



United States Department of Agriculture

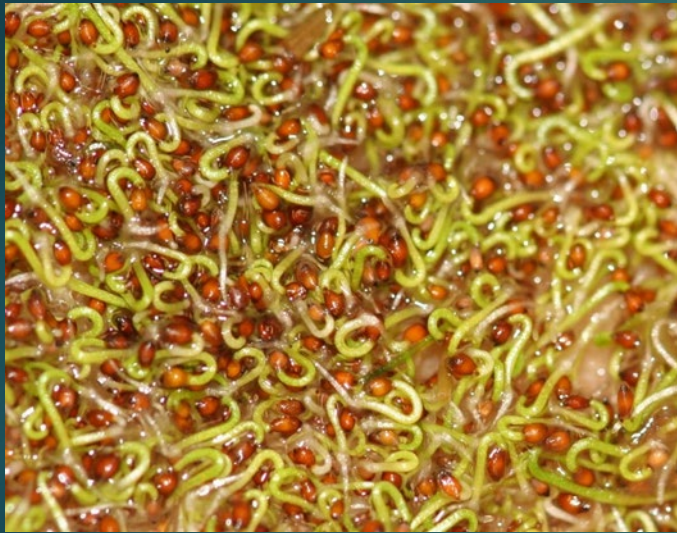
Seed Germination Using an Oxygenated Water Bath

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NRCS PLANT MATERIALS
CENTER

ABERDEEN IDAHO

2011



Baltic rush

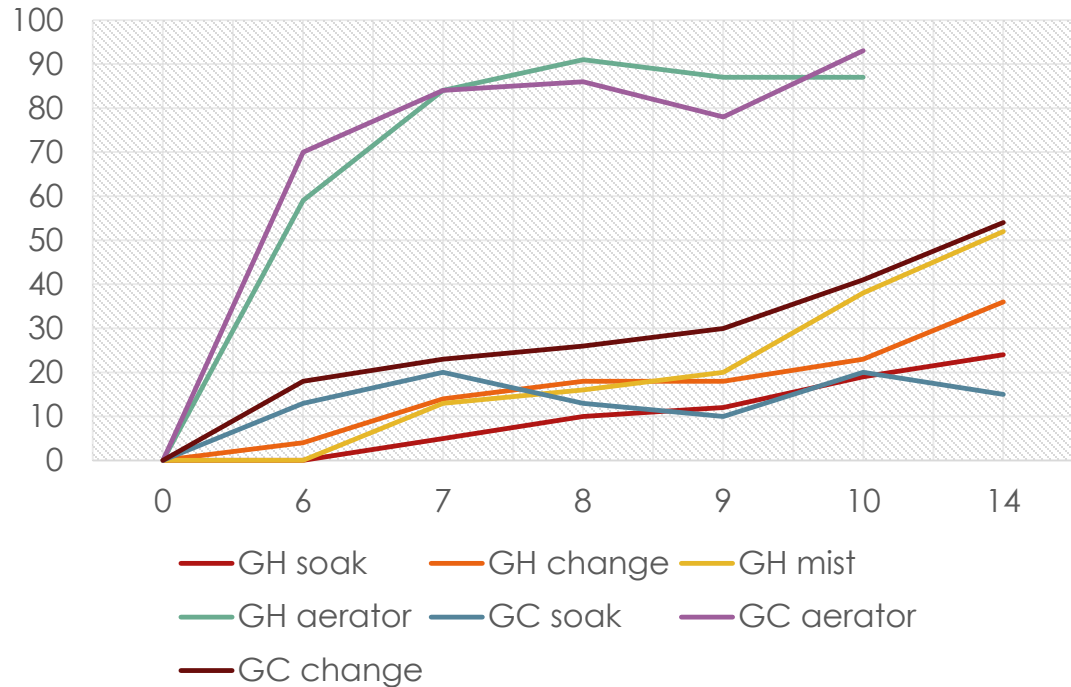


HIGH TECH!



Nebraska Sedge (*C. nebrascensis*)

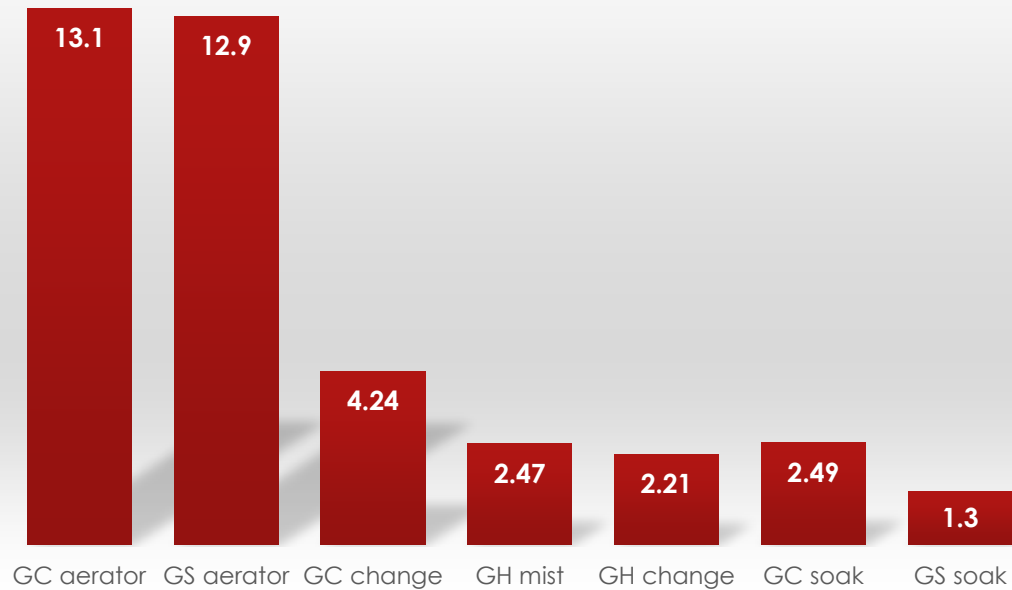
Percent germination from 6 to 14 days after initiation of treatment




GH=greenhouse conditions
GC=Growth chamber



Germination rate of CANE2 at 10 DAI



Rate= (number germinants/days)+...(number final count/final days)



“A variation of the stratification procedure is to stratify seeds in a cold-water bath where the oxygen content of the liquid is kept near saturation by forcing compressed air through the liquid. This method has given spectacular results with seed of species that normally do not respond or respond poorly to stratification. The specific length of stratification must be determined by trial and error.”

