

**Transplanting Wyoming Big Sagebrush
to Increase
Seed Source Diversity**

**Kent McAdoo, UNCE
Chad Boyd, USDA - ARS
John Swanson, UNR
Roger Sheley, USDA - ARS
Clare Poulsen, USDA - NRCS**

Rationale for Planting “Island” Sagebrush Plants

- **Recruitment from existing seedbanks unreliable/episodic (Perryman et al. 2001)**
- **Successfully planting seeds is unreliable (Shaw et al. 2005)**
- **But seedlings can be readily transplanted (McArthur et al. 2004)**
- **Shrub “islands” can serve as dispersed seed sources, accelerating site diversification (Longland & Bateman 2002)**

Objectives - to determine the influence of:

- **Site (3 plant communities)**
- **Reduction of herbaceous competition**
- **Plant source (wildings vs. nursery stock)**

...on survival of sagebrush transplants

Directing Successional Change (Applied EBIPM Principles)

- **Disturbance/Site Availability – gyphosate**
- **Colonization/Dispersal – shrub transplants**
- **Species Performance –**
 - * **competition reduction**
 - * **plant source provision**

Treatments

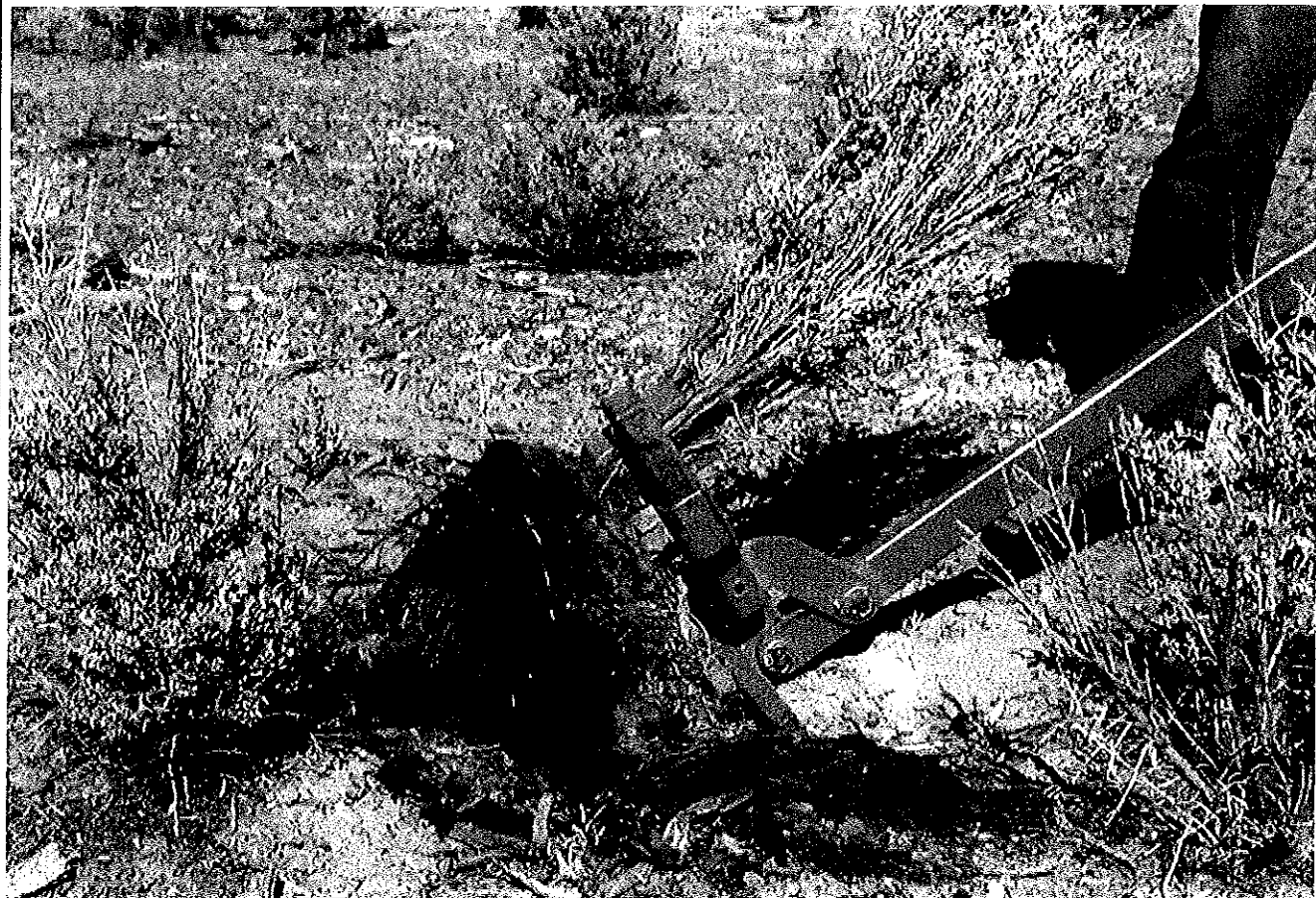
- **Treatments in randomized block design with 5 replications**
- **Spring-applied treatment of glyphosate (64 oz/ac) to reduce herbaceous cover.**
- **Each block includes eight 5m² plots representing factorial combinations of herbicide treatment, no herbicide treatment, year of planting, and plant source (native or nursery stock).**
- **Ten sagebrush plants were planted in each plot.**

