



# 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)

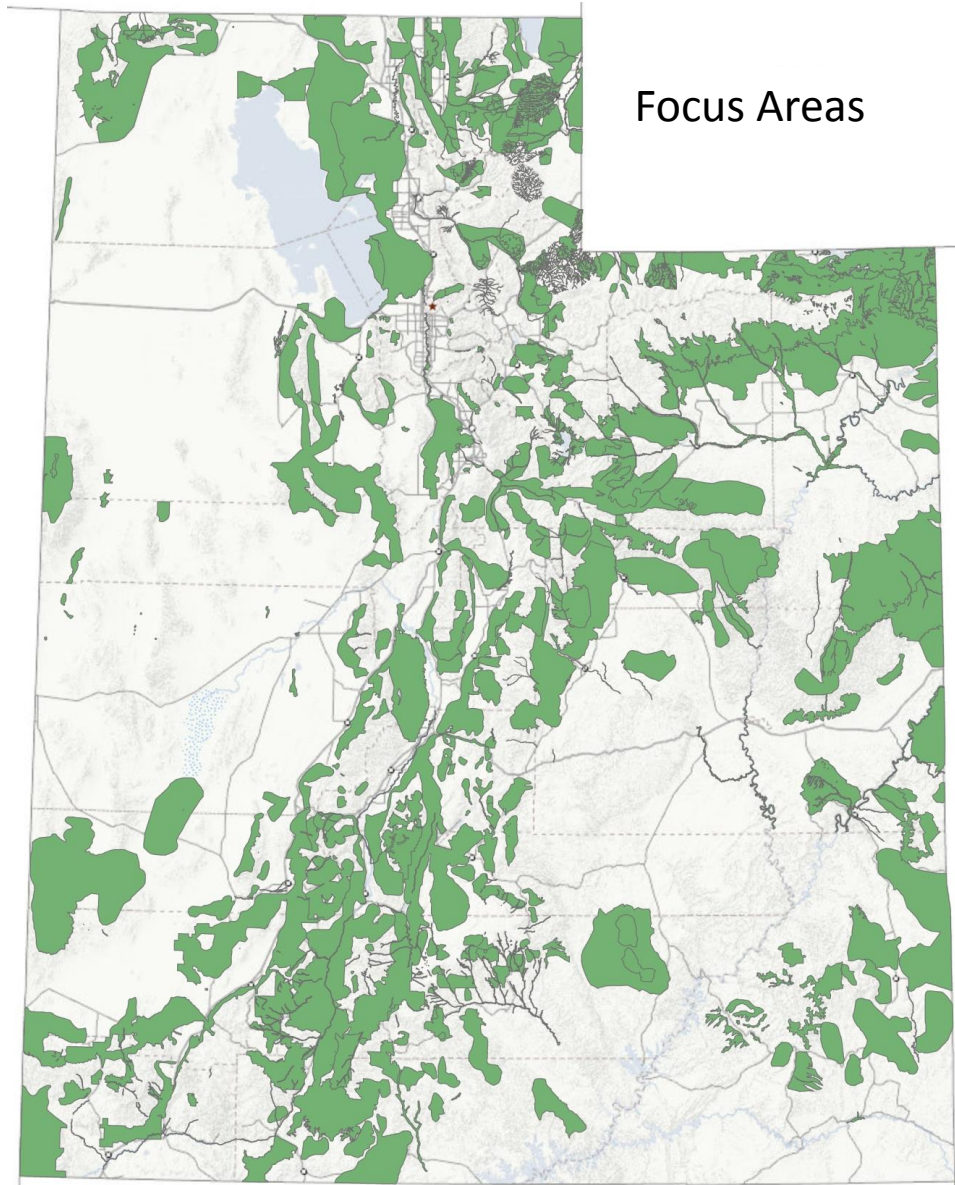


# Utah Watershed Restoration Initiative

- A Watershed, Broad Landscape, Cross-Boundary, Solutions Oriented Partnership
- Collaborative-Proactive Effort
- Common Core Goals
  - Wildlife and Biological Diversity
  - Water Quality and Yield for all Uses
  - Opportunities for Sustainable Uses
- Locally Led Teams Develop and Implement Projects
- Partners Include
  - USFS, BLM, SITLA, USFWS, NRCS, NPS, UDAF, Farm Services Agency, Private Landowners, Sportsman Groups, Academia, Local Governments, Industry, Energy, Etc.



