

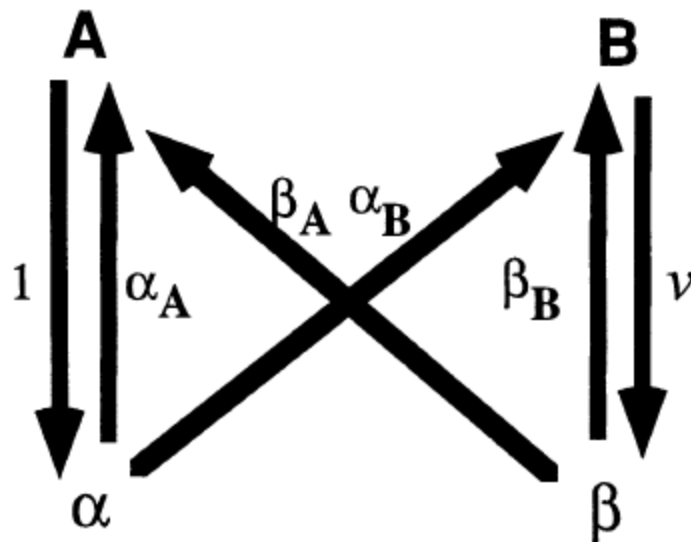
Effects of soil inocula on the growth responses of native annual forbs and the invasive annual grass, *Bromus diandrus*

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Plant-Soil Feedback (PSF)

- changes in plant species composition that result in changes in the soil conditions, which in turn cause further change in the plant community, and vice versa

Model of PSF



A = Plant A

B = Plant B

α = soil community associated with Plant A

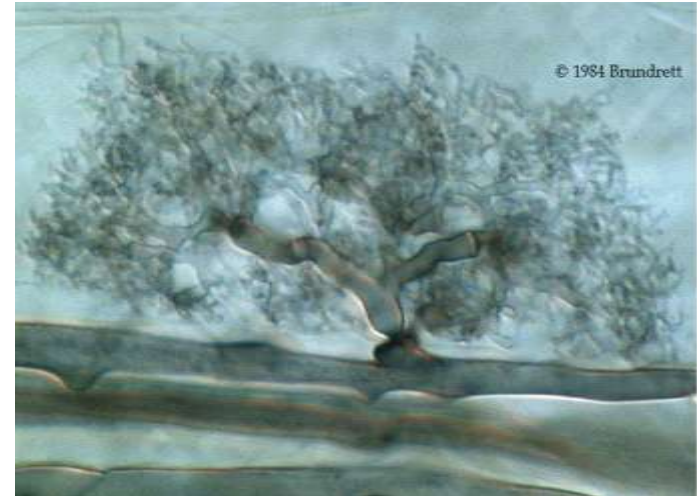
β = soil community associated with Plant B

v = the strength of influence plant B on the soil community

PSF Continued

- Positive PSF
 - commonly results from changes in the density of host-specific mutualists, including arbuscular mycorrhizal (AM) fungi

- Negative PSF
 - Most plants create PSFs that decrease subsequent conspecific performance
 - May result from an accumulation of host-specific bacterial and fungal pathogens



Invasive Species and PSF

- Invasive plants have the ability to alter the rhizosphere microbial community upon establishment and form either positive or negative feedbacks that affect their dominance.
 - Due to differences in:
 - Life history strategies
 - Phenology
 - Physiology



Question

- **How does mycorrhizal inoculum from invaded and native coastal sage scrub alter plant growth responses of the invasive species *Bromus diandrus* relative to native species it displaces?**

