

# Revegetation of Exotic Annual Grass-Invaded Rangelands

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# Why Revegetate?

- Increase diversity
- Provide higher quality forage
- Improve wildlife habitat
- Decrease frequent fires



# Effective control is first step

- Burning
- Grazing
- Mechanical
- Herbicide
  - Plateau (imazapic)
  - Roundup (glyphosate)
  - Milestone (aminopyralid)
  - Others



# Spring treatments

- Spring application of imazapic (87.5 g ai·ha<sup>-1</sup>) with surfactant

Mid-May post-spray



Early-June

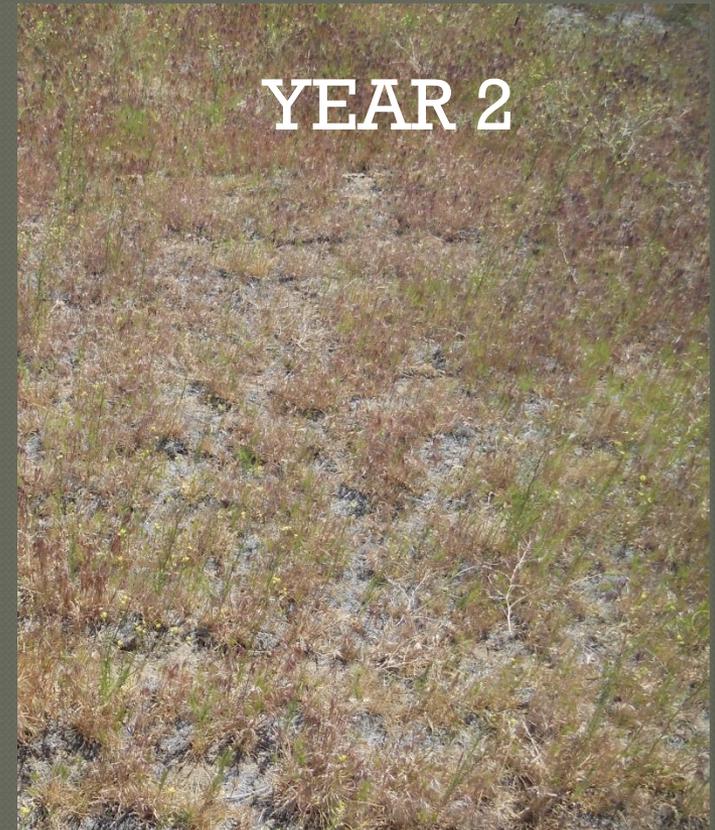


rain



# Spring treatments (Glyphosate)

- 32 oz·ac<sup>-1</sup> (Davies unpublished)
  - 0-10 AG per m<sup>2</sup> (year 1)
  - ~200 AG per m<sup>2</sup> (year 2)
- 2.2-4.4 oz·ac<sup>-1</sup> (Kyser et al. 2012)
  - Medusahead control
  - Minimal damage to non-target
  - Multiple years



# Herbicide Effects on Residual Vegetation

- **Glyphosate**
  - Contact herbicide
  - Damage limited at low rates  
 $2.2-4.4 \text{ oz}\cdot\text{ac}^{-1}$
  - Infrequent windows of opportunity
- **Imazapic & other pre-emergent herbicides**
  - Timing is critical
  - Surfactant increase risk
  - Native annuals



