

Effects of Invasive Grass, *Phragmites australis*, on Tidal Salt Marsh Environment



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Introduction

Invasive species can become dominant and outcompete native species, changing relatively diverse communities into monocultures (Reinhart and Callaway, 2006). Many view the introduction of *Phragmites australis* into the *Spartina alterniflora* marsh as a negative shift from a biologically diverse and productive marsh to one less biologically diverse and productive (Meyer et al. 2001). The introduced European genotype of *Phragmites* have thrived in the United States particularly in disturbed and/or altered tidal salt marshes (Chamber et al., 1999). The objective of this study was to examine the effects of *Phragmites* invasion on the physical marsh environment, such as soil organic content and sediment accumulation.



Figure 1. Study site at Hackensack Marsh, Carlstadt NJ.

Methods

Three vegetation types, *Spartina*, *Phragmites* and *Spartina* mixed with *Phragmites* (mixed) were included in this study. Eighteen sampling plots, 1m² in size, six for each vegetation type, were selected at Hackensack Marsh, Carlstadt NJ. Dates and times for sampling were determined according to the time of low tide. Sediment and debris samples were taken from the center of each plot. Samples were placed into a drying oven at 65°C for 5 days to remove all moisture. The samples were weighed and recorded as dry weight. The soil samples were then placed in a Muffle furnace at 540°C for 4 hours. The samples were weighed and recorded as ash weight. The percent organic content of the soil was calculated using the following equation: % organic content = (dry weight-ash weight) /dry weight.

Results & Discussion

The soil samples in the mixed vegetation plots were found to contain the highest percent organic contents among the three vegetation types (Figure 2). Soil in the *Spartina* plots had a higher average organic content than soils in the *Phragmites* plots (Figure 2). Liao et al. (2007) and Li et al. (2008) also found that *Spartina* dominated marsh had a higher soil organic content than *Phragmites* marshes. The average organic content in debris was found the highest in the *Phragmites* plots and lowest in the mixed plots (Figure 4). *Phragmites* contains higher lignin contents than *Spartina*. The high lignin content in *Phragmites* might slow down the decomposition of *Phragmites* and result in a higher organic content in debris collected at the *Phragmites* plots. The lower lignin contents in *Spartina* plots resulted in a faster decomposition and lower organic contents in debris.

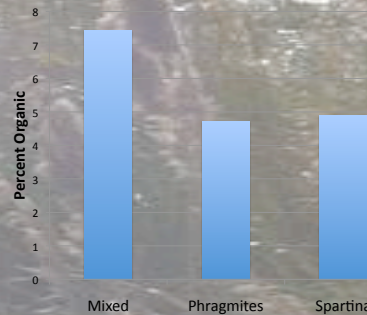


Figure 2: Average percent organic content in soil of the three vegetation plots.

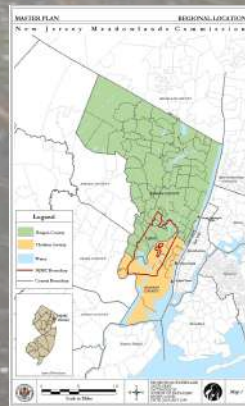


Figure 3: Location of Study site

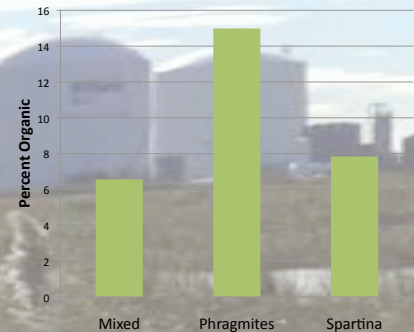


Figure 4: Average percent organic content in debris of the three vegetation plots.

Conclusion

In conclusion, *Phragmites* was found to have a slightly higher percent organic in debris and lower percent organic soil content than *Spartina*, which concurs with previous studies. Due to the lack of research on carbon soil concentrations of eastern United States salt marshes, we suggest future studies be conducted. Any future studies that shed some light on the current invasive species problem is ultimately valuable information that can be used to predict how to eradicate invasive species further, allowing for the conservation of current ecosystems

References

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