Young & Young, 1986

Other Wetland Sedges and Bulrushes

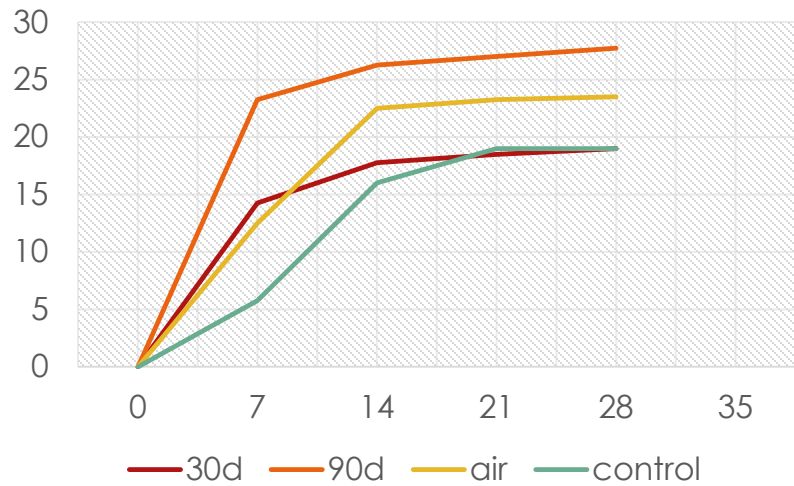
- 30 day strat
- 90 day strat
- Oxygenated water
- Non-treated Control