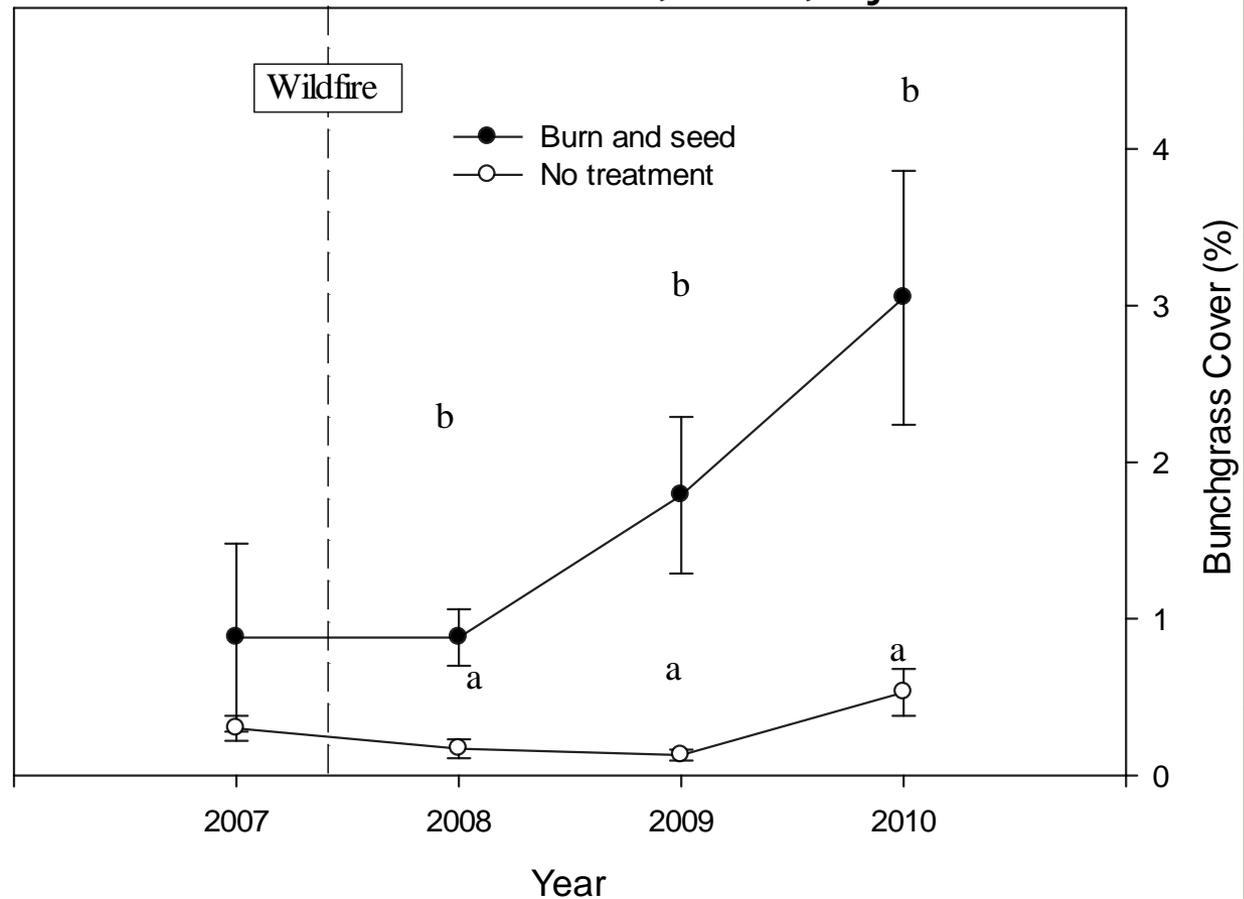
# Control

- Gradual increases in exotic AG
  - Follow up treatments
  - Need to seed
- Need to change dominance from annuals to perennials



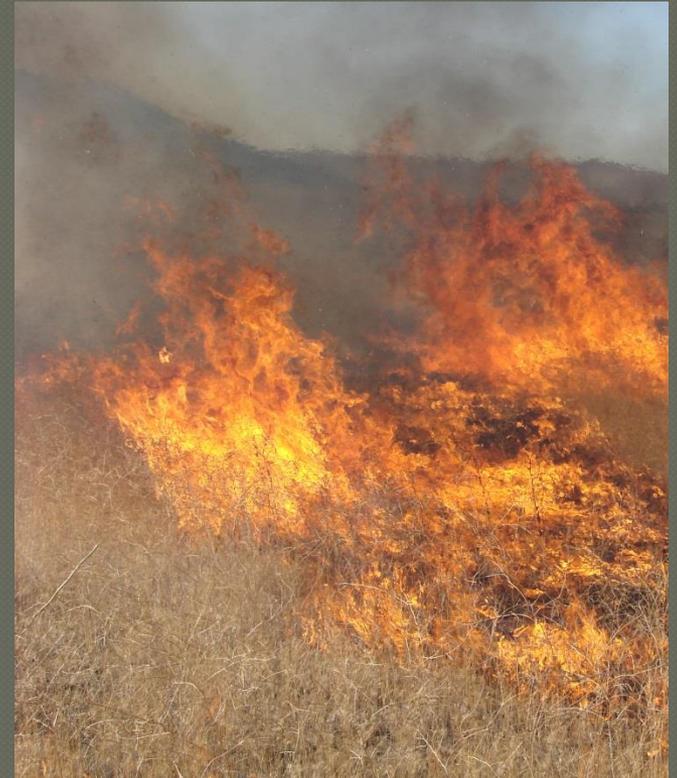
# Seeding after wildfire (w/out herbicide)

