

Investigations of Wetland Seed Establishment

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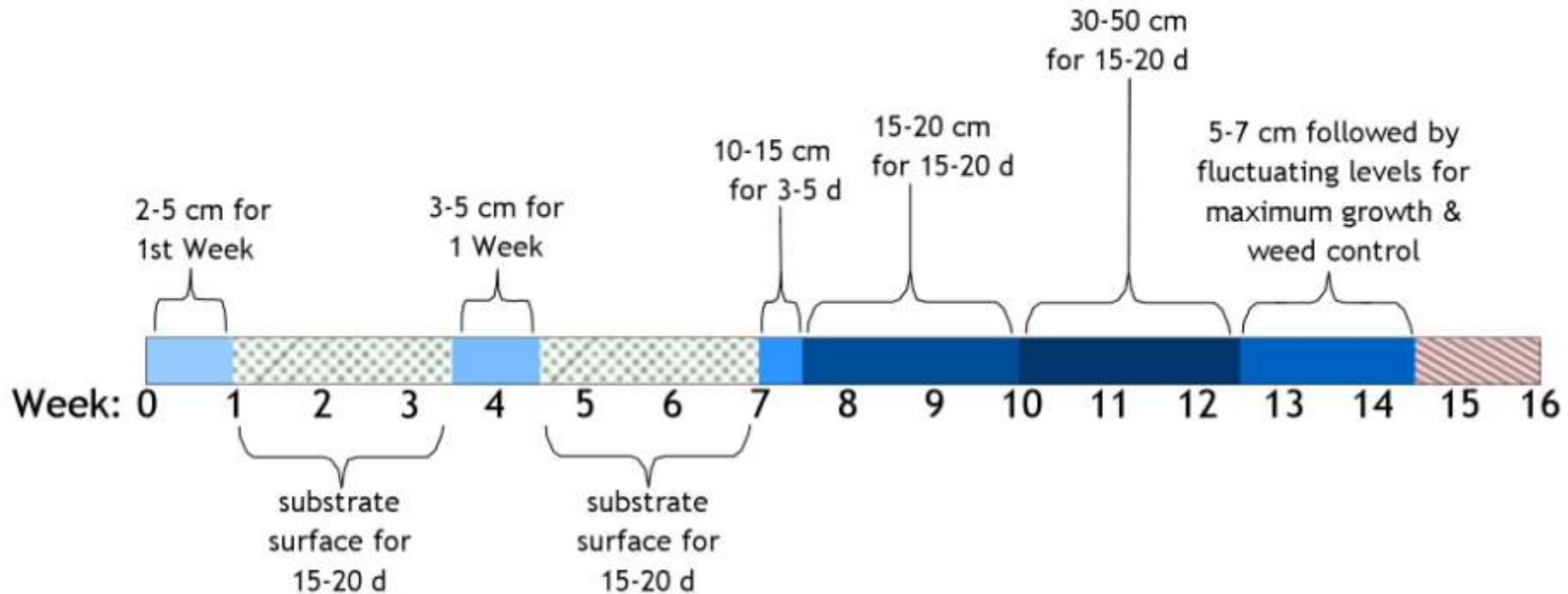
The Problems

- 1. Germination requirements**
 - Light
 - Heat
 - Moisture
- 2. Seeds float**
 - Can't drill
 - Can't broadcast
- 3. Need to follow wetland hydrology**
- 4. Seed is expensive**

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>Scirpus acutus</i>	\$70

Hydrologic time line for wetland plant establishment



Perigynium removal for light requirement in *Carex* spp.



In most cases, purchased *Carex* seed has the perigynium still intact.

The Standard

- 10 ci greenhouse grown plants
- planted at 18" spacing or every 2.25 ft²
- approximately 25 PLS per cell
- Takes approximately 100 to 120 d from strat to xplant.

