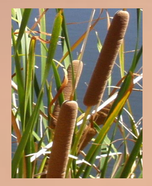

Cattail
Typha

Effects of *Typha sp.* on the Growth of *Schoenoplectus californicus*

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Biology 1406 B, Spring 2011, Baylor University, Waco, TX

Bulrush
S. californicus

Abstract

Among many mechanisms, invasive plant species utilize strength in numbers to outcompete with native plant species in an environment. The cattail *(Typha sp.)* plant was chosen as the invasive species and the bulrush *(S. californicus)* as the native species because both inhabit Lake Waco Wetlands. To determine how the invasive species affects the growth of the native species, this design observes the change in height, carbon levels, and nitrogen levels in nine mesocosms over the course of three weeks. The groups included two plants of cattail, two plants of bulrush, and one plant of each species per trial. The recorded levels showed little variation among the groups expressing weak to no correlation to invasive effects. Therefore, the research concludes that the influence of invasive plant species is dependent upon the population density ratio between the invasive and native plants and not necessarily physiological aspects that contribute to biological fitness.

Introduction

Wetlands hold a diverse array of aquatic and terrestrial plants as well as provide a conducive growing environment for its inhabitants by storing and removing excess nutrients. Diversity of plant species is jeopardized by invasive plants, some of which drive a native species to extinction (Angeloni et. al, 2006). This preliminary experiment seeks to test the effectiveness of invasive plant species against native plant species for soil-based nitrogen and carbon. By observing the changes in nutrient absorption and growth, it will be shown that the invasive species will outcompete the native species.

Materials and Methods

A trial consisted of three, 18.93L containers. The first container, (Group A) consisted of two cattails, the second (Group B) of two bulrush, and the third (Group C) of one cattail and one bulrush. This trial was repeated twice simultaneously over the course of three weeks totaling nine containers, nine cattail and nine bulrush *(see figure 1)*. Group A and B represented a control for their respective species while Group C observed the species interactions.

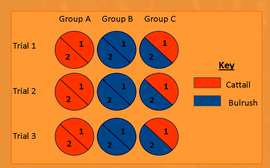
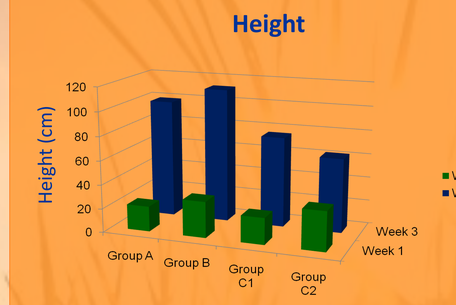
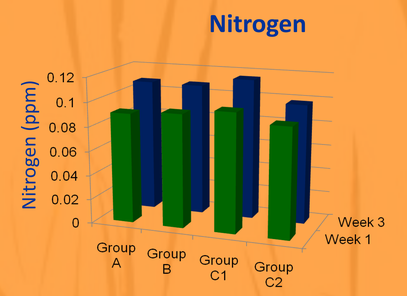
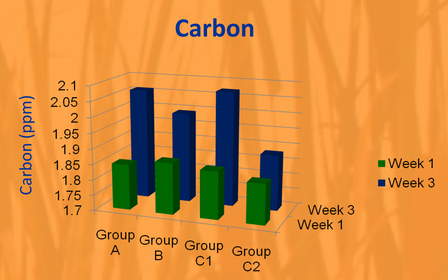


figure 1

For each of the 18 plants, the heights, nitrogen and carbon levels were recorded weekly. Soil carbon and nitrogen content were determined using a Thermo Finnigan EA flash 1112 elemental analyzer. All carbon is oxidized to CO2 and all nitrogen is reduced to N2. Diagnostics were run on 2g soil samples for each plant after being dried in an incubator, manually pulverized and filtered of debris.







Discussion

Invasive plants compete for the usage of resources, so the observation of carbon and nitrogen soil levels and height change give insight to growth processes in specimens. However, lack of correlation between data points among the groups signify that cattail did not have great impact on the growth of bulrush, justifying that the invasiveness of cattail relies heavily upon population density in specified areas. This excludes data points where specimens had been physically damaged or had died. As the literature points out, the invasiveness of cattail is reduced when singled out. Van Kleunen identifies six characteristics which describe the invasiveness of cattail including superiority in physiology, leaf and shoot allocation, growth rate, size, and biological fitness (2010). The data found comparative growth rates arguing that cattail interacts with other plants as would be expected by non-invasive species. Cattail shows no significant difference in resource uptake that would affect growth in bulrush.

Conclusion

Cattail shows a tendency to outnumber bulrush in natural environments. Their ability to overpopulate areas allows them to outperform other plants by depleting common resources. The results conclude that cattail observes competitive edge by overpopulating the specified area. When observed on a one-to-one basis, the cattail did not have as strong an impact on the growth of bulrush in terms of neither height, carbon levels, nor nitrogen levels. As this design demonstrates, it is difficult to control invasive plant populations because their superior biological fitness results in a greater consumption of resources. Therefore, by executing measures to disperse the population and evening the population density ratio between invasive and native species may result in decreased competition and stable diversity.

Literature Cited

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