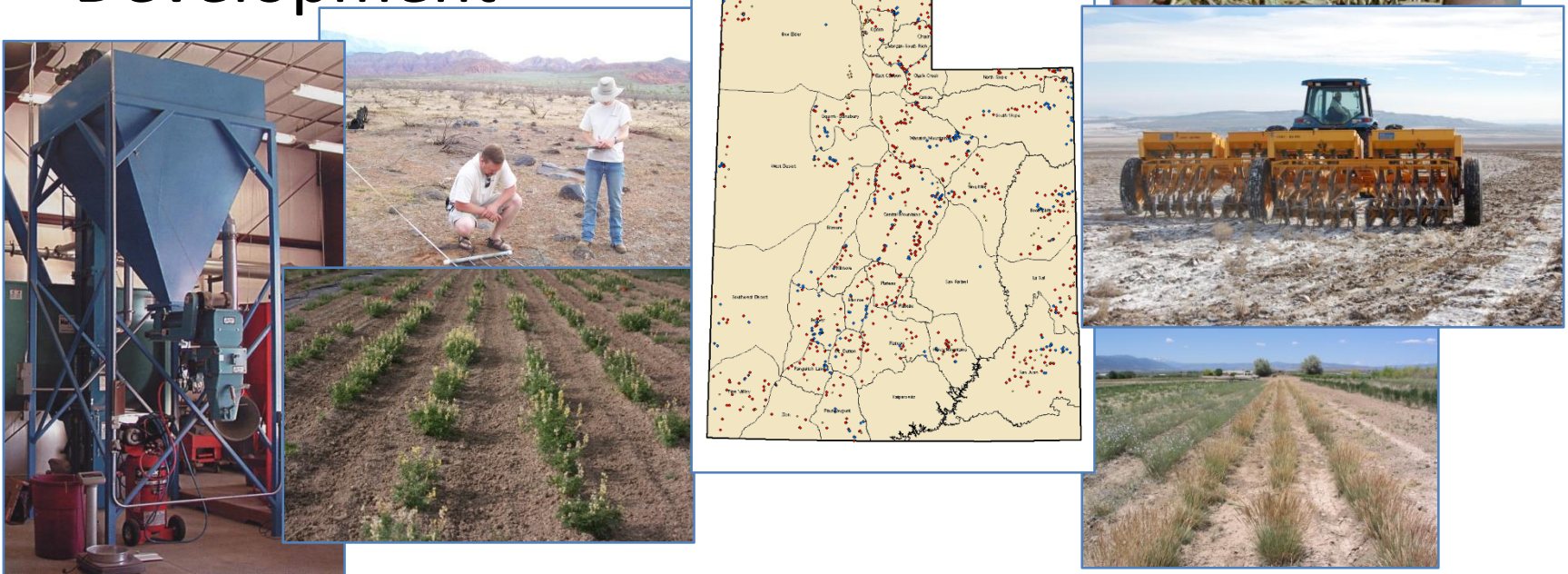
# Watershed Restoration Initiative



- Goal of 100,000 acres treated annually
- 1.3 million acres treated since 2004
- \$179 million invested since 2004
- Numerous treatment methods, habitat types, and objectives
- [wri.utah.gov](http://wri.utah.gov)

# Great Basin Research Center and Seed Warehouse

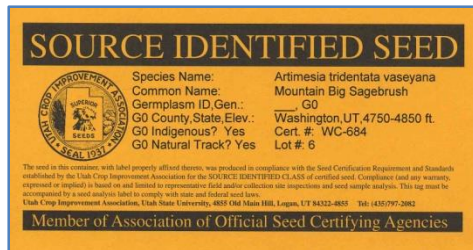
- Seed Resources and Restoration Equipment
- Range Trend Monitoring
- Research and Plant Materials Development



# Providing Logistical Support for Restoration Projects

- Seed Resources

- Bulk seed acquisition for all WRI projects to reduce cost
- Custom seed mixing to meet project goals
- Provide plant materials suited to site potential
- Ability to respond to emergency wildfire restoration projects



# UDWR Seed Warehouse

- Warehouse constructed in 2004 with an expansion in 2010
- Increased storage capacity from 650,000 lbs to 1.25 million lbs
  - 1.1 million lbs in temperature controlled warehouse
  - 150,000 lbs in cold storage
- BLM Seed Network
- Diversify fire rehab mixes with shrubs and forbs



