

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

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## **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 5m<sup>2</sup> 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 <sup>a</sup>	8 <sup>cd</sup>
Nursery	Glyphosate	50 <sup>a</sup>	16 <sup>bd</sup>
Wilding	Untreated	6 <sup>b</sup>	10 <sup>c</sup>
Wilding	Glyphosate	18 <sup>c</sup>	34 <sup>a</sup>

\* 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 <sup>a</sup>	4 <sup>ab</sup>
Nursery	Glyphosate	46 <sup>a</sup>	12 <sup>a</sup>
Wilding	Untreated	4 <sup>b</sup>	2 <sup>b</sup>
Wilding	Glyphosate	10 <sup>c</sup>	4 <sup>ab</sup>

\* 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 <sup>a</sup>	14 <sup>b</sup>
Nursery	Glyphosate	68 <sup>a</sup>	36 <sup>a</sup>
Wilding	Untreated	6 <sup>b</sup>	12 <sup>ab</sup>
Wilding	Glyphosate	22 <sup>c</sup>	20 <sup>ab</sup>

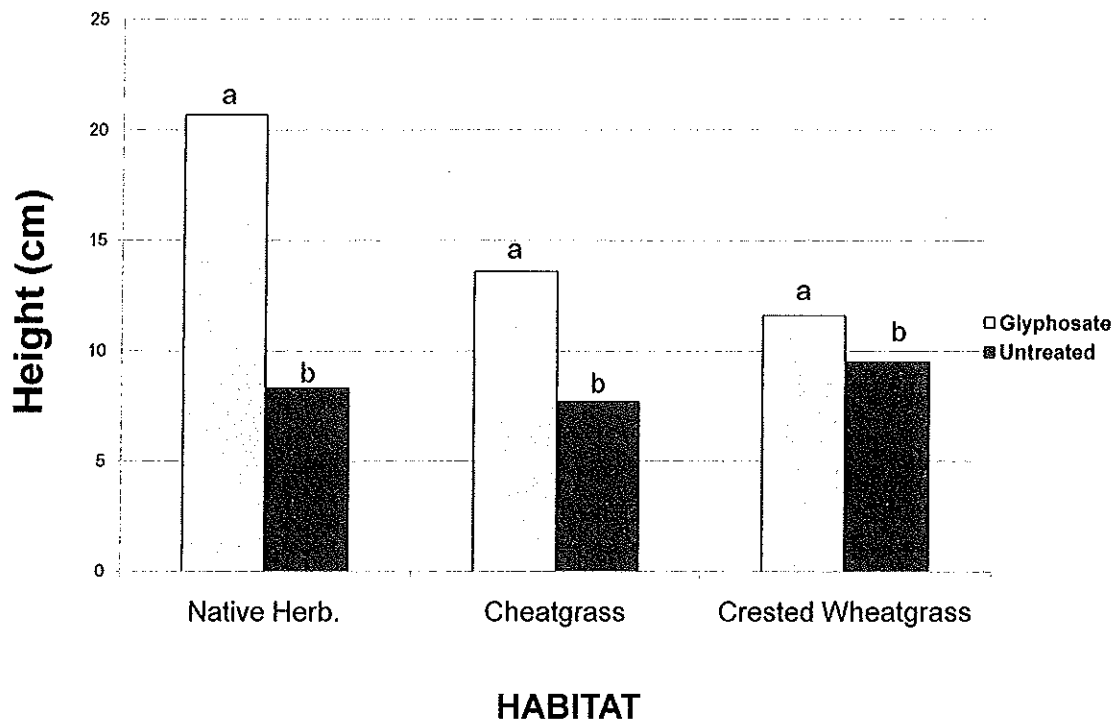
\* Means followed by differing letters during same year are significantly different @ p<0.05

***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 <sup>a</sup>	10.0 <sup>a</sup>
Nursery	Glyphosate	55 <sup>a</sup>	21.3 <sup>b</sup>
Wilding	Untreated	5 <sup>b</sup>	8.7 <sup>a</sup>
Wilding	Glyphosate	17 <sup>c</sup>	19.3 <sup>b</sup>

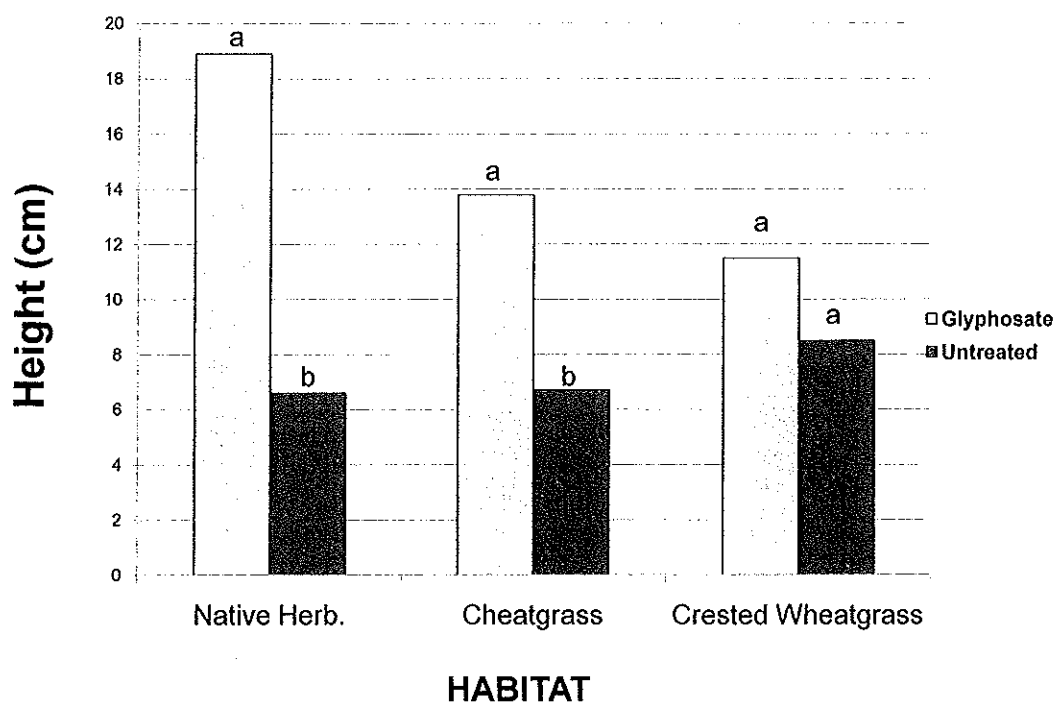
\* Means followed by differing letters during same year are significantly different  
 @ p<0.05

