Will different populations of Little Bluestem display different levels of phenotypic variation?

Stacy Caeiro,[1] Daniel Puga,[2] Jacob Zeldin,[3] Andrea Kramer [1 3]
[1]Northwestern University,[2]California Polytechnic State University San Luis Obispo,[3]Chicago Botanic Garden

Introduction

- One goal for seed sourcing is to foster trait diversity to maximize restoration outcomes
- Variation of functional traits, traits that indicate competitive ability, exist within and among populations
- When should we source seeds from one population, and when is it better to source seeds from multiple populations?
- How is trait variation structured both within and between populations?

Experimental Methods

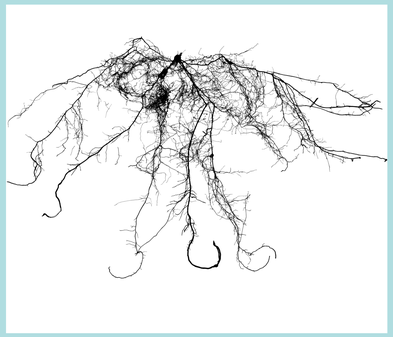
- Little Bluestem is a prairie grass native to IL
- Seeds were sourced from 4 populations in IL & WI
- Seeds were micropropagated, grown via tissue culture
- Sample size: 5-7 genotypes per population, 5-9 plants per genotype

Statistical Analysis

- **Coefficient of Variation (CV):** the extent of variability in relation to the mean of the population
- The higher the CV, the greater the variability
- We used linear models to understand differences in the CV of the genotypes based on populations

Traits

- **Root Dry Matter Content**
  dry mass / fresh mass
  - Indicates lifespan and growth rate
- **Specific Leaf Area**
  fresh mass / surface area
  - Regulates light capture and nutrient retention
- **Total Biomass**
  - Indicates plant productivity



Root scan

The **different populations** display significantly **different levels of variation** for **root dry matter content** (RDMC), but **not** for specific leaf area (SLA) or total biomass.

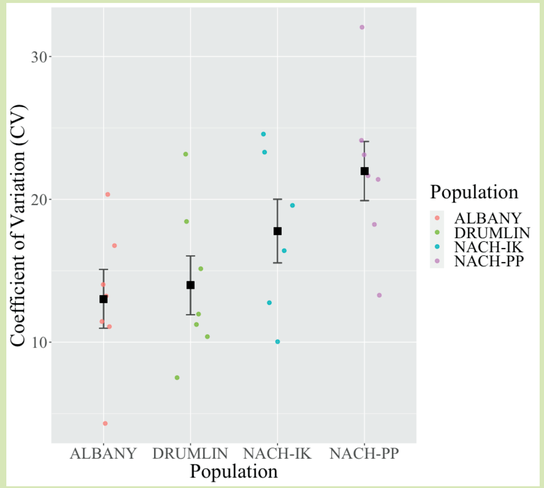


Figure 1: Coefficient of variation (CV) of RDMC per populations. Black, square points represent estimated mean population-level CV, while circular points represent estimated genotype-level CV.

Population	Coefficient of Variation
Albany	13
Drumlin	14
Nach-IK	17.8
Nach-PP	22

Figure 2: Estimated mean population level CV for RDMC

Trait	P-value	F-statistic	Df
SLA	0.397	1.03	3, 22
RDMC	0.022	3.89	3, 23
Total Biomass	0.617	0.61	3, 22

Figure 3: Statistical analysis of CV between populations for SLA, RDMC, and total biomass

Discussion

- The NACH-PP population had the most RDMC variation
  - This was the only mesic soil population, suggesting more trait syndromes may be viable in a resource rich or less stressful environment
- It may be viable to source seeds from only one population if it has enough trait variation, but, as this study shows, the amount of trait variation differs between populations
- Future research could include more populations from mesic sites to see if the pattern of increased variation holds true
  - Additionally, it would be beneficial to repeat this study with other restoration relevant prairie species

Little Bluestem grown in the lab

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Contact
jzeldin@chicagobotanic.org