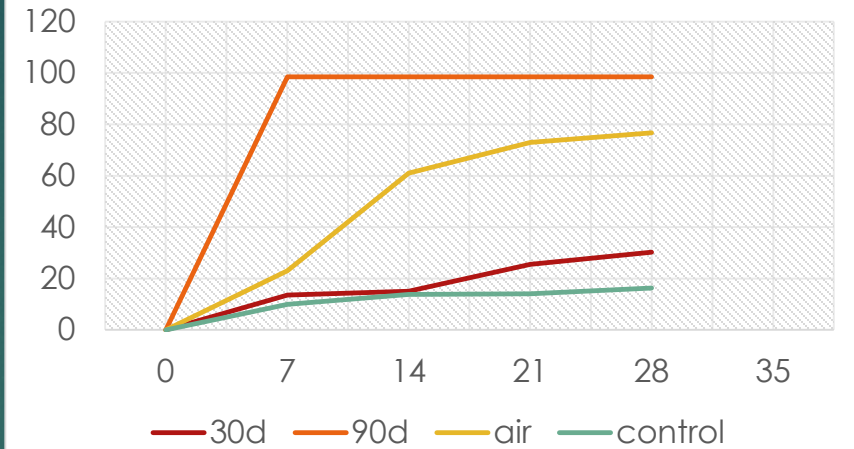
Strong dormancy, some benefit

*Note scale on Y axis

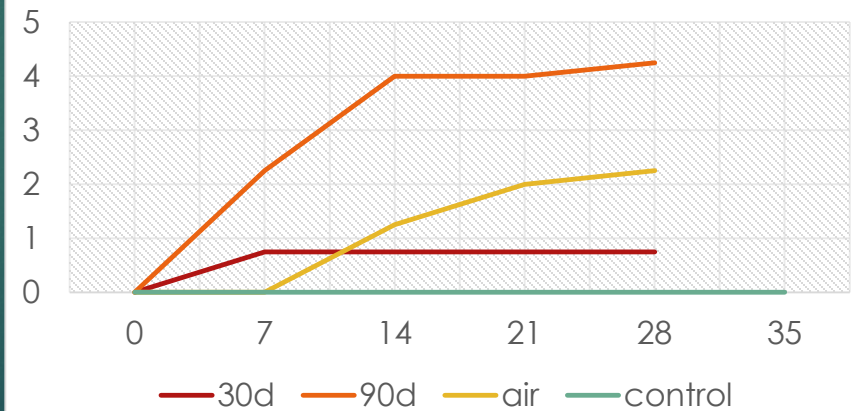
Carex feta



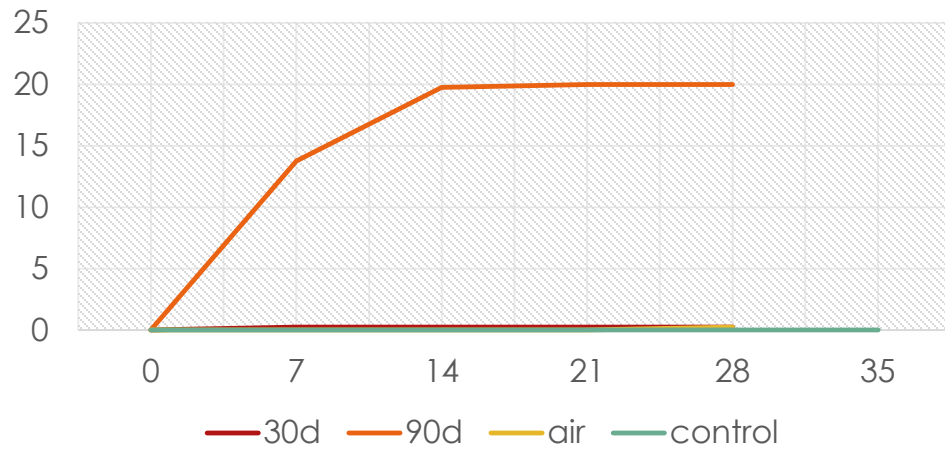
C. subfusca



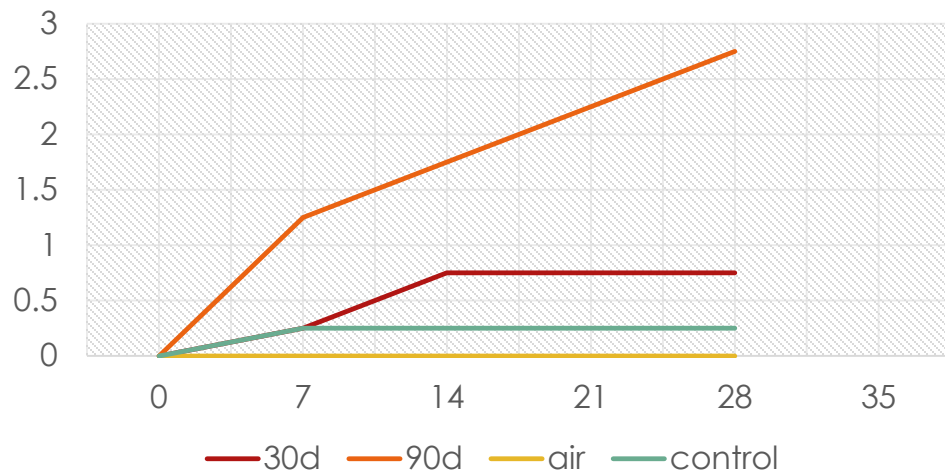
C. lanuginosa



C. vesicaria



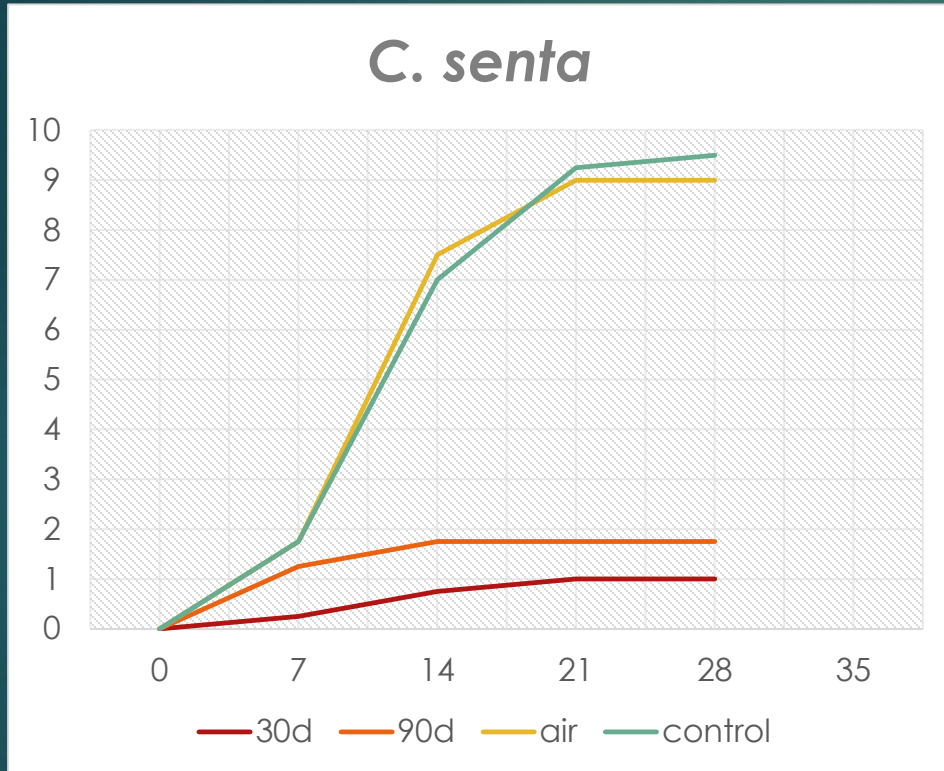
C. rostrata



- Strong dormancy
- No help from oxygenated water

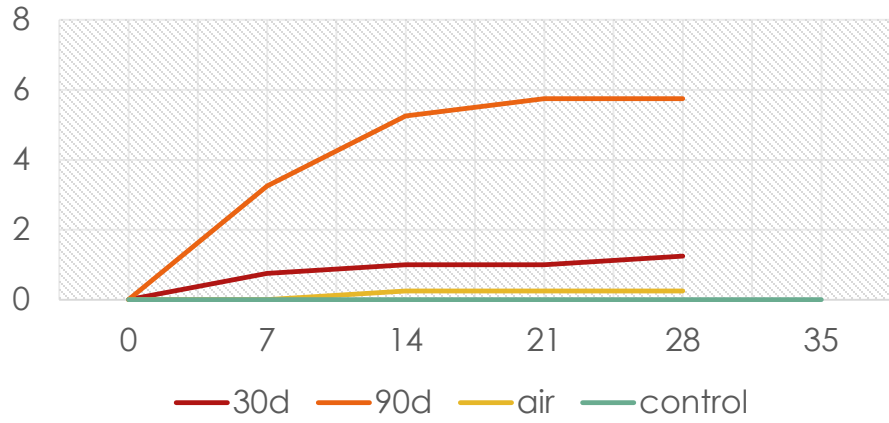


