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Cover Crops As Tools: How Soil Fungal Communities Can Be Prepared For Successful Prairie Restoration

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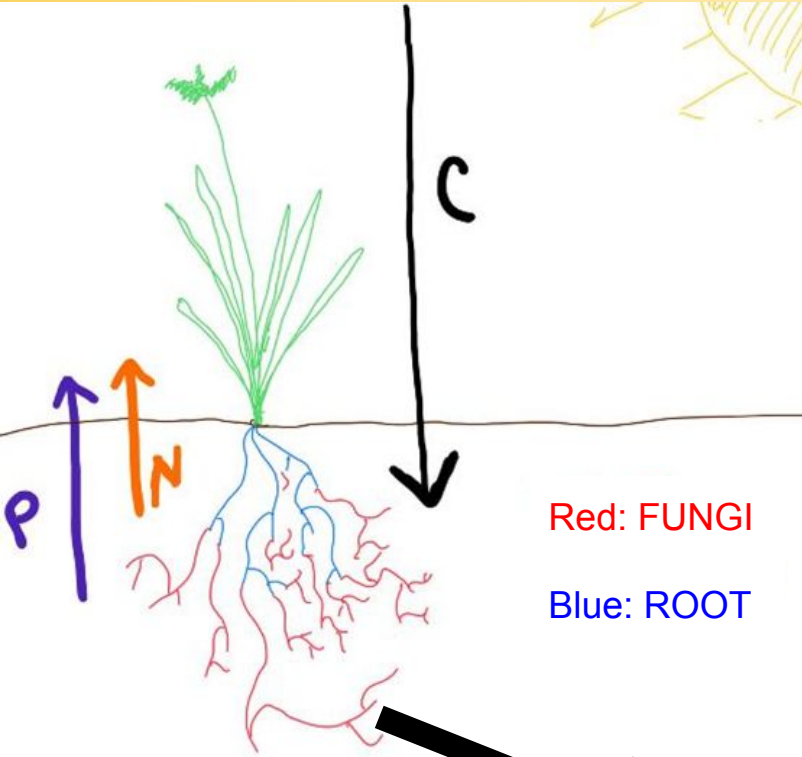
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Cover Crops as Tools: Manipulation of Fungal Soil Communities for Successful Prairie Restoration

Andrew Allee, Blake Branch,
Elizabeth Middleton (Indiana Department of Natural Resources), and Alice Tipton

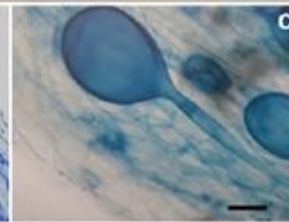
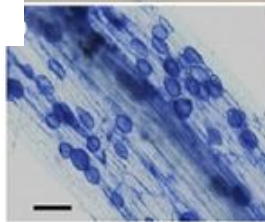
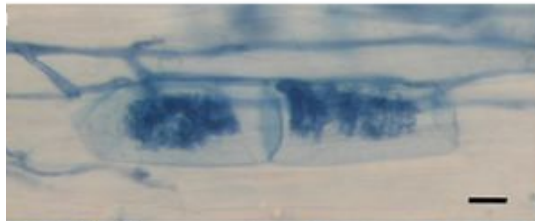


What are AMF and why do we care?