## Sagebrush Nursery Stock Robustness - 2009



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

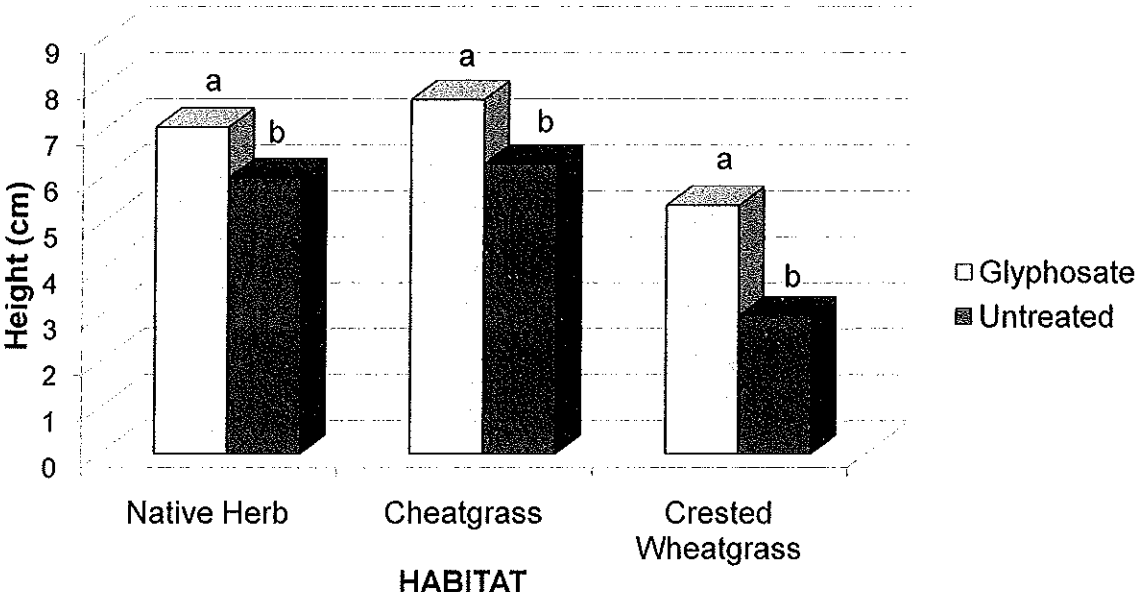
## Sagebrush Wilding Transplant Robustness - 2009



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

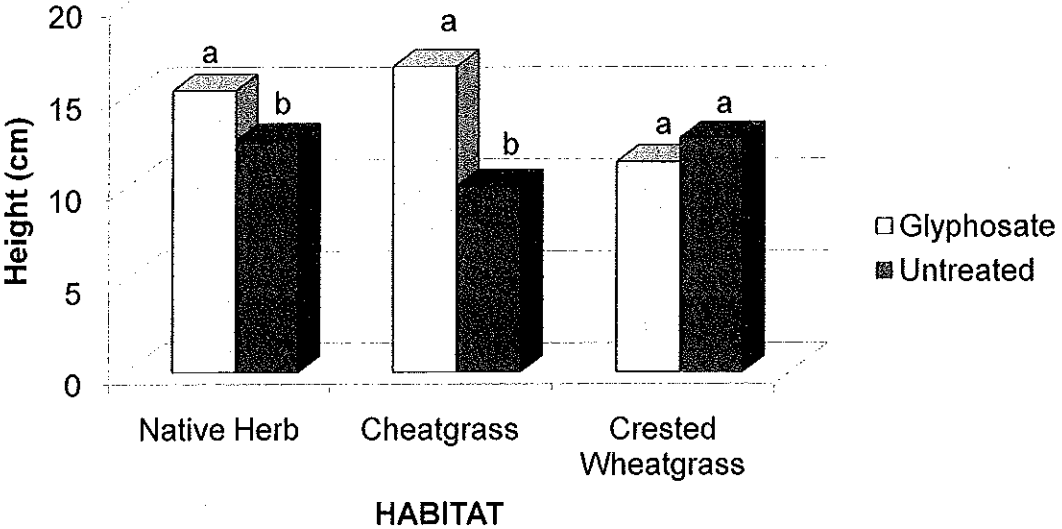


# Sagebrush Nursery Stock Robustness - 2010



\*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 @  $p < 0.001$