

Investigations of Wetland Seed Establishment



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The Problems

1. Germination requirements

- Light
- Heat
- Moisture

2. Seeds float

- Can't drill
- Can't broadcast

Seed cost per pound of common Intermountain wetland species (2010)

<i>Carex nebrascensis</i>	\$90
<i>Carex rostrata</i>	\$150
<i>Eleocharis palustris</i>	\$100
<i>Juncus balticus</i>	\$125
<i>Juncus ensifolius</i>	\$200
<i>Schoenoplectus acutus</i>	\$70

The Standard

- 10 ci greenhouse grown plants
- planted at 12-18” spacing
- approximately 25 PLS per cell

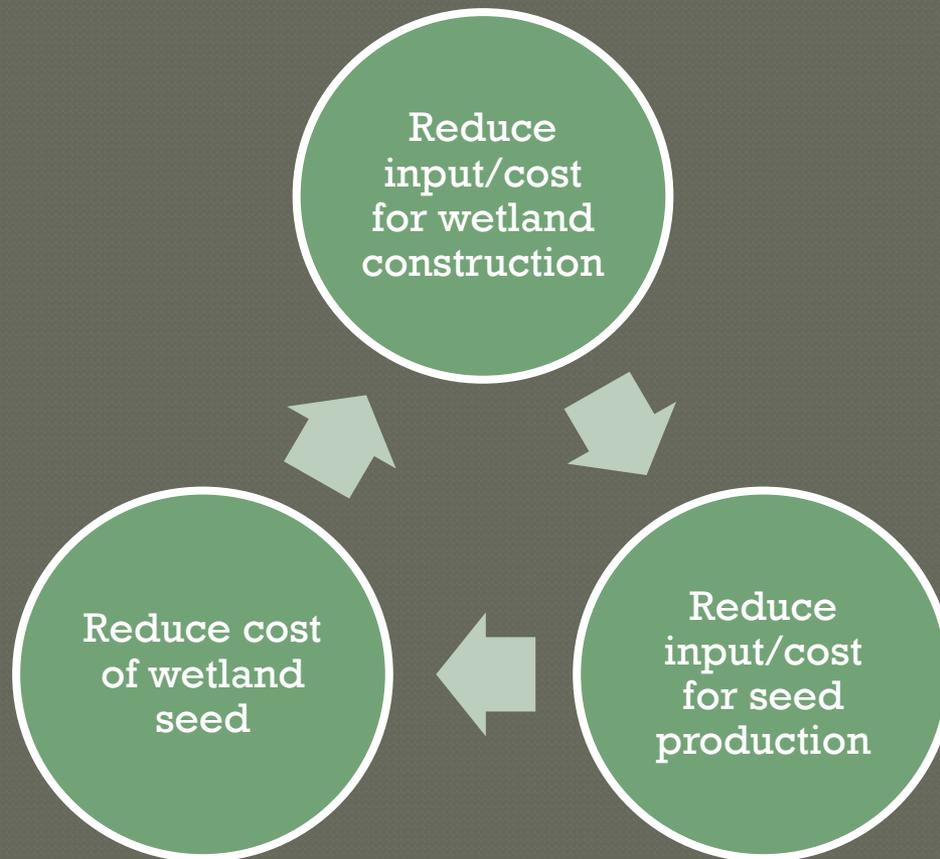
For one acre that amounts to 19,000 plants from approximately 500,000 seeds.

Estimated cost for greenhouse plug production including delivery and installation is \$2.00 per plant or \$38,720/ac (2007).