Red: FUNGI

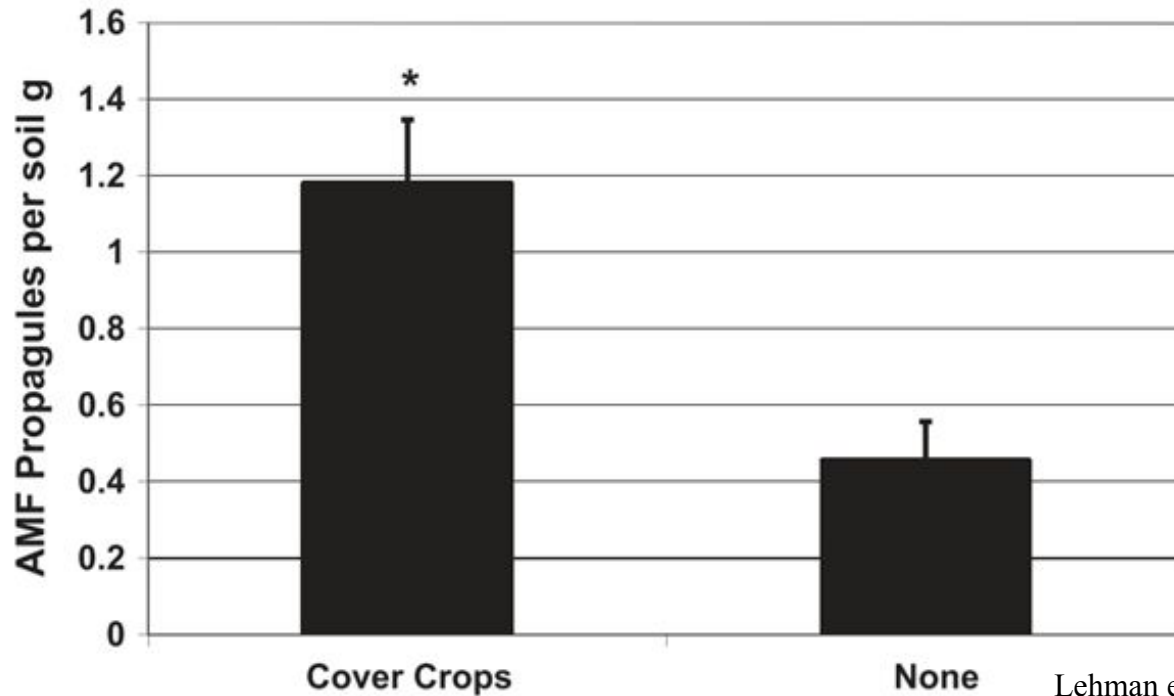
Blue: ROOT



Modern agricultural practices, such as fertilizer additions and tillage alter AMF communities (Stover et al. 2012 *Appl Soil Ecol*; Liu et al. 2015 *Soil Biol Biochem*; Avio et al. 2013 *Soil Biol Biochem*).

