Introducing Big Sagebrush into a Crested Wheatgrass Monoculture

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Introduction:

Over many decades Crested Wheatgrass, (Agropyron cristatum and Agropyron desertorum) has proven its effectiveness as a means to control wind and soil erosion in arid and semi-arid areas. Its ability to persist is both an asset and a potential hurdle. Once it becomes established the area resources are protected and stabilized from further degradation, but most ecological succession is slowed or halted, depending on the time frame being measured. The ability to establish any other plant population is limited at best. Establishing native plant materials back into these areas is warranted for such uses as increased wildlife habitat, ecological diversity, and aesthetics. It is possible to consider crested wheatgrass as an ecological ladder beginning at stabilizing and protect the resources and then transitioning to a more diverse community. The methodology used to transverse this ladder has often resulted in less-than-hoped-for results within expected time frames.

Finding a method to accomplish this transition from a monoculture of crested wheatgrass would be welcomed if the resource base were not subject to degradation in the conversion process. Tillage of most types (disking, chiseling, ploughing, roto-tilling, etc.) to reduce the stand of crested wheatgrass and decrease its stabilizing effect can result in unacceptable soil erosion. So the ability to keep in place the benefits of crested wheatgrass is an important consideration when considering conversion. Drilling of desired species directly into these stands often meets with failure due to the competitiveness of the grass. Transplanting of small containerized plant materials can overcome the initial poor establishment for seed sown techniques. The potential higher establishment costs associated with transplanting should be measured against the costs of continued failure or relative low success of seeding techniques. With many sources of restoration funding there is a one-time opportunity for success. This technique might be useful in the establishment of Seed gardens which are often planted as a way to increase the seed bank of desired species in areas of interest.

Materials and Methods:

Transplants of Basin big sagebrush (Artemisia tridentata, ssp. tridentia), Mountain big sagebrush (Artemisia tridentata, Nutt. ssp. vaseyana (Rydb.) Beetle), and Wyoming big sagebrush (Artemisia tridentata, Nutt. ssp. wyomingensis Beetle & Young) were obtained from the State of Utah's Forestry, Fire and State Lands, Lone Peak Conservation Nursery, Draper Utah. Species were grown as containerized seedlings using 3.8 x 21 cm Super Cell Cone-Tainers (Ray Leach Cone-Tainer).

Treatments to be sprayed (60 year old stand of Nordan Crested Wheatgrass) were done on April 20, 2004, with 1.5 pints of Round-up Ultra (glyphosate) per acre. The field was then allowed to lay fallow for a year. Field transplanting was done on April 7-8, 2005, in both the chemically treated and control treatments.

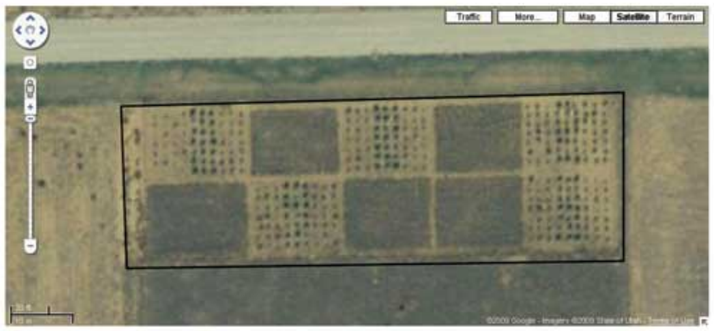
Plot location is at the Utah State University Nephi Experiment Station Farm, approximately 4 miles south of Nephi, Utah (39º – 38'– 43.62" N, 111º – 52' – 22.29" W, 1573 m above sea level). Soil at the site is a Nephi Silt Loam (fine-silty, mixed, superactive, mesic Calcic Argixerolls). Mean annual precipitation is 14.62 inches per year. Treatments were in a randomized complete block design (five replications) with twenty-one plants per species planted within the treatment blocks. They were arranged in three rows with only the 5 plants in the middle of each species block used for date collection. All plant materials were spaced 1.0 meters between rows and within rows.

Control June 2009 Sprayed

Wyoming Big Sage

Basin Big Sage

Mountain Big Sage



Google Earth Image of Plots

Results:

Plant Height

Sub-Species	Year	Control cm	Sprayed cm
Basin Big Sagebrush	2005	27.9	45.2
	2006	29.2	82.6
	2007	37.3	98.6
	2008	48.0	103.8
	2009	58.0	105.3
Mountain Big Sagebrush	2005	11.2	18.3
	2006	7.9	44.6
	2007	8.5	73.4
	2008	9.5	79.4
	2009	4.1	58.7
Wyoming Big Sagebrush	2005	18.7	22.9
	2006	10.6	57.3
	2007	12.1	77.2
	2008	17.8	85.3
	2009	16.6	88.5

LSD at Alpha 0.05 is 8.9 cm

Plant Survival

Sub-Species	Year	Control %	Sprayed %
Basin Big Sagebrush	2005	100	100
	2006	100	100
	2007	100	100
	2008	100	100
	2009	100	100
Mountain Big Sagebrush	2005	96	96
	2006	64	96
	2007	64	96
	2008	52	96
	2009	12	68
Wyoming Big Sagebrush	2005	88	100
	2006	64	100
	2007	64	100
	2008	64	100
	2009	48	100

LSD at Alpha 0.05 is 13.2%

Conclusion:

Five years of data indicate that controlling crested wheatgrass prior to transplanting resulted in higher sagebrush survival and faster establishment. There were some differences between sagebrush subspecies. Basin big sagebrush survived equally well with or without grass control but grew faster with grass control. Chemical control of the grass was important for both the survival and growth of Mountain big sage and Wyoming big sage. The ability to grow viable plant materials in a site long stabilized by a monoculture of Crested Wheatgrass provide possible evidence of methods to reintroduce native plant materials into our protected rangelands.

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