Davies, Nafus, & Johnson 2013



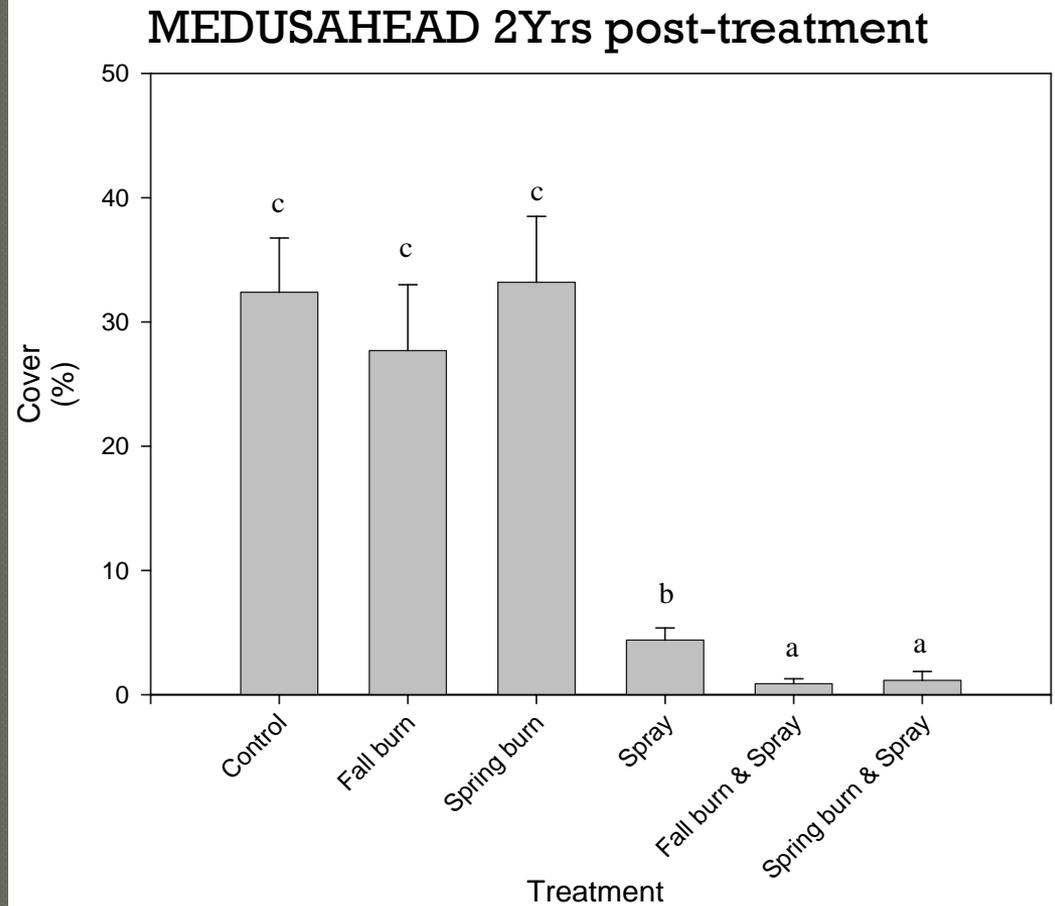
# Seeding after wildfire (w/out herbicide)

- PG abundance and cover too low
- Exotic annual density > 130 plants per m<sup>2</sup>
- Need follow-up treatment

