

Biochar Effects on Mycorrhizal Fungi in Sagebrush Roots

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Introduction

- Sagebrush steppe ecosystems are under threat from invasive species and increased instances of wildfire [1]
- Arbuscular mycorrhizal fungi (AMF) root colonization has been shown to increase survival and performance of sagebrush seedlings [2,3]
- Cheatgrass favors an association with dark septate endophytic fungi (DSE), not the mutualistic AMF that sagebrush associate with [4], and this may reduce the success of restoration efforts.
- Biochar soil amendments have been shown to have a positive affect on AMF colonization in some crops [5,6,7]

Study Organisms



Figure 1. Big Sagebrush (*Artemisia tridentata* sp. *wyomingensis*)

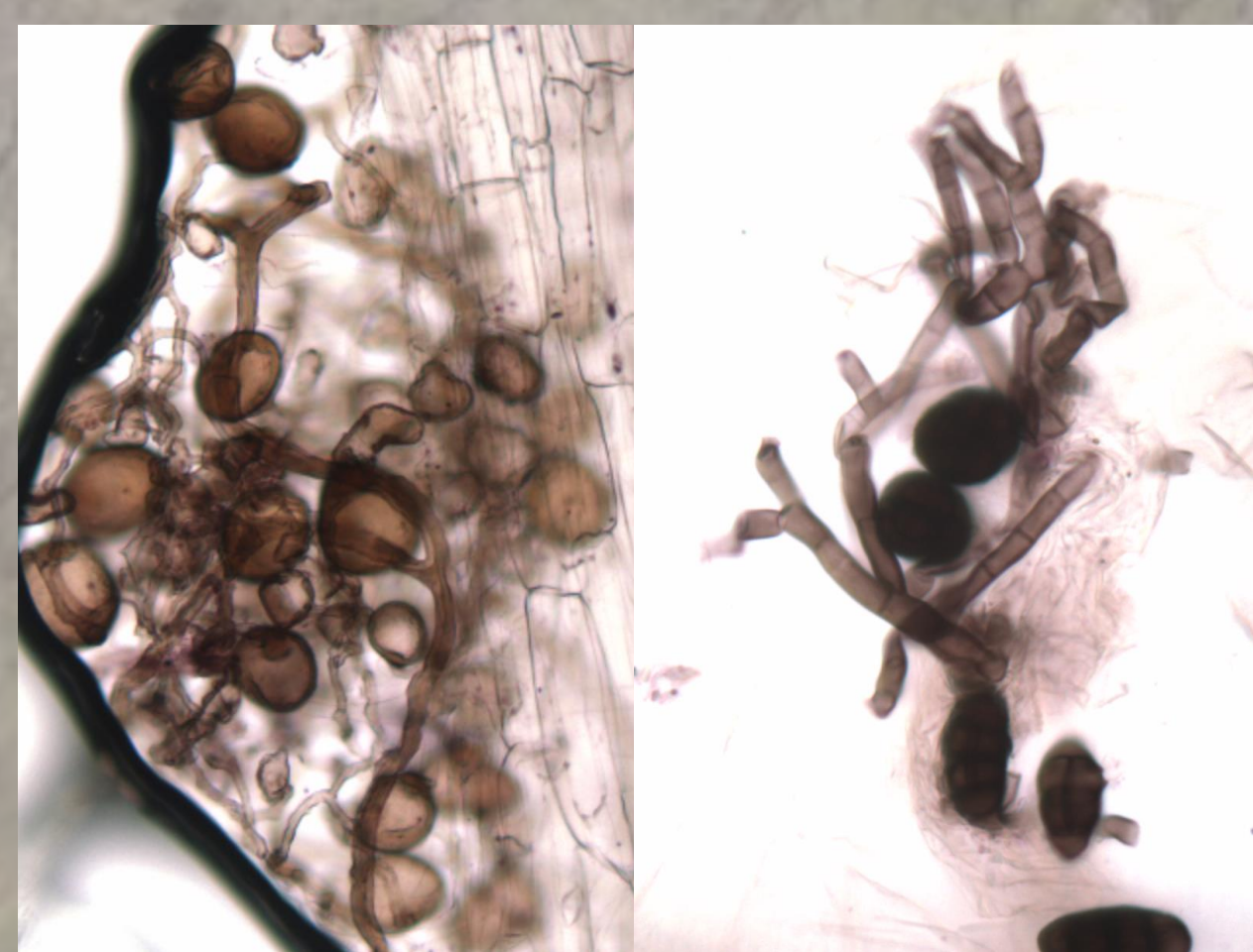


Figure 2. Arbuscular mycorrhizal fungi (AMF) spores and hyphae (L), and Dark Septate Endophytic fungi (DSE) hyphae and structures (R) in roots of sagebrush seedlings.