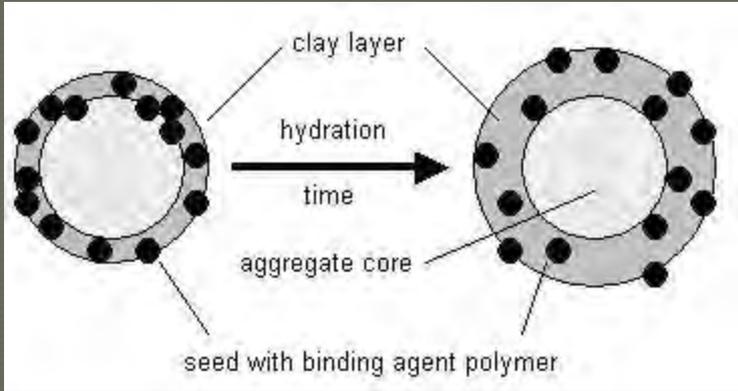




The Goal: Develop a technique for direct seeding of wetland grass-like species



Submerseed®





2005 Submerseed Initial Evaluation

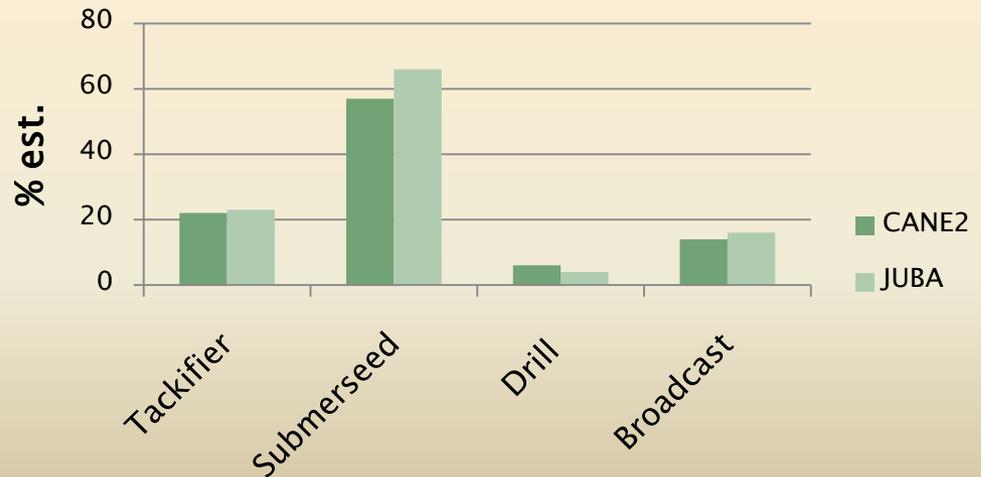
Carex nebrascensis
Juncus balticus

4 Treatments

1. Hydroseeding tackifier
2. Submerseed
3. Drill (0.25 in)
4. Broadcast (surface)

CANE2 185 PLS/ft; JUBA
770 PLS/ft
Flood & wash over
Temps 100-110 F

Percent establishment following a single flooding



Submerseed Field Evaluation



Inert Carriers and Hydroseeding



A. Rice hulls, B. Straw mulch, C. Wood fiber mulch , D. Fertil Fibers

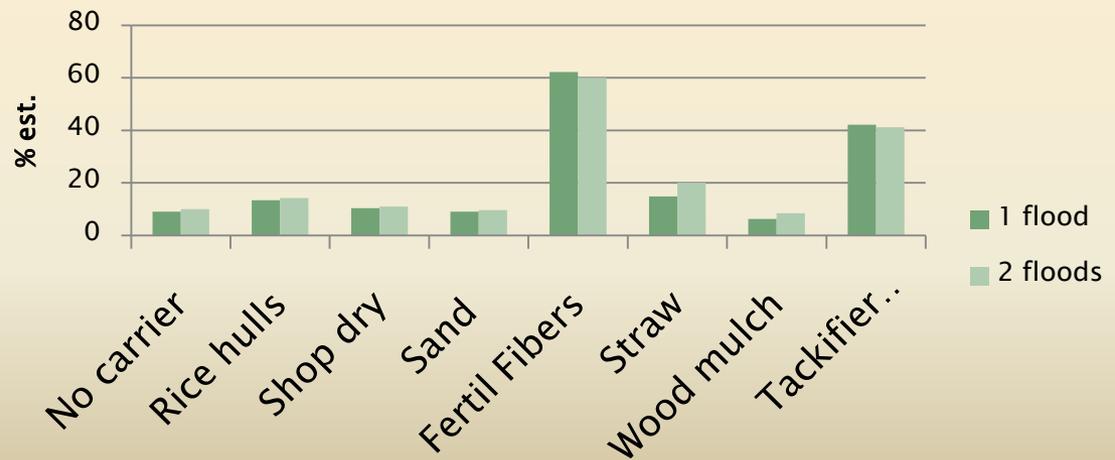


Hydromulch Initial Evaluation 2006

JUBA

- FF, Straw and wood mulch with tackifier
- Other treatments broadcast dry + pressed

