

# Seeding Big Sagebrush in Utah



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# Major Threats

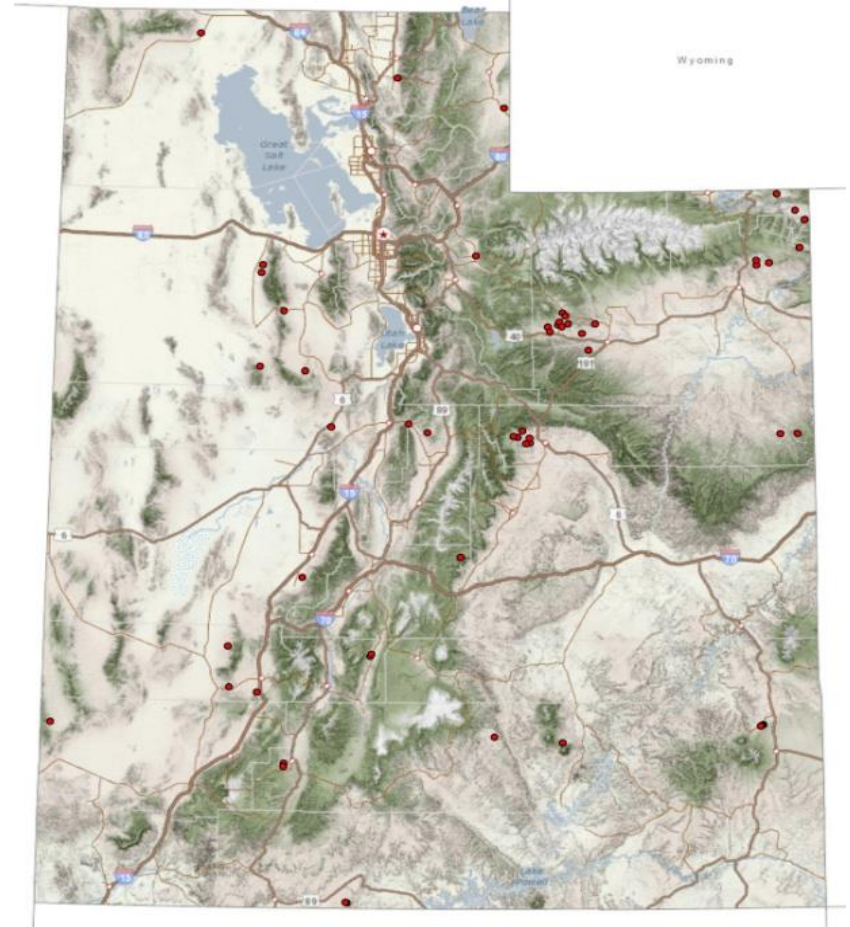
Loss, Degradation, Fragmentation of Habitat Due to:

- Catastrophic wildfire
- Pinyon-juniper expansion
- Loss of understory species
- Invasive species (Cheatgrass)