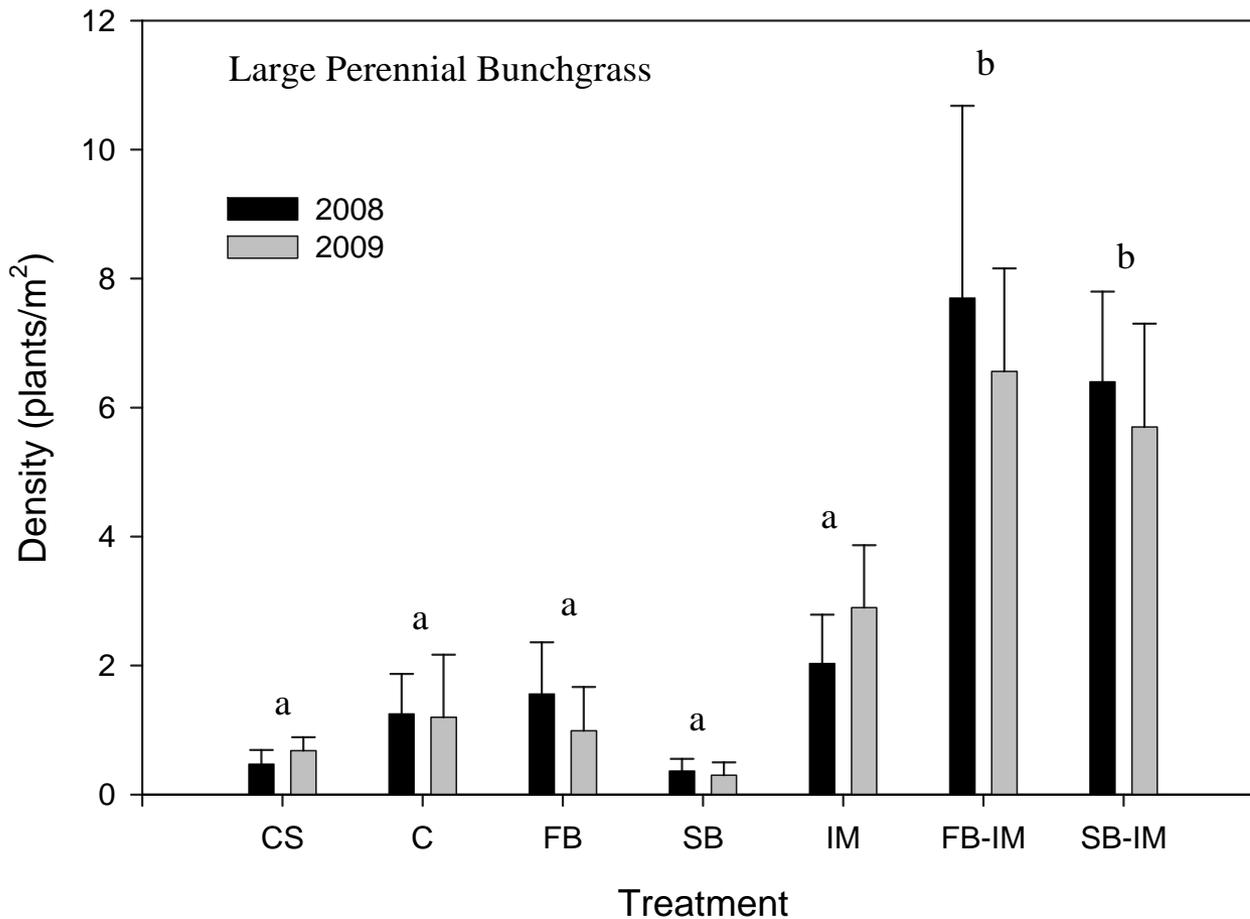


# Control

- Burning applied in spring or fall prior to spraying
- Imazapic
  - fall application
  - 6 oz per ac



# Control and Revegetate



CS = Control + seed

C = Control

FB = Fall burn

SB = Spring Burn

IM = Imazapic  
(Plateau®)