Question

Can we improve sagebrush seedling establishment by amending soil with a native AMF inoculum and biochar to promote native AMF colonization?

Results

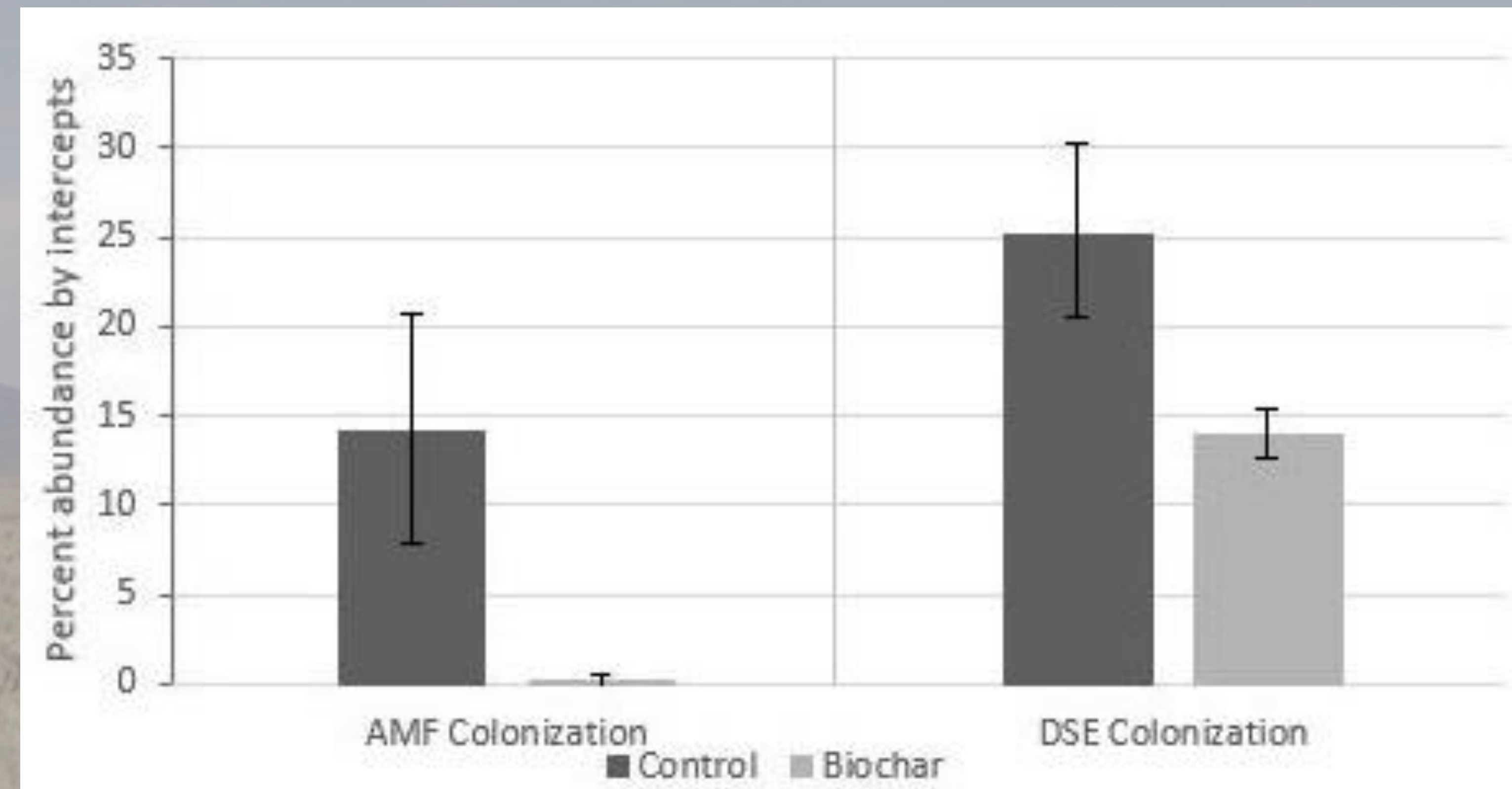


Figure 4. Mean percentage of fungal root colonization by intercepts, comparison of DSE and AMF colonization in biochar and no-biochar treatments. AMF colonization shows no significant difference between biochar treatment ($P=0.178$). No significant difference for DSE seen either ($P=0.099$).