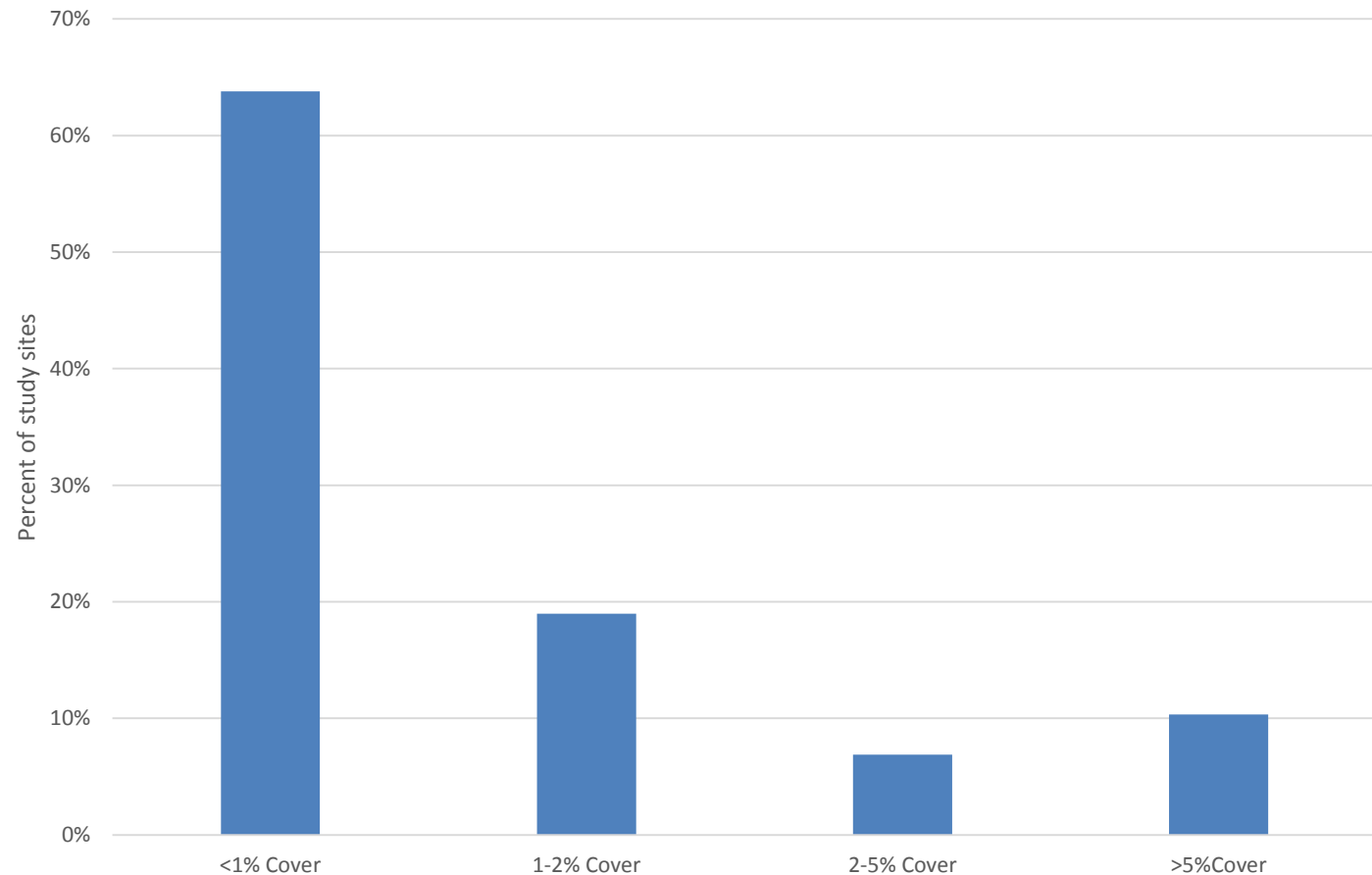


# Monitoring Results in Utah

- 58 monitoring plots where sagebrush was seeded
  - <5% cover
- Pre-treatment and post treatment
- Wyoming big sage seeded on 54 of 58
- Line intercept method



# Max Recorded Sagebrush Cover



**Salt Mtn Stockpond** Burned in Big Pole Fire 2009,  
0.08 PLS lbs/acre



**Salt Mtn Stockpond**  
0% cover 3 years after fire



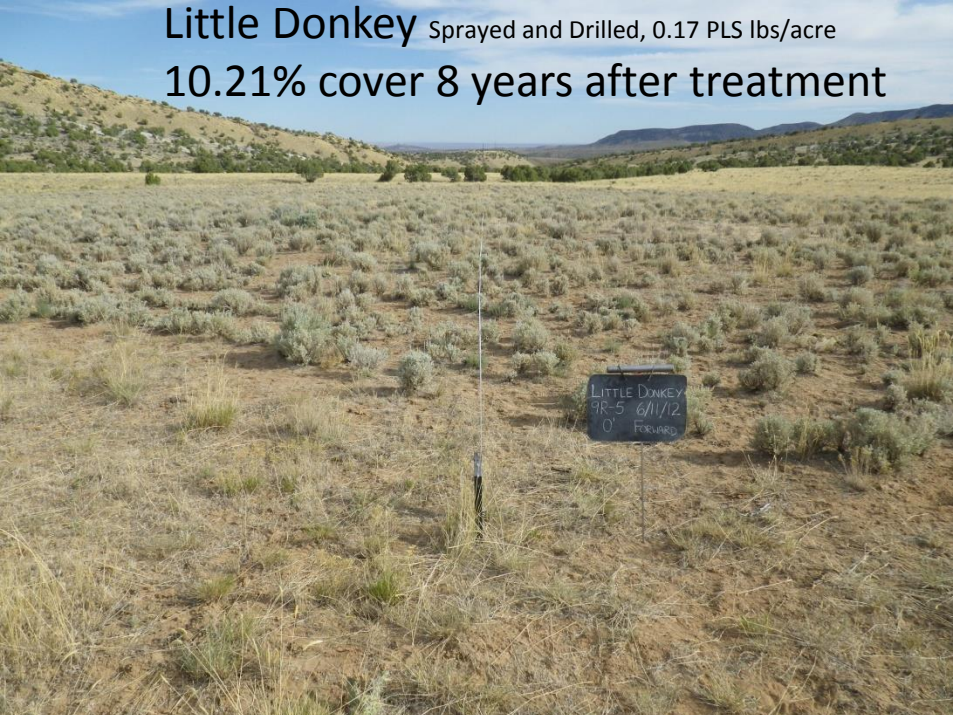
**Hop Creek** Burned in Salt Creek Fire 2007, 0.16 PLS lbs/acre



**Hop Creek**  
0% cover 5 years after fire



**Little Donkey** Sprayed and Drilled, 0.17 PLS lbs/acre  
10.21% cover 8 years after treatment



**Blacktail Chaining** 0.20 PLS lbs/acre  
1.01% cover 7 years after treatment



**Greenville Bench Bullhog** 0.03 PLS lbs/acre  
1.95% cover 7 years after treatment



**Wildcat Push** 0.15 PLS lbs/acre  
0.63% cover 3 years after treatment



# Why Such Limited Success?

- Are our seeding techniques wrong?
  - Rates, Timing, Seeding Method
- Is the source of seed appropriate?
  - Can we better verify what is on the seed tag?