Percent establishment following one and two flooding events



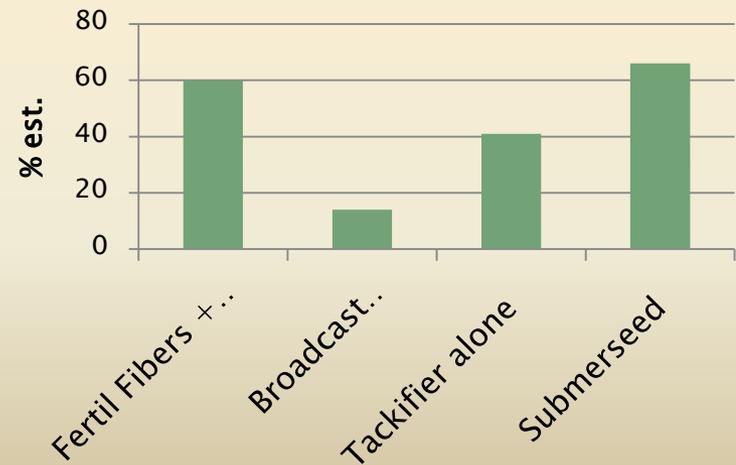


Juncus 07 Outdoor Tank Evaluation

100 PLS/ft²



Percent establishment following a single flooding





Expanded outdoor trial (2008)

- Submerseed
- Fertil Fibers hydro
- Straw mulch hydro
- Broadcast (ricehulls) followed by lawn roller
- 100 PLS/ft²

Results= 0

Temp?
Moisture?

Have to find a way to better control temps and hydrology, and create correct environment.



CAPMC Pollinator Hedgerow 2009



- Temperature buffer
- Increased soil and surface moisture
- Up to 80% light penetration
- Protection from birds

Floating Row Cover for sedge establishment

Treatments

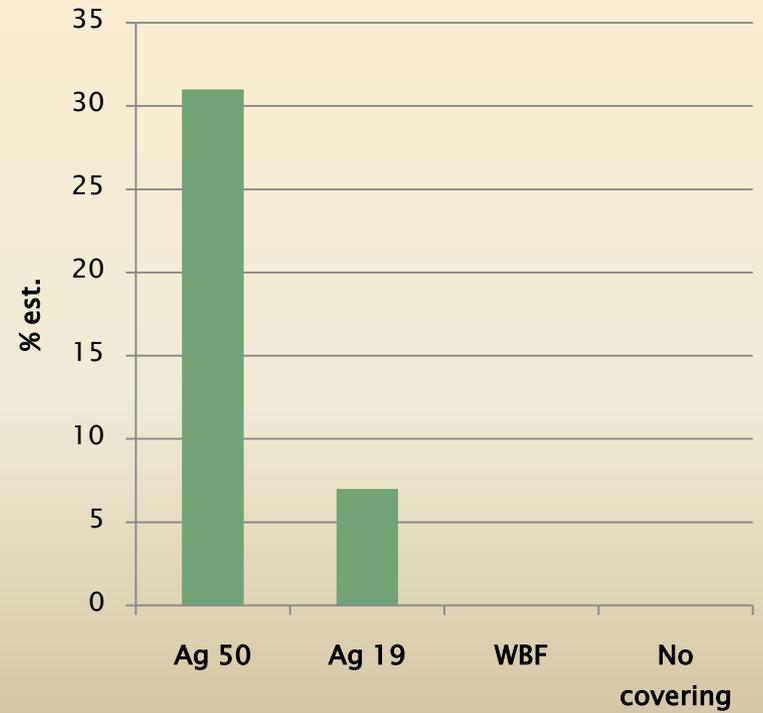
1. Ag 19
 2. Ag50
 3. WBF
 4. No cover
- Plots: 6x8'
 - Irrigated with micro-spray emitters



Carex praegracilis, a CA wet meadow sedge



Percent establishment under row covering treatments



Ag 50- 31%

Ag 19- 7%

Floating Row Cover, 2010 with flood irrigation

- Planted 7/17
1000PLS/m²

- CANE2 and JUBA
- Ag19
- Ag50
- Non-covered Control

- Covered 4 wks or 8 wks



CANE2 Ag19 4wk:
5 plants/m² (0.44%)



