Light requirements for germination of native Intermountain West wetland species in competition with *Phragmites australis*

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Introduction

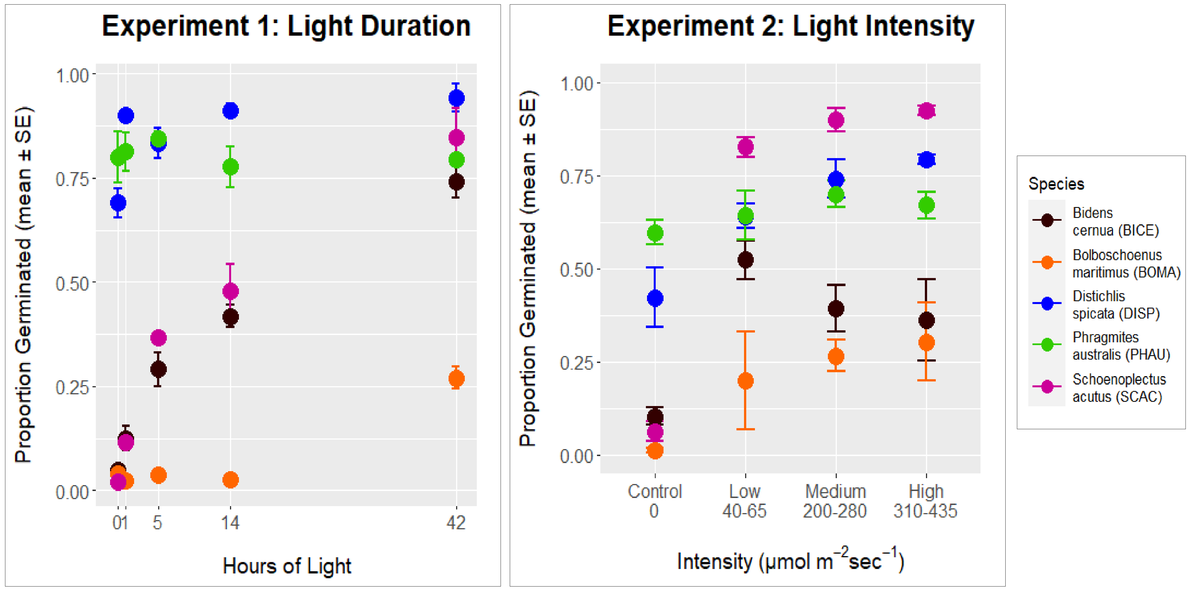
Wetlands make up ~ 6% of earth's surface area but provide many functions: carbon sequestration, water quality enhancement, wildlife habitat, etc.

- US wetlands face the threat of invasive species ***Phragmites australis,*** which displaces native communities.
- Light's impact on germination is **understudied** in wetland species. Minor differences in light conditions may alter germination outcomes.

Research Questions

- How does light exposure **duration** impact germination of native species relative to *Phragmites?*
- How do varying **intensities** of light impact germination?

In dense 15ft stands, Phragmites inhibits light from seeds



Interactions of species and light are significant. ANODEV p values are 2.2E-16 and 9.3E-11 for experiments, respectively

Methods

Seeds were sown under green light in boxes containing saturated sand. Control boxes were wrapped in tinfoil to block light exposure. We counted germinated seeds afterwards.

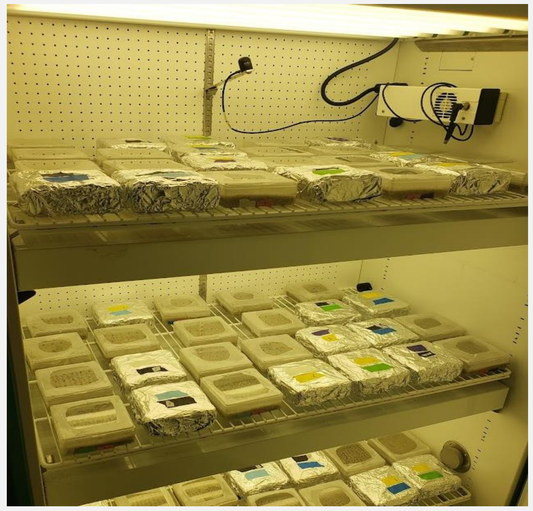
Experiment 1 (Light duration): Boxes were in growth chambers for 30 days and exposed to variable durations of a white light pulse: control (0), 1, 5, 14, 42 hrs.

Experiment 2 (Light intensity): Boxes were in growth chambers for 21 days and exposed to variable intensities of white light on a daily cycle: control (none), low, medium, high.

Results

Regarding light **duration**, PHAU germination was high (>75%) across treatments. DISP had similar trends, with slightly lower rates at 0 hrs. Germination for SCAC and BICE steadily increased with increased light. BOMA rates were minimal (<5%) until 42 hours (~25%).

Regarding light **intensity**, PHAU germinated at >55% regardless of treatment. DISP showed more linear trends to light but performed similarly to PHAU. SCAC had very high rates when any light was present. BICE and BOMA had slightly lower germination rates overall and require at least some light to germinate as well.



Experiment 1 boxes (4.3" x 4.3" x 1.37") in CONVIRON growth chamber

Conclusion

Wetland managers can reduce *Phragmites* invasion and improve restoration efforts by understanding differences in germination requirements among species.

- Light requirements inform species selection for revegetation
- *Distichlis* and *Schoenoplectus* may be good contenders to *Phragmites* and should be considered in future research
- *Phragmites* may not require as much light to germinate as previously expected

Future research should examine species of varying functional groups. Research on white vs. red vs. far red light could also be insightful for mimicking natural canopy light.

Utah State University | USU Wetland Ecology & Restoration Laboratory

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