusion and Discussion

The data was inconclusive with our hypothesis. Bulrush showed an increase in growth while algae showed a decrease in growth, which may suggest bulrush is better adapted in nutrient uptake than algae in general. The bulrush seemed to flourish in all mesocosms but the mesocosms which contained algae only showed growth initially, but eventually died after a two week period. Dr. Hill (personal communication) has suggested that a possible reason for the decrease in algal growth could have been due to lack of nourishment or self regulation. There was a small amount of algal growth in the bulrush only mesocosms, because there was filamentous algae in the water when it was added into the mesocosms directly from cell 1. This experiment could be improved with more time, filtered water, and a controlled environment, in which other organisms could not enter.



Weighing Procedure



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Literature Cited

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