# Seeding Big Sagebrush

## Recommended Seeding Methods from Great Basin Fact Sheet (2015):

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



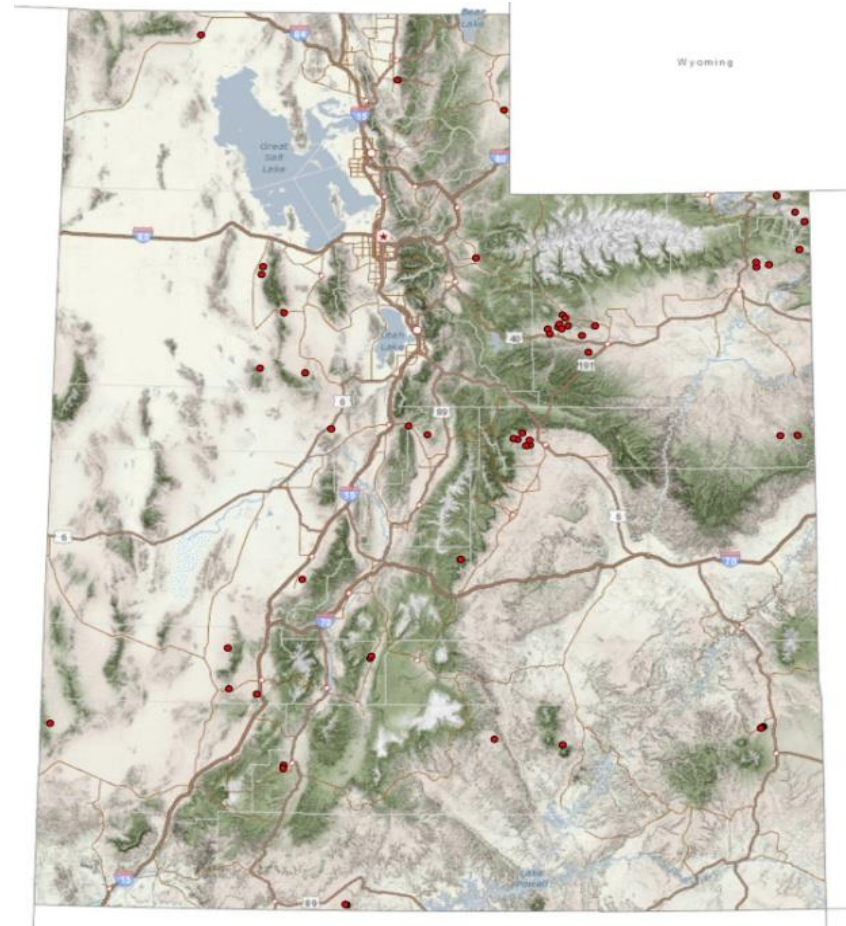


# Recommended Seeding Rates

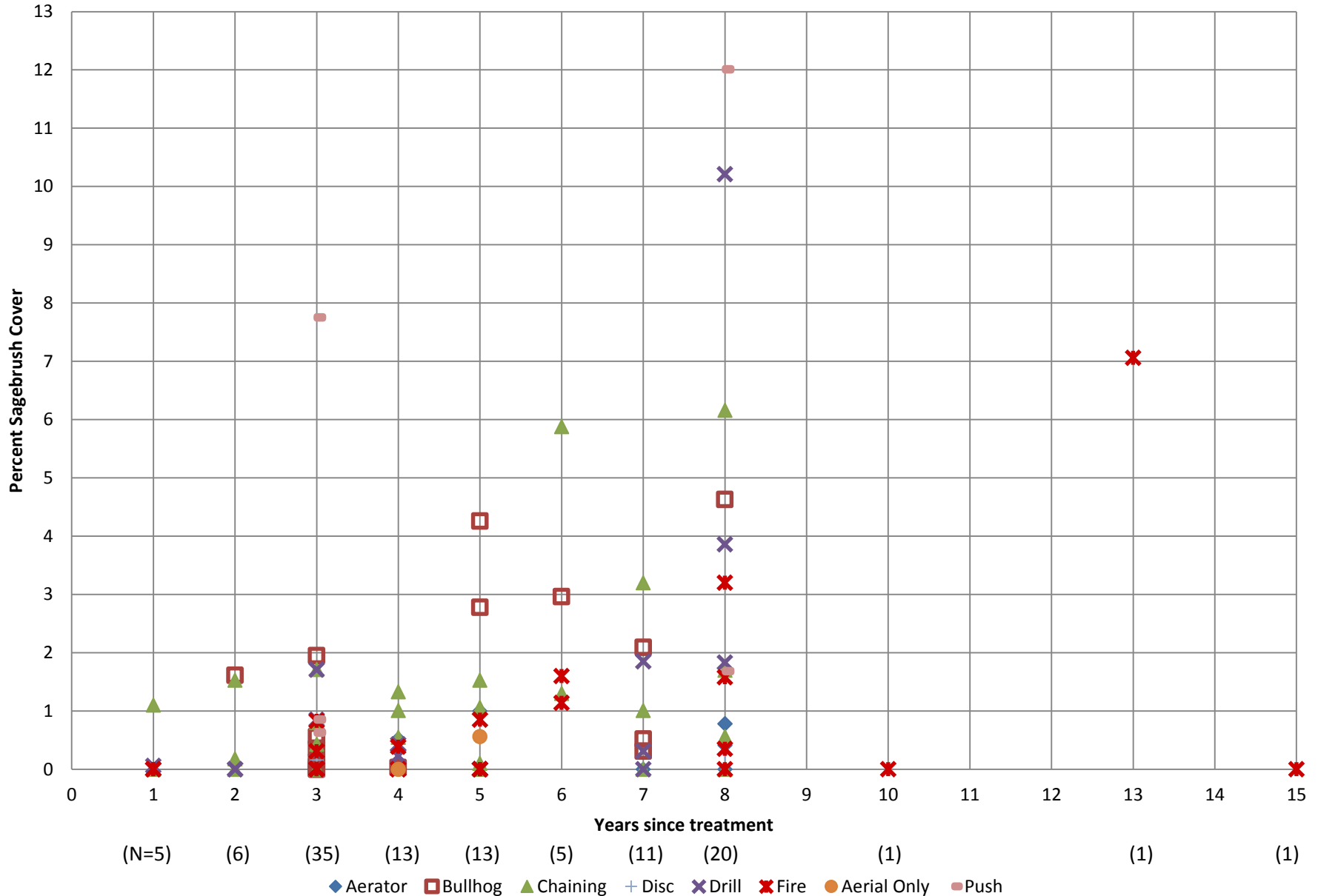
Recommendation	Reference
<b>0.2-0.5 PLS lbs/acre</b>	<b>Jacobs, Jim, Joseph D. Scianna, and Susan R. Winslow. 2011.</b> Big sagebrush establishment. Natural Resources Conservation Service, Plant Materials Technical Note No. MT-68.
<b>0.1 PLS lbs/acre</b>	<b>Lambert, Scott M. 2001.</b> Seeding considerations 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.