Study Sites

- **Cheatgrass monoculture**
- **Crested wheatgrass monoculture**
- **Post-fire native herbaceous community**

**Collecting Wildings
with a
“Weed Wrench” ©**





Sampling & Analysis

- **Sagebrush density measured in Sept. by direct count**
- **Seedling height recorded for each surviving transplant**
- **Data will be analyzed for treatment effects using mixed model analysis of variance with block and treatment x block considered random and other effects fixed.**

Timeline

- **2009, spring - establish plots, spray herbicide, pull and plant sagebrush wildings, plant sagebrush nursery stock**
- **2009, fall – collect survival and robustness data**
- **2010, spring & fall – repeat as described above**
- **2011 – complete data analysis and prepare manuscript**

Cheatgrass Monoculture Site
Sagebrush Transplant Survival

<u>Source</u>	<u>Herb. Control</u>	<u>% Survival*</u>	
		<u>2009</u>	<u>2010</u>
Nursery	Untreated	38 ^a	8 ^{cd}
Nursery	Glyphosate	50 ^a	16 ^{bd}
Wilding	Untreated	6 ^b	10 ^c
Wilding	Glyphosate	18 ^c	34 ^a

* Means followed by differing letters during same year are significantly different @ p<0.05

Crested Wheatgrass Monoculture Site
Sagebrush Transplant Survival

<u>Source</u>	<u>Herb. Control</u>	<u>% Survival*</u>	
		<u>2009</u>	<u>2010</u>
Nursery	Untreated	40 ^a	4 ^{ab}
Nursery	Glyphosate	46 ^a	12 ^a
Wilding	Untreated	4 ^b	2 ^b
Wilding	Glyphosate	10 ^c	4 ^{ab}

* Means followed by differing letters during same year are significantly different
 @ p<0.05

Native Herbaceous (Post-fire) Site
Sagebrush Transplant Survival

<u>Source</u>	<u>Herb. Control</u>	<u>% Survival*</u>	
		<u>2009</u>	<u>2010</u>
Nursery	Untreated	68 ^a	14 ^b
Nursery	Glyphosate	68 ^a	36 ^a
Wilding	Untreated	6 ^b	12 ^{ab}
Wilding	Glyphosate	22 ^c	20 ^{ab}

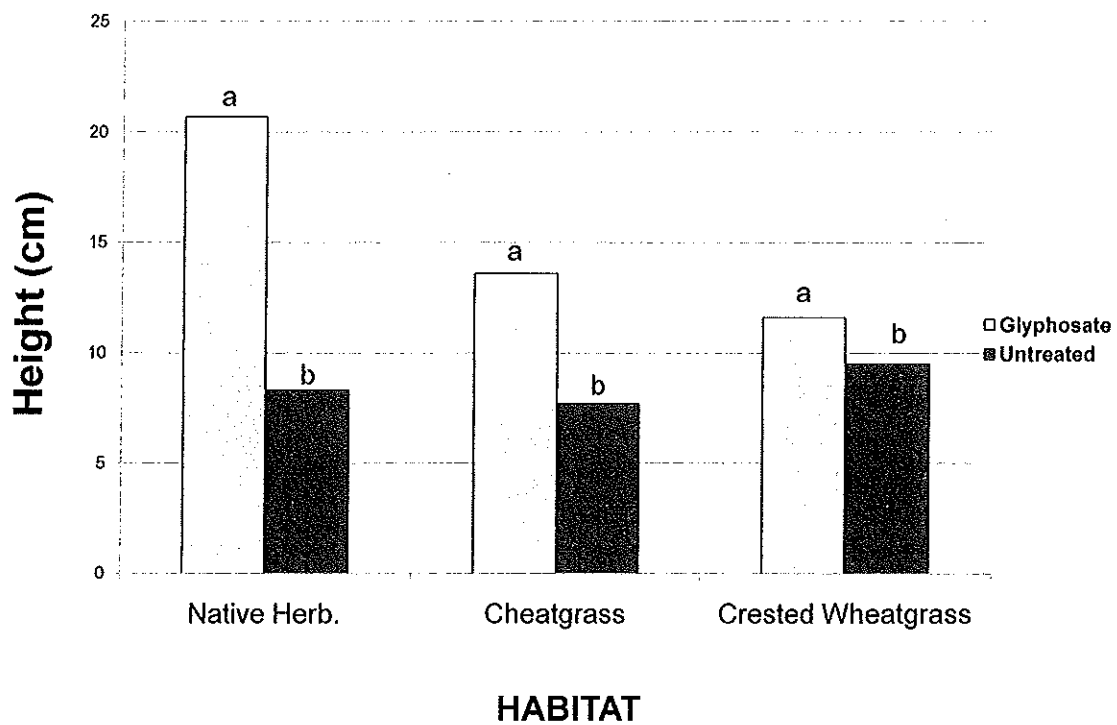
* Means followed by differing letters during same year are significantly different @ p<0.05