FB-IM = Fall burn and  
Imazapic

SB-IM = Spring burn &  
Imazapic



September 2006

**Davies 2010**



May 2010

*burn & imazapic*

*Seed crested  
wheatgrass &  
Squirreltail*



October 2007

Imazapic at 87.5 g ai ha<sup>-1</sup>. One year (2012) after seeding



Seeded one year post-control



Seeded immediately after control

# One pass-system: 2 yrs post seeding

Seeding one year after imazapic

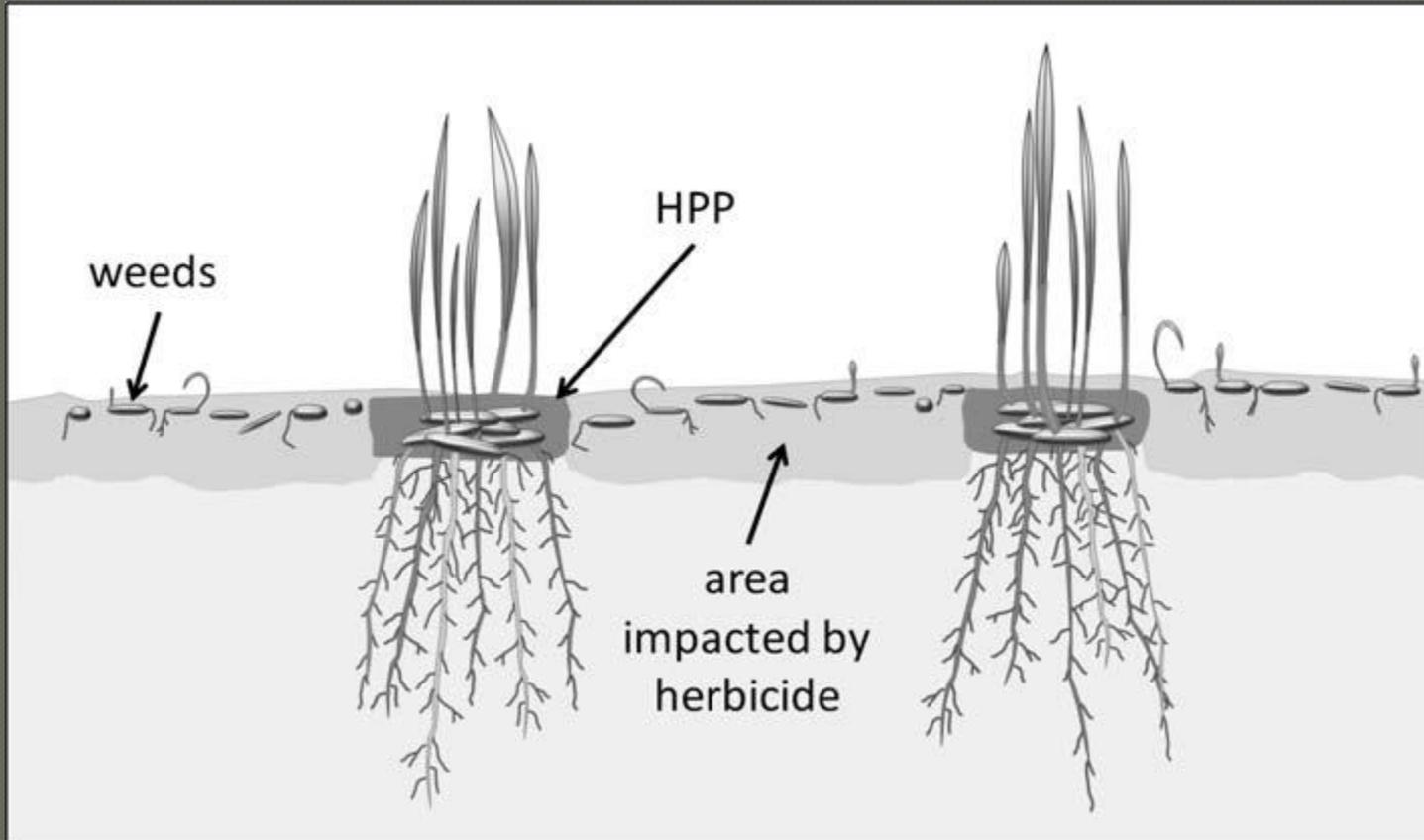


Seeding & imazapic simultaneously

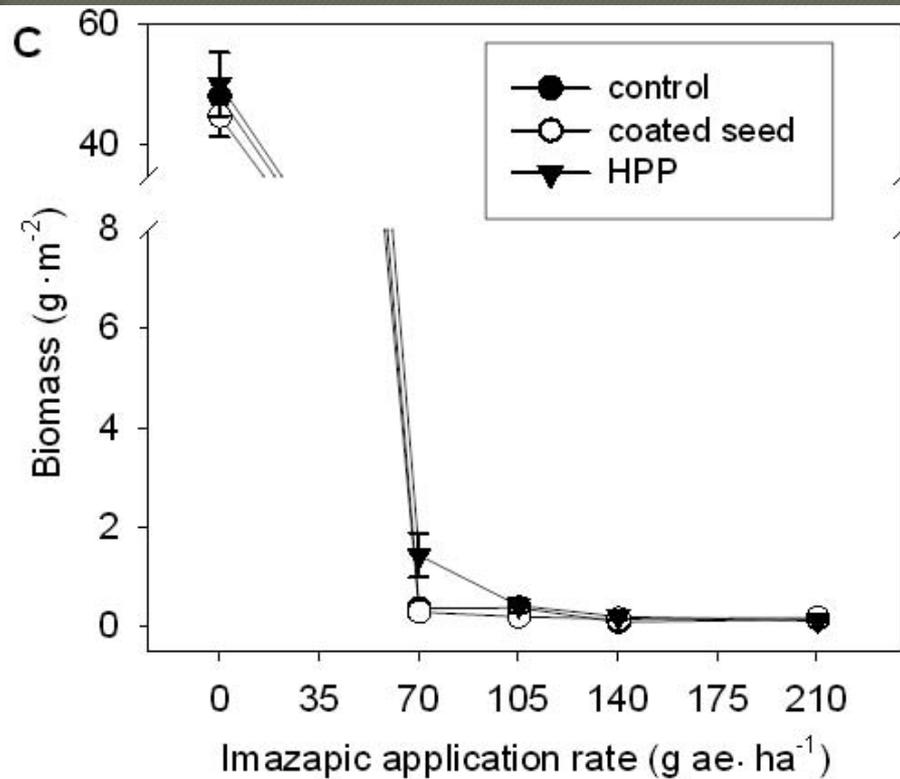


Davies, Madsen, Nafus, Boyd, & Johnson 2014

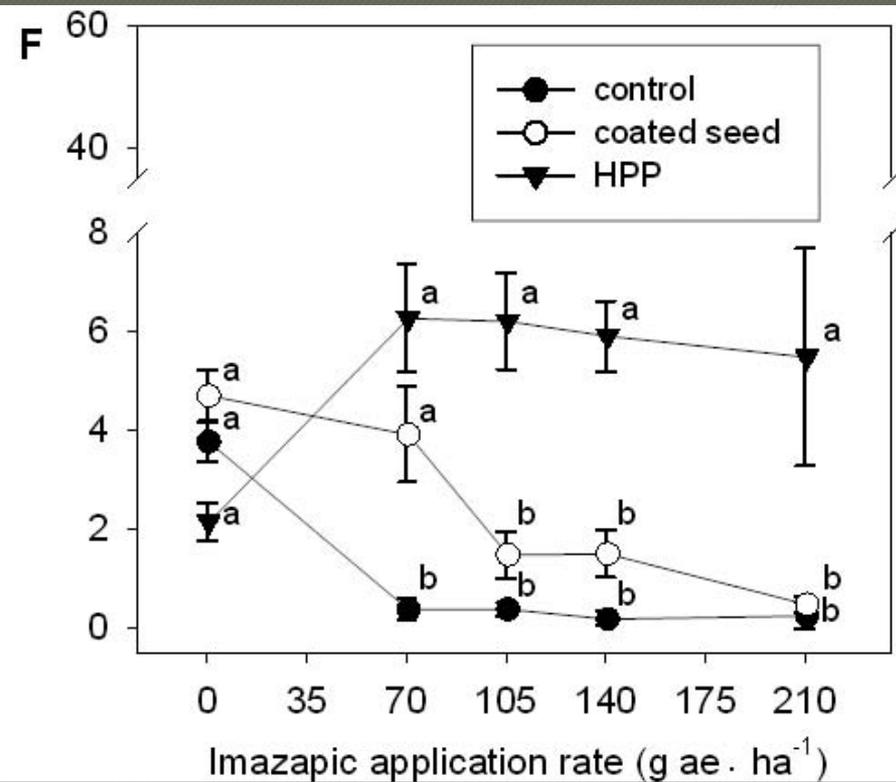
# Activated carbon pods (HPP) to improve one pass system