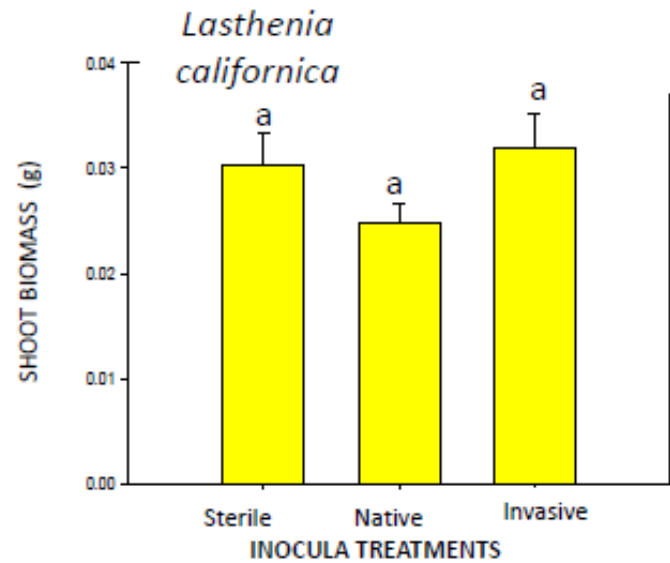
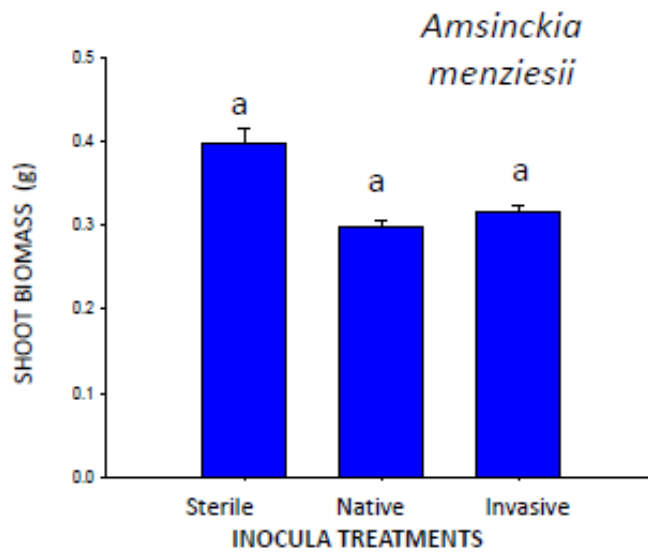
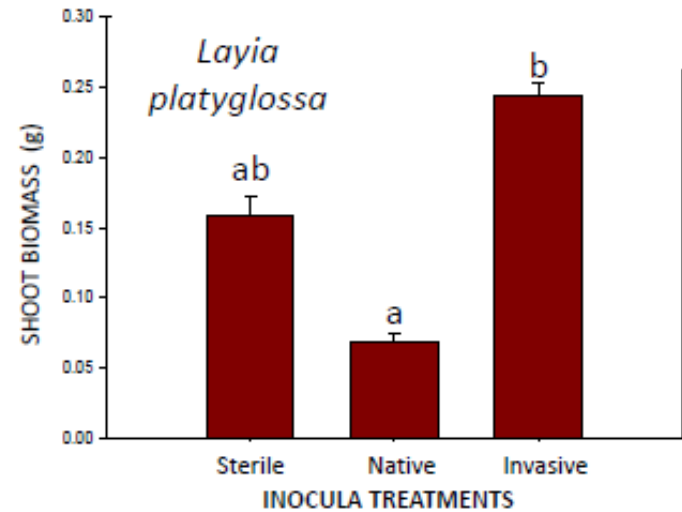
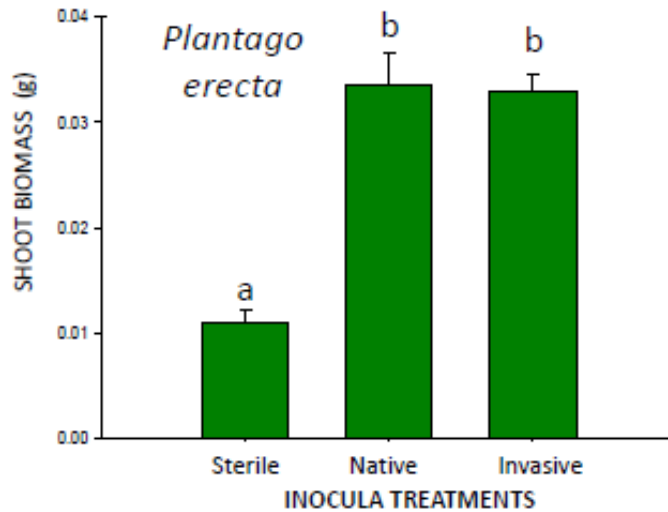
Experimental Design

- **Five Species:** Native *Amsinckia menziesii*, *Layia platyglossa*, *Lasthenia californica*, *Plantago erecta*, and exotic *Bromus diandrus*
- **Three Soil Treatments:** Sterile, Native inoculum, Invasive inoculum
- **Measurements:** Aboveground biomass (vegetative stage) and root biomass