# Monitoring Results in Utah

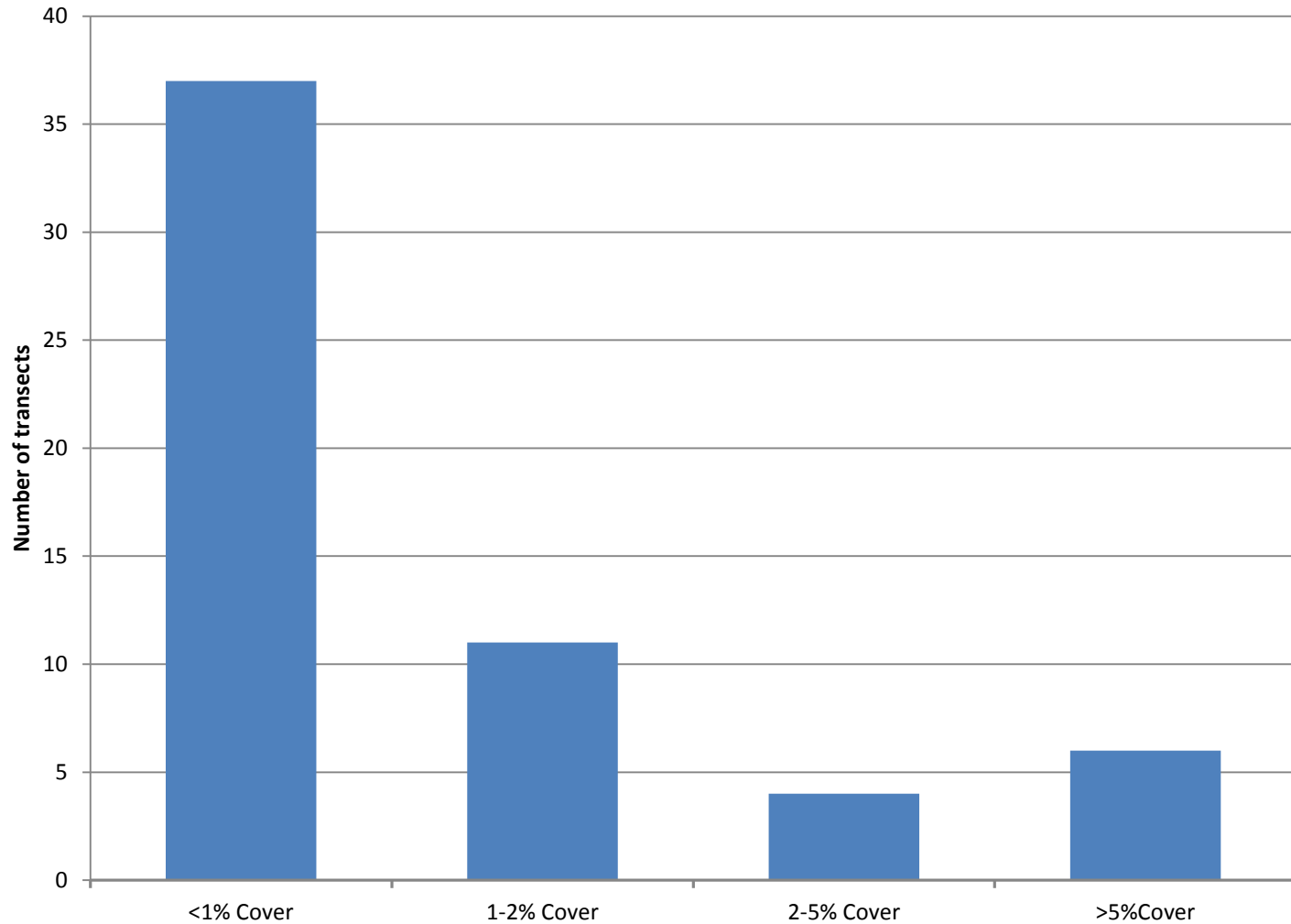
- 58 monitoring plots where sagebrush was seeded
  - <5% cover
- Pre-treatment and post treatment
- Wyoming big sage seeded on 54 of 58
- Line intercept method