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





The Good News:

Transplants work very well

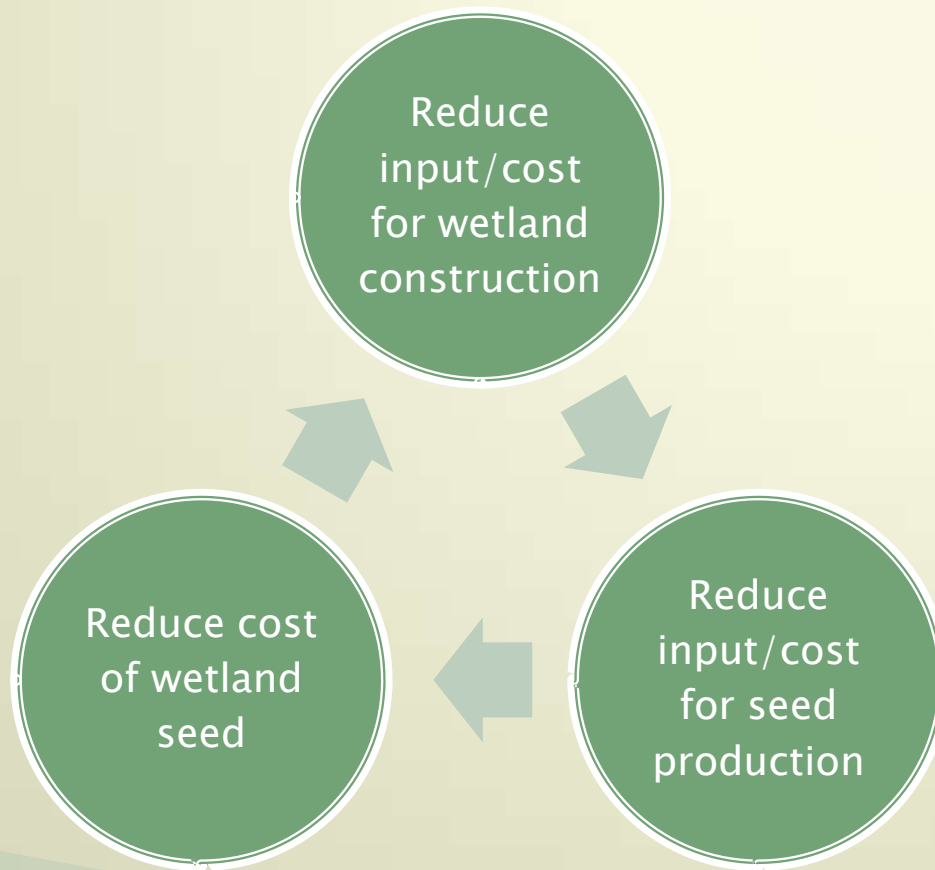
Essentially 100% establishment with proper water manipulation

The Bad News:

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

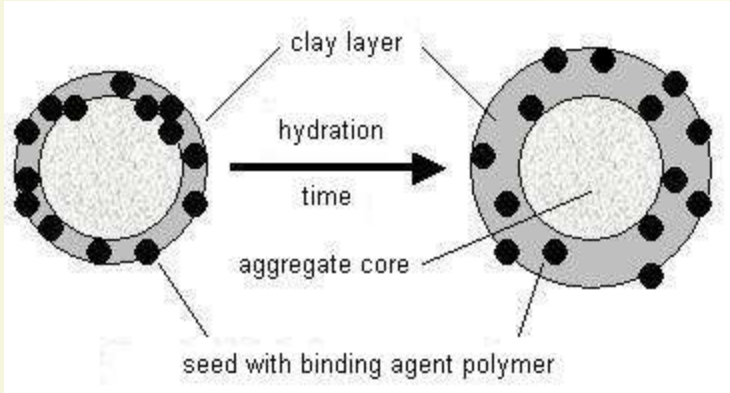


The Goal: Develop a technique for direct seeding of wetland grass-like species



Seed Establishment Trials

Submerseed®





2005 Submerseed Initial Evaluation

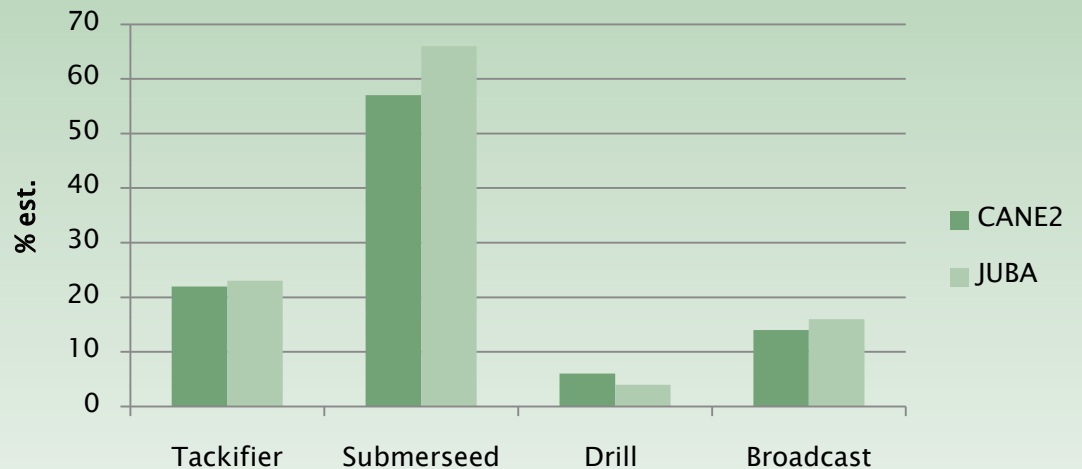
Carex nebrascensis and *Juncus balticus*

4 Treatments

- Hydroseeding tackifier
- Submerseed
- Drill (0.25 in)
- 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

