

Root frost tolerance in native
Solidago speciosa versus weedy
Solidago canadensis in Biocore
Restoration Prairie

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Climate Change

- Average winter temperatures in Wisconsin have risen by 1.5°C in the past century¹
- Less winter precipitation → delayed snowpack accumulation, earlier melting
- Increased freeze/thaw cycles (FTCs)²
- FTCs might be influencing plant communities

Biocore Restoration Prairie



Snow Fences



- Manipulating snow levels with snow fences in the Biocore Prairie
- Expecting to see changes in plant functional types (PTFs) abundances³

Plant Functional Types

- Great predictors for plant community dynamics and responses to environmental changes^{3,4}
- Influence many ecological processes
- Examples: Specific leaf area, clonality, life form

Root Frost Tolerance

- Indicator of competitive strength and climate response⁵
- Plants avoid frosts by overwintering as belowground root systems
 - using the snow packs as insulation⁶
- **↑**Winter temperatures, and **↑**FTCs lead to decreased root protection

Weed versus Native



Native showy goldenrod
(*Solidago speciosa*)⁷



Weedy Canadian goldenrod
(*Solidago canadensis*)⁸

Biological Rationale

- Invasive weeds have higher nutrient uptake efficiencies⁹
- Frost tolerance is correlated with nutrient stress survival¹⁰
- Predicated that the weedy Canadian goldenrod would have a higher frost tolerance than the native showy goldenrod