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# Seeding Big Sagebrush

Recommended Seeding Methods from Great Basin Fact Sheet (2015) and Stevens and Monsen (2004):

- Late fall or early winter
  - Seed on snow
  - “January is generally the best month to seed.”
  - “Delaying seeding until uniform snow is advisable”
  - Avoid early germination
- Broadcast onto disturbed soil
- Lightly cover seed
- Drill very shallow 1/16 inch
  - Packer Wheels
- Wheel packer



# Recommended Seeding Rates

Recommendation	Reference
<b>0.2-0.5 PLS lbs/acre</b>	<b>Jacobs, Jim, Joseph D. Scianna, and Susan R. Winslow. 2011.</b> Big sagebrush establishment. Natural Resources Conservation Service, Plant Materials Technical Note No. MT-68.
<b>0.1 PLS lbs/acre</b>	<b>Lambert, Scott M. 2001.</b> Seeding considerations in restoring big sagebrush habitat. Nancy L. Shaw, Mike Pellant, Stephen B. Monsen, (compilers). 2005. Sage grouse habitat restoration symposium proceedings; 2001 June 4–7; Boise, ID. Proceedings RMRS-P-38. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
<b>0.25-0.5 PLS lbs/acre</b>	<b>Meyer, Susan. 1994.</b> Germination and establishment ecology of big sagebrush: Implications for community restoration. P. 244-251. In: S. B. Monsen and S. G. Kitchen (compilers). Proceedings of Symposium on the Ecology, Management, and Restoration of Intermountain Annual Rangelands, May 18-21, 1992, Boise ID. USDA Forest Service General Technical Publication INT-GTR-313.
<b>5-9 live seed/ft<sup>2</sup></b>	<b>Meyer, Susan. 2008.</b> <i>Artemisia</i> L. P. 274-280. In: F. T. Bonner and R. P. Karrfelt (editors). Woody Plant Seed Manual. Agric. Handbook No. 727. Washington, DC. U.S. Department of Agriculture, Forest Service. 1223 p.
<b>1.8-3.6 PLS lbs/acre</b>	<b>Schuman, G. E., M. C. Mortenson, and L. E. Vicklund. 2012.</b> Effects of Wyoming big sagebrush seeding rate and grass competition on long-term density and canopy volume of big sagebrush and wildlife habitat.

# New Research - Ott et al. (2017)

- Fall seeding > winter seeding
- Drill delivery with imprinting > broadcasting
- Seeding rates higher than typical recommendations
  - 1X = 0.08 PLS lbs/acre (typical rate)
  - 5X = 0.4 PLS lbs/acre
  - 10X = 0.8 PLS lbs/acre

# Sagebrush Seeding Research Studies With No Success

- Cheatgrass restoration
  - Imazipic and various seeding methods (2011)
- Seeding Rate Studies
  - Various rates on two fires (2013)
- Ephraim Farm (2014)
  - Various rates
  - 2 application dates



# Expanded Timing and Rate Study

## 2015-16, 2016-17, 2017-18

- Two locations (3 reps per location)
- 12 rates (0.1-5 PLS lbs/ac)
- 10 seeding dates
  - Nov 17 – Mar 21 (every two weeks) 2015-16
  - Oct – Feb (every two weeks)
- Soil disturbed prior to seeding with a chain harrow
- Additional roller packer treatment prior to snowfall

