

# Characteristics That Determine a Successful Squirreltail (*Elymus elymoides*)

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## Results

Seeding native grasses in the Great Basin is often ineffective. For decades the development of “improved” native germplasm has been a priority. This research examines how three unique phenotypes of bottlebrush squirreltail (*elymus elymoides*) differ and how that might lead to improved establishment.

Bottlebrush squirreltail is a short-lived perennial bunchgrass that has been studied extensively for rangeland rehabilitation. It is a good candidate for plant material development because of high degree of phenotypic variation as seen below.



We have had little rehabilitation success with squirreltail germplasm releases. In 2009, we began searching for populations from severe habitats or plants that exhibited unique characteristics in the northwestern Great Basin.

### Characteristics for Selection

- Leaf morphology- pubescent, glaucous, size
- Flower morphology – color, size, timing
- Seedling vigor – emergence, 1<sup>st</sup> year flowering
- Germination – cold temperature germination



In 2011, we identified 3 unique phenotypes. Selection from 100s of samples was based on visual observations of a seedling as “unique” from all other seedlings grown in a greenhouse. An individual “unique” seedling was then grow to provide seed. We then planted 20 meter rows of progeny seed at the University Nevada at Reno cooperative research plots for seed lots and to monitor flowering and green-up dates.

**Type 1 ‘Gray’** squirreltail: exhibits rapid seedling growth and pubescent leaves giving a silvery appearance. It has the earliest flowering and the typical curly leaf appearance.

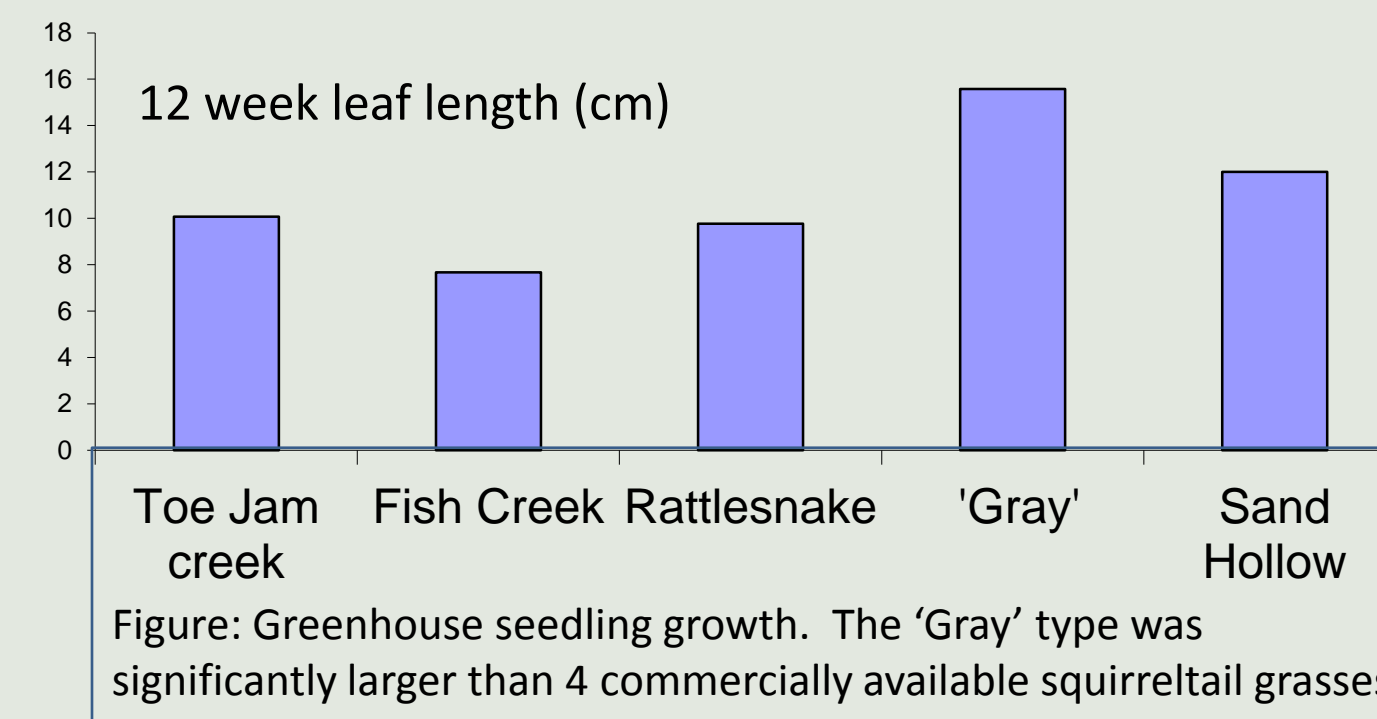


Image: The ‘Gray’ type often has a visibly more robust look (left) compared to commercial varieties (above).  
Photos: April 10<sup>th</sup> 2013



The ‘Gray’ type has the “typical” curly leaf appearance.