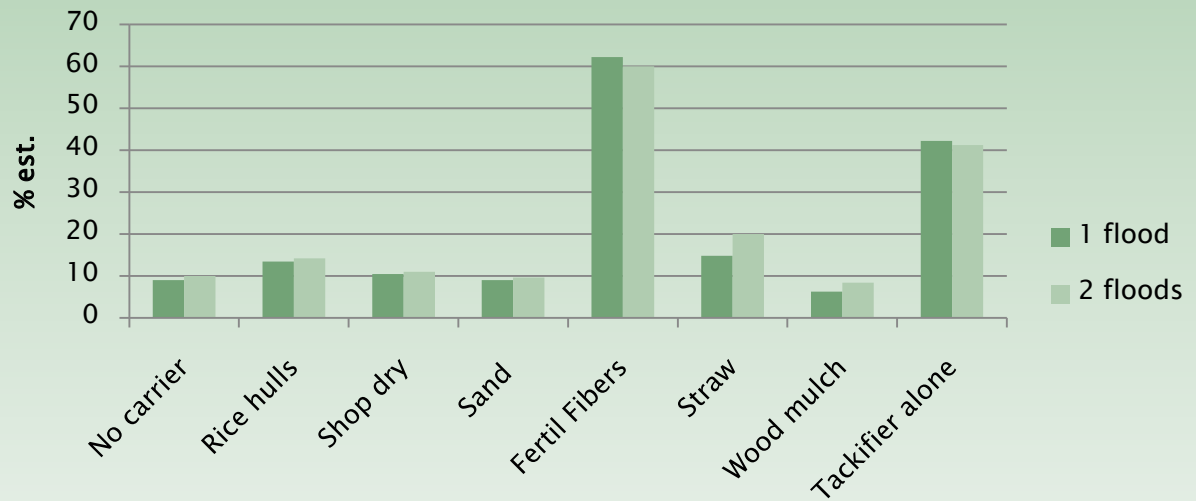


Hydromulch Initial Evaluation 2006

JUBA

- FF, Straw and wood mulch with tackifier
- Others broadcast dry

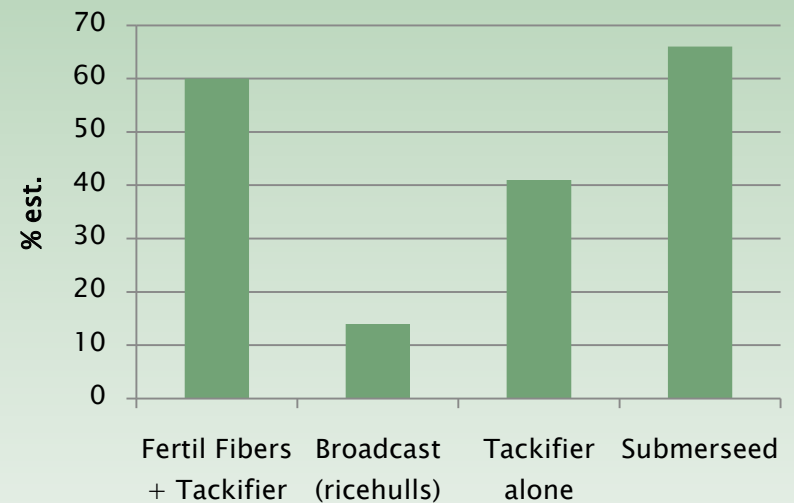
Percent establishment following one and two flooding events



Juncus 07 Outdoor Tank Evaluation



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



- Frost protection
- Increases soil and surface moisture
- Up to 80% light penetration
- Protection from birds

Floating row cover

Agribon™

variety of thicknesses

thicker cloth recommended for greater protection from frost and wind, yet lets in less sunlight than the thinner fabric.

Agribon19®

- protect plants down to -2° C (28° F)
- weighs 0.55 oz/yd²
- allows 85% light transmission

Agribon50®

- protects down to -4° C (25° F)
- weighs 1.5 oz/yd²
- allows 50% light transmission

Floating Row Cover for sedge establishment

Treatments

1. Ag 19
2. Ag50
3. WBF
4. No cover

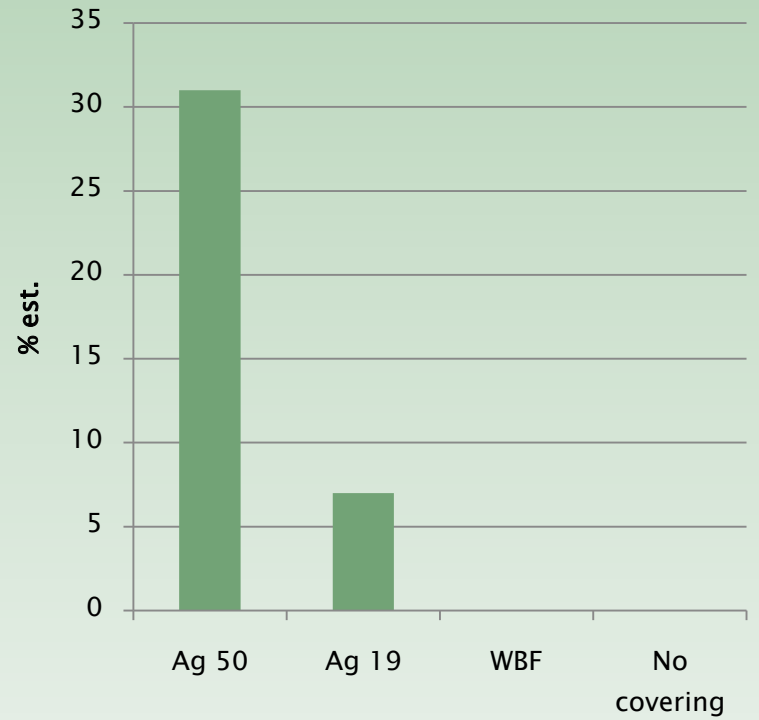
- Plots: 6x8'
- Irrigated with micro-spray emitters