All Sites Combined
Sagebrush Transplant Survival

<u>Source</u>	<u>Herb. Control</u>	<u>% Survival*</u>	
		<u>2009</u>	<u>2010</u>
Nursery	Untreated	49 ^a	10.0 ^a
Nursery	Glyphosate	55 ^a	21.3 ^b
Wilding	Untreated	5 ^b	8.7 ^a
Wilding	Glyphosate	17 ^c	19.3 ^b

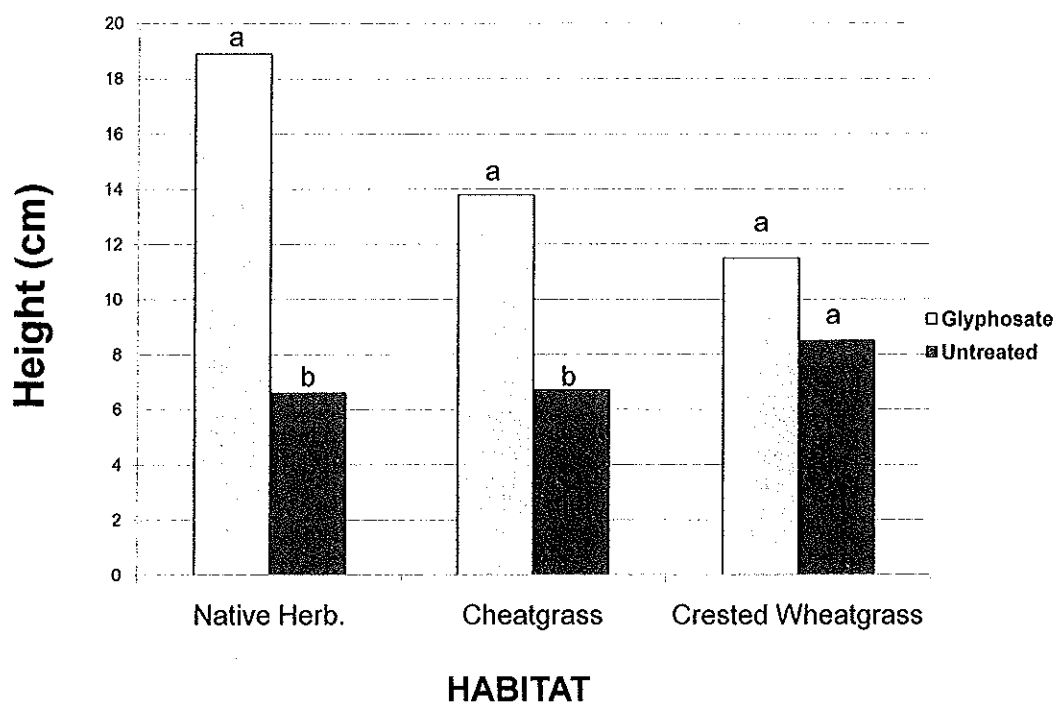
* Means followed by differing letters during same year are significantly different
 @ p<0.05