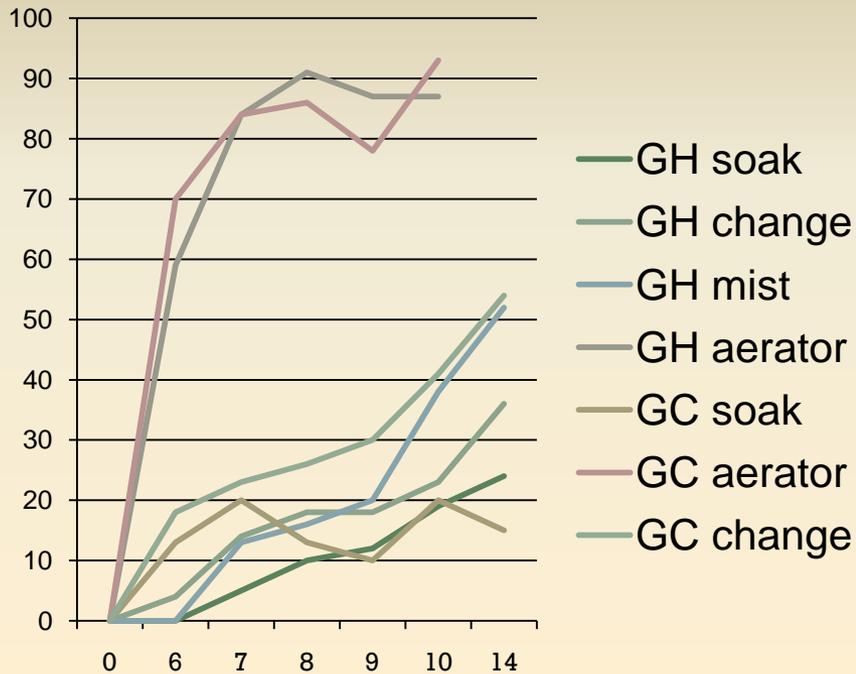
Pre-germinated Seed

Can you germinate the seed, and then sow it into a wetland?



Nebraska Sedge

Percent germination from 6 to 14 days after initiation of treatment



GH=greenhouse
conditions
GC=Growth chamber



Nebraska sedge germination rate and total percent germination after 10 days.

Treatment	Germination rate ¹	Germination (10 DAI) ²
		---%---
GC aerator	13.10 a	93 a
GH aerator	12.90 a	87 a
GC change	4.24 b	41 b
GH mist	2.47 c	38 b
GH change	2.21 c	23 c
GC soak	2.49 c	20 c
GH soak	1.30 d	19 c
P=	<0.001	<0.001
LSD (0.05)	0.83	9.8