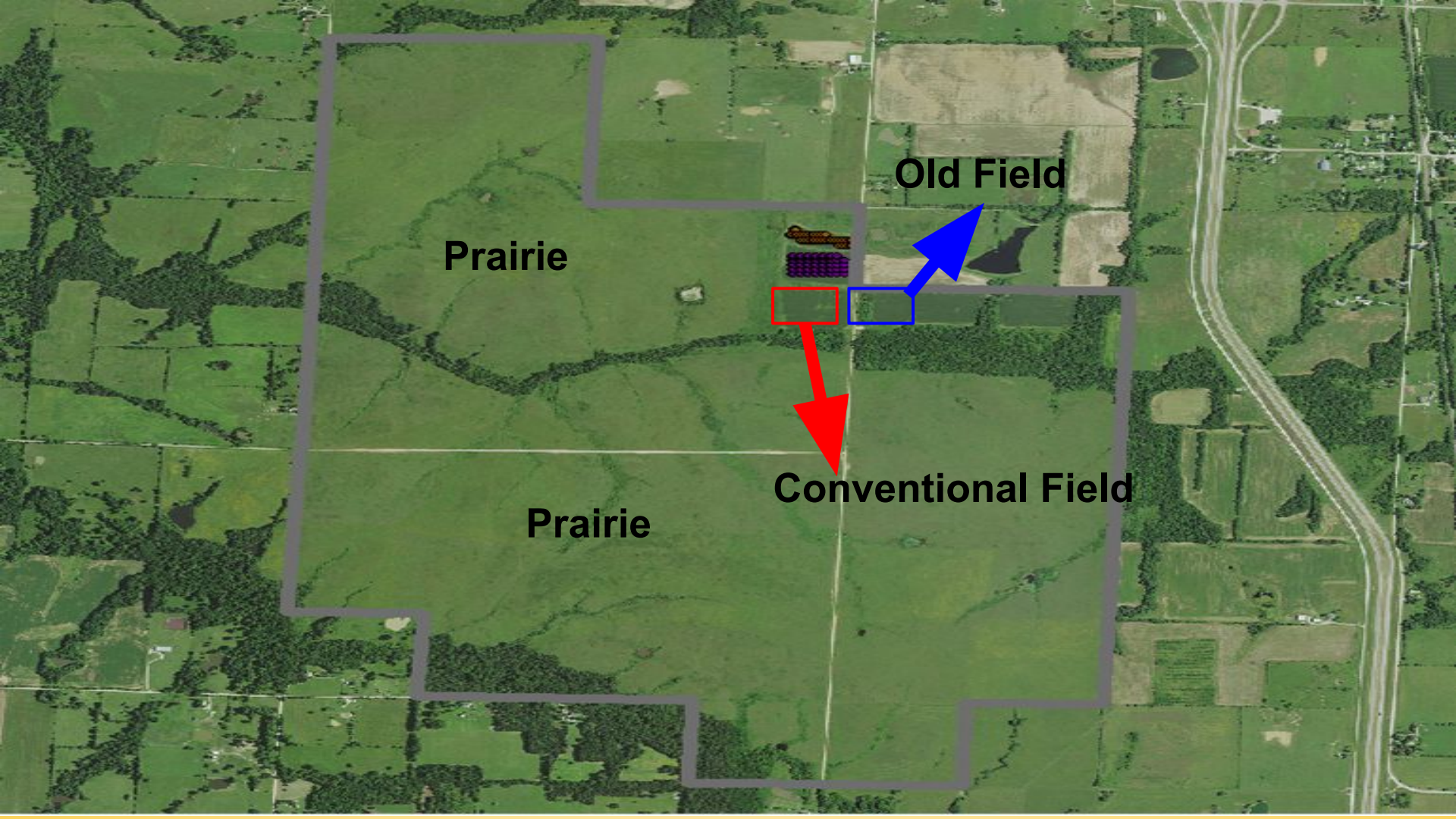


Can the use of cover crops produce a more “prairie-like” soil making restoration easier?



- **Main question:** Can the use of cover crops produce a more “prairie-like” soil making restoration easier?
- Five year study
- **Results at this point are the preliminary data,** comparing the AMF community in old fields (where cover crop treatments will be placed), a conventional field, and a prairie





Prairie

Old Field



Conventional Field

Prairie

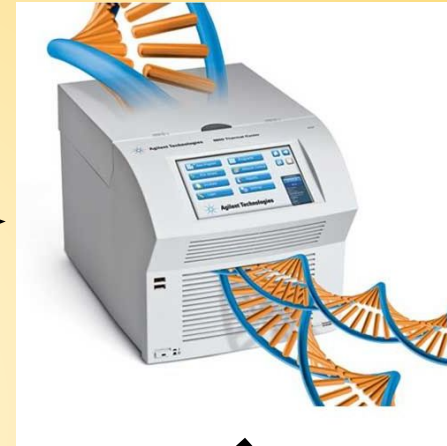
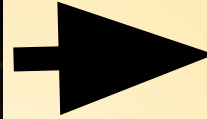
Project overview



Collect Soil



Extract DNA



PCR:
“Copy
Machine”



