The Effects of Different Nitrogen Levels on *Spirogyra sp.*

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Abstract

The objective of this experiment was to find out how different levels of nitrogen affect the growth of algae. Twelve containers were set up at 4 different levels of nitrogen (0.0%, 0.001%, 0.01%, 0.1%) with 3 trials of each level. At the beginning of the study, 0.5 g samples of *Spirogyra sp*. were collected from Lake Brazos (figure 1) and added to each container. Each week, the weight of the *Spirogyra sp.* was measured to determine the level of nitrogen that promoted the most algal growth. At the end of the three week trial, the algae with 0.1% nitrogen grew the most, and the control group grew the least.

Introduction

Because algae are important components of aquatic ecosystems, it is beneficial to find a level of nitrogen for optimal growth. The slow moving water of the Wetlands ecosystem supports algal growth allowing nitrogen to be filtered from water coming from the Bosque River Weisner). Nitrogen is a secondary nutrient in freshwater systems and enriches the consistency in algal growth (Elser et al. 2011). It was hypothesized that higher amounts of nitrogen would increase the growth of *Spirogyra sp.* collected from the Lake Brazos.

Methods and Materials

- The experiment done over a three week period was designed to test algae growth at four different nitrogen levels in de-ionized water
- 12 plastic containers (1.5 L) with 1.4 L of de-ionized water and 0.5 g of *Spirogyra sp.* in each (Figure 2)
- Levels of Nitrogen in each container were set to 0.001%, 0.01%, 0.1%, and a control of 0%, with 3 trials of each
- Water was changed weekly with initial concentrations
- Mass of each trial was measured weekly over a three week period

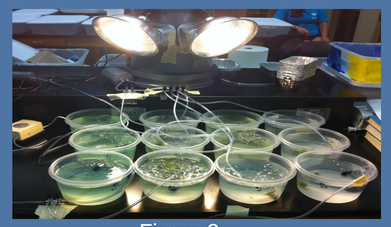


Figure 2

Figure 1

Results

In general, the algae grew the first two weeks, then experienced a sudden drop-off during week three (see figure 4). At the end of the three week trial period, the 0.1% sample had the highest mass, and the control group had the lowest mass (see figure 3). The week before the sudden drop-off in week 3, the 0.001% nitrogen level had the highest averaged mass.

Figure 3: Change of algal mass at different concentrations of nitrogen

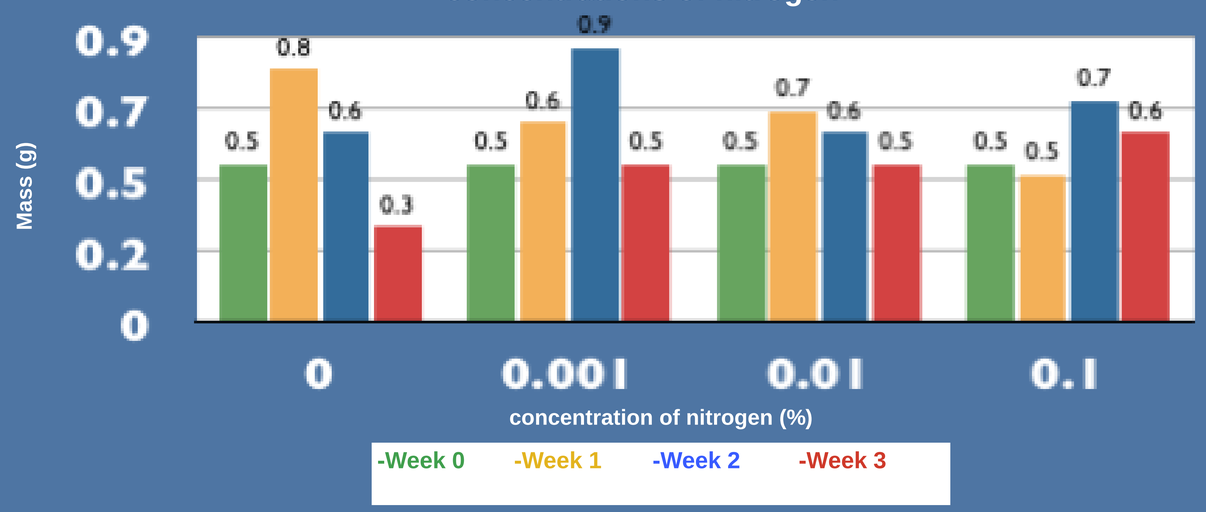
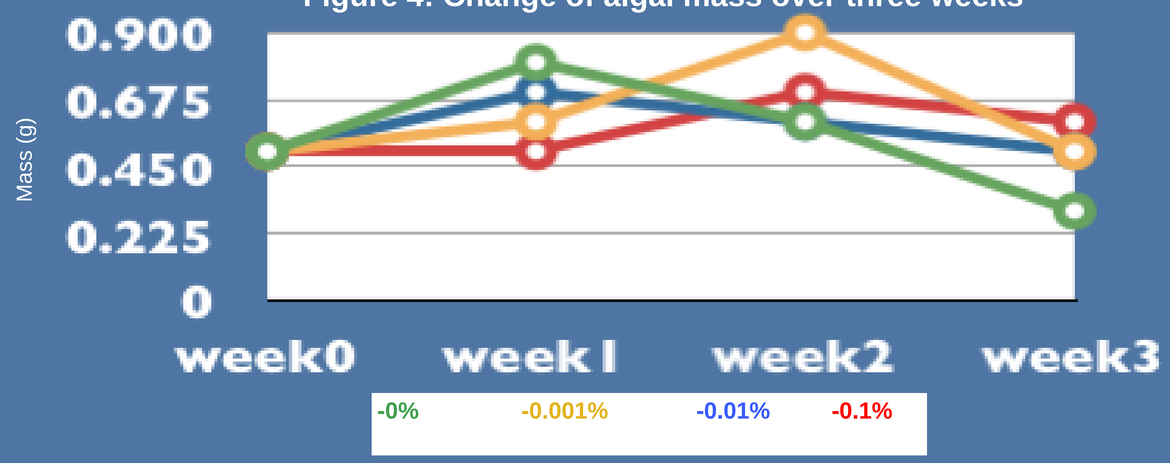


Figure 4: Change of algal mass over three weeks



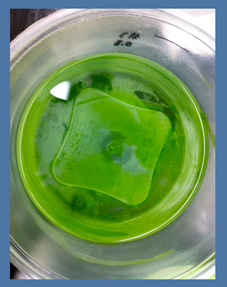


Figure 5

Discussion & Conclusion:

The results did not support the original hypothesis because of sources of error. It was hard to get precise measurements of algae when it went from a filamentous form to a non-filamentous form (Figure 5). In particular, the trials with 0.1% N were in a unicellular growth form. In this unicellular form, the filter paper was not able to collect all organisms. In other cases, consistency of water mass across samples led to imprecise measurements. As a result, the data was scattered and exhibited limited correlation. At the end of the three week period there was a significant difference in mass between 0% and 0.1% levels. The effect of the 0.001% and 0.01% levels was more difficult to distinguish.

References

-Elser, Marzolf, Goldman. 2011. Canadian Journal of Fisheries and Aquatic Sciences.

- Stefan, Weisner E.B. "Effects of Vegetation State on Biodiversity and Nitrogen Retention in Created Wetlands: a Test of the Biodiversity–ecosystem Functioning Hypothesis." *Freshwater Biology* 55.2 (2010): 387-96.

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