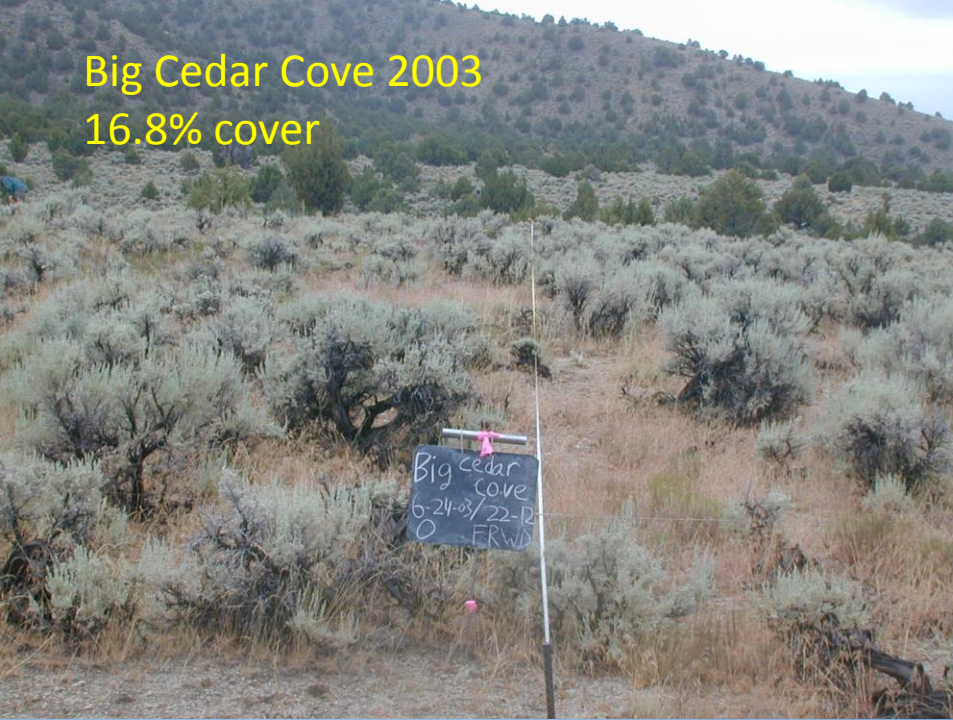
# Sagebrush Cover After Seeding at 58 Trend Studies in Utah



# Max Recorded Sagebrush Cover



Big Cedar Cove 2003  
16.8% cover



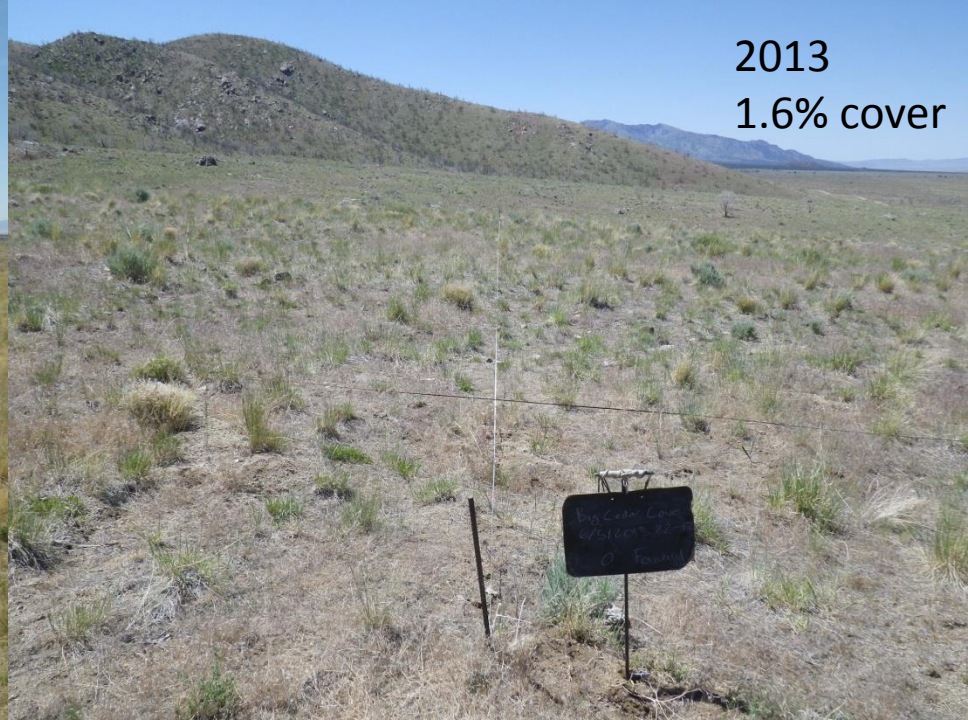
2008 Burned in 2007 Milford Flat seeded at 0.13 PLS/ac



2011



2013  
1.6% 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?

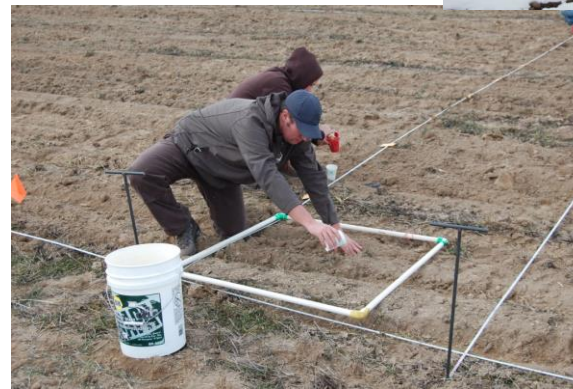
- Are our seeding techniques wrong?
  - Rates, Timing, Seeding Method
- Is the source of seed appropriate?
  - Can we better verify what is on the seed tag?





