

Plant Materials for Salt-affected Sites, Big Horn County, Montana

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Objective: Test species for use in salt-affected sites

County: Big Horn, MT

Average Annual Precipitation: 11 - 14 inches

MLRA: 58A, Northern Rolling Plains, Northern Part

Dominant Soil Type: Haverson, Vanada

Elevation: 2877 ft

Site Preparation: Disk and harrow

Planting Date: April 23, 2010

Planting Method: Drill seeded (plot drill) at 14 inch rows

Previous Site History: Crop and pasture land

Herbicide: None

Irrigation: None for first five years, then some flood irrigation

Grazing: Wildlife and cattle

Monitoring Dates: Sept 2012, Sept 2014, and June 2019



Fig. 1. Western wheatgrass had consistent canopy cover and height in the low and moderate EC areas.

Introduction: The purpose of this planting was to identify species suitable for a larger-scale pasture planting in a salt-affected area. The planting site had a salinity gradient with electrical conductivity (EC) ranging from low (<4 mmhos/cm) to moderate (4 to 6 mmhos/cm) to high (>6 mmhos/cm). Ten grasses, seven forbs, and two shrubs were planted individually in all levels of EC to test their salinity tolerance. All species were seeded at their recommended full stand rates (Table 1). Species establishment and characteristics were monitored for ten years. In 2019, the low and moderate EC plots could be evaluated but the high ECH plots had been removed.

Table 1. Seeded species and their seeding rate.

Common Name	Scientific Name	Cultivar	lbs PLS/acre
Altai wildrye	<i>Leymus angustus</i>	Prairieland	10.0
Basin wildrye	<i>Leymus cinereus</i>	Trailhead	7.0
Manystem wildrye	<i>Leymus multicaulis</i>	Shoshone	6.0
Russian wildrye	<i>Psathyrostachys juncea</i>	Bozoisky	6.0
Tall fescue	<i>Schedonorus arundinaceus</i>	Fawn	4.0
Creeping meadow foxtail	<i>Alopecurus arundinaceus</i>	Garrison	2.0
Hybrid (green) wheatgrass	<i>Elymus hoffmanii</i>	Saltlander	8.0
Tall wheatgrass	<i>Thinopyrum ponticum</i>	Largo	10.0
Thickspike wheatgrass	<i>Elymus lanceolatus</i>	Critana	7.0
Western wheatgrass	<i>Pascopyrum smithii</i>	Rosana	10.0
Alfalfa	<i>Medicago sativa</i>	Bullseye	5.0
Birdsfoot trefoil	<i>Lotus corniculatus</i>	Leo	3.0
Cicer milkvetch	<i>Astragalus cicer</i>	Lutana	8.0
Small burnet	<i>Sanguisorba minor</i>	Delar	15.0
Strawberry clover	<i>Trifolium fragiferum</i>	O'Connors	4.0
White prairie clover	<i>Dalea candida</i>	Antelope	4.0
Forage kochia	<i>Bassia prostrata</i>	Immigrant	2.0
Fourwing saltbush	<i>Atriplex aptera</i>	Wytana	8.0

Results:

- Western wheatgrass, tall wheatgrass, and hybrid wheatgrass were the best performing grasses with good to excellent stand rating and at least 50% canopy cover. Western and tall wheatgrass plants had consistent height in both the low and moderate EC plots while hybrid wheatgrass had larger plants in the low EC plot.
- Foxtail barley (*Hordeum jubatum*) was considered a weed in the pasture. Western and tall wheatgrass had the lowest canopy cover of foxtail barley.



- Tall fescue had fair to good stand ratings and 40% canopy cover; however, the distribution of tall fescue plants was not evenly distributed in the plot.
- Birdsfoot trefoil had excellent stand establishment, and by 2019 had 10% cover in the moderate EC area and 40% cover in the low EC area.
- Alfalfa, strawberry clover, thickspike wheatgrass, and alтай wildrye had low (5 to 10%) cover in the low EC area. Consider using these species if adding diversity or pollinator plants is a site objective.
- All species that established were spreading naturally on the site by 2019 by either seed or rhizome.

Table 2. Species establishment and characteristics over ten years.

Common Name	Stand Rating 2012	Stand Rating 2014	2019			Notes
			Density (plants/ft ²)	Canopy Cover (%)	Leaf Height (inch)	
Altai wildrye	Poor	Failure	trace	5	22	Only in low EC area
Basin wildrye	Fair	Failure	0	-	-	
Manystem wildrye	Good	Failure	0	-	-	
Russian wildrye	Poor	Good	0	-	-	
Tall fescue	Fair	Good	2.7	40	9	
Creeping meadow foxtail	Fair	Good	trace	5	23	Spreading in moist area, absent from plot
Hybrid wheatgrass	Good	Excellent	5.5	60	20	Larger plants in low EC area
Tall wheatgrass	Excellent	Excellent	2.9	55	26	Low weed cover
Thickspike wheatgrass	Failure	Failure	trace	10	18	Only in low EC area
Western wheatgrass	Good	Excellent	9.1	50	13	Spreading in low & mod EC
Alfalfa	Good	Good	trace	5	32	Only in low EC area
Birdsfoot trefoil	Excellent	Excellent	2	25	20	Lower cover in mod EC
Cicer milkvetch	Good	Fair	0	-	-	
Small burnet	Fair	Poor	0	-	-	
Strawberry clover	Good	Poor	trace	5	25	Only in low EC area
White prairie clover	Poor	Poor	0	-	-	
Forage kochia	Failure	Failure	0	-	-	
Fourwing saltbush	Poor	Failure	0	-	-	



Fig. 2. Birdsfoot trefoil had 40% cover in the low EC area and was spreading throughout the site.



Fig. 3. Tall wheatgrass is a robust, salt-tolerant species that performed well on this test site.

