

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⁻¹) with surfactant

Mid-May post-spray



rain



Early-June



Spring treatments (Glyphosate)

- 32 oz·ac⁻¹ (Davies unpublished)
 - 0-10 AG per m² (year 1)
 - ~200 AG per m² (year 2)
- 2.2-4.4 oz·ac⁻¹ (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



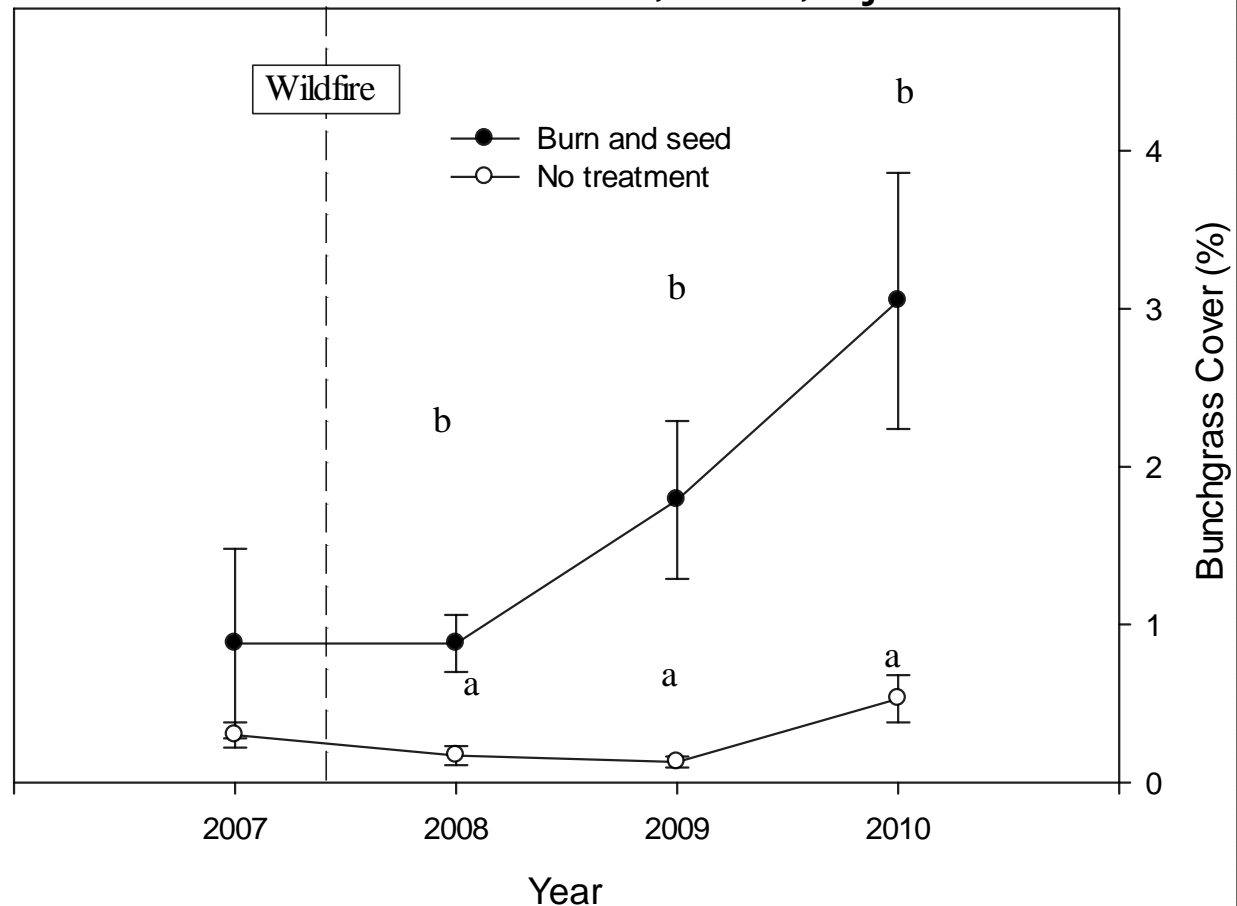
Control

- 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



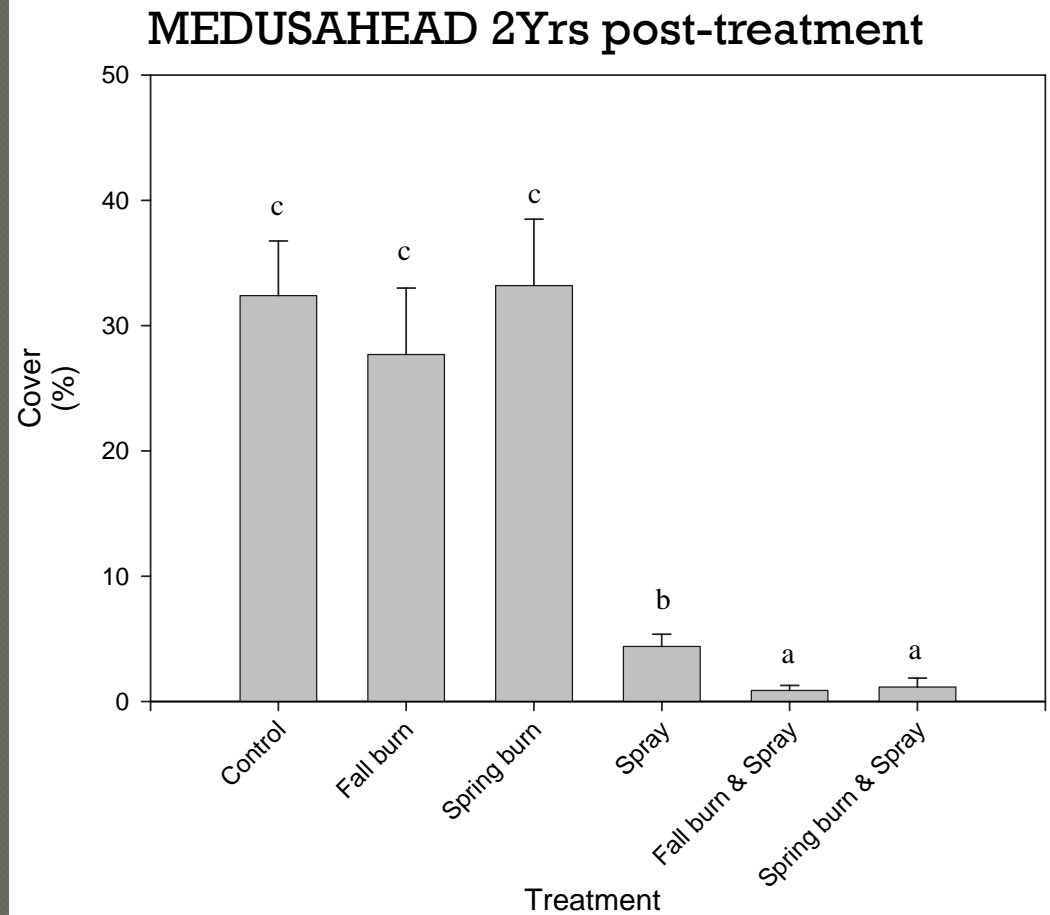
Seeding after wildfire (w/out herbicide)

- PG abundance and cover too low
- Exotic annual density >130 plants per m²
- Need follow-up treatment