No treatment necessary

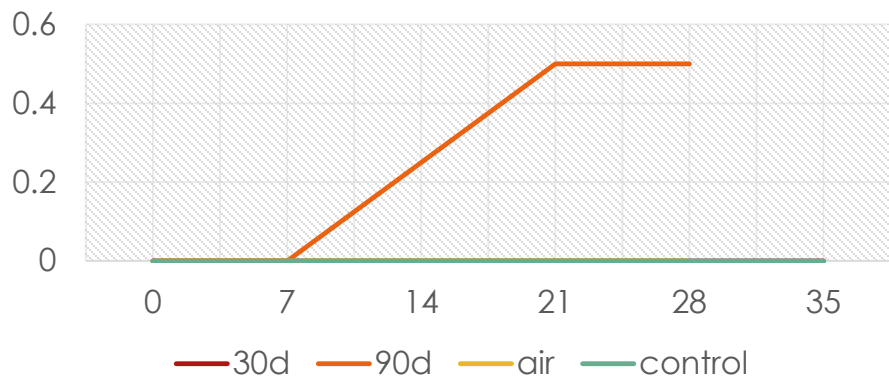


Bulrushes

Schoenoplectus acutus



Schoenoplectus americanus



- Very low germination
- No help from oxy
- Combination of strat + oxy?



Arid Forbs?

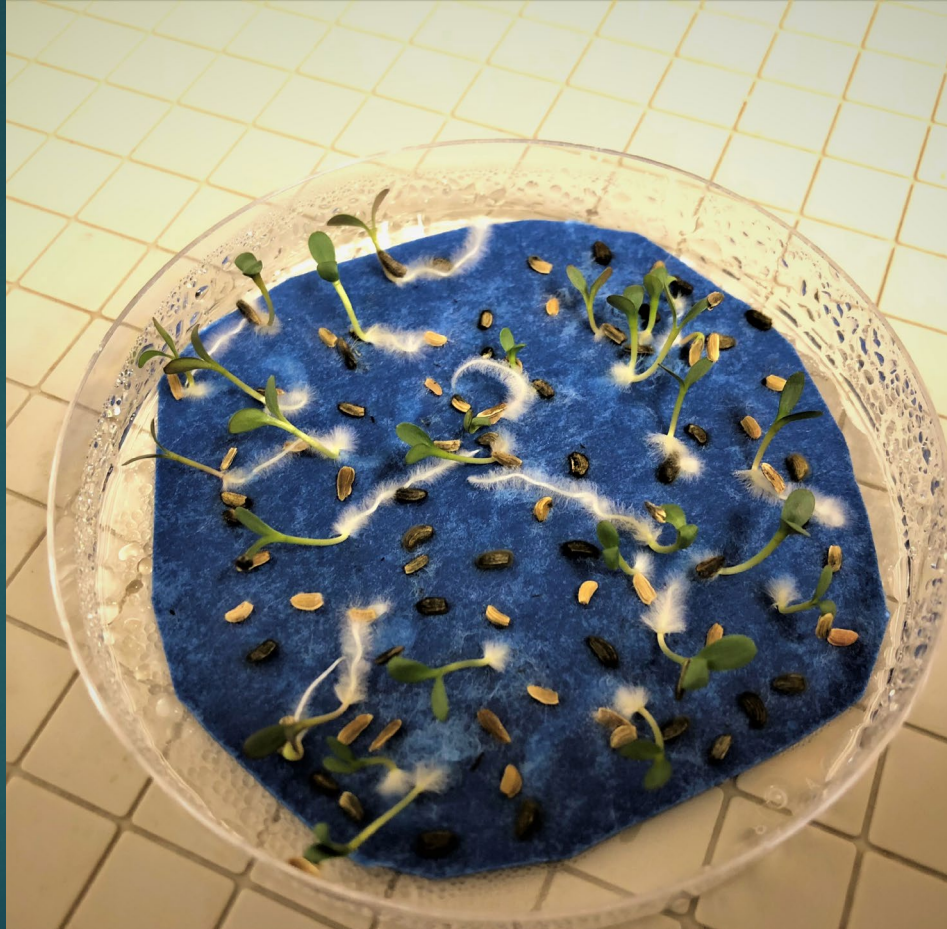
Curlycup Gumweed

- Native to western North America
- Short-lived perennial
- Adapted to disturbed sites
- Late season flowers
- Excellent for pollinators
- Good seed production attributes