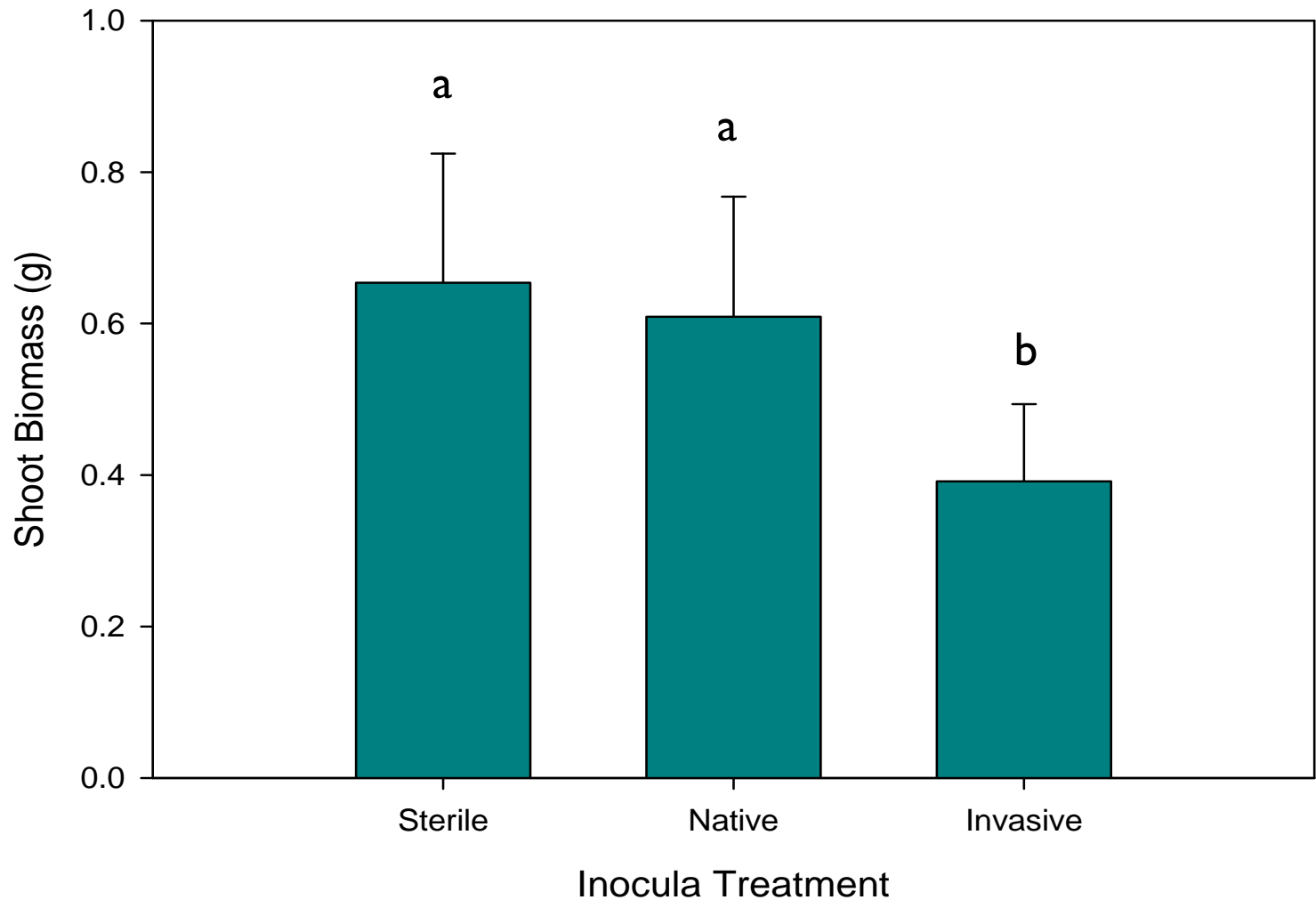
Results: Monocultures

MONOCULTURES

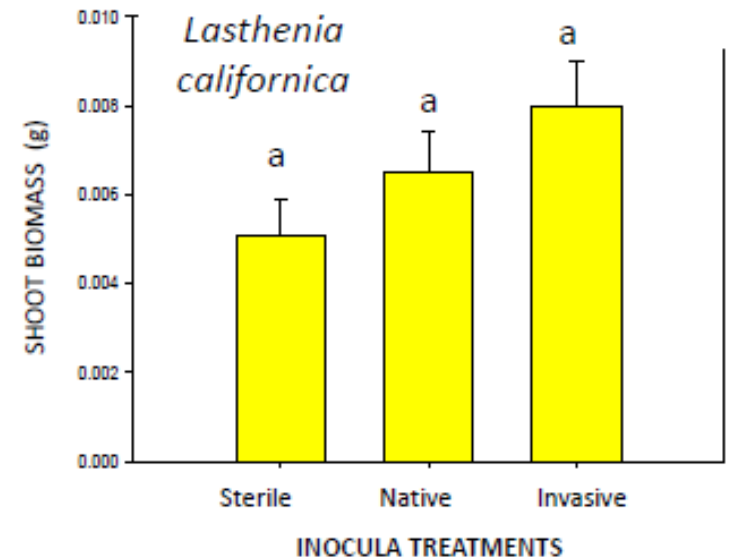
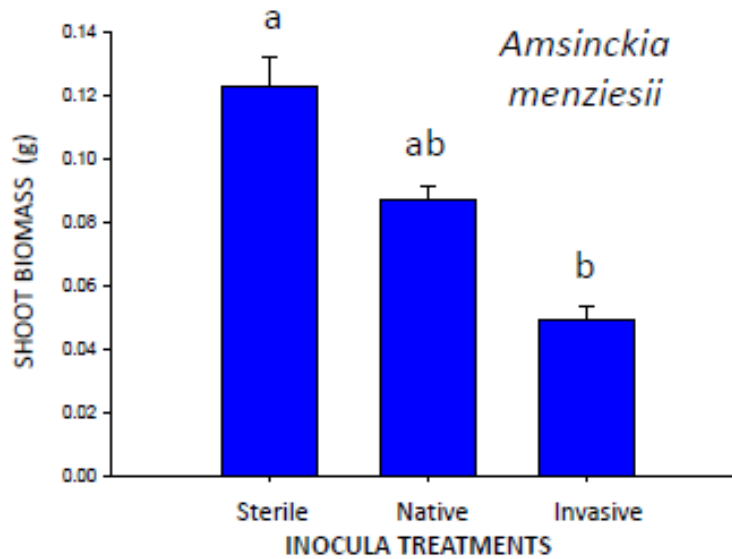
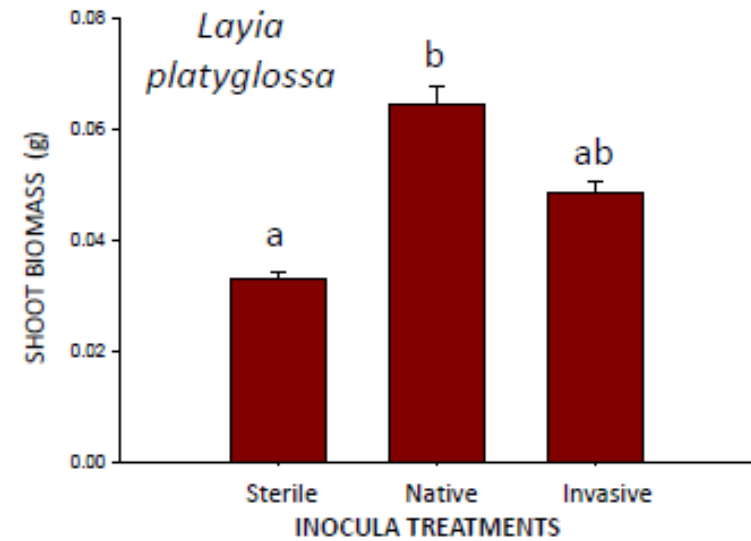
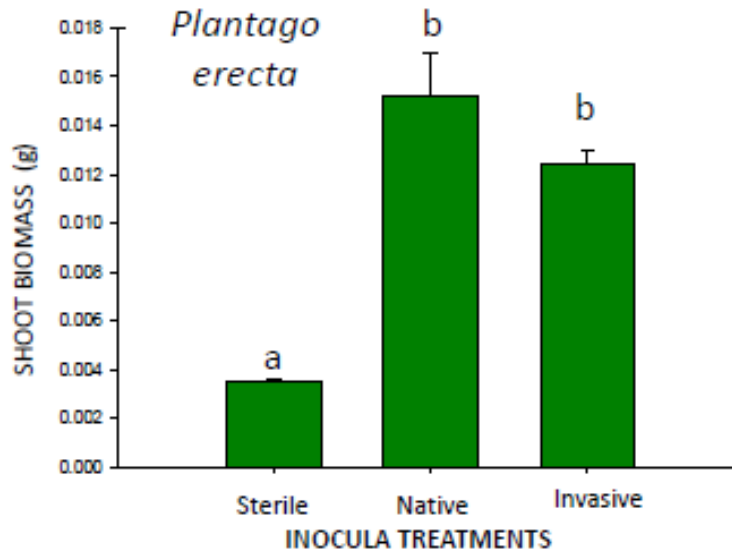


Results: Monocultures

Bromus diandrus
Monocultures



Results: In competition with Bromus



Plantago vs. Bromus



Amsinckia vs. Bromus

Amsinckia
germination
was 5 days
after
Bromus



Conclusions

- Native and Invasive inocula did not vary in mycorrhizal species composition; there are no uninvaded soils
- *Plantago* did not respond to source of inoculum, but increased growth with inoculum suggests a positive plant-soil feedback
- Both *Amsinckia* and *Bromus* had negative feedback with invasive inoculum.
- The lack of response of *Bromus* to soil inoculum in competition suggests that its invasive potential may be derived from competitive ability rather than soil conditioning
- Different responses to inoculum in monoculture and mixture may be due to differences in soil microbial groups cultured by competitors

Application to Restoration

Even though *Plantago* and *Layia* responded positively to inoculum in monoculture and mixture, inoculation will not ensure restoration success and *Bromus* still needs to be controlled



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