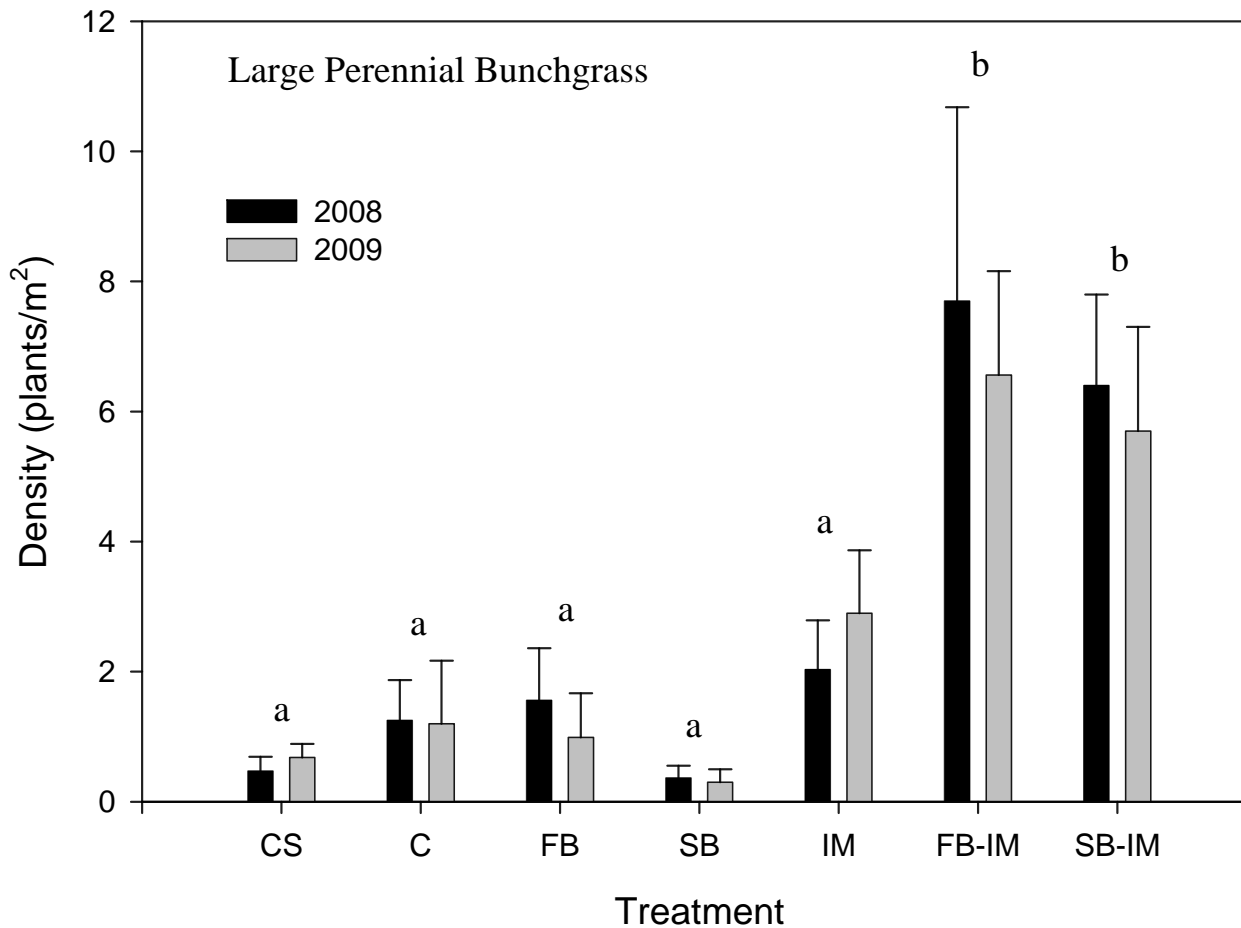


Control

- 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

Davies 2010



September 2006

burn & imazapic



May 2010

Seed crested
wheatgrass &
Squirreltail



October 2007

Imazapic at 87.5 g ai ha⁻¹. 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