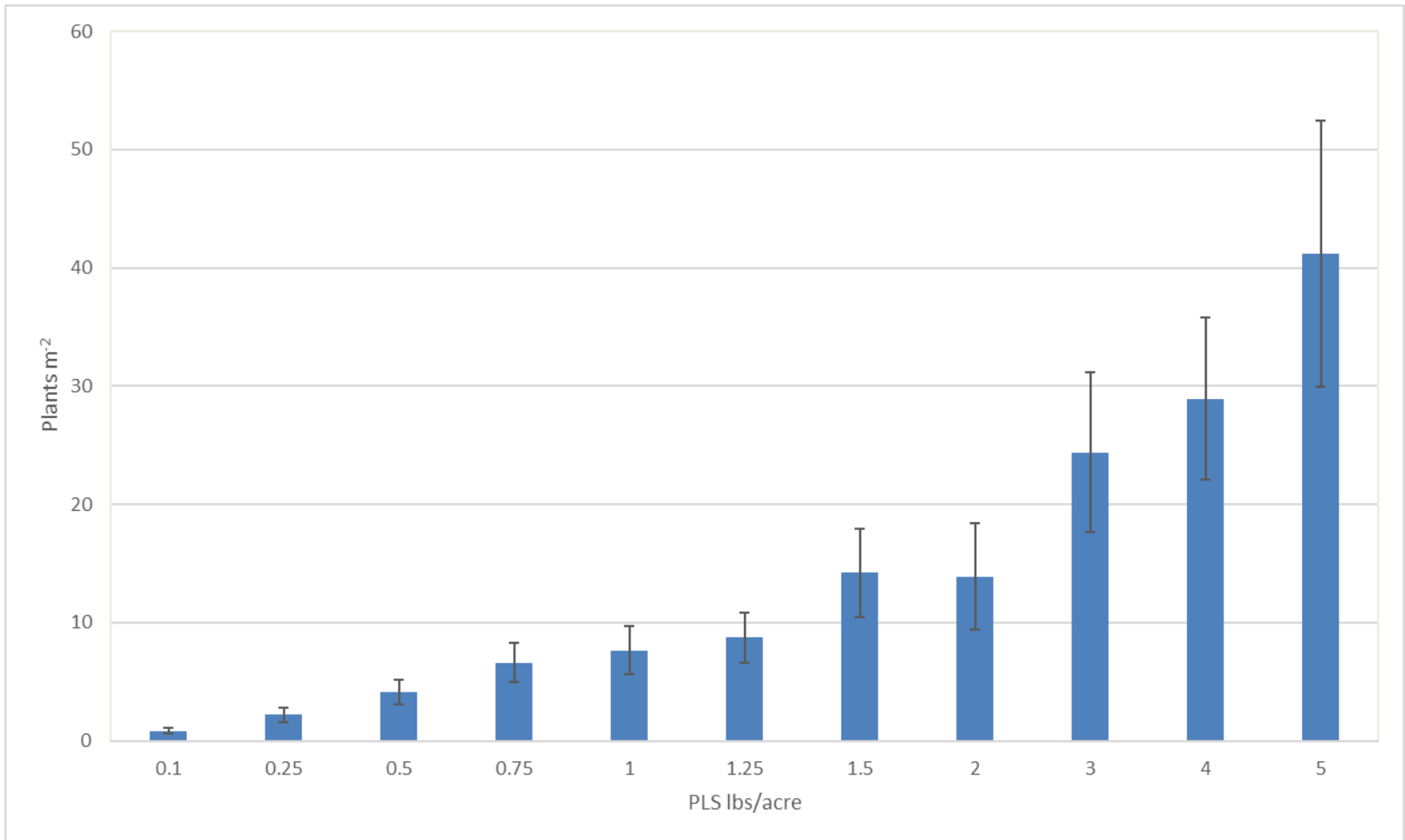




# Density by Seeding Rate

2015-2016 Trial

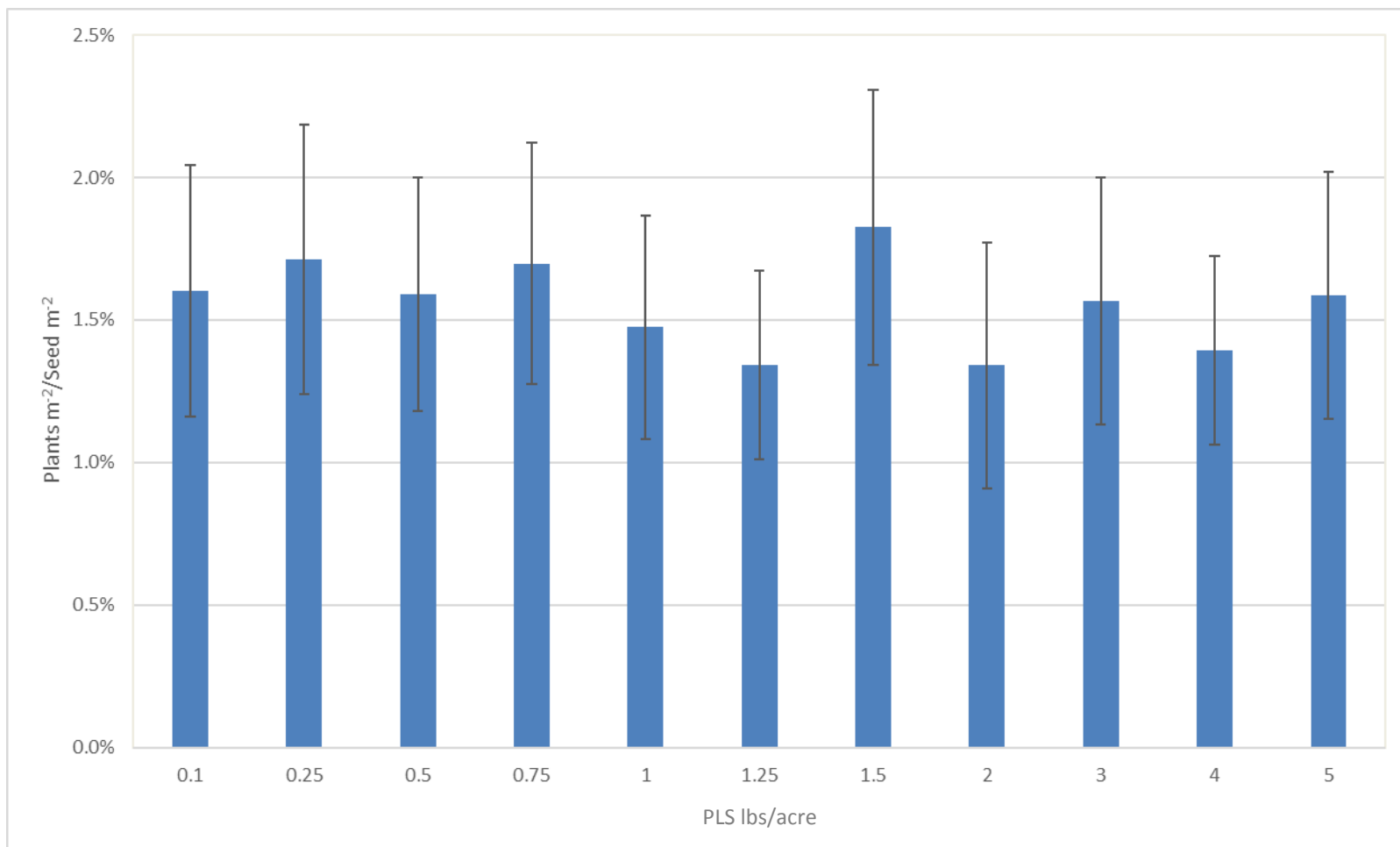
May 2016 Observation



# Percent Establishment by Seeding Rate

2015-2016 Trial

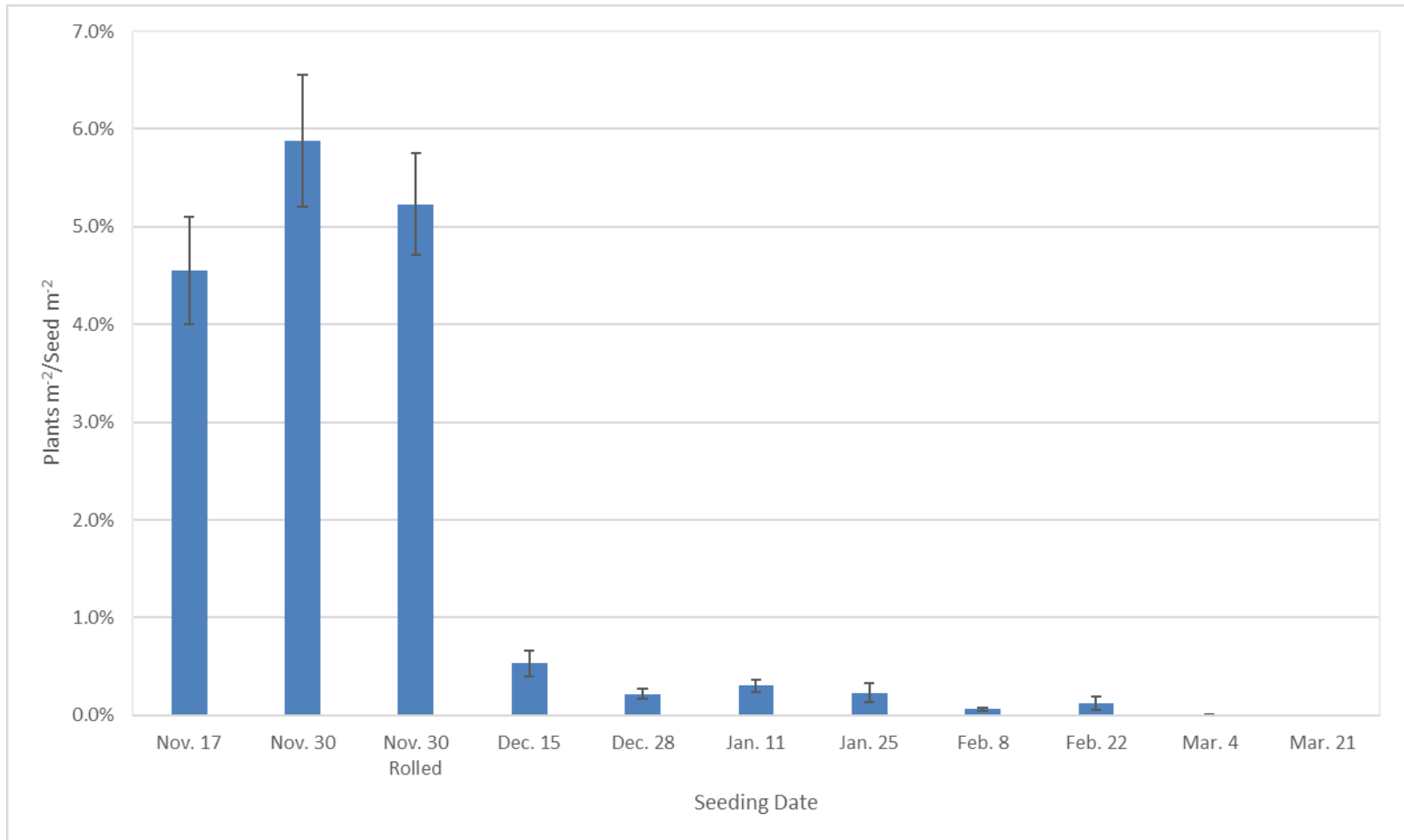
May 2016 Observation



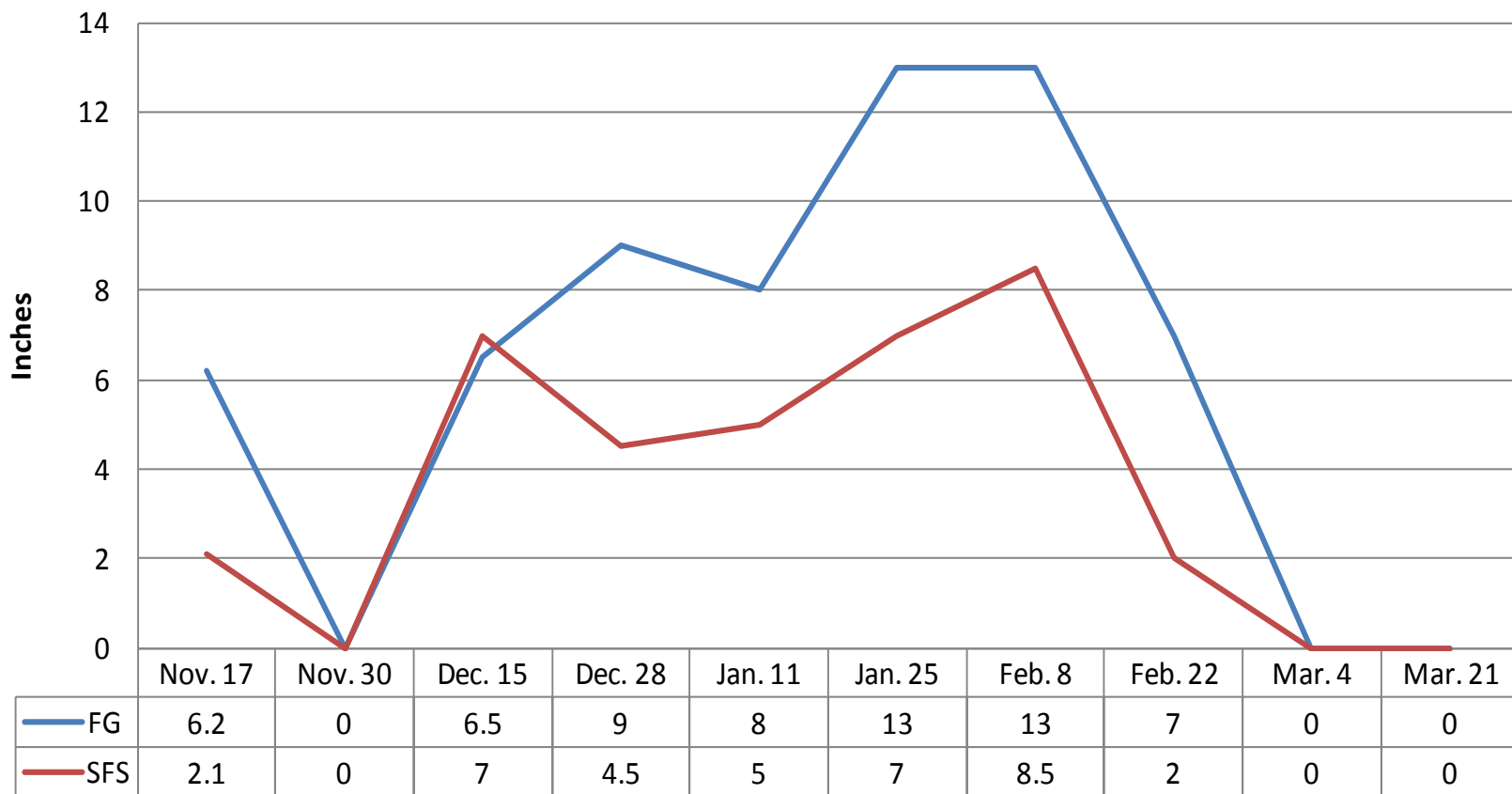
