Leaky Moss in Montana's Grasslands

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Leaky Moss In Montana’s Grasslands  
Ryan Milling, Mandy Slate, and Ragan Callaway  
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Can vascular plants benefit from moss leachate?

Could nutrient pulses from rehydrating moss be influencing vascular plant recruitment? What effect do these nutrient pulses have on plants in competition? Do native and non-native plants benefit differently?

Moss interacts with grassland plants:  
Spatial Association

In our study site near Bonner, MT, we found that moss co-occurred with knapweed at least 70% of the time and moss cover was greater in sites with a high concentration of knapweed.

Influence in Competition

The effect of moss on knapweed and fescue was not significant when either plant was grown alone. When in competition with fescue, moss suppressed knapweed whereas fescue was unaffected.

Current Experiment:  
Does moss leachate impact growth in a native and a non-native grassland species, Centarea stoebe, and Festuca idahoensis?

Common Garden:  
Collect Moss Leachate

Water Fescue and Knapweed, both alone and in competition with moss leachate or normal water

Measure final plant biomass and compare

Expected Results

We expect to find that both fescue and knapweed have increased growth when grown alone and watered with moss leachate. In competition we might see that native plants are able to compete better against non-native invaders when moss leachate is present. This could have many management implications especially among restoration efforts. The presence of moss could fortify natives against potential invaders.

Acknowledgments

Much thanks to Mandy Slate, Ragan Callaway, and the rest of the Callaway Lab for their support and resources. Funding provided by the Davidson Honors College Undergraduate Research Award.

Selected References


Why do mosses leak?

Mosses lack the cuticle and stomata that vascular plants use to regulate the movement of water and solutes. In mosses, water and nutrients move across the leaves and diffuse straight across cell walls.

What’s in the ‘leachate’?

Using Total Organic Carbon and Nitrogen (TOCN) analysis we were able to get preliminary data suggesting sugars are present in moss leachate. These sugars could potentially be used by the surrounding plants after each rehydration event. Using the method of leachate collection in our current experiment we found a mean Total Soluble Carbon Release of 29.82 mg/L.

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