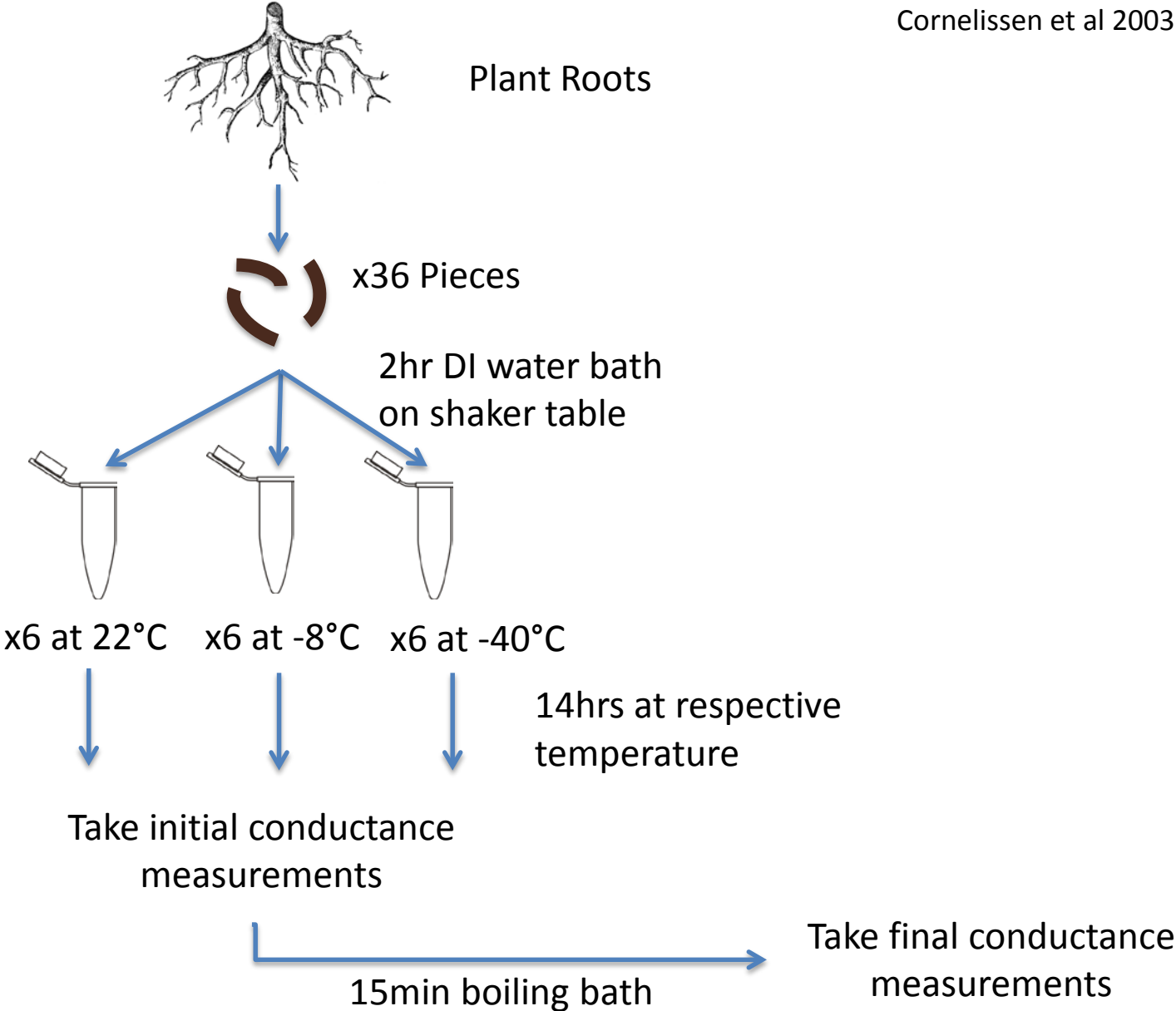
Root Collection

- Root collection in Mid-October

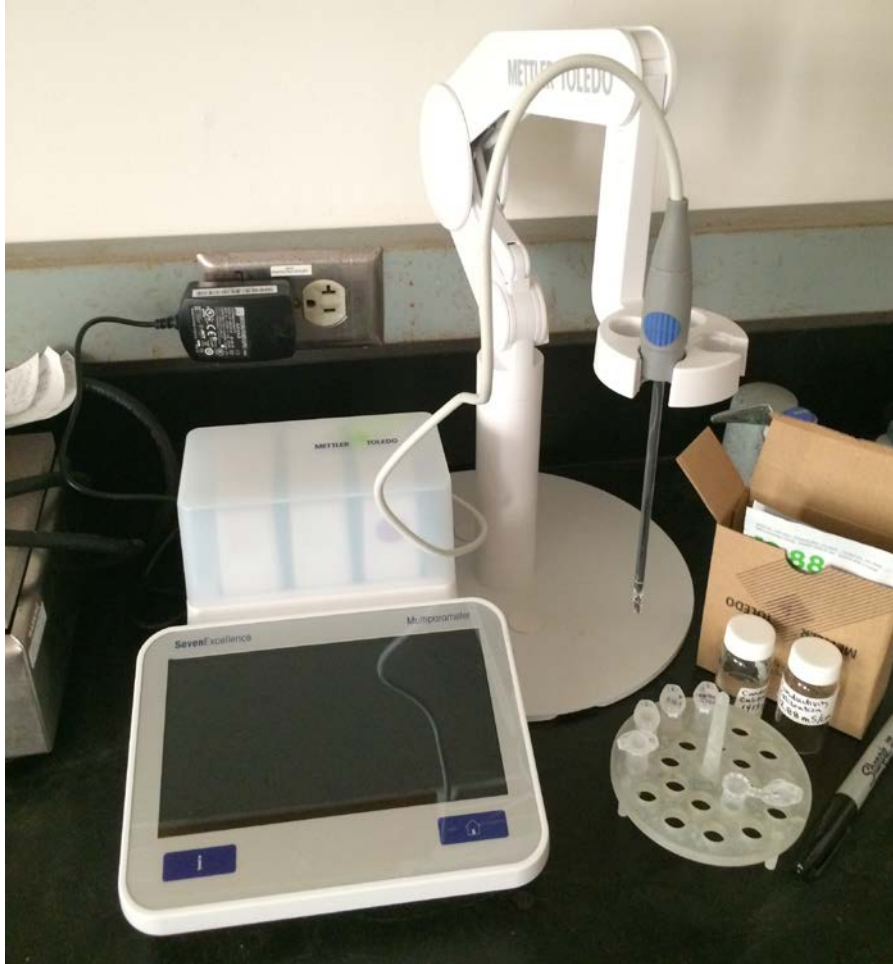