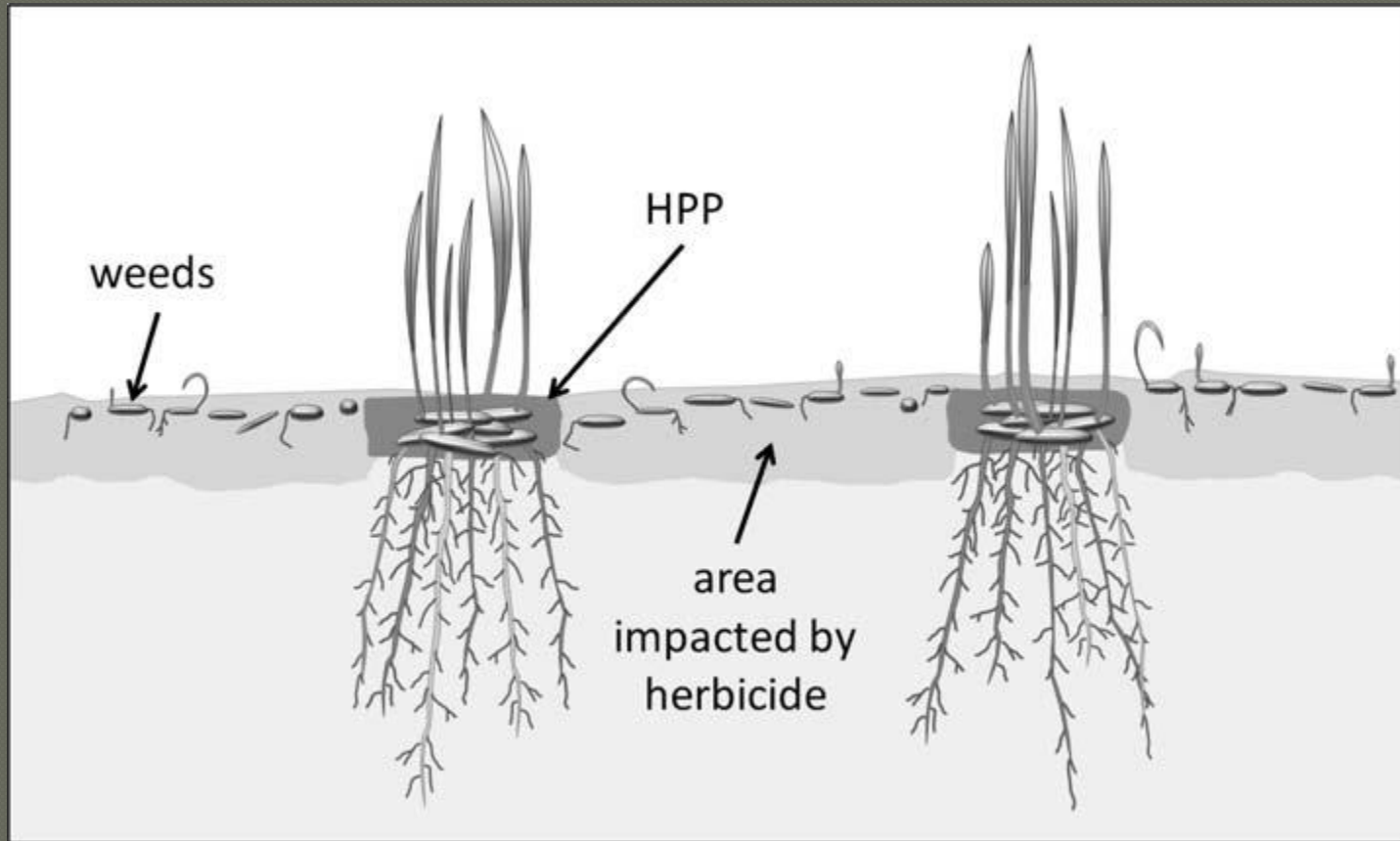


Seeding & imazapic simultaneously

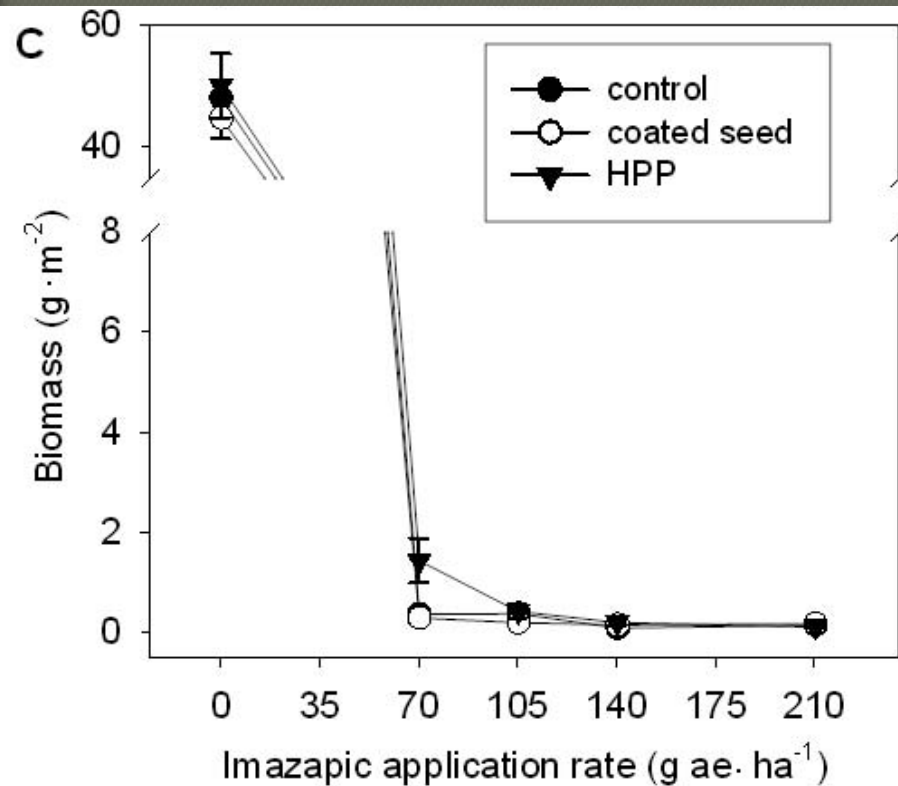