# 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



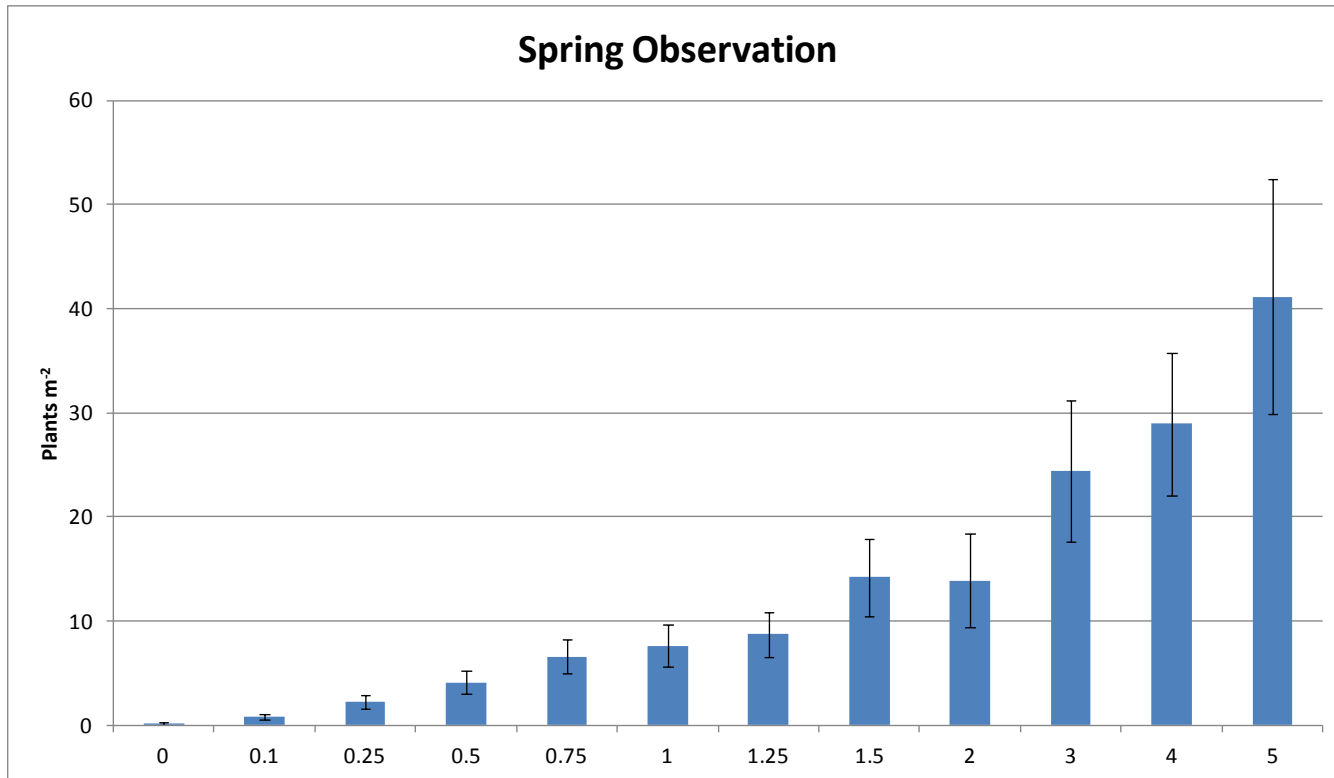
# Expanded Timing and Rate Study 2015-16