Carex praegracilis, a CA wet meadow sedge

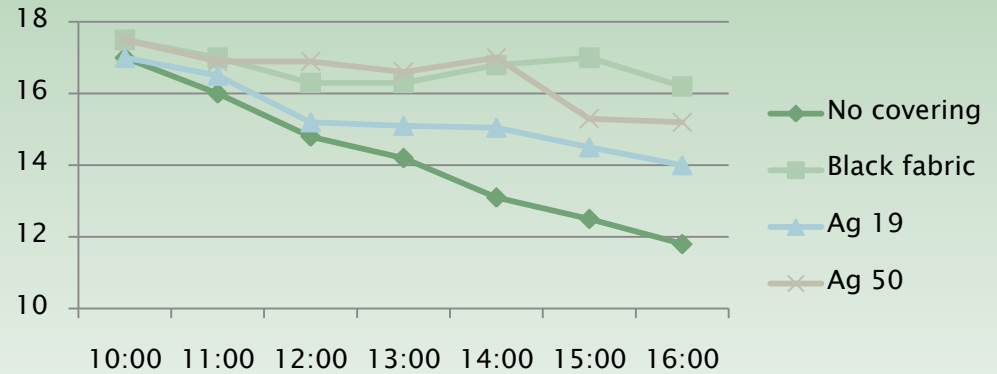


Percent establishment under row covering treatments

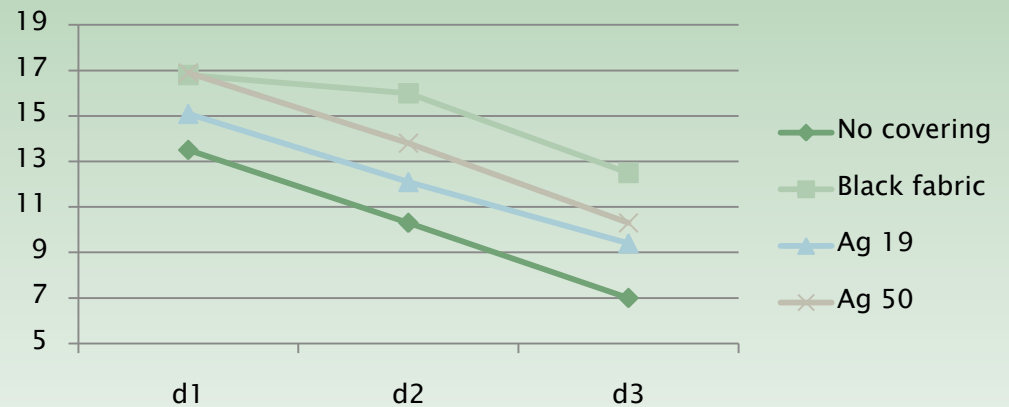




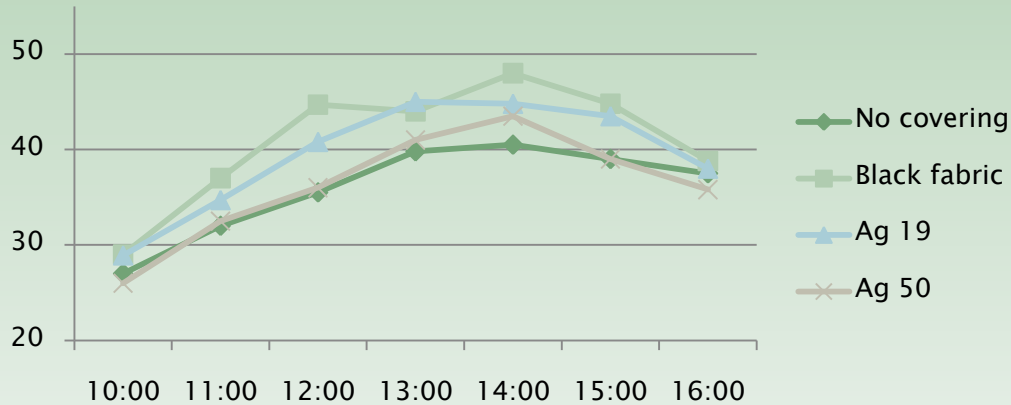
Hourly gravimetric soil moisture percentage 1 day after irrigation