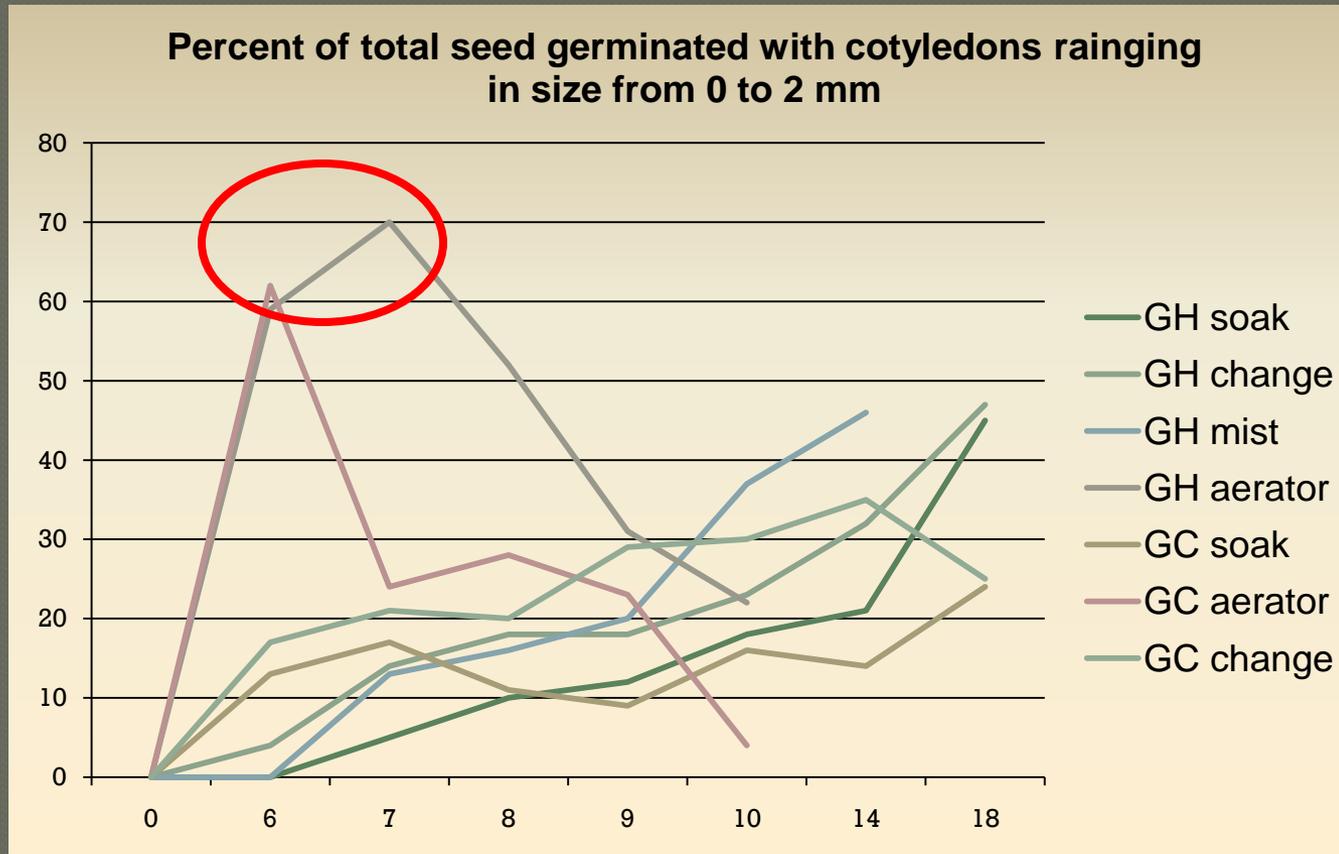


Nebraska sedge



Baltic rush

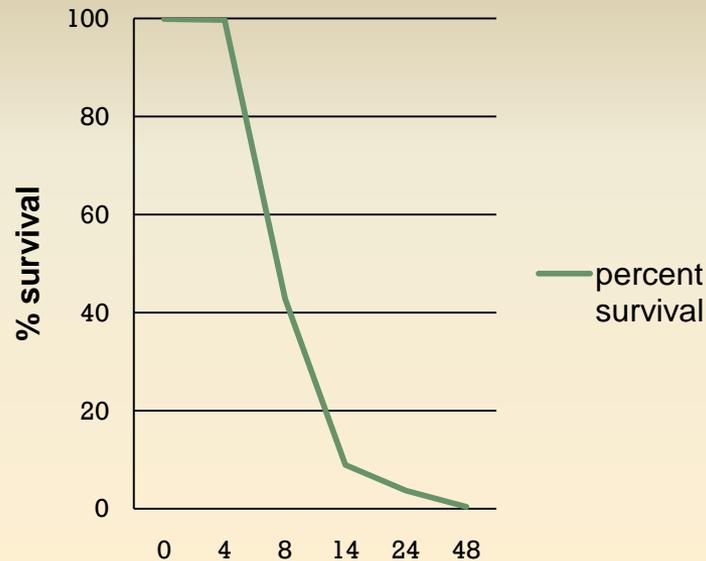
Developing Pre-germination Protocols



Can our wetland species be dried and broadcast like rice?