Davies, Madsen, Nafus, Boyd, & Johnson 2014

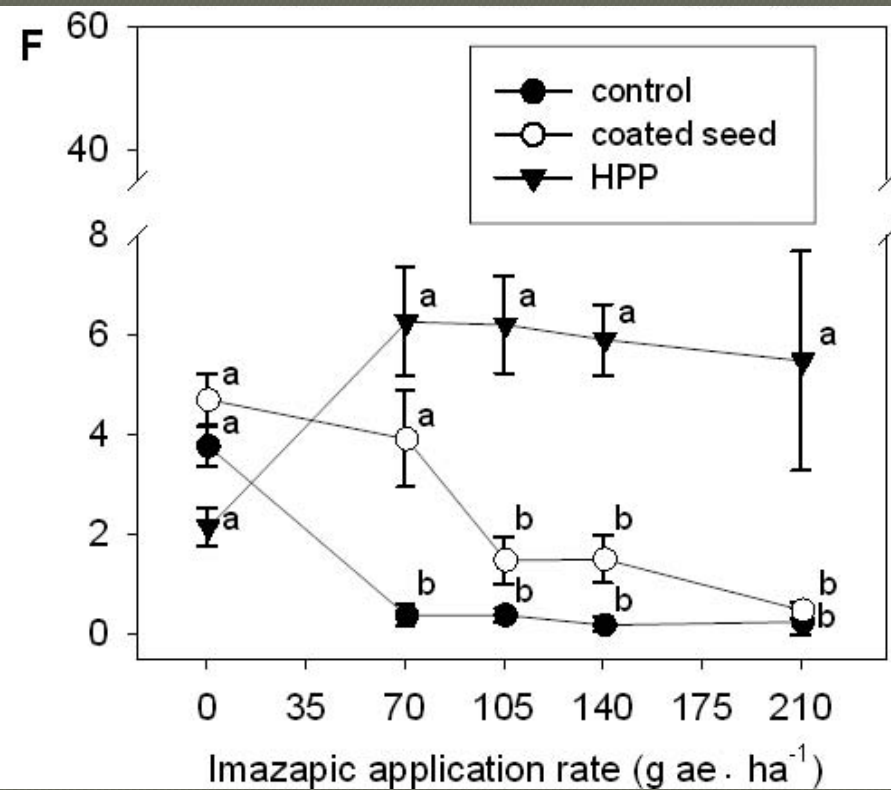
Activated carbon pods (HPP) to improve one pass system