## Cheatgrass



## Bluebunch Wheatgrass

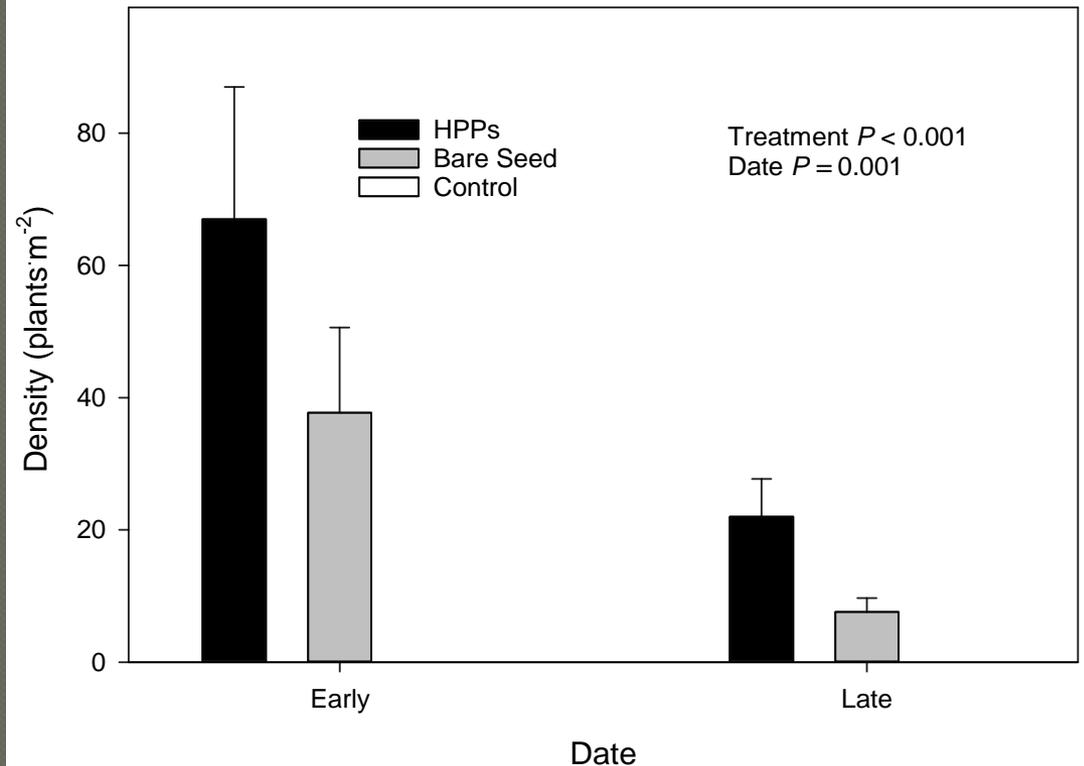




Pellet - 12oz - B2

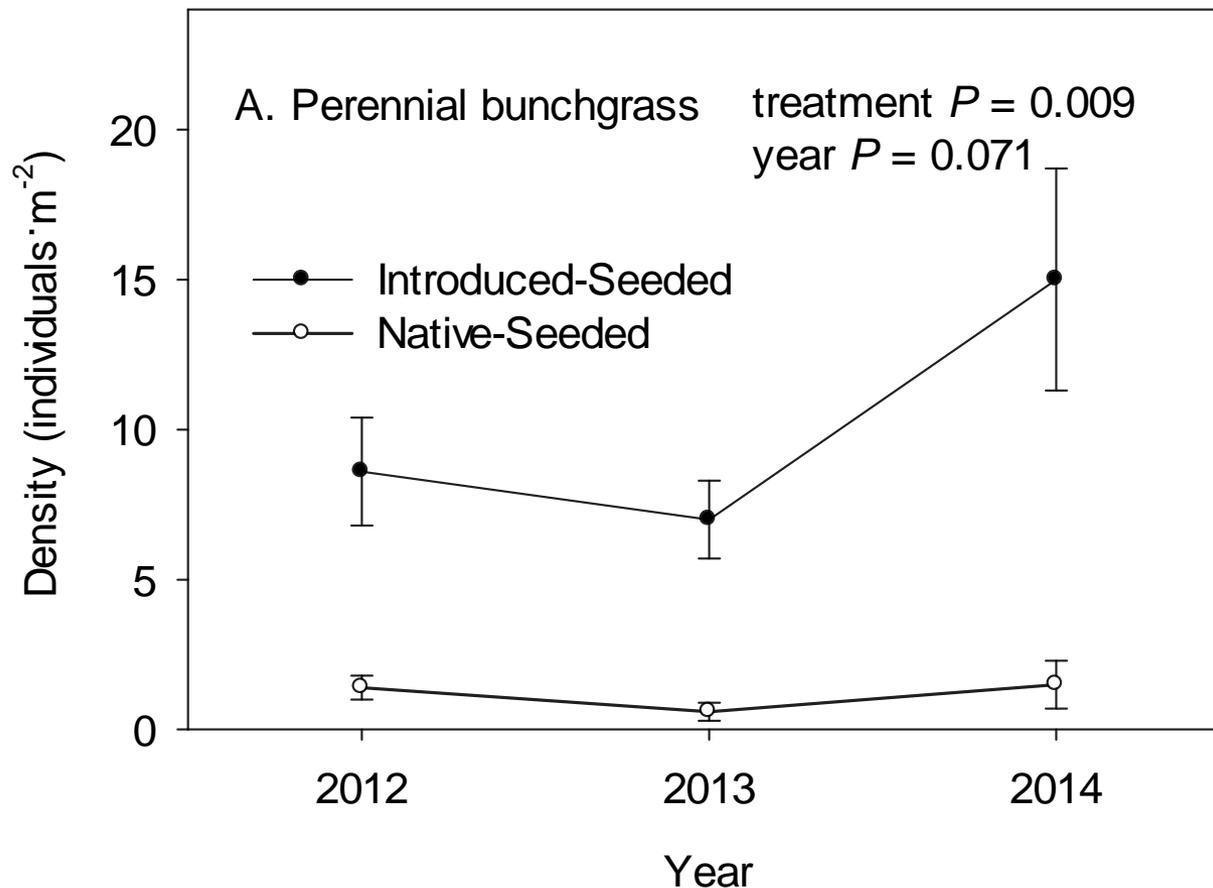
# Field trials of HPPs

- Crested wheatgrass
