

# Does salinity variation affect *Spartina patens* growth?

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## Introduction

- Louisiana is rapidly losing its coastal marshes due to a variety of natural and human factors
- Spartina patens* is one of the most wide spread species in the Louisiana coastal zone
- Spartina patens* is a very resilient macrophyte that can survive a wide range of salinities and has a large ecological amplitude
- Previous work has primarily focused on the tolerance of this species to constant salinity
- We tested *Spartina patens* ability to tolerate fluctuating salinity
- It is important to know just how resilient this species is to fluctuating salinity in order to make important decisions concerning coastal restoration in the future



Figure 1.1: *Spartina patens* thrives in most coastal environments.



Figure 1.2: plants in the constant salinity and the plants in the high variability rotation are both in the 6 ppt bucket at the same time. At times two groups would overlap and there would be ten plants in one bucket.



Figure 1.3: These plants were moving to another salinity tub and are shown here draining before being put into the saline solution.

## Results

- All 15 *Spartina patens* plants survived the experiment.
- Growth of the plants was not statistically different among the salinity variation treatments.
- None of the biomass measurements (above, below, and total) were statistically different among the salinity variation treatments.

### Mean Total Growth

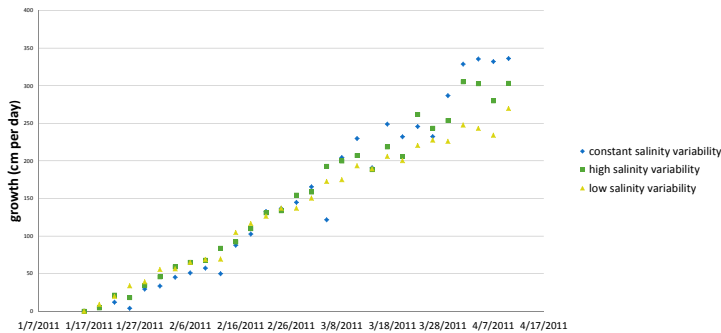


Figure 2.1: scatter plot showing the average total growth of the plants from each of the three salinity variability treatments

### total biomass

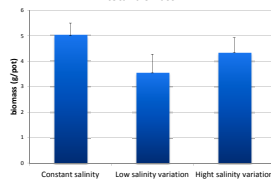


Figure 2.2: total biomass of all 15 plants.

### aboveground biomass

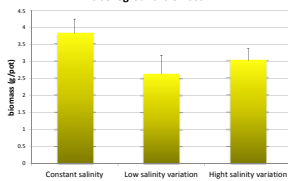


Figure 2.3: total aboveground biomass of all 15 plants

### belowground biomass

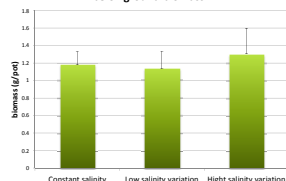


Figure 2.4: total belowground biomass of all 15 plants

## Methods

- Fifteen *Spartina patens* were used in this experiment.
  - 5 were kept at a constant salinity level of 6 ppt
  - 5 went through a low salinity variation treatment and moved from tubs with 3, 6 and 9 ppt
  - 5 of the plants went through a high salinity variation treatment moving from tubs with salinities of 0, 3, 6, 9 and 12 ppt.
- Measurements of stem length were taken every three days when the plants were moved among tubs.
- After 96 days the plants were removed and all of the dead and live above ground and below ground material was collected. The plants were then sorted into dead and live material, dried out and weighed to determine each plants biomass.
- Total stem growth was determined by subtracting total stem height of the plant at the beginning of the experiment from the subsequent measurements. Average growth per day was estimated as the slope of the regression line fitted to the stem growth data.
- Analysis of Variance (SAS) was used to determine if the salinity variation treatments significantly affected growth as well as aboveground, belowground, and total biomass.

### Salinity Treatment

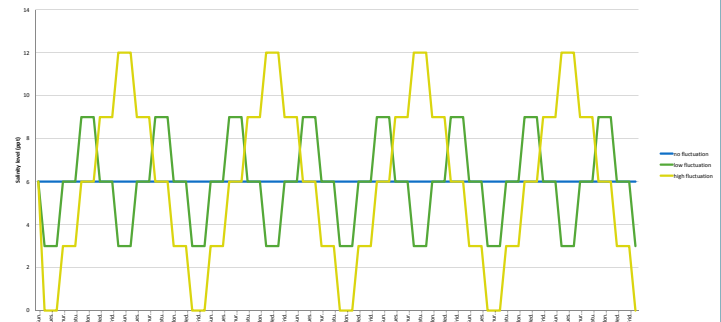


Figure 3.1: Graph shows the difference between the constant, low and high salinity treatments



Figure 3.2: There were five large buckets containing salinities of 0, 3, 6, 9 and 12 ppt in which we moved our plants around during the experiment



Figure 3.3: The plants lengths were measured every three days.

## Conclusion

- We expected that the high salinity variability would reduce the growth and biomass of *Spartina patens* plants. However, *Spartina patens* growth and biomass were not affected by the salinity variation treatments.
- These results confirm the wide salinity tolerance of *Spartina patens* expected from its large range in the Louisiana coastal zone.
- Future experiments should be performed to test *Spartina patens* tolerance for salinity variation under different flooding regimes.



Figure 4.1: all 15 plants at the beginning of the experiment



Figure 4.2: all 15 plants at the end of the experiment after being removed from their pots and soil washed off.

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