- 90+D stratification

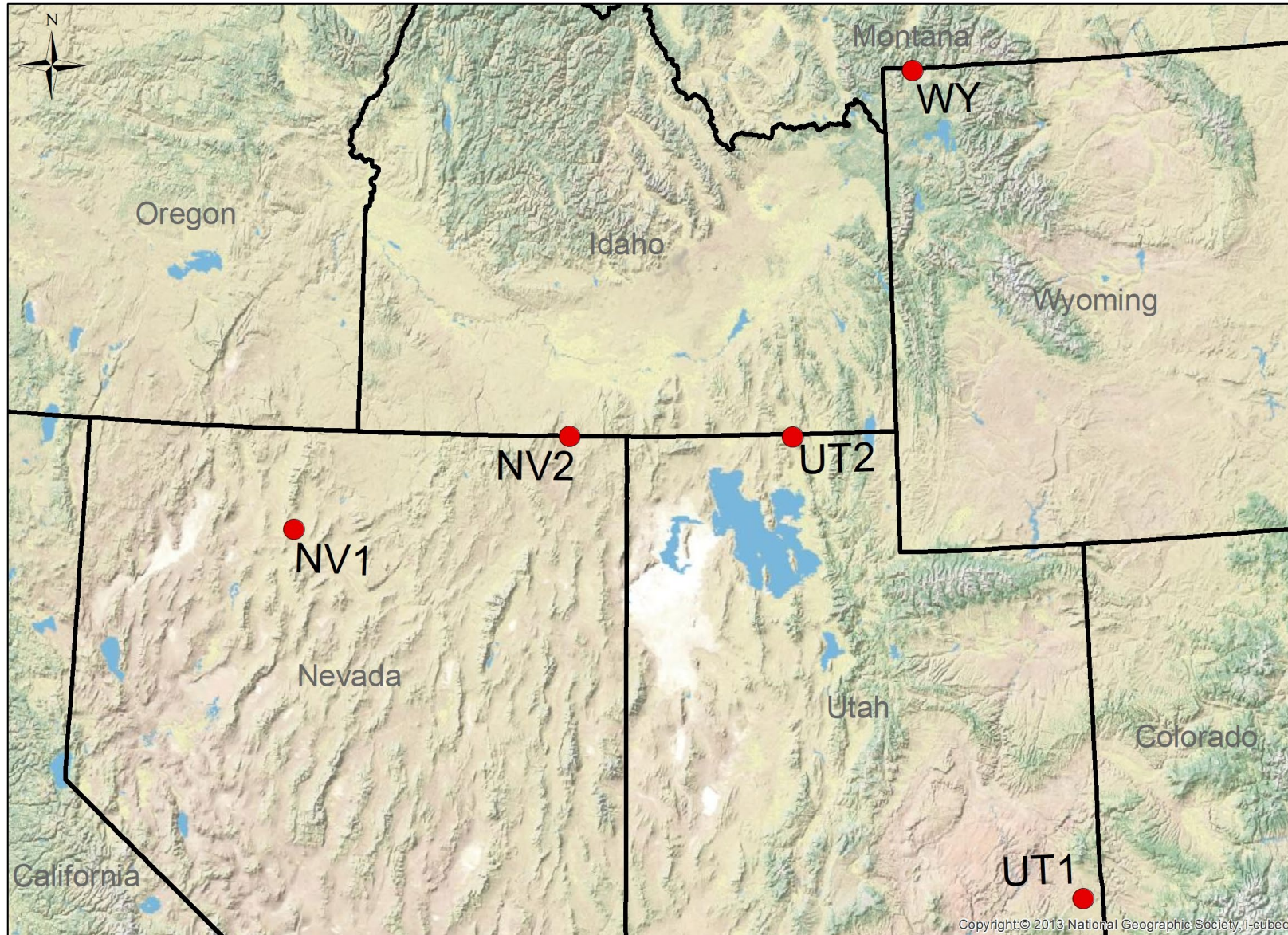


90d strat



Oxygenated
Water

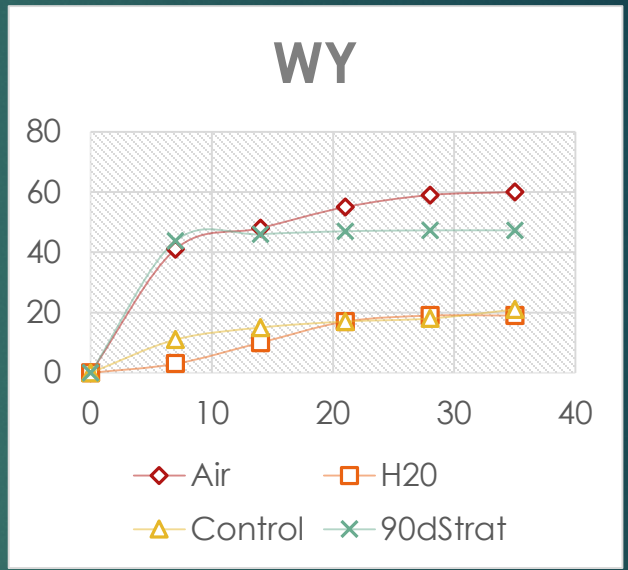
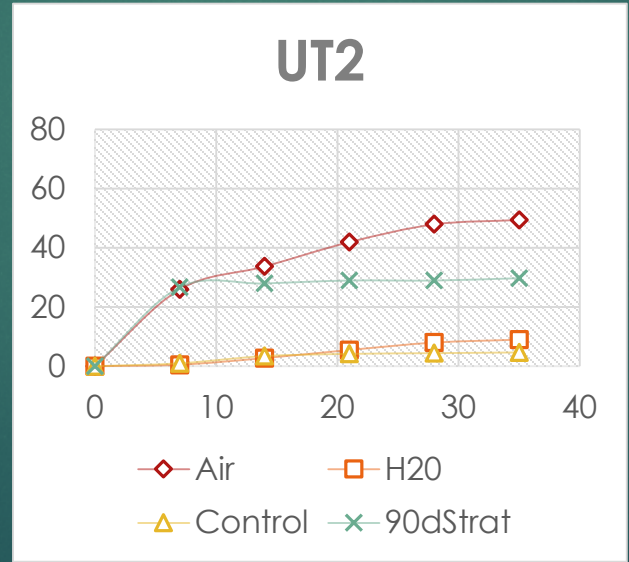
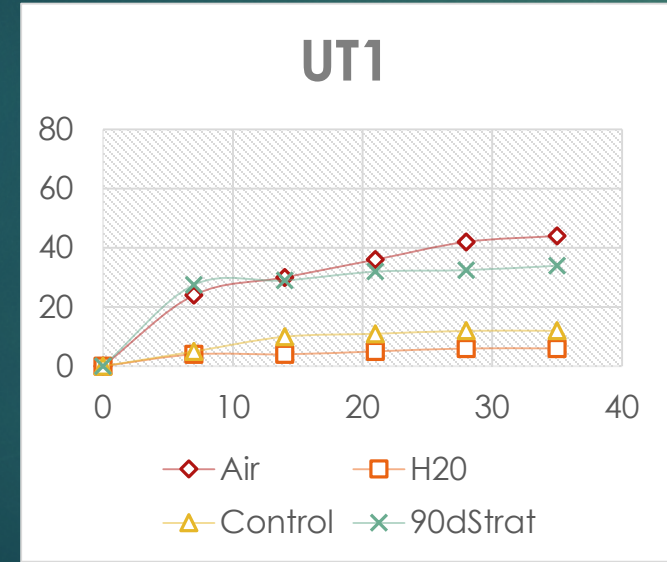
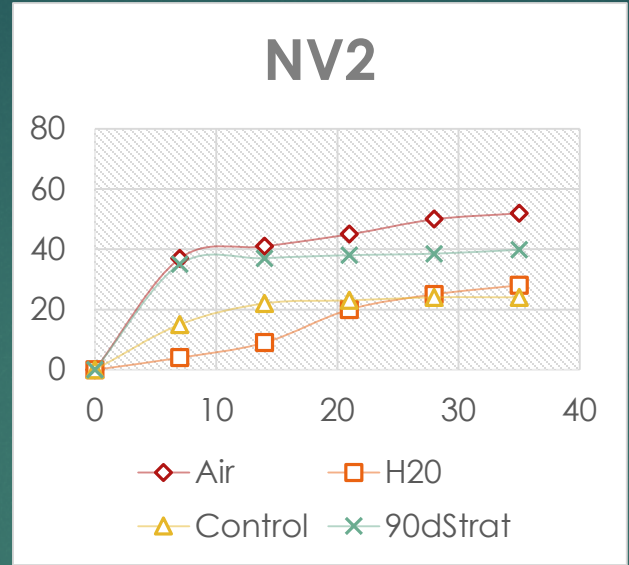
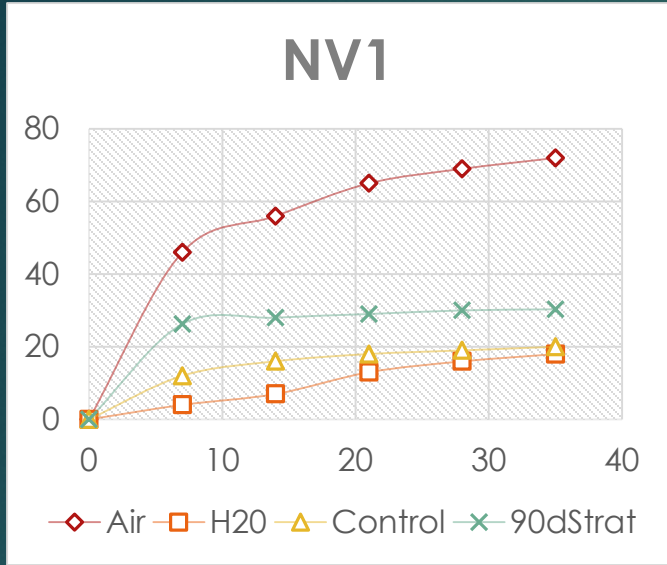