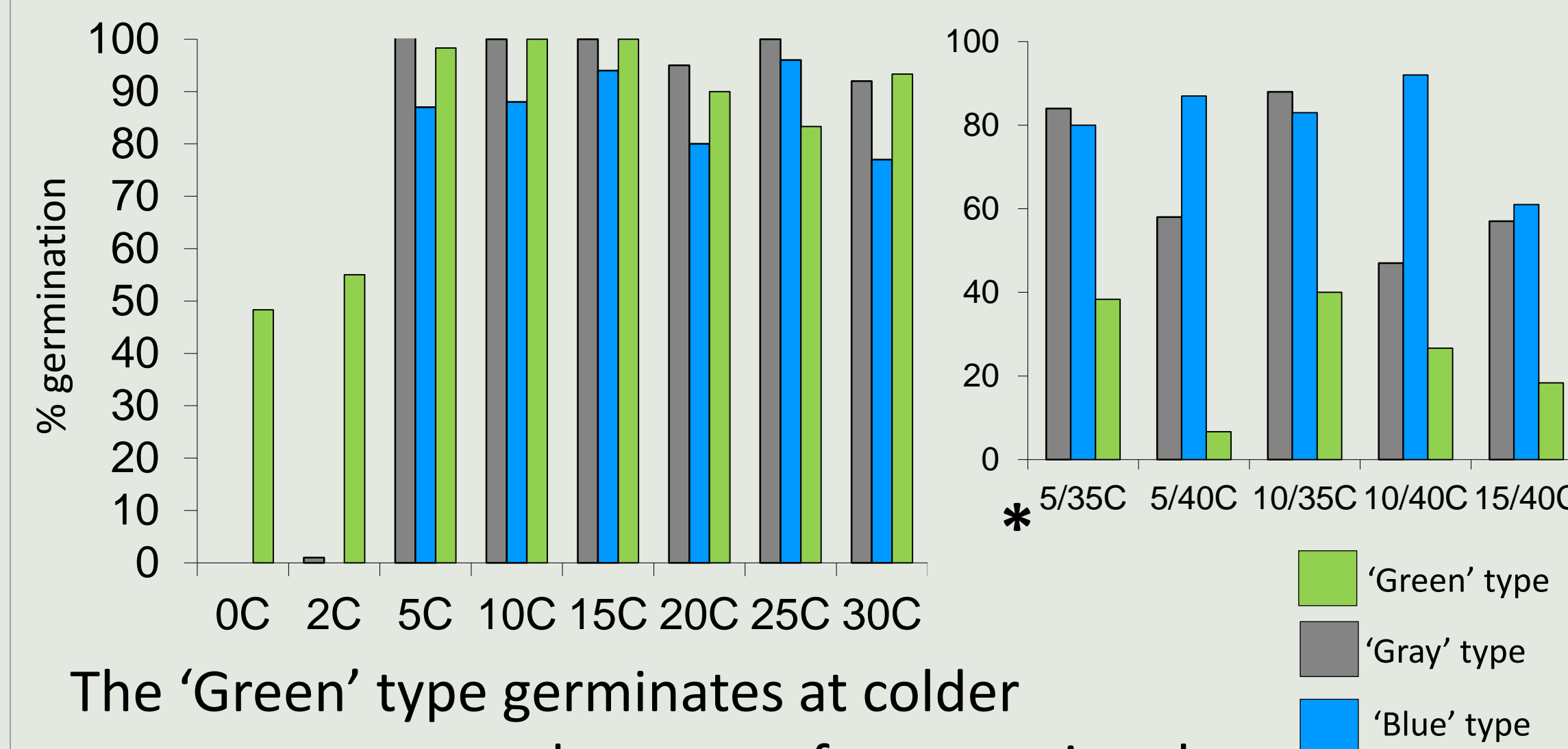


‘Gray’ is the only type that flowers the first year after seeding in the field, beginning in May

Photo: July 15<sup>th</sup> 2014, seeded fall 2013

Research seed lots flowering date.	‘Blue’	‘Gray’	‘Green’
	4/10/14	4/25/14	5/15/14

**Type 2 ‘Green’** squirreltail: exhibits colder temperature germination, and early green-up, but delayed flowering.



The ‘Green’ type germinates at colder temperatures an advantage often associated with cheatgrass. However, it germinates much less at widely fluctuating temperatures\*.