# Percent Establishment by Seeding Date

2015-2016 Trial

May 2016 Observation



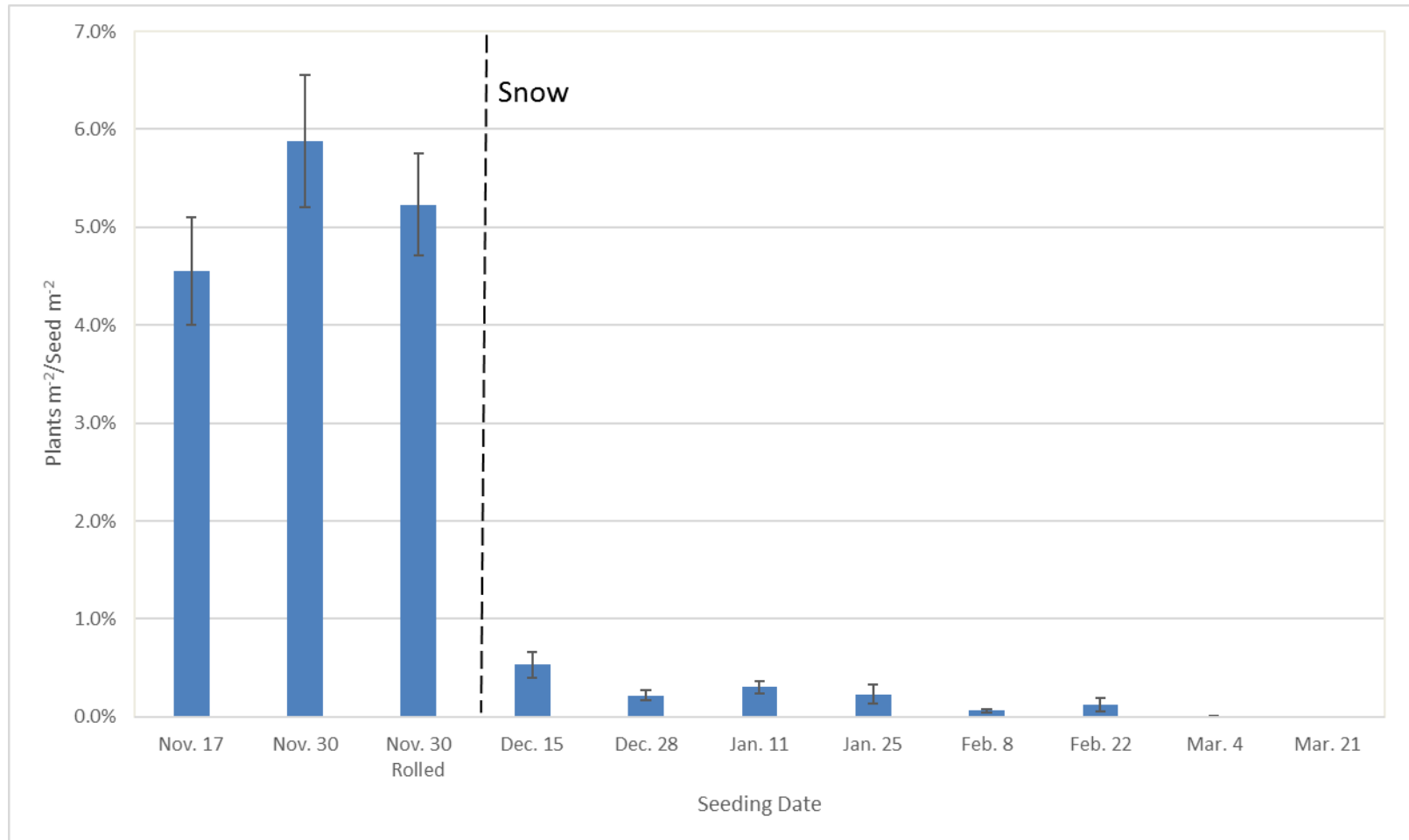
# Snow Depth



# Percent Establishment by Seeding Date

2015-2016 Trial

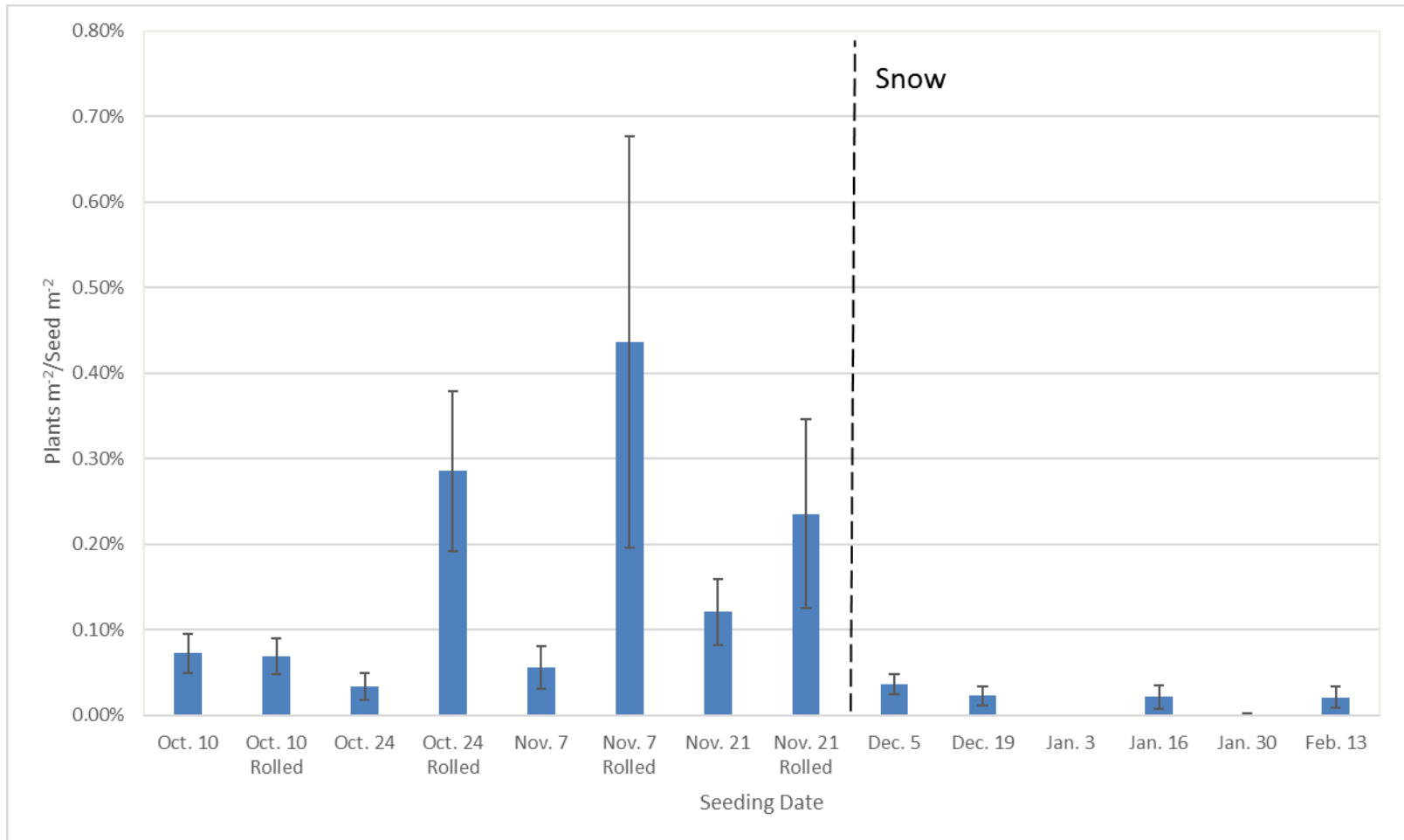
May 2016 Observation



# Percent Establishment by Seeding Date

2016-2017 Trial, Ft Green Location

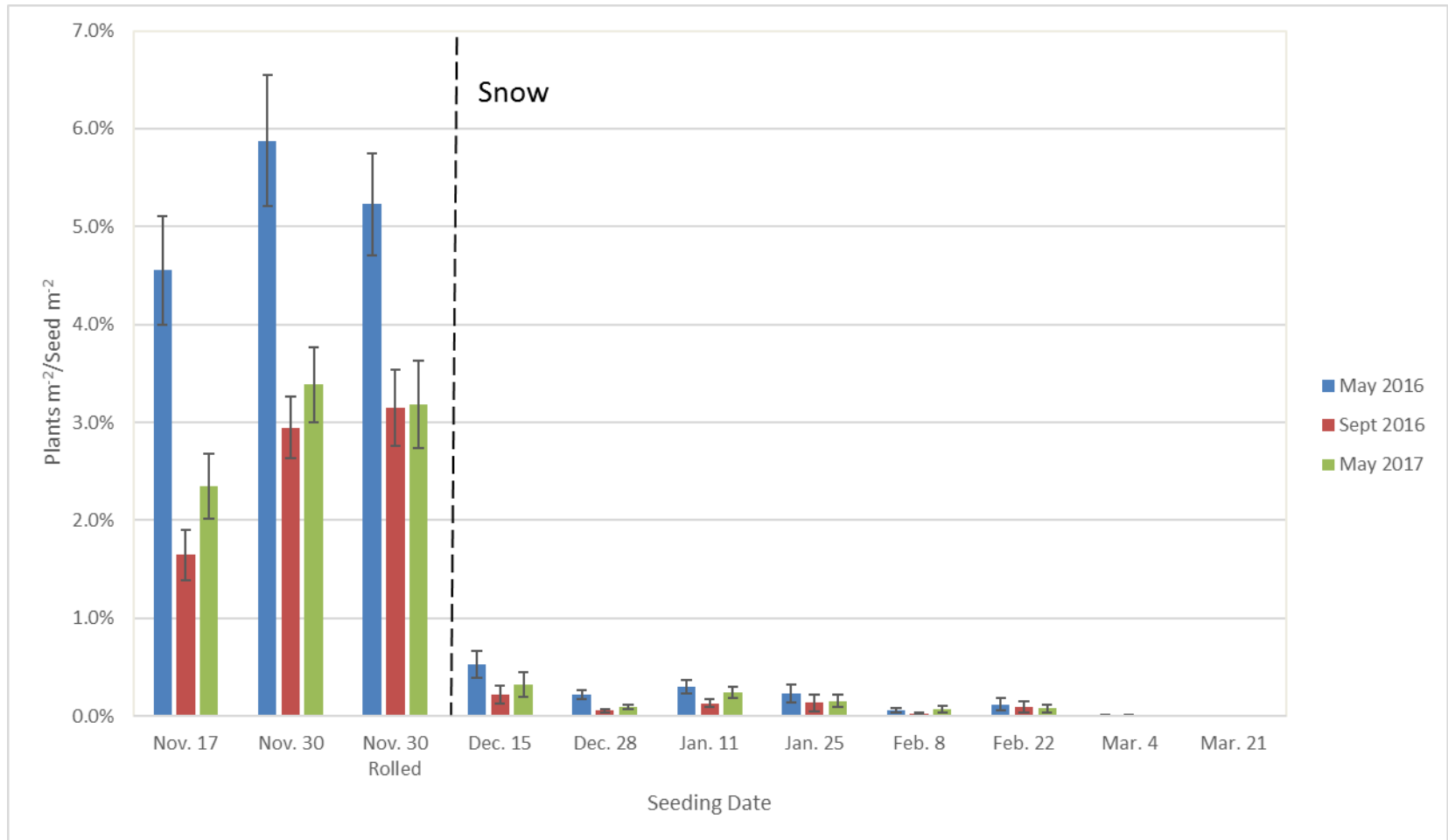