Sagebrush Nursery Stock Robustness - 2009



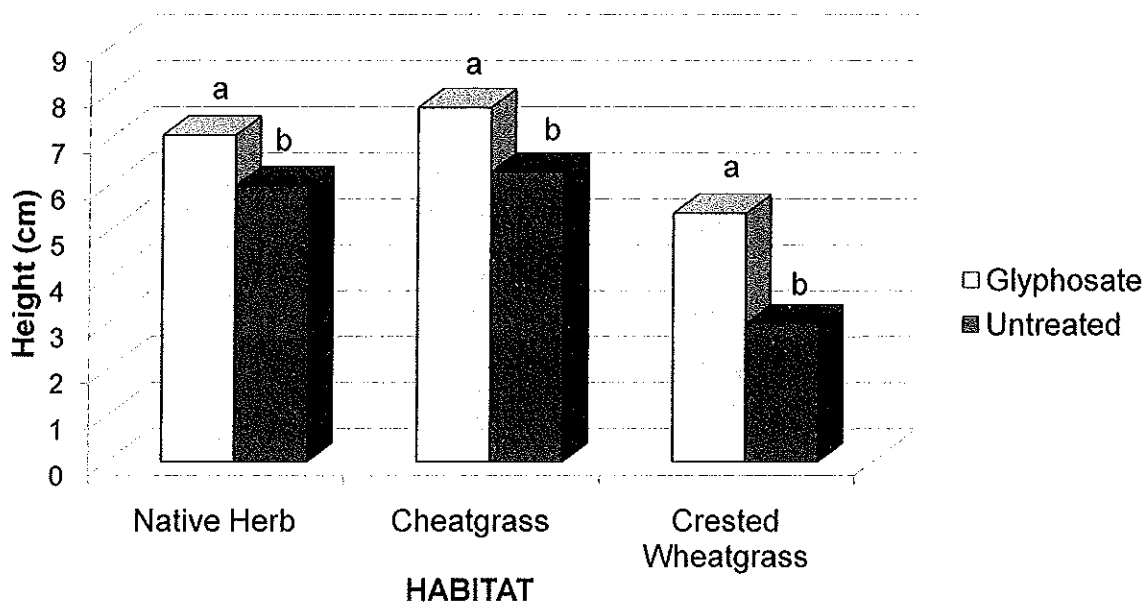
*Means within a habitat followed by differing letters are significant @ $p < 0.001$

Sagebrush Wilding Transplant Robustness - 2009



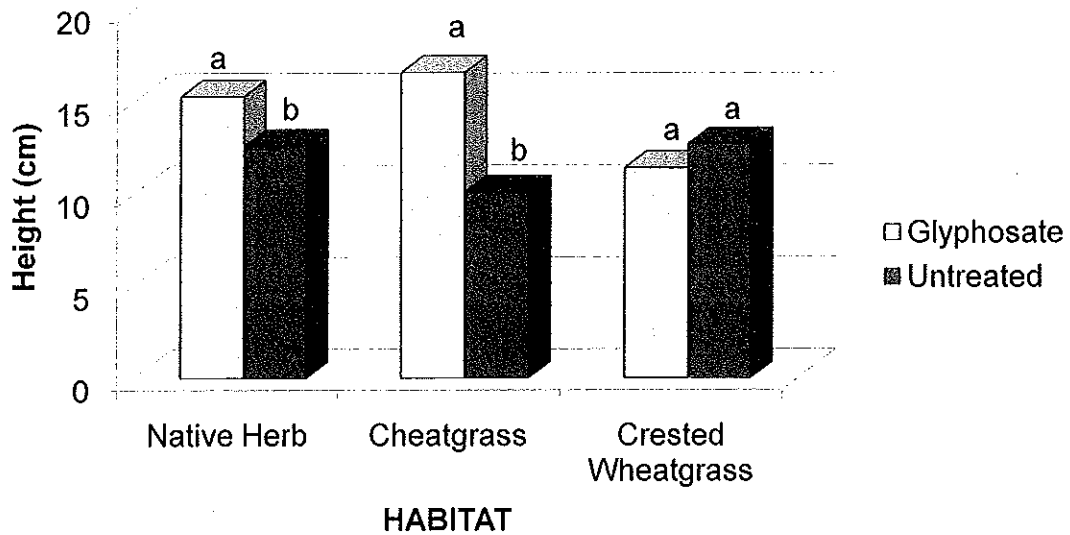
*Means within a habitat followed by differing letters are significant @ $p < 0.001$

Sagebrush Nursery Stock Robustness - 2010



*Means within a habitat followed by differing letters are significant @ $p < 0.001$

Sagebrush Wilding Transplant Robustness - 2010



*Means within a habitat followed by differing letters are significant @ $p < 0.001$