Methods

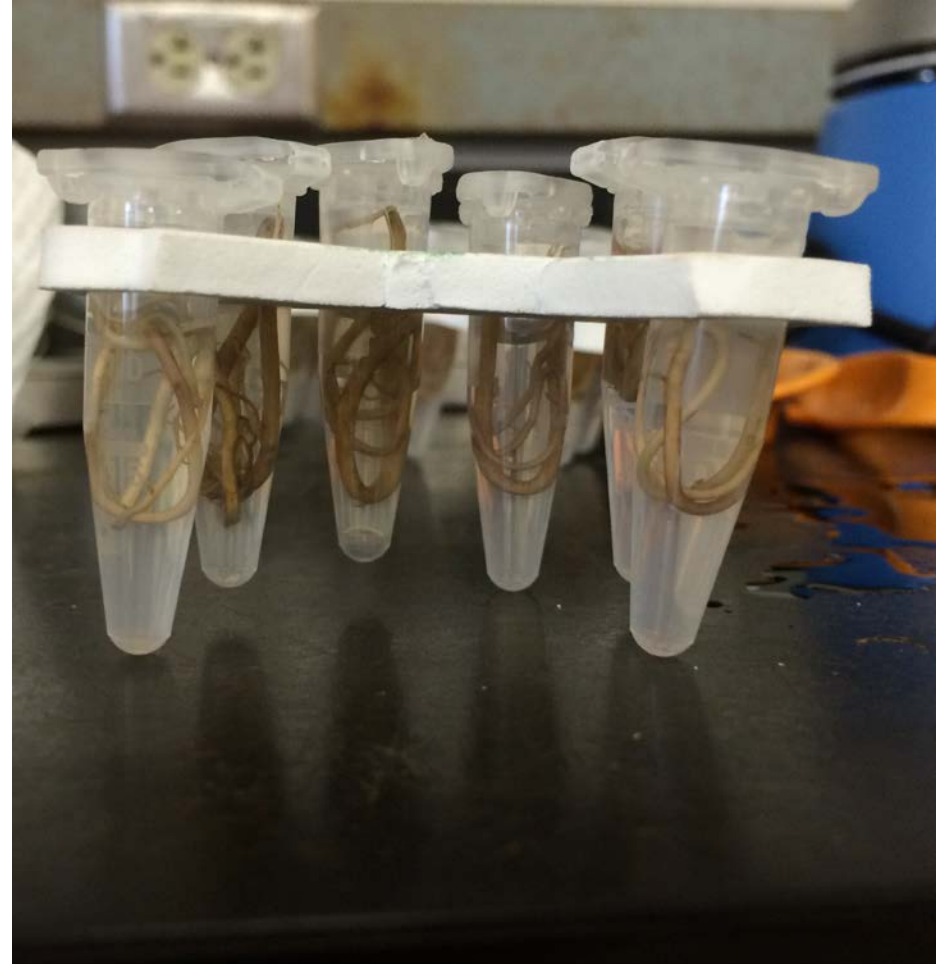
Altered methods from
Cornelissen et al 2003