0 100 200 300 400 500 Miles

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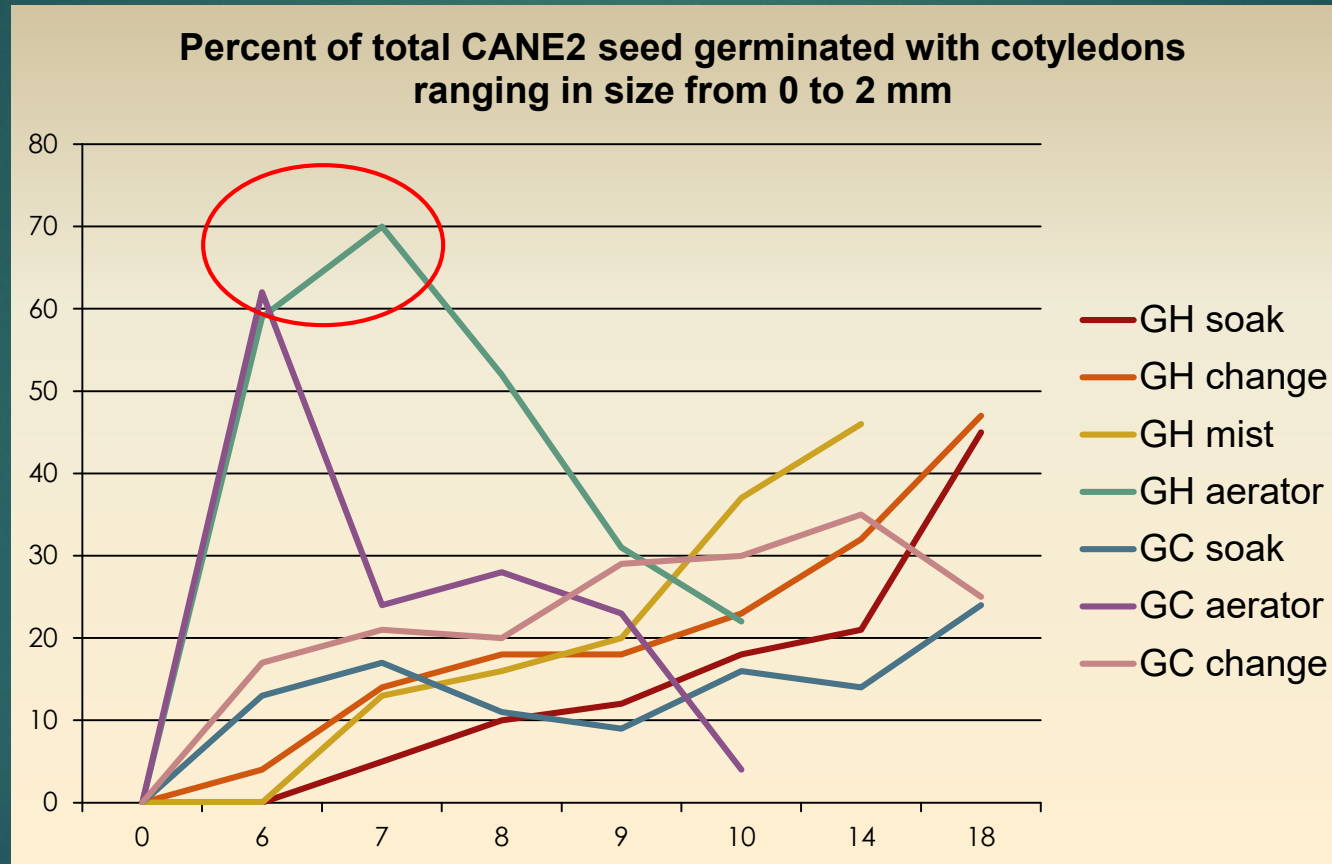


Applications:

Field
Planting?