Cheatgrass



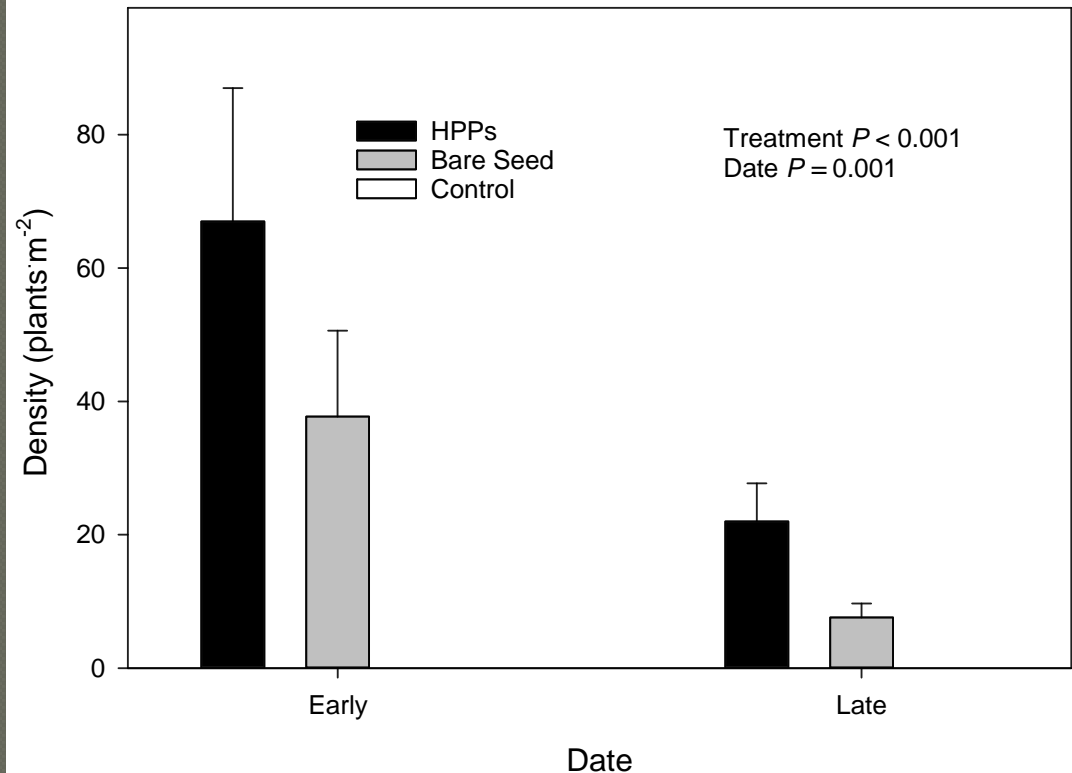
Bluebunch Wheatgrass





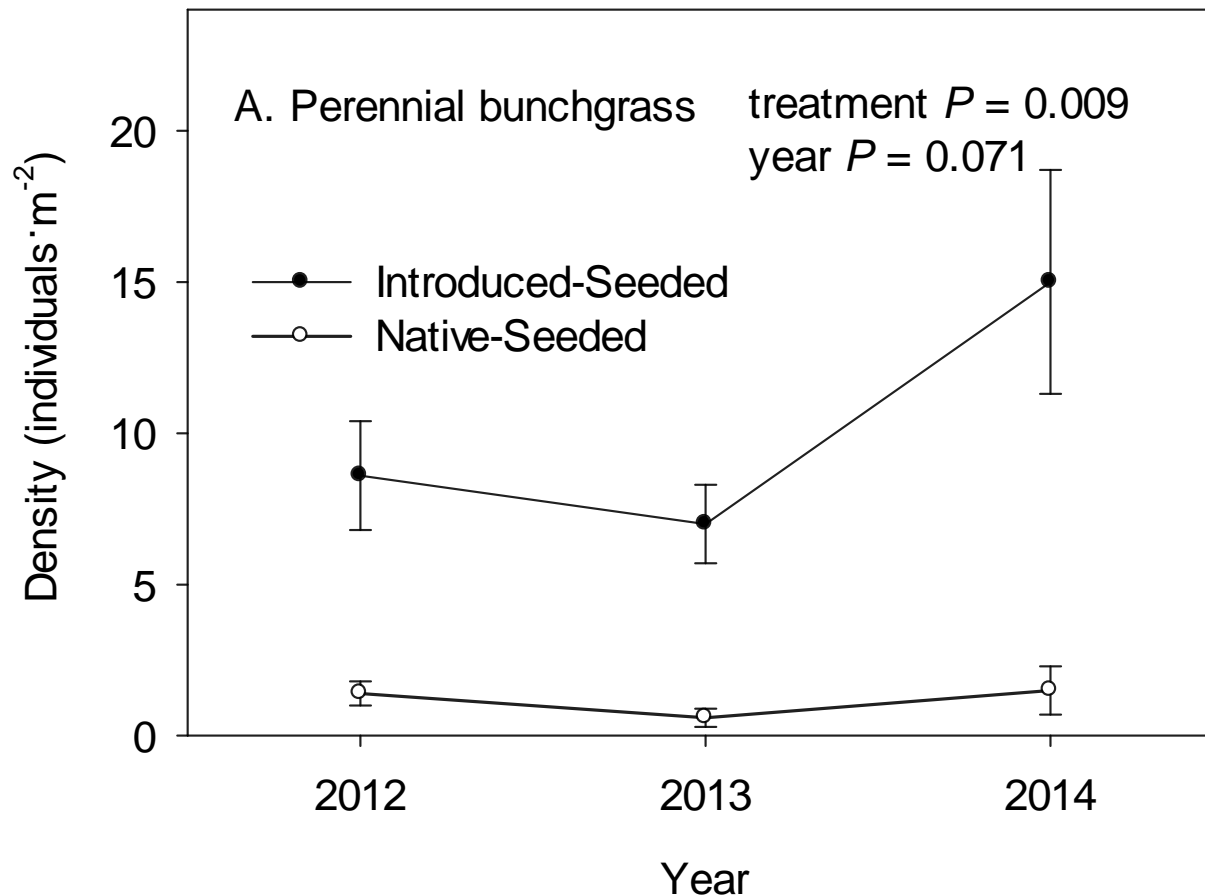
Field trials of HPPs

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



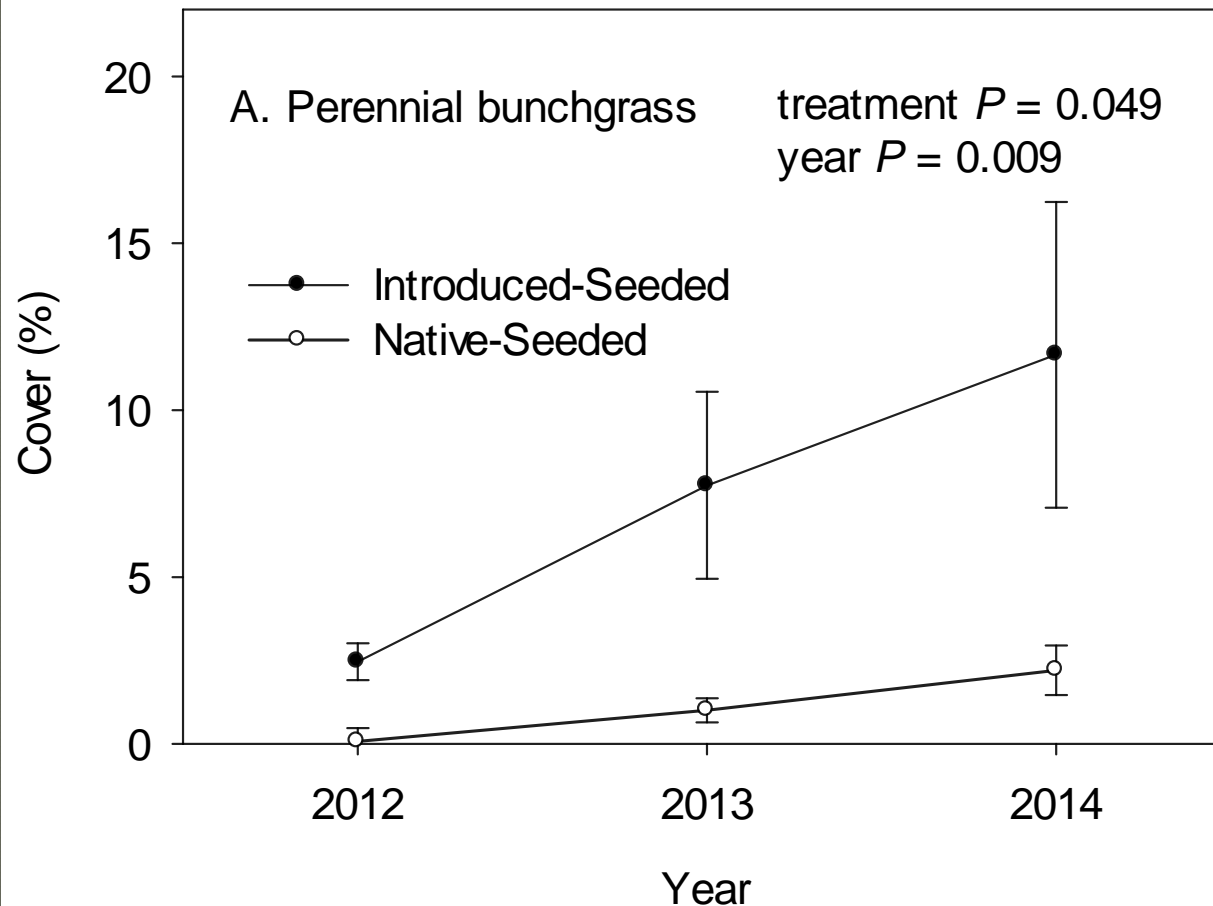