- Cheatgrass and Medusahead site
- 6 oz Imazapic per acre
- 300% survival with HPPs



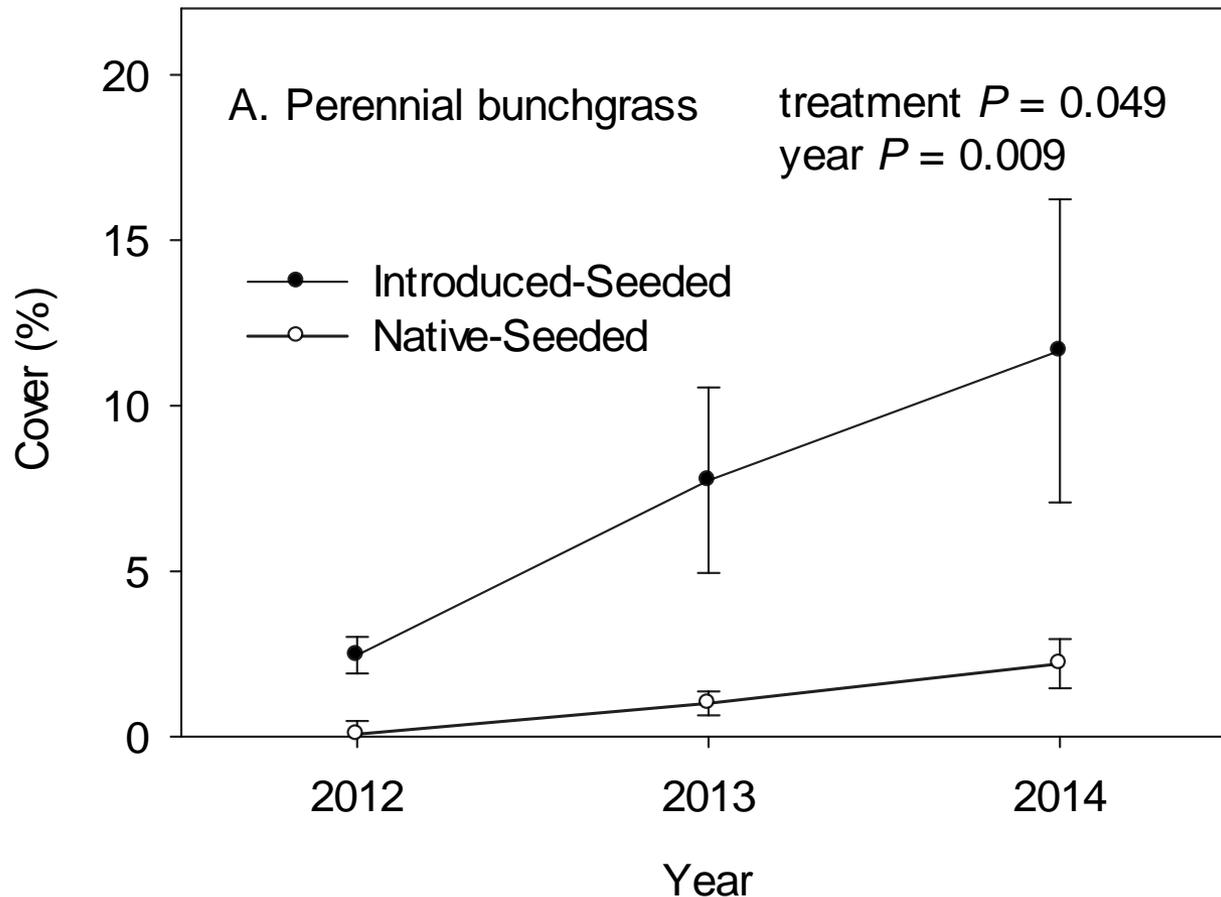
# Revegetation: Native vs. Introduced

Davies, Boyd, Johnson, Nafus, & Madsen (2015)