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

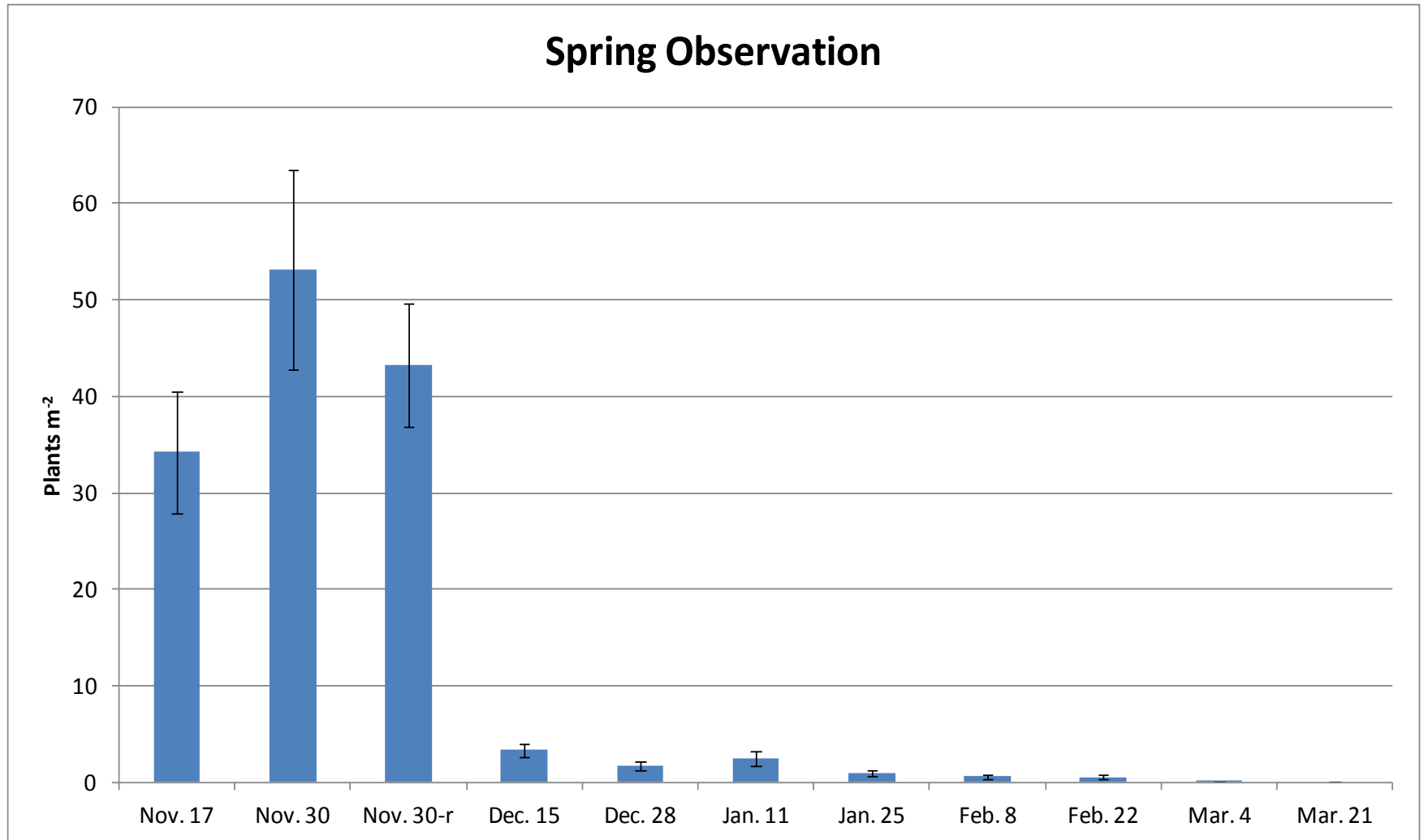




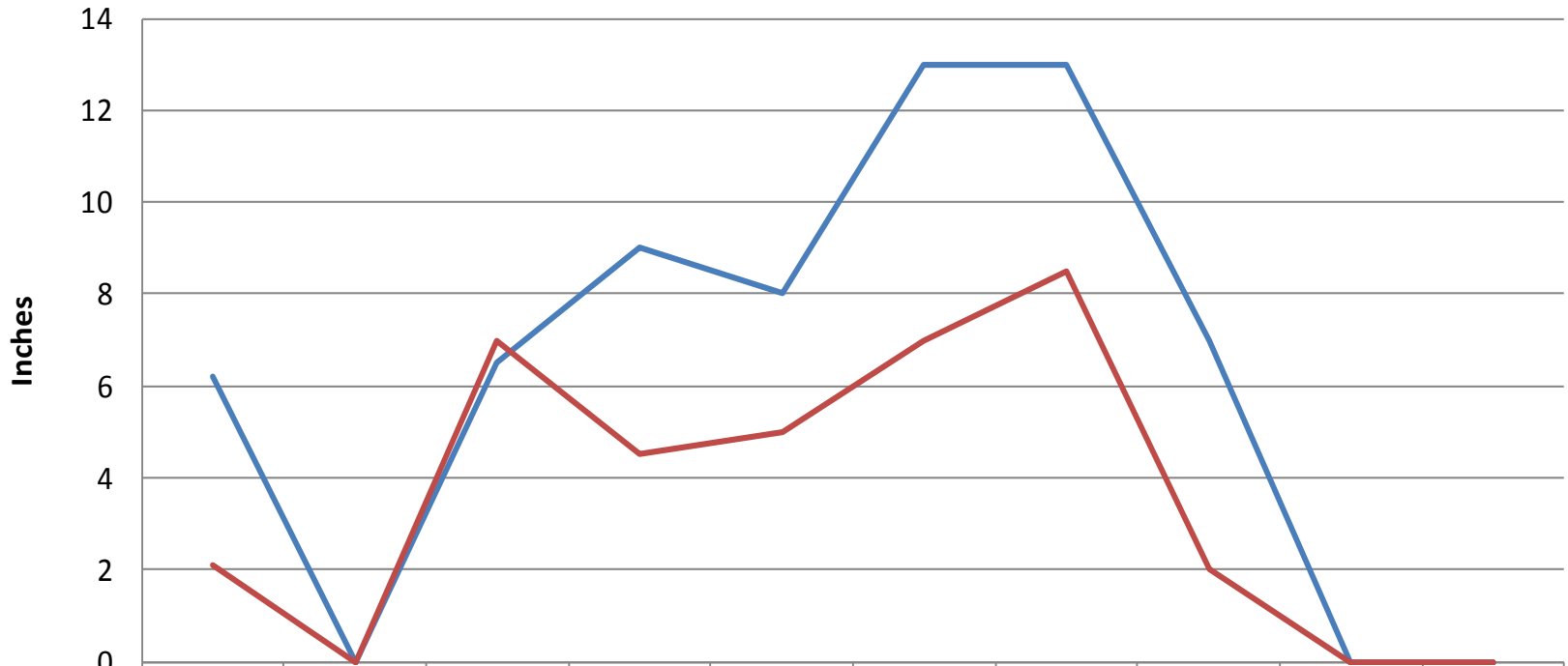
# Initial Results – Seeding Rates



# Density by Seeding Date



# Snow Depth



	Nov. 17	Nov. 30	Dec. 15	Dec. 28	Jan. 11	Jan. 25	Feb. 8	Feb. 22	Mar. 4	Mar. 21
FG	6.2	0	6.5	9	8	13	13	7	0	0
SFS	2.1	0	7	4.5	5	7	8.5	2	0	0







