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Arbuscular Mycorrhizal Fungi Associations Across Multiple Saltmarsh Plant Species Mitigating the Impacts of Sea-Level Rise

Rayna Koberstein
Portland State University

Catherine E. de Rivera
Portland State University

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Rayna E. Koberstein*, Catherine E. de Rivera
Department of Environmental Science and Management, Portland State University

Background and Goals

- Salt marshes provide important habitat and ecosystem functions and services.
- Sea level rise will increase the elevation and rate of terrestrial salt water inundation, thereby reducing the ecosystem services provided by salt marshes.
- Marsh managers need information about what plants may be most successful in marsh restoration and mitigation of sea level rise.
- Halophytic plants within salt marshes can benefit from symbiotic arbuscular mycorrhizal fungi (AMF) facilitations through increased inundation tolerance, greater nutrient availability and uptake and alleviation from saline stress.
- This study aims to identify which Oregon salt marsh plants have AMF to help with future maintenance and restoration of marshes.

Salmon River Estuary at Cascade Head, Oregon. Site of research. Image: USGS, 2017.

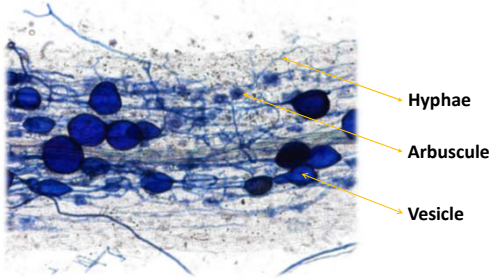
Research Question

- What plant species host AMF, and what is the pattern of distribution across the low and high marsh areas?

Expected Results

- There may be higher rates of AMF in dominant plants in the low marsh and lower rates of AMF in plants which lack biological saline and hydrophytic adaptations.
- Soil parameters in samples containing AMF will have lower saline content, moisture and a neutral pH. The proportion of AMF spores will be homogeneous across all samples.

What is Arbuscular Mycorrhizal Fungi (AMF)?



- **Arbuscular Mycorrhizal Fungi:** A fungi which receives carbon nutrition from the roots of its associated plant. In return, it can increase nutrient uptake and inundation resilience to the plant.
- **Hyphae**: The AMF's filaments that absorb the mineral nutrients from soil and transports them to the host plant.
- **Vesicle:** Storage structure for nutrients collected by hyphae.
- **Arbuscule:** Sites of exchange within hyphae for phosphorus, carbon, water, and other nutrients (9).

AMF connects plant roots with soil; increases root surface area; allows fungus to uptake nutrients to share with plants.

Jaumea (*Jaumea carnosa*)

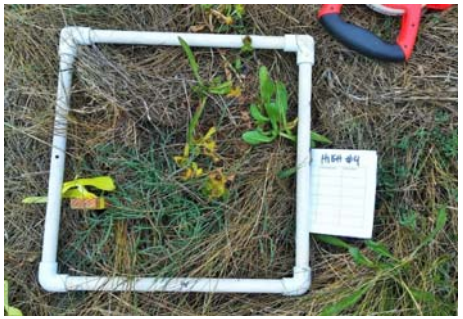
Lyngbye's sedge (*Carex lyngbyei*)

Pickleweed (*Salicornia virginica*)

Salt Grass (*Distichlis spicata*)

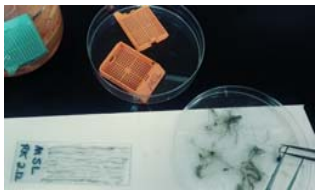
Methods

- Extracted AMF from eight monoculture plots from four plant species in high and low marsh plots.
- Dyed extracted roots with Trypan blue before mounting them on slides.
- Will calculate AMF spores in soils at each site.
- Soil samples will be analyzed for percent water, soil salinity and pH.



Field collection site in high marsh: polyculture plot containing jaumea, pickleweed and salt grass. Plant samples were collected as well as soil at a depth of 10 cm, where most AMF is found.

Histocassettes of cleaned root samples being processed.



Trypan dyed roots are slide mounted in lactoglycerol for preservation.

Outcomes

- Determining the presence of AMF across plant species will help future restoration efforts build resilience against sea level rise.

Acknowledgements

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