Data Collection

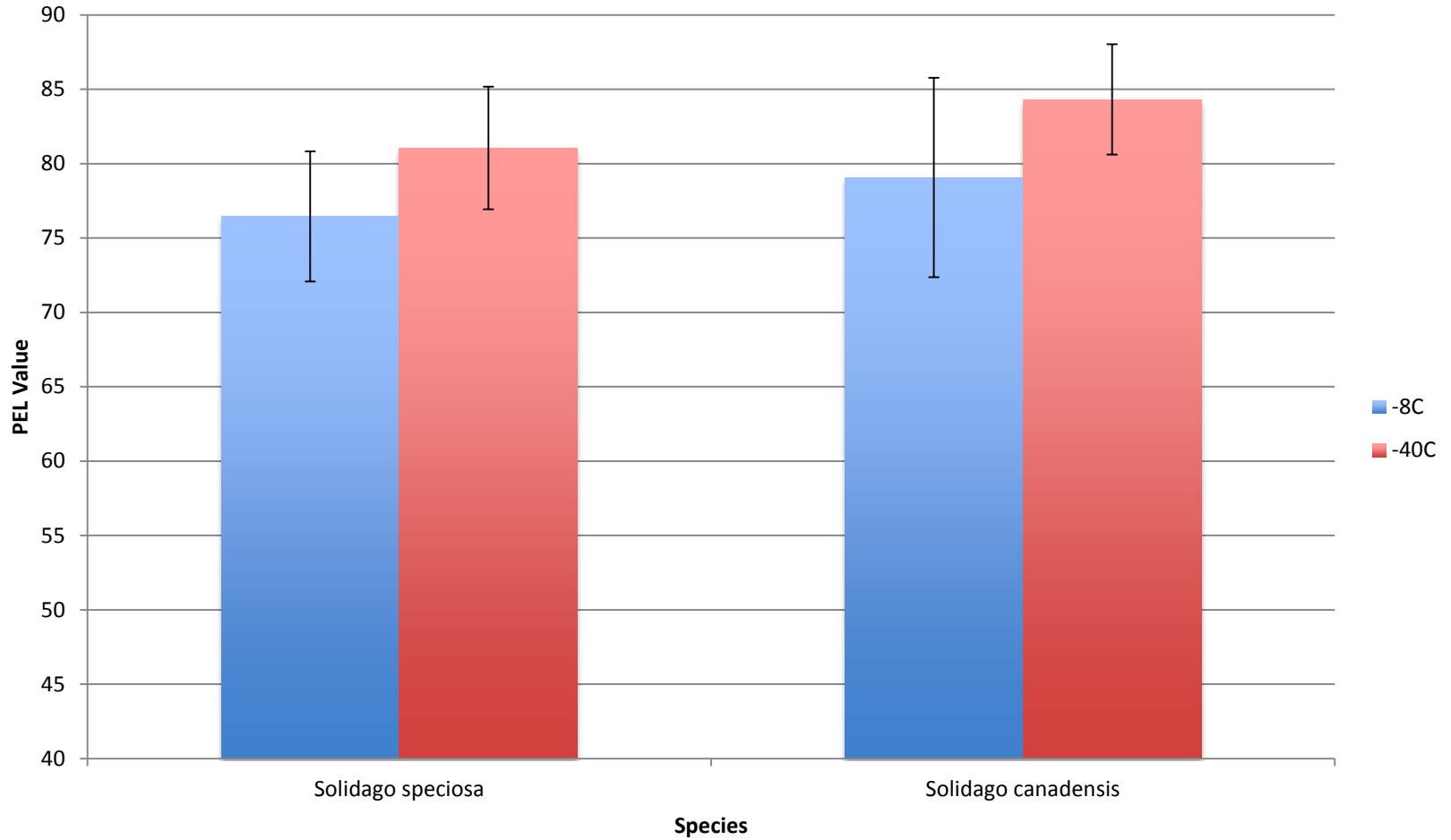


Seven Excellence Conductivity Meter



One round of sub-replicates
pre-treatment

Results



$F(1,19) = 83.517, P = 0.06939$

Implications

- No statistical significant differences or interactions
- $P=0.06939$, not statistically significant, but biologically significant?
 - Late sampling
 - Small sample size
- Future sampling needed for bigger picture
 - Using frost tolerance as plant community predictor with changing temperatures

What I Learned

- What is a prairie!
- Identification of 40+ plant species
- General knowledge of plant functional type ecology
- Developed and implemented procedure for root frost tolerance



Special Thanks

Questions?

Literature Cited

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