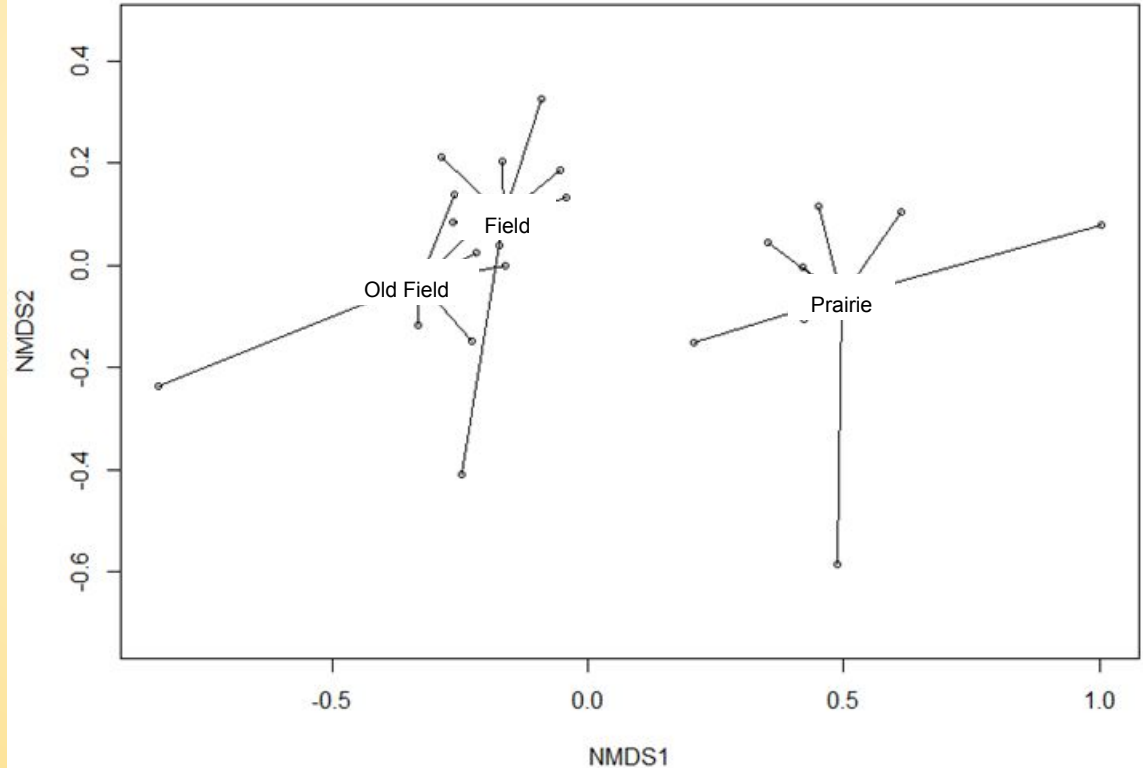
Barcode DNA
via Sequencing



Community Composition of Each Treatment Group is Different: Fields are Distinct from Prairie

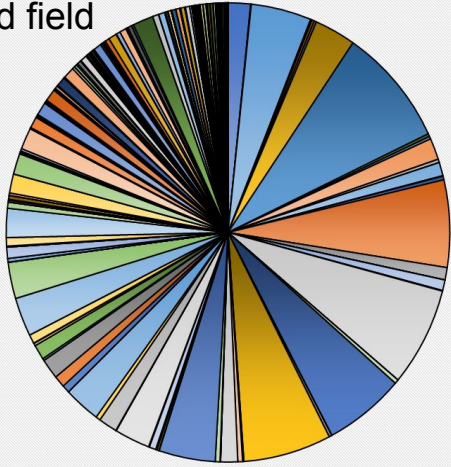
- Why NMDS?
“Clustering” based upon OTU similarity or difference between treatments

