

## Introduction & Hypothesis

- Schizachyrium scoparium* (Little bluestem) native tall prairie grass species in Midwest prairie environments.
- Traits that were looked at are tiller number, root dry matter content (RDMC), leaf dry matter content (LDMC) and maximum plant height (cm).
- Soil influence and characteristics (e.g., soil bulk density, water holding capacity and soil texture) can be expected to influence plant traits
  - E.g., restricted root growth, accessible nutrient for a plant, plant water holding capacity

### Hypothesis:

**Populations originating from different soil types will display differences in functional traits.**

**Populations originating from soils with higher bulk density will have higher tiller numbers and have a higher maximum plant height.**

### Westport Drumlin (Wisconsin):

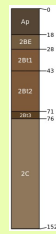


Figure 1 Klidder Soil Series - Soil Profile

### Nachusa Grassland: Prairie Pothole (Illinois)

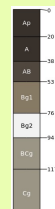


Figure 2 Selma Soil Series - Soil Profile

### Nachusa Grassland: Isabel's Knob (Illinois)



Figure 3 Wyanet Soil Series - Soil Profile

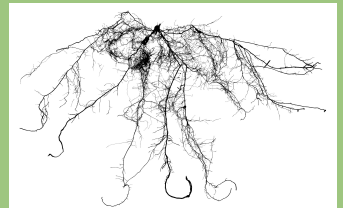
### Albany Dry Prairie/ Oak Barren (Wisconsin):



Figure 5 Oshtemo Soil Series - Soil Profile

## Materials and Methods

- Schizachyrium scoparium* seeds were collected at location sites. Once seeds were collected, they were then germinated and micropropagated for 18 weeks
- Total of 187 little blue stem were counted for maximum vegetative height and tiller number.
- Little bluestem was then harvested starting with collecting five fully developed leaves with little damage from each plant individual. Leaves were then scanned and photographed.
- Roots and aboveground biomass was then separated to be weighed for fresh and dry weight of roots and shoots.
- We then ran linear models in R to understand differences in trait values across the four populations.



## Results

- RDMC varied significantly between the Wisconsin population and Illinois populations ( $F = 7.424$ ,  $df = 3, 183$ ,  $p < 0.001$ )
- Tiller number was not significantly different between the populations, ( $F = 1.05$ ,  $df = 3, 183$   $p = 0.381$ )
- Maximum height differed between populations ( $F = 3.695$ ,  $df = 3, 183$ ,  $p = 0.0129$ ) Albany had a larger variation than all populations and had a significantly taller plant height. NACH-IK had the shortest estimated plant height.
- LDMC differed between populations ( $F = 19.69$ ,  $df = 3, 178$ ,  $p = 4.522e-11$ ), DRUMLIN has a larger variation in comparison with the other three populations, yet DRUMLIN and NACH-PP have similar estimated LDMC.

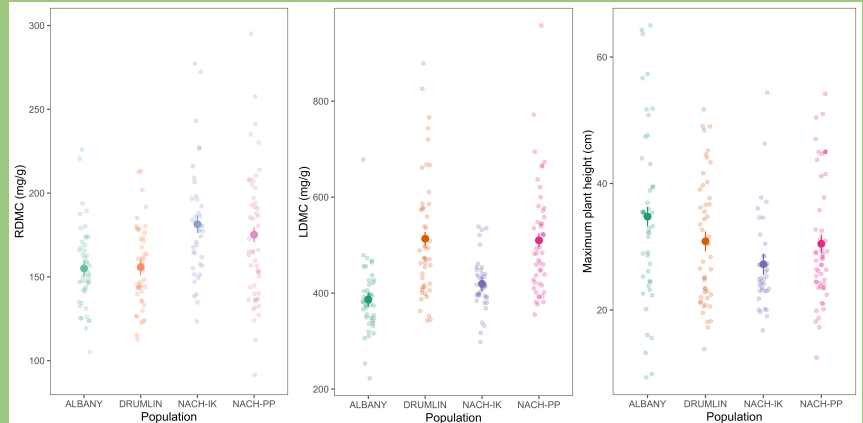


Figure 6: Model estimates for Root dry matter content (RDMC), LDMC, Maximum plant height across the four little bluestem populations. Large points represent model estimates (+/- SE). Smaller points represent raw data.

## Discussion

### RDMC:

- ALBANY & DRUMLIN have well drained dry soils so they can tolerate a lesser shrink and swell in root and water interactions.
- NACH-IK & NACH-PP are not significantly different from each other but are significantly different from the Wisconsin populations

### LDMC:

- NACH-IK and ALBANY both are found with the lowest LDMC values. Since these two come from more developed soils there may be a negative correlation with nutrient accessibility and resources that plants are able to access in the soil.

### Maximum Plant Height:

- There is a lot more variation in plant vegetative height in ALBANY, while NACH-IK has the least amount of vegetative height between the four different populations.
- DRUMLIN and NACH-PP have similar values with maximum plant height and maximum plant height variation.

## Conclusion

- Soil compositions and characteristics can then predict a certain level of plant functional traits in Little bluestem.
- With this information to take steps further in restoration practices on how collecting seeds from certain locations can show different functional traits and develop in different ways.
  - This can lead us further steps of from where seeds are sources and where they would do best environmentally.

## References

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- Westerband et al. Intraspecific trait variation in plants: a renewed focus on its role in ecological processes. *Annals of Botany* 127: 397-410, (2021)
- Correa, J., Postma, J.A. & Wojciechowski, T. Phenotypic response to soil compaction varies among genotypes and correlates with plant size in sorghum. *Plant Soil* 472, 59–76 (2022).

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