Methods

- Soil from a fire that burned in 2011 at the OCTC just south of Boise ID, and soil from an adjacent intact sagebrush stand was collected to 15cm depth with a 4cm diameter core.
- Pots (150 ml) were filled with 110g of soil from the fire, 40g sand, and a 5g inoculum of intact sagebrush soil. Half of the pots received a biochar treatment (1.5g surface mulch layer).
- Sagebrush seeds (10) were added to the pots.
- Not all seeds germinated, surviving plants analyzed were: Biochar ($n=8$), No Biochar ($n=5$)
- Seedlings were harvested at three months and analyzed for fungal colonization (i.e., AMF and DSE) using the line intercept method [8]

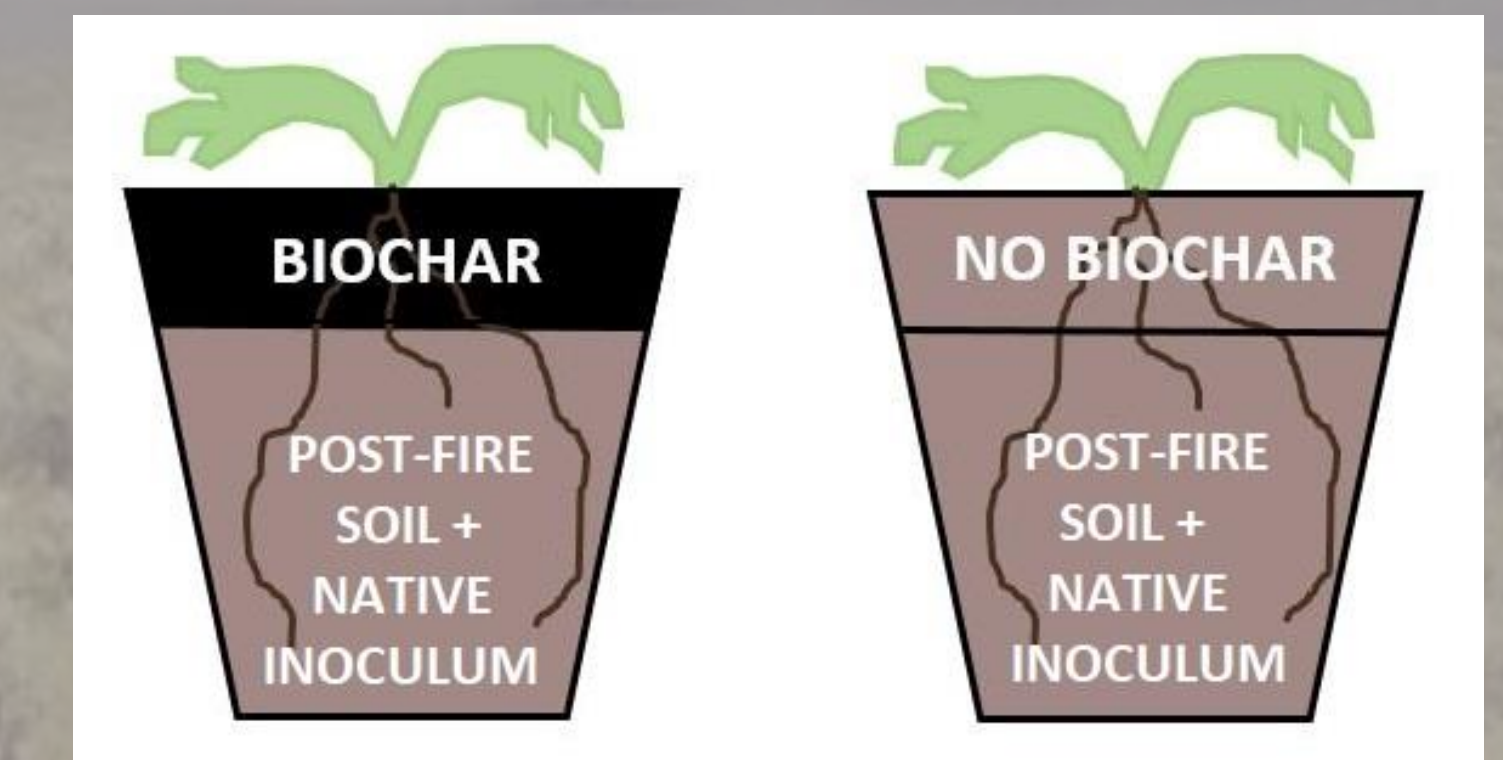


Figure 3. Treatment layout for greenhouse experiment

Conclusions

- Preliminary data shows low AMF colonization rates, and much higher DSE colonization.
- Biochar addition did not influence DSE or AMF colonization
- Data are not representative of all fires, ongoing research from multiple fire sites is showing varying results, more research is needed.

Acknowledgments

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Scan for references