The ‘Green’ type greens up earlier  
Photo: January 8<sup>th</sup> 2015

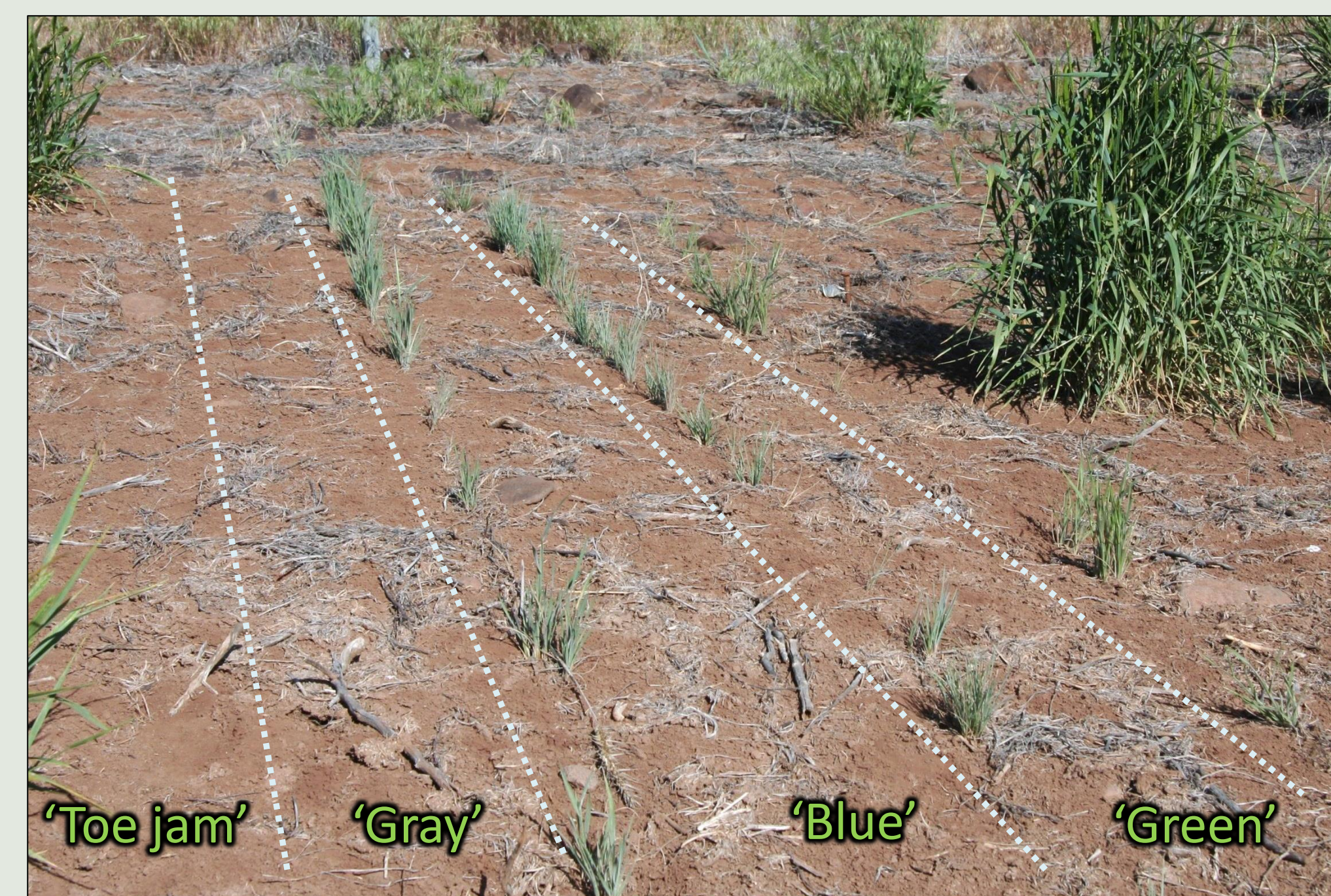
### Field Seeding Trials

First spring (May) maximum seedling densities (plants/m<sup>2</sup>)

Site	‘Gray’	‘Blue’	‘Green’	‘Toe Jam Creek’
Antelope Valley, NV	22.43	21.53	17.94	0.00
Bedel Flat, NV	0.00	1.79	0.00	0.90
Doyle, CA	20.63	21.53	20.63	0.90
Empire, NV	1.79	0.00	0.00	0.00
*Flanigan, NV	9.87	2.69	8.97	0.00
Squaw Creek, NV	3.38	2.32	0.00	*no sample
<b>Average /m<sup>2</sup></b>	<b>9.68</b>	<b>8.31</b>	<b>7.92</b>	<b>0.36</b>

## Discussion

Initial selections were based on “visual” cues of arid adaptations (ex: pubescent leaves). That does not automatically infer more successful rehab-seeding establishment. Long-term monitoring would be required for such evaluation. In the fall of 2014, we seeded larger plots which we will monitor in 2015 and continued years.



**Type 3 ‘Blue’** squirreltail: exhibits a small curved leaf surface almost needle-like, they have a robust dormant season biomass, and a purple inflorescence.

