VEGETATION RECOVERY IN SLASH PILE SCARS FOLLOWING RESTORATION OF AN OZARK WOODLAND

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Slash Pile Scars

- Land Management Technique
- Goals:
  - Removal of woody Debris
  - Fire Suppression (Western US)
  - Prescribed Burns (Shaw)

Photo by Quinn Long
Vegetation Recovery in Burn Piles

Percent Native Plant Cover

P=0.018

Passive recovery burn plot 6 months after burn
Experimental Questions

- How does pile burning alter soil nutrient, moisture, and compaction compared to unburned areas?
- Are some native species superior than others at colonizing burn-scars during the first-growing season?
- What is the relative importance of the soil biotic and abiotic environment in determining initial germination and establishment rates in slash pile scars?
Species Used in Field and Lab Experiment

Grasses
- Bromus pubescens
- Chasmanthium latifolium

Composites
- Symphyotrichum drummondii
- Solidago ulmifolia

Legumes
- Lespedeza violacea
- Senna marilandica
Field Study

- **Goal:** Determine what species are best able to colonize a burn scar

*Photo by Leighton Reid*
Field Study: Soil Results

- **pH**: Burn, Control
  - Burn: 8
  - Control: 7
  - $P = 0.009$

- **Olsen P**: Burn, Control
  - Burn: 500
  - Control: 400
  - $P = 0.005$

- **Sum N (ppm)**: Burn, Control
  - Burn: 12
  - Control: 10
  - $P = 0.49$

- **Cation Exchange Capacity (CEC)**: Burn, Control
  - Burn: 30
  - Control: 25
  - $P = 0.001$

- **Organic Matter (%)**: Burn, Control
  - Burn: 4
  - Control: 3
  - $P = 0.01$

- **Soil Compaction (kg/cm²)**: Burn, Control
  - Burn: 3
  - Control: 2
  - $P < 0.001$
Field Study: Species Establishment

Grasses

- Brup: P=0.01
- Plot Occupancy
- Burn: Green
- Control: Green

Composites

- Sydr: P<0.001
- Plot Occupancy
- Burn: Brown
- Control: Green

Legumes

- Levi: P=0.04
- Plot Occupancy
- Burn: Brown
- Control: Green

- Soul: P=0.03
- Plot Occupancy
- Burn: Brown
- Control: Green

- Sema: P=0.04
- Plot Occupancy
- Burn: Brown
- Control: Green
Lab Experimental Design

- Germination and seedling growth experiments
- Goal:
  - Determine importance of abiotic and biotic factors in germination and establishment rates in slash pile scars
Germination Experiment

- Monitored germination over 30 days
- Four treatments:
  - Control
  - Sterilized Control
  - Burn
  - Sterilized Burn
Germination Results: Grasses

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<tbody>
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<td><strong>Burn Control</strong></td>
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**Germination Proportion**

- **Bromus pubescens**
  - NS

- **Chasmanthium latifolium**
  - NS
Germination Results: Composites

**Symphyotrichum drummondii**

- Sterilization: $P < 0.001$
- Germination Proportion
  - Unsterile Burn: a
  - Sterile Burn: b
  - Unsterile Control: a
  - Sterile Control: b

**Solidago ulmifolia**

- Soil Type: $P < 0.001$
- Germination Proportion
  - Unsterile Burn: a
  - Sterile Burn: a
  - Unsterile Control: b
  - Sterile Control: b
Germination Results: Legumes

Soil Type × Sterilization: $P < 0.001$

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<td><strong>Lespedeza violacea</strong></td>
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<td><strong>Senna marilandica</strong></td>
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Soil Type × Sterilization: $P < 0.001$

- **Lespedeza violacea**
  - Unsterile Burn
  - Sterile Burn
  - Unsterile Control
  - Sterile Control

- **Senna marilandica**
  - Unsterile Burn
  - Sterile Burn
  - Unsterile Control
  - Sterile Control
Seedling Growth and Biomass

- Same four soil types/treatments as germination experiment
- Seedling growth monitored in pots
Biomass Results: Grasses

*Bromus pubescens*

Soil Type: $P = 0.03$

- Unsterile Burn
- Sterile Burn
- Unsterile Control
- Sterile Control

*Bromus pubescens*

Soil Type: $P < 0.0001$

- Unsterile Burn
- Sterile Burn
- Unsterile Control
- Sterile Control

*Chasmanthium latifolium*

Soil Type: $P < 0.0001$

- Unsterile Burn
- Sterile Burn
- Unsterile Control
- Sterile Control
Biomass Results: Composites

Symphyotrichum drummondii

- Sterilization: $P = 0.01$

- Unsterile Burn: a
- Sterile Burn: b
- Unsterile Control: a
- Sterile Control: b

Solidago ulmifolia

- Soil Type × Sterilization: $P = 0.02$
- Soil Type: $P = 0.003$
- Sterilization: $P = 0.005$

- Unsterile Burn: ab
- Sterile Burn: a
- Unsterile Control: ab
Biomass Results: Legumes

**Lespedeza violacea**
- Soil Type: $P < 0.01$
- Sterilization: $P = 0.06$

**Senna marilandica**
- Soil Type: $P = 0.04$
- Sterilization: $P = 0.06$
Conclusions

- Burn pile scars alter soil chemistry, nutrients, moisture, and compaction.
- Most species showed lower occupancy and biomass in burn scars relative to the controls.
- Mechanisms for reduced establishment are not due to lower germination capacity in burn scars.
- Several species achieved greatest biomass in unsterilized soil suggesting positive soil feedbacks.
- Vegetation recovery in burn piles can be expedited by seed additions.
Acknowledgments

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