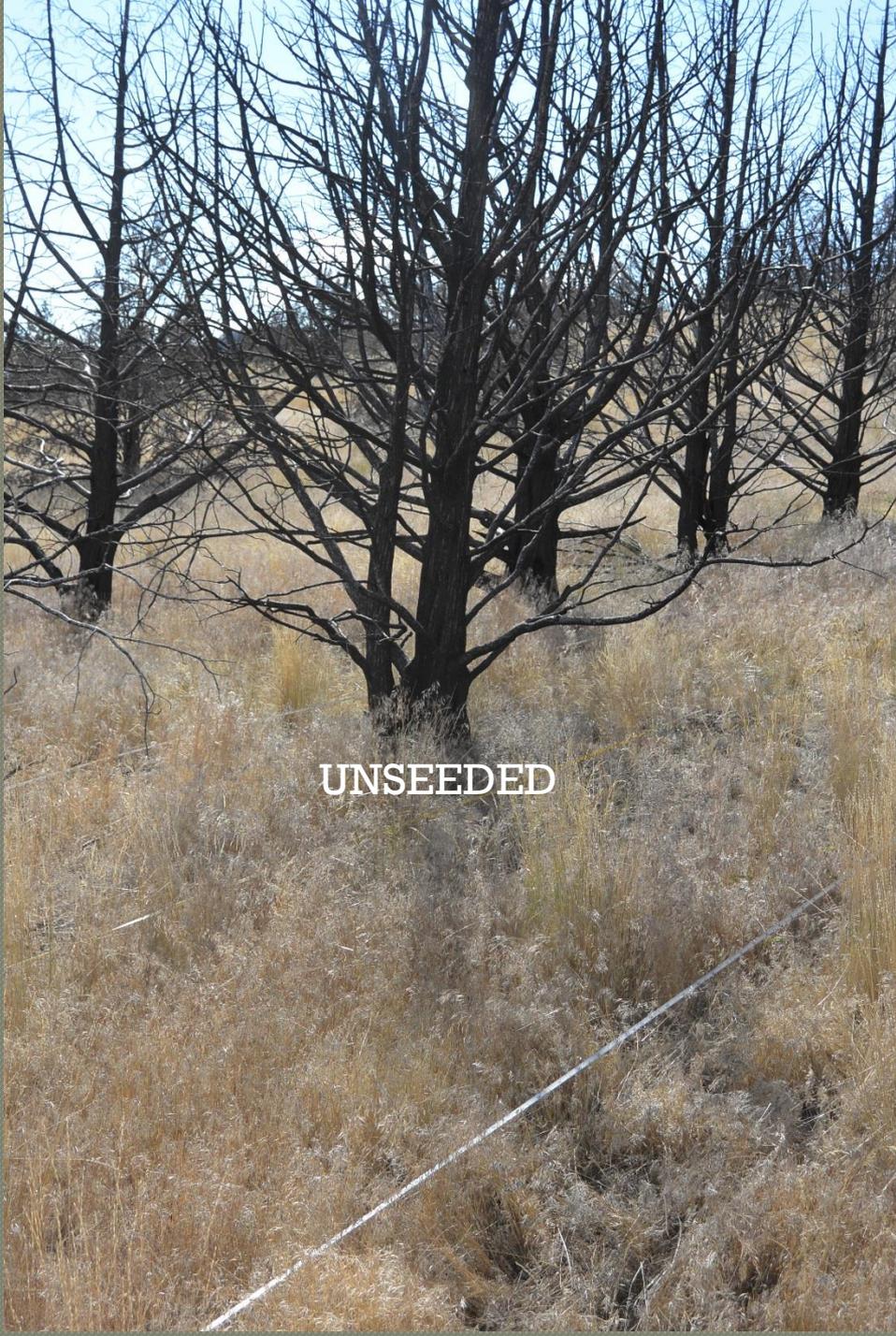


# Revegetation: Native vs. Introduced

Davies, Boyd, Johnson, Nafus, & Madsen (2015)







# Where Natives are Successful

- Successful at higher elevations
- Successful with greater precipitation
- May need better and longer control of exotics
- Seed enhancement technologies





- Natives challenged to establish
- Seedling stage is limitation

# Lessons learned

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- Integrated treatments improves control and revegetation
- Successful control is a must
- Apply pre-emergent prior to annual grass growth
- Wait one year to seed after pre-emergent herbicide
- Native species can be used on cooler and wetter sites

A landscape photograph showing a fence line running through a field of tall grass. In the background, there are rolling hills under a clear blue sky. The word "Questions?" is overlaid in white text in the center of the image.

Questions?