May 2017 Observation



# Percent Establishment by Seeding Date

2015-2016 Trial

All Observations

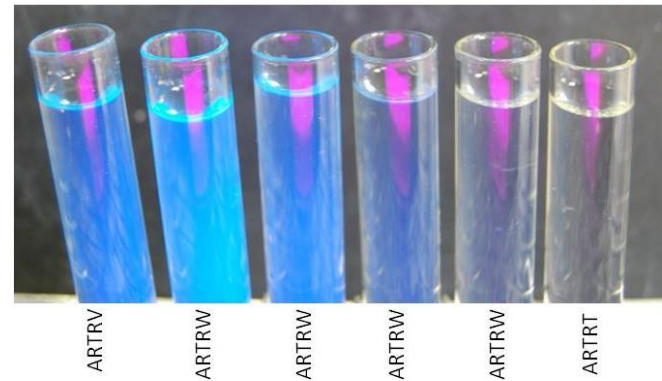
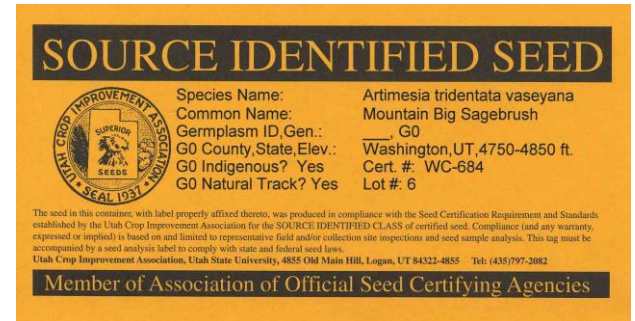


# Early Observations

- Higher success seeding dates in November when seed had good soil contact prior to winter-long snow cover
- Roller packing seemed to improve establishment in year 2
  - Replicated with more treatment dates in October
- The more you seed the more you get
  - Some loss of seedlings over the summer

# Other Questions

- Are commercial seed lots correctly identified?
  - Verifying subspecies from seed
    - UV test
    - Seed weights (Richardson 2015)
- Where is it appropriate to move sagebrush seed?
  - Seed transfer zones for big sagebrush – Bryce Richardson



# Other Questions

- Technology to improve establishment
  - Seed coating technologies – Matt Madsen BYU
- Does anything other than the correct weather condition matter?
  - Sagebrush is established in episodic events (Perryman 2001)

Thank You