Revegetation: Native vs. Introduced

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

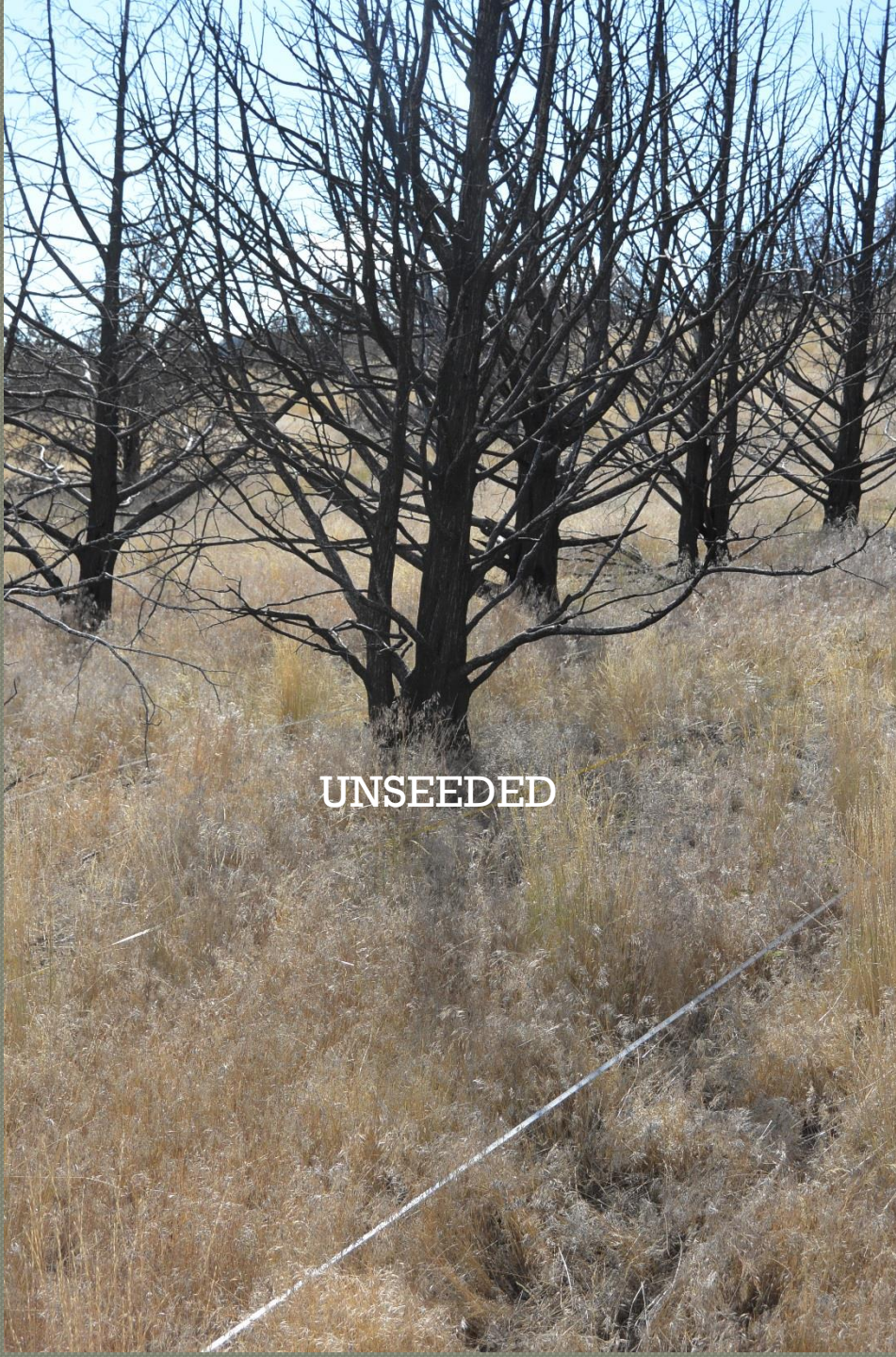


Revegetation: Native vs. Introduced

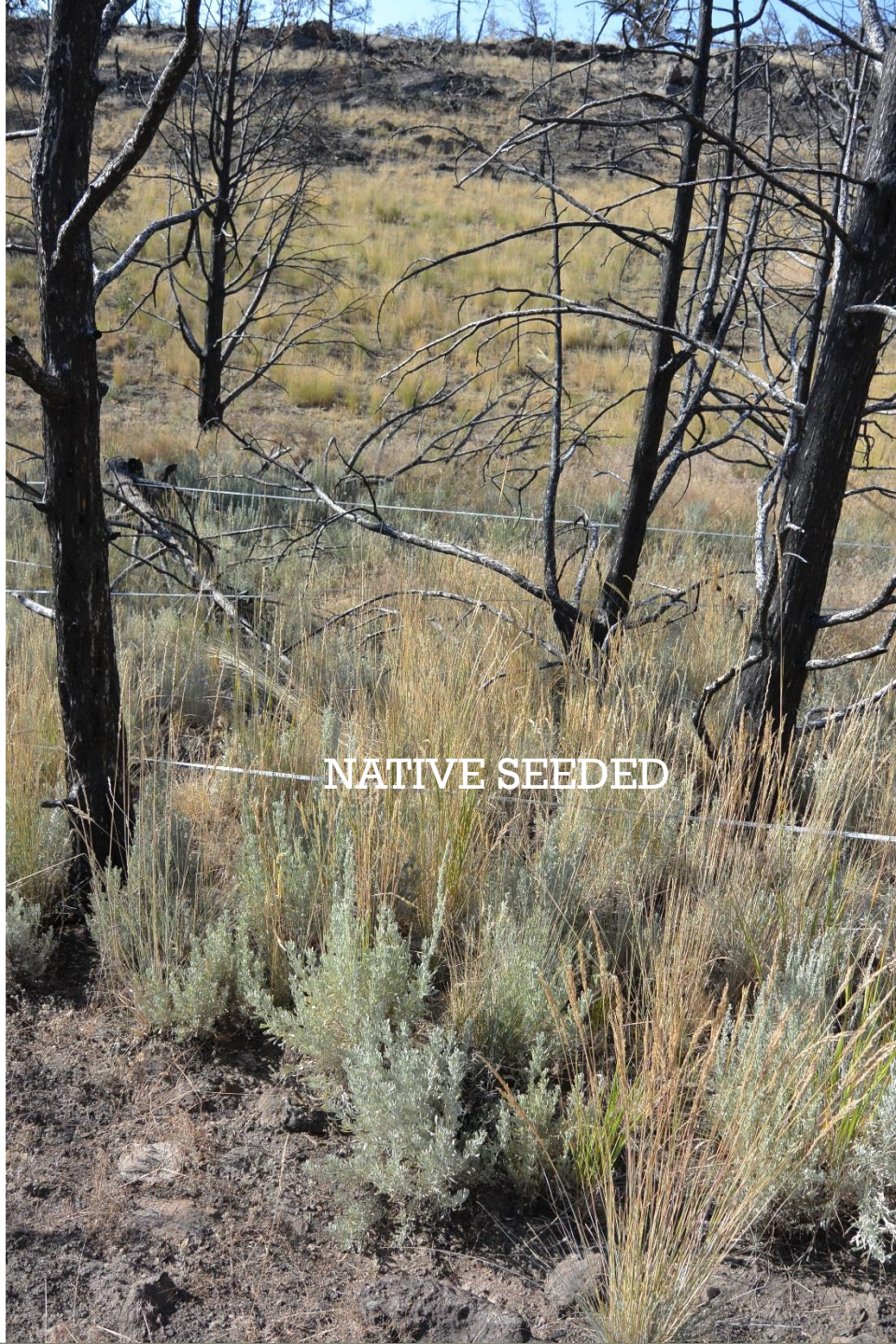
Davies, Boyd, Johnson, Nafus, & Madsen (2015)







UNSEEDED



NATIVE SEEDED

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

- 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 wide, open field with a mix of green and brown grass. A wire fence runs diagonally from the foreground towards the middle ground. In the background, there are rolling hills and mountains under a clear blue sky. The word "Questions?" is overlaid in large white text in the center of the image.

Questions?