Does pollen limit reproduction in a native, wind-pollinated prairie grass?

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INTRODUCTION

- *Dichanthelium leibergii* is a native prairie grass of conservation concern whose habitat is highly fragmented
- My previous study found low germination in *D. leibergii*
- Is pollen limitation the cause?

- **Pollen limitation**:
  - Plants receive inadequate or unsuitable pollen
  - Normally not expected in wind-pollinated species
- **Seed set**:
  - Number of ovules that successfully develop into seed.

RESEARCH QUESTIONS

1) What is the extent of pollen limitation in a remnant population of *D. leibergii*?
2) Does seed set differ between outcross vs. self-pollen?

STUDY SPECIES

- Perennial - Cool season (C3)
- Wind-pollinated
- Cleistogamous
- 2 flowering phases

Fig 1. *D. leibergii* inflorescence (‘panicle’).

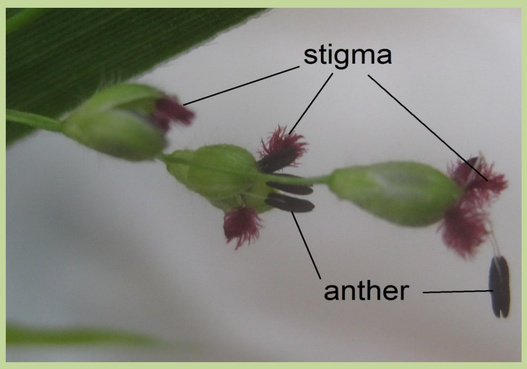

Fig 2. Stages of floret emergence. Stigma emerges first, followed by anthers.

METHODS

- Douglas County, Minnesota
- Crossed experimental design:
  1) Outcross pollen added
  2) Self pollen only (bagged)
  3) Open-pollinated (unmanipulated)
- Sample size: 32 plants, 2-3 inflorescences per plant
- Observed daily progress of individual florets over 9 days
- Harvested ~790 seeds
- Determined seed set by weighing

Fig 3. Hand pollination of *D. leibergii* spikelet.

RESULTS

- Pollen-added and self-pollinated inflorescences had higher seed sets than open-pollinated ones (generalized linear mixed model with binomial response, n= 77 inflorescences on 32 plants, p=0.014).

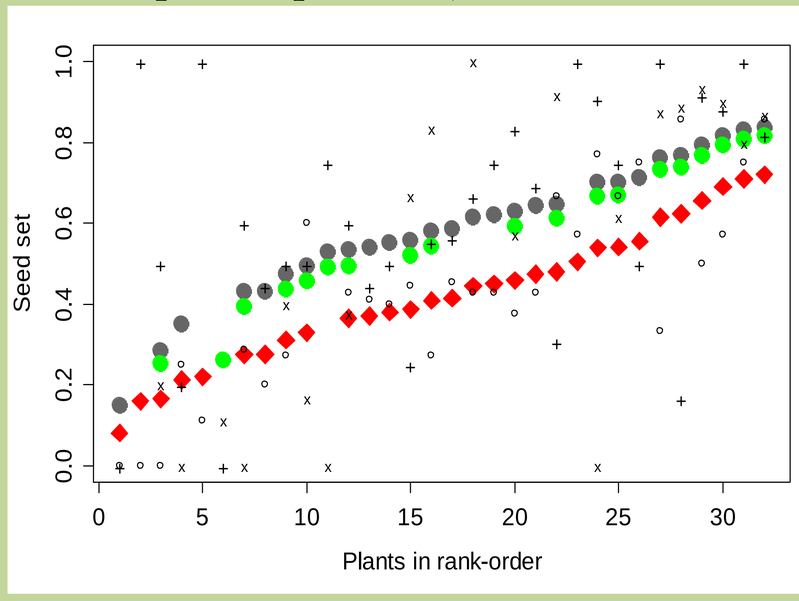

Fig 4. Seed set of inflorescences, as predicted by model:
gray: pollen-added;
green: selfed;
red: open-pollinated.

Actual data are shown:
‘+’ pollen-added;
‘**x**’ selfed;
‘**o**’ open-pollinated.

- Height, diameter, and density of neighboring conspecifics did not explain the variance among plants (glm with quasibinomial response, n= 32 plants)

POLLEN VIABILITY

- Assessed pollen viability by staining with 0.05% toluidine blue and viewing at 10X under compound microscope
- Preliminary results found >70% viability for all samples

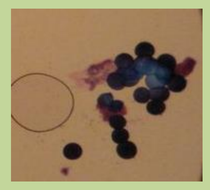

Fig 5. Staining levels indicate pollen viability

CONCLUSION

- *D. leibergii* suffers lower seed set due to inadequate pollen
  - may be a form of reproductive strategy
- *D. leibergii* is self-compatible

Fig 6. Bagged inflorescences at field site.

Fig 7. Older florets.

ACKNOWLEDGEMENTS

Many thanks to my amazing advisor Stuart Wagenius, Team Echinacea, Minnesota DNR, Dr. Alan Smith (UMN) and Ben Morgan (CBG). This project was supported by the National Science Foundation (Grants 0545072, 0544970, & 1052165), Northwestern University (Summer Undergraduate Research Grant and Katherine L. Krieghbaum Research Scholarship), and Garden Club of America (Clara Carter Higgins Summer Environmental Studies Scholarship).