percent survival after drying following a 7d aerated pre-germ

Nebraska Sedge



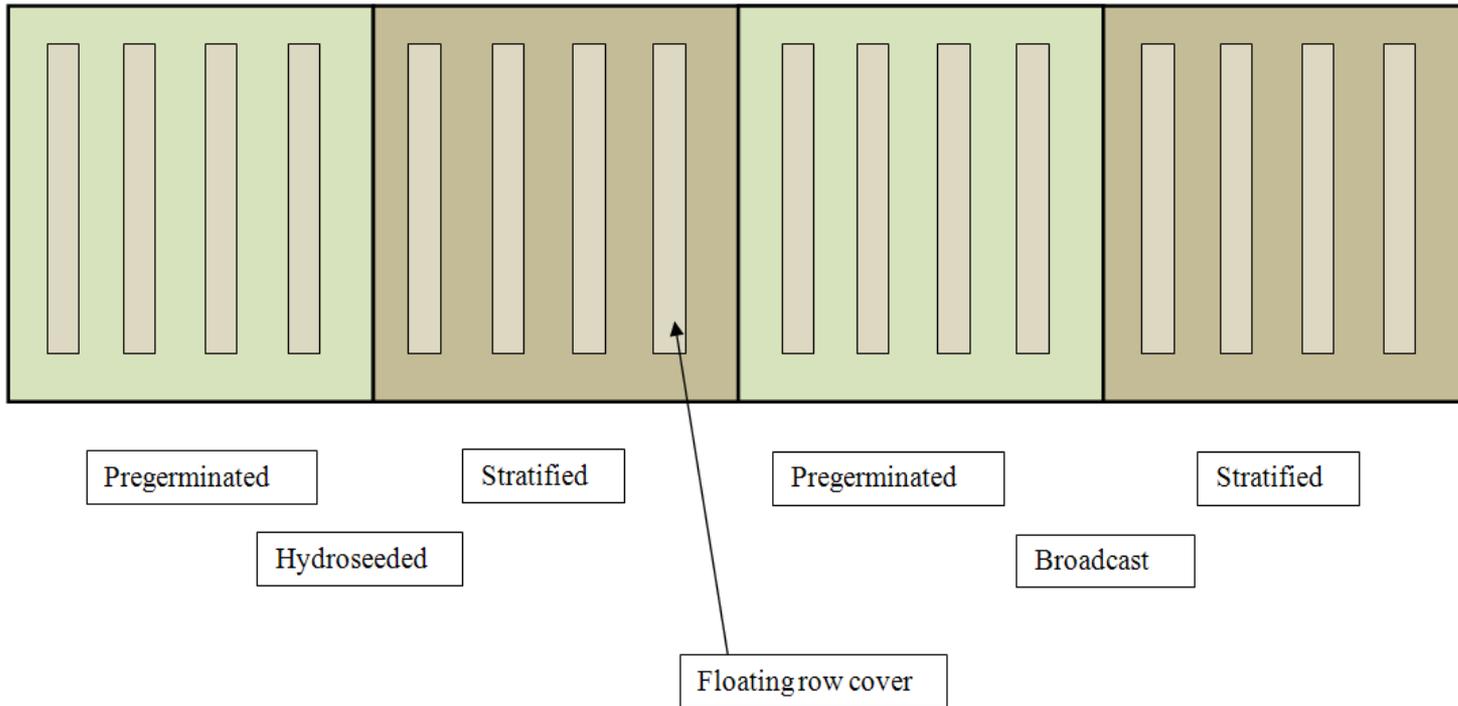
Baltic Rush



Needs to be dry enough that it doesn't stick to equipment or other seed

2011 NPS Project Design

Pond 1. 200 x 50'



2 ponds, 1 is slurried, 1 is traditionally prepped

Cost breakdown for establishing constructed wetlands*

	GH plugs (18" spacing)	Broadcast	Hydroseed (FF)	Hydroseed (tackifier alone)	Submerseed	Row Cover
Seed (\$150/lb) @ 0.2 lb/ac	\$10	\$30	\$30	\$30	\$30	\$30
Shipping	included	na	\$440	na	included	\$100
Carrier	na	Rice hulls \$ negligible	Fertil fibers \$670	na	SS	Rice hulls \$ negligible
Tackifier	na	na	\$60	\$60	na	na
Equipment needed	na	Spreader Imprinter	Hydroseeder \$200	Hydroseeder \$200	Spreader, ATV	Fabric \$700 Staples \$100
Labor @\$20/hr	included	8=\$160	8=\$160	8=\$160	8=\$160	8=\$160
Total	\$40,000 (includes installation)	\$200	\$1,560	\$520	\$1,000-8,000	\$1,100

***Costs do not reflect bed preparation**

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