Developing Pre-germination Protocols for Hydroseeding



Pre-germinated + Hydroseeded

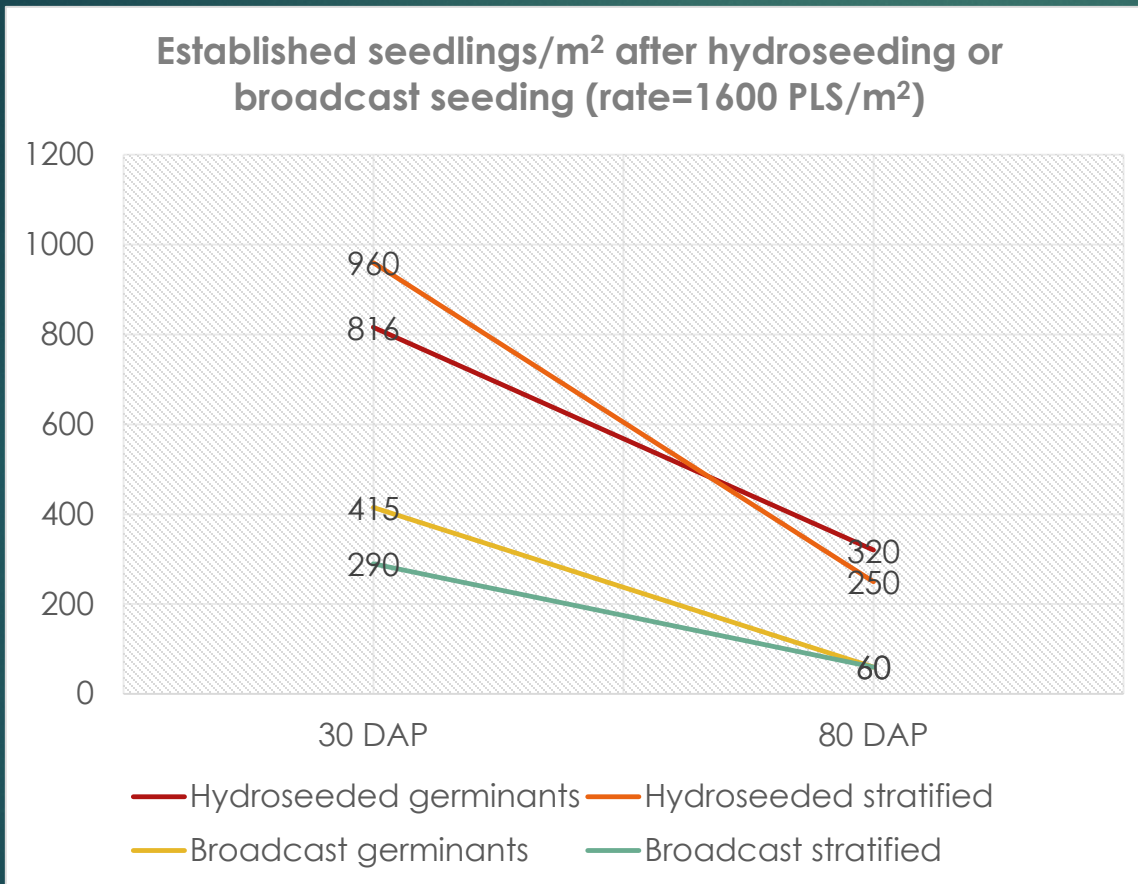
Stratified+ Hydroseeded

Pre-germinated + Broadcast

Stratified + Broadcast



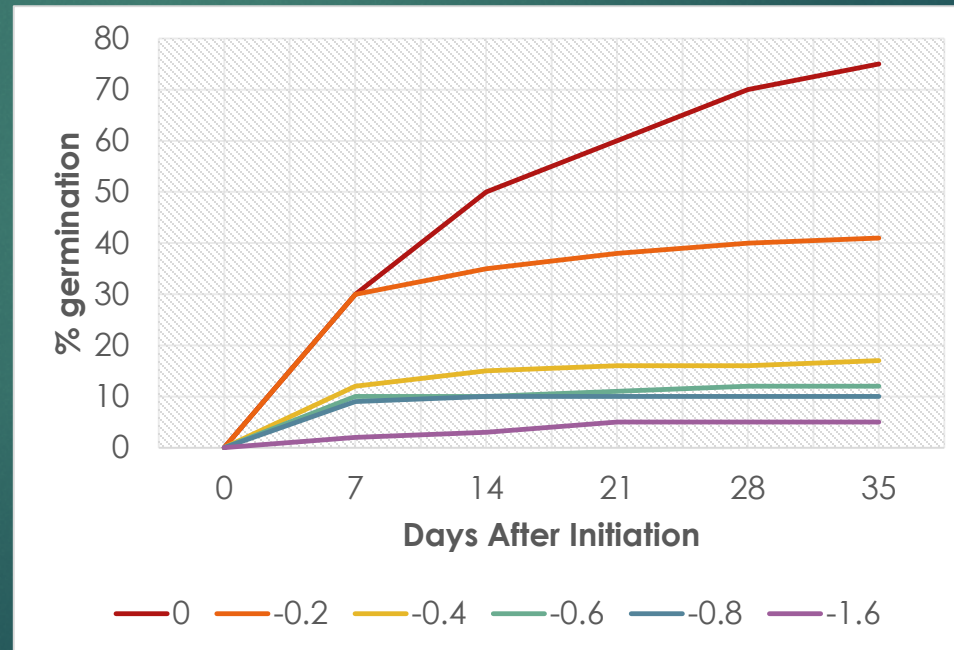
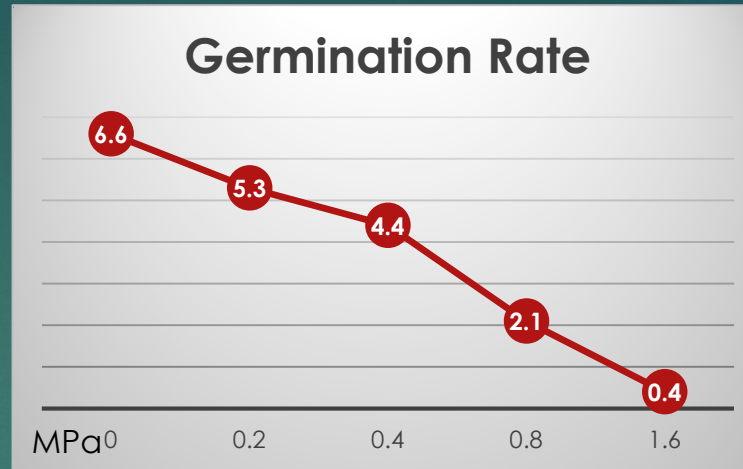
Wetland Establishment Field Trial