# Year One Observations

- Highly successful seeding dates in November when seed had good soil contact prior to winter-long snow cover
- No difference in establishment for roller packing
  - Replicated with more treatment dates in 2016
- The more you seed the more you get
  - We will monitor persistence past the first winter



# Seed Source

## Do we have the right seed?

Species or subspecies	Crown	Leaf shape	Leaf margin <sup>a</sup>	Plant architecture <sup>b</sup>	Layering	Preferred soil mineralogy and soil temperature	Color of sage/water solution under UV light <sup>c</sup>	Flowering begins
Basin big sagebrush	Uneven 	Long and narrow 	Straight	Y shaped, erect	No	Deep, well drained; aridic-mesic	Colorless	Late August
Mountain big sagebrush	Even 	Broadly cuneate 	Tapered	U shaped, basal branching	No	Well drained, frigid-cryic	Strong bluish white	July, (<6 flowers/ inflorescence)
Wyoming big sagebrush	Uneven 	Belled 	Bell shaped	U shaped	No	Shallow to moderately deep soil, aridic	Colorless	August

### SOURCE IDENTIFIED SEED



Species Name: *Artemesia tridentata vaseyana*  
 Common Name: Mountain Big Sagebrush  
 Germplasm ID, Gen.: \_\_\_\_\_, G0  
 G0 County, State, Elev.: Washington, UT, 4750-4850 ft.  
 G0 Indigenous? Yes Cert. #: WC-684  
 G0 Natural Track? Yes Lot #: 6

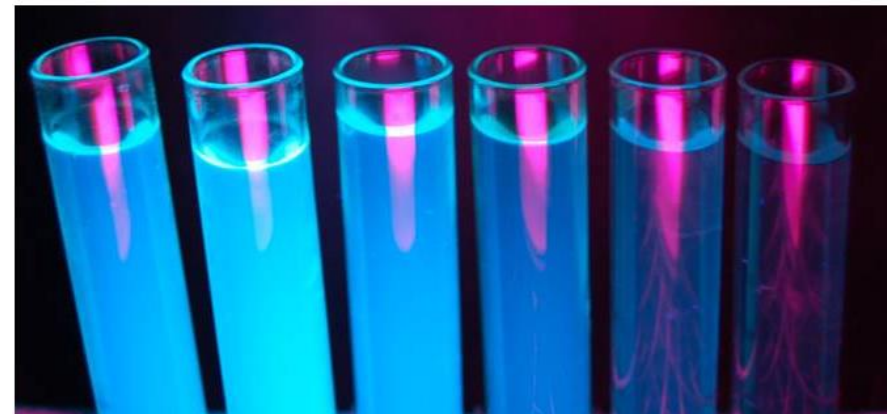
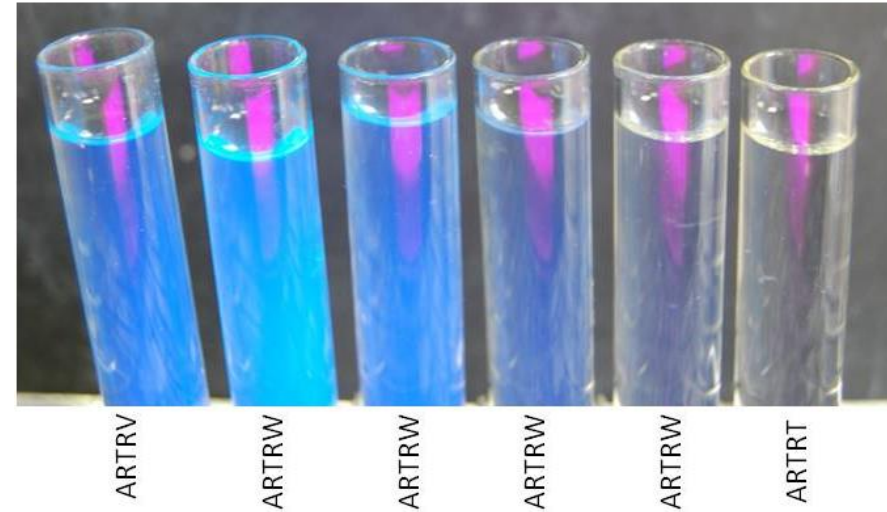
The seed in this container, with label properly affixed thereto, was produced in compliance with the Seed Certification Requirement and Standards established by the Utah Crop Improvement Association for the SOURCE IDENTIFIED CLASS of certified seed. Compliance (and any warranty, expressed or implied) is based on and limited to representative field and/or collection site inspections and seed sample analysis. This tag must be accompanied by a seed analysis label to comply with state and federal seed laws.

Utah Crop Improvement Association, Utah State University, 4855 Old Main Hill, Logan, UT 84322-4855 Tel: (435)797-2082

Member of Association of Official Seed Certifying Agencies

# Seed Source

- Can we verify subspecies from seed?
- UV test
- Seed weights (Richardson 2015)



# Other Questions

- Where is it appropriate to move sagebrush seed?
  - Seed transfer zones for big sagebrush – Bryce Richardson
- Can we develop technology to better hedge our bets?
  - 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





The preceding presentation was delivered at the

# **2017 National Native Seed Conference**

Washington, D.C. February 13-16, 2017

This and additional presentations available at <http://nativeseed.info>

