Phosphorus content in *Juncus effusus* and growth of planted saplings in created wetlands of Virginia

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Introduction

- Tree establishment and growth is an important step in forested wetland creation and causes for slow growth of saplings are poorly understood.
- Efforts to predict sapling growth using soil nutrient content failed to contribute to growth models.
- Plant tissue nutrient concentrations have been shown to predict plant productivity in created wetlands (Atkinson et al., 2010; Dee & Ahn, 2014).
- *Juncus effusus* is a facultative wetland species, occurring 67-99% of the time in wetlands (McMullen, 2012), and is a dominant species in created wetlands that our lab has been researching in northern Virginia.
- The purpose of this study was to determine the relationship of *J. effusus* phosphorus content and growth of saplings planted in created wetlands.

Methods

- *J. effusus* (Figure 1) samples were collected adjacent to saplings in 3 non-tidal created forested wetland sites in Loudoun County, Virginia in summer 2015.
- Tree morphology (basal stem diameter, canopy, and height) was examined at planted trees and *J. effusus* samples were collected in 0.25-m^2 plots around the saplings.
- *J. effusus* and total aboveground biomass samples were dried and weighted to determine biomass.
- Samples of *J. effusus* were then ground twice, first in a coffee grinder and then through a sieve in a Thomas Wiley Mini-Mill to achieve a finely ground sample.
- Phosphorus content in *J. effusus* was determined through an ashing/acid extraction technique described by Chambers and Fourqurean (1991).

Figure 1. *Juncus effusus*

Results

Phosphorus was not related to any of the three sapling growth parameters (Figures 2-4), and was not related to colonizing vegetation aboveground biomass (Figure 5).

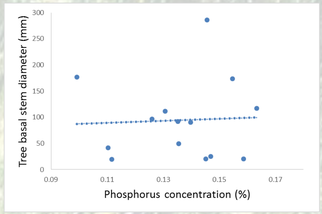

Figure 2. Percent phosphorus content in *J. effusus* and tree basal stem diameter (r = 0.059, p = 0.84).

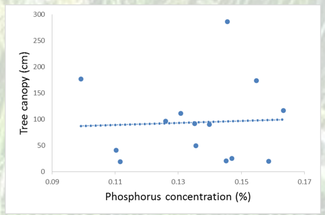

Figure 3. Percent phosphorus content in *J. effusus* and sapling canopy (r = 0.046, p = 0.88).

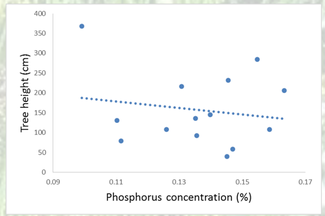

Figure 4. Percent phosphorus in *J. effusus* and sapling height (r = -0.17, p = 0.56).

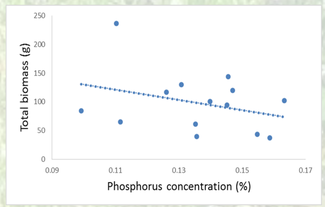

Figure 5. Percent phosphorus content in *J. effusus* and total biomass of colonizing vegetation (r = -0.32, p = 0.26).

Discussion

- There was no correlation between the phosphorus content of *J. effusus* and sapling growth. Phosphorus did not limit plant growth in newly created wetland studies (Dee & Ahn, 2014; Vitousek *et al*., 2010) but has been found to co-limit plant growth with nitrogen in 20-year-old created wetlands (Atkinson *et al*. 2010).
- Dee and Ahn (2012) investigated tissue nutrient concentrations as a predictor of aboveground biomass in created wetlands. They found that the C:N ratio was negatively correlated with belowground biomass and found that the best predictors of vegetation among soil samples were with soil organic matter, pH, and the C:N ratio. P was not included as a major indictor of aboveground biomass production in that study.
- Bedford *et al.* (1999) suggest that many North American wetlands are either P limited, or co-limited by N and P.
- Phosphorus content in *J. effusus* does not appear to be a limiting nutrient at our sites.

References

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