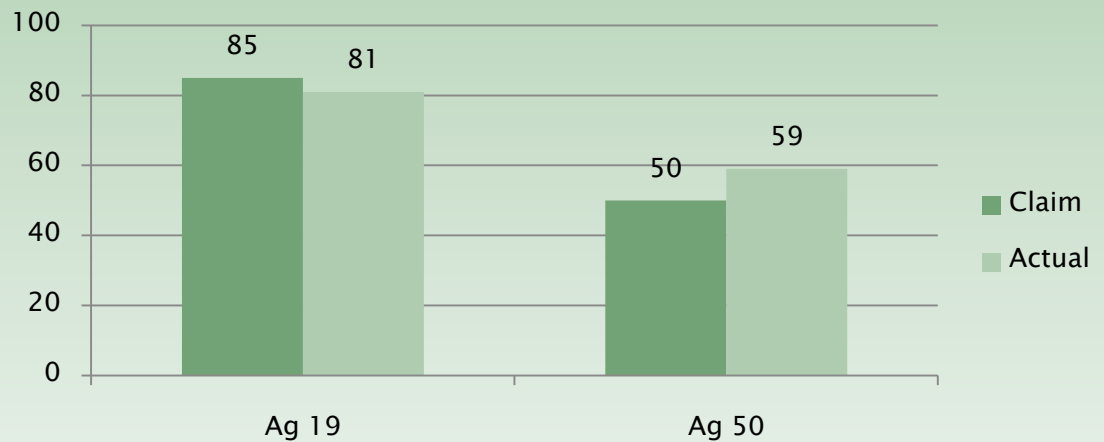
Gravimetric soil moisture 1 to 3 days after irrigation



Average surface temp (°C) 1 day after irrigation



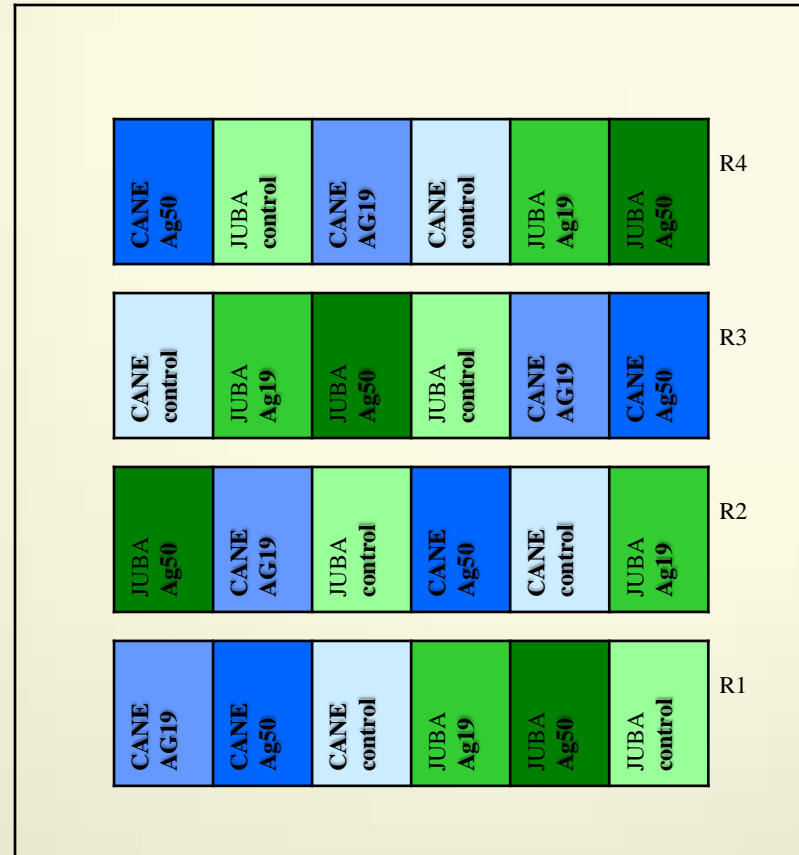
Percent photosynthetically active radiation (PAR)



2010 Floating Row Cover Used with Flood Irrigation

Evaluations

- Establishment densities
- Seed movement under cover
- How long to leave cover on plants
- Growth under cover and Weed control



Cost breakdown for 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

Cost for establishing seed production fields may differ.

Not-So-New Ideas Worth Looking At



Pre-germinated seed

Need precise
germination and
handling protocols



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