$P < 0.001^{**}$

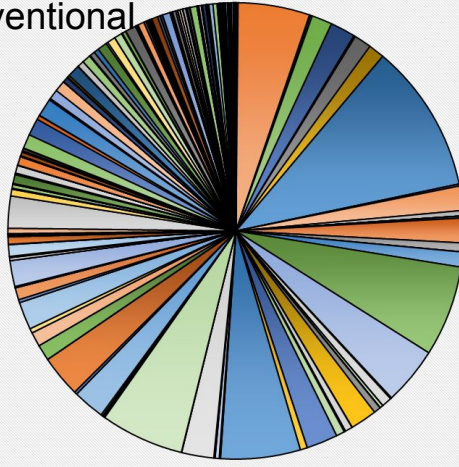


Community composition by field type

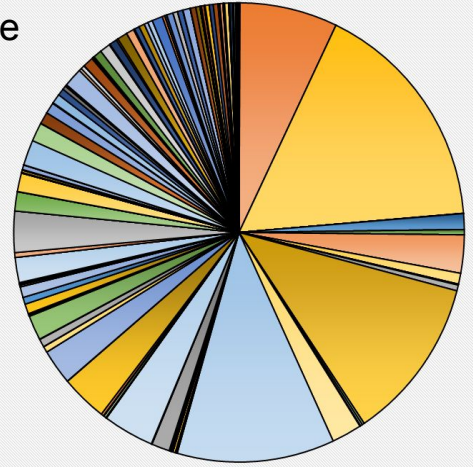
Old field



Conventional field



Prairie

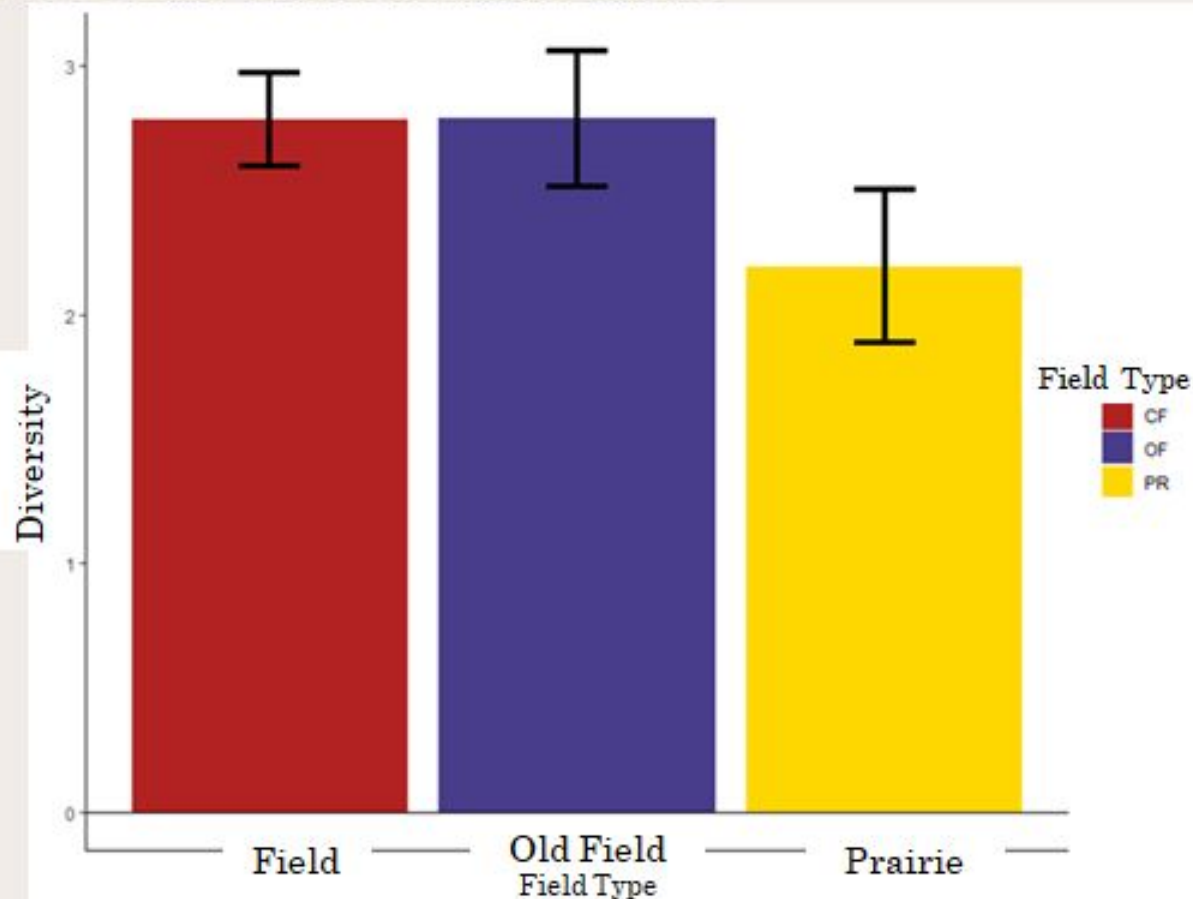


No Significant Difference in Diversity Between Treatments

$P > 0.205$

Diversity: Relative abundance and evenness of species in a community

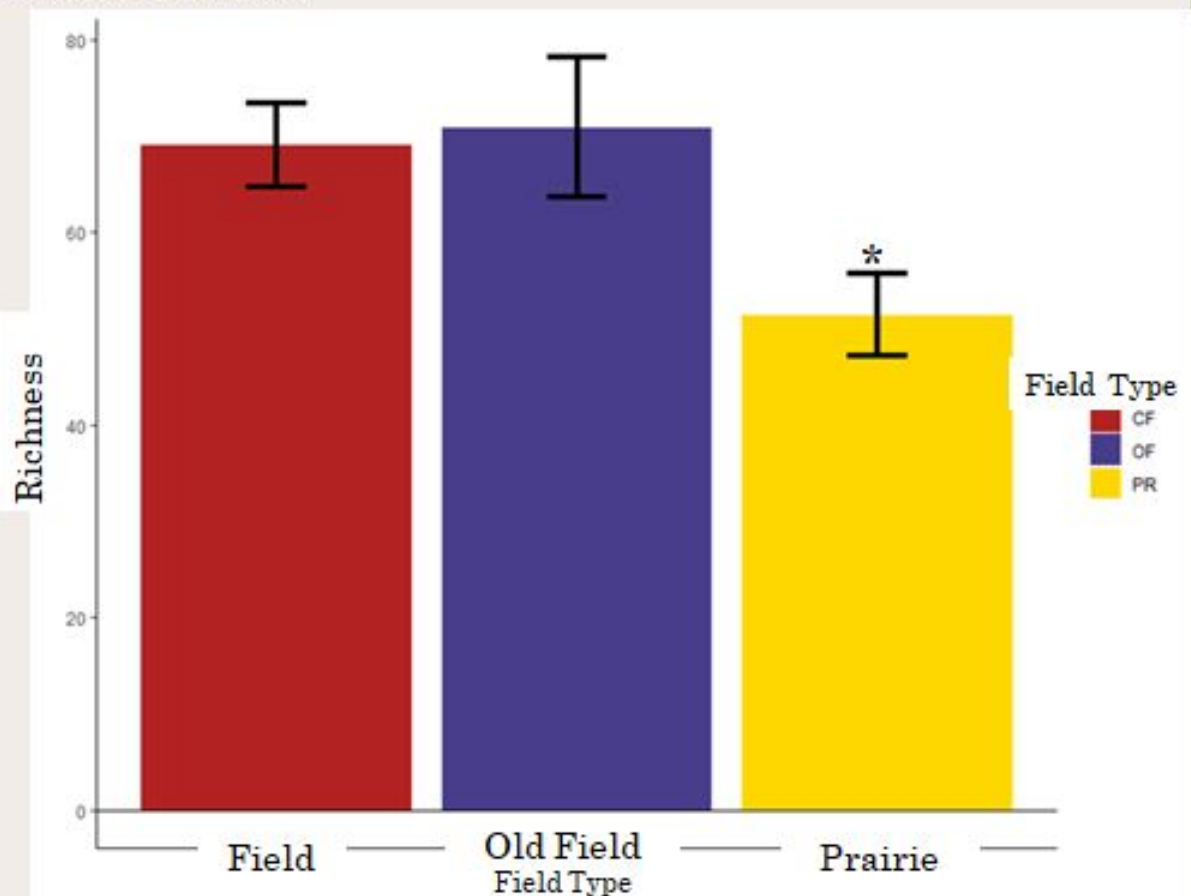
LsMeans Package
Rstudio: Shannon
Diversity Test



Significant Difference in Richness Between Treatments

* $P < 0.05$

Richness: The number of different species in a community



Conclusions & Limitations

Conclusion:

- **1. The community composition of prairie vs other fields is distinct
2. Richness was significantly different in treatments, but diversity was not

Limitations:

1. This is preliminary data for the project as a whole
2. This data speaks to one community, and CANNOT be applied to all prairies, and fields- only this sample

Future Directions

Moving Forward:

1. Monitor soil nutrient data (PLFA)
2. Monitor soil AMF community composition
3. Once prairie planting begins, we'll monitor the number of rare species that establish



Acknowledgments

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