SOIL MODIFICATION AS A RESTORATION TOOL TO REDUCE OLD WORLD BLUESTEMS

Trials, Tribulations, & Interesting Finds

Adam B. Mitchell\textsuperscript{1}, Andrea R. Litt\textsuperscript{1}, Anthony D. Falk\textsuperscript{2}, Forrest S. Smith\textsuperscript{2}

\textsuperscript{1}Fish and Wildlife Ecology and Management Program, Montana State University, Bozeman, MT
\textsuperscript{2}South Texas Natives, Kingsville, TX
Old World bluestem grasses
(OWB, Bothriochloa spp., Dichanthium spp.)
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Soil Modification

• Changes in soil pH

• Nutrient availability

• Soil microbiota
Goals & Objectives

• Restore Native Vegetation
  – Reduce OWB dominance, cover, composition, and structure

• Restore Native Arthropod Communities
  – Increase abundance and diversity

• Quantify Efficacy for Landowners
Study Site

Kleberg bluestem
(D. annulatum)
Control and Reference Site
Initial Treatments: Disking
Initial Treatments: Soil treatments

- Disturbance
- pH decrease
- pH increase
- Carbon addition
- Mycorrhizae

- Disturbance+seed
- pH decrease+seed
- pH increase+seed
- Carbon addition+seed
- Mycorrhizae+seed
Initial Treatments: Soil treatments

- Disturbance
- pH decrease: Sulfur
  - 3.59 kg/plot
- pH increase: Lime
  - 69.84 kg/plot
- Carbon: Sucrose
  - 7.35 kg/plot
- Mycorrhizae: MycoGrow
  - 57.6 kg/plot
Initial Treatments: Seeding
Sampling Methods

- **Plots**
  - 6 x 9-m

- **Quadrats**
  - 1m²
  - 2 each

- Sampled every month in the summer
Vegetation Sampling

- Canopy Cover
- Density
- Height
- Species
- Soil Chemistry
Arthropod Sampling

- Pitfall Traps
- DVAC
- Berlese Funnel
- Family, Morphospecies
- Functional Group

www.bioquip.com
Results: Post-Treatment 2011

http://www.droughtmonitor.unl.edu/

Sept 2011
Soil pH

![Soil pH Graph]

Kleberg  Native

Sulfur Seed  Sulfur  Lime Seed  Lime
Available Nitrate

Kleberg Native Carbon Seed Carbon
Results: Post-Treatment 2012

http://www.droughtmonitor.unl.edu
Invasion, Drought, & Interaction
Plant Species Richness

2011

2012

Kleberg Native

Kleberg Native
Plant Community Composition

2011

Kleberg Native

2012

Kleberg Native

- Bare
- Litter
- Grass
- OWB
- Forb
- Wood

Graph showing the plant community composition for Kleberg and Native in 2011 and 2012.
Arthropod Species Richness

2011

Kleberg
Native

2012

Kleberg
Native
Arthropod Abundance

2011

2012

Kleberg
Native

Kleberg
Native
Arthropod Community Composition
Functional Groups

2011

Kleberg Native

2012

Kleberg Native
Arthropod Community Composition

• Kleberg 2011
  – *Blattella vaga* (21%)
  – *Solenopsis invicta* (17%)
  – *Armadillidium vulgare* (15%)

• Kleberg 2012
  – *Mochloribatula texana* (47%)
  – *Blatella vaga* (10%)
  – *Entomobryra* spp. (5%)
Arthropod Community Composition

- **Native 2011**
  - *Armadillidium vulgare* (70%)
  - *Entomobrya* spp. (8%)
  - *Solenopsis invicta* (5%)

- **Native 2012**
  - *Armadillidium vulgare* (30%)
  - *Solenopsis geminata* (8%)
  - *Entomobrya* spp. (7%)
Conclusions

• Impacts of plant invasion on communities are influenced by drought events

• Arthropod composition reflect changes in plant communities for higher trophic levels

• Relationships between plant invasion and climatic variation can give insight to management
Future Work