No difference from 30d strat in % establishment, but much easier to work with

Lab Work?

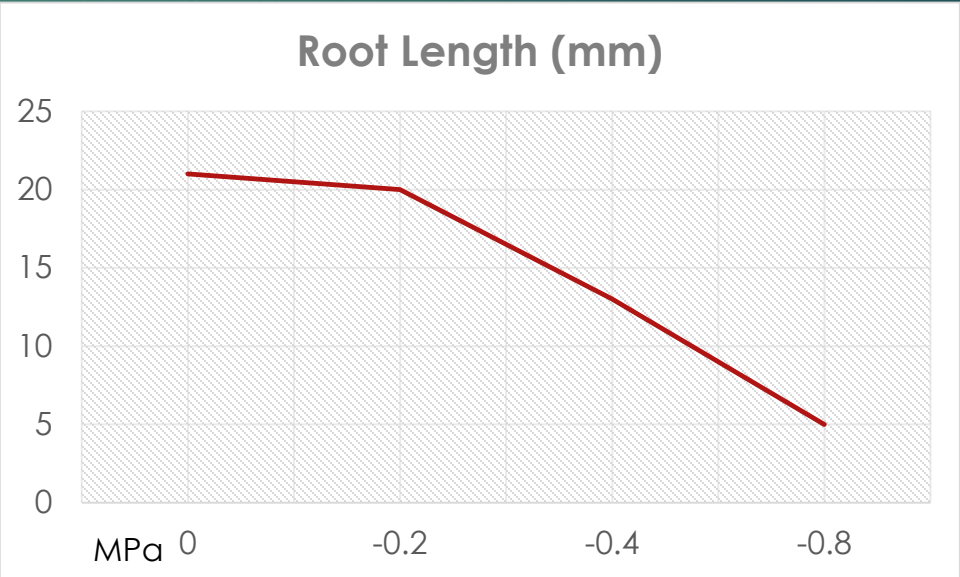
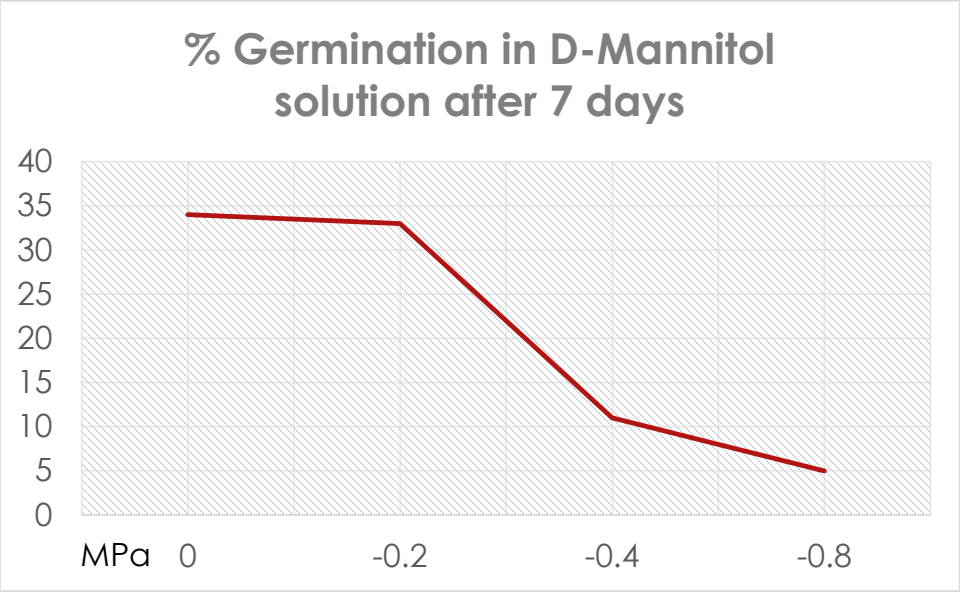
- Plant screening or selection based on germination in low water potential solutions



- Stratification period
90d cool/moist
prior to initiation of
mannitol
treatments



GRSQ in Oxygenated D-Mannitol treatment



Additional Applications



P. coneflower

- Greenhouse propagation
- Seed lab viability testing?
- Rangeland seeding?



Other forbs attempted (not compared to control)

- Munro's globemallow: excellent when preceded by hot water rinse
- Rocky Mountain penstemon: excellent
- Hoary tansyaster: excellent
- Prairie coneflower: excellent
- Palmers penstemon: 0% germ in oxy
- Showy milkweed: good



Conclusions

- Response varies by species
- Need systematic screening
- Shows promise in hastening and synchronizing germination of some difficult species
- May have broader applications in field and lab

Thank You!

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