

# PLANT RELEASES

## FORAGE AND RANGE RESEARCH LABORATORY - LOGAN, UTAH



### PLANTS FOR THE WEST

Plant Materials Release Catalog

Featuring Rangeland, Irrigated Pasture, and

Turfgrass Germplasm



# Reader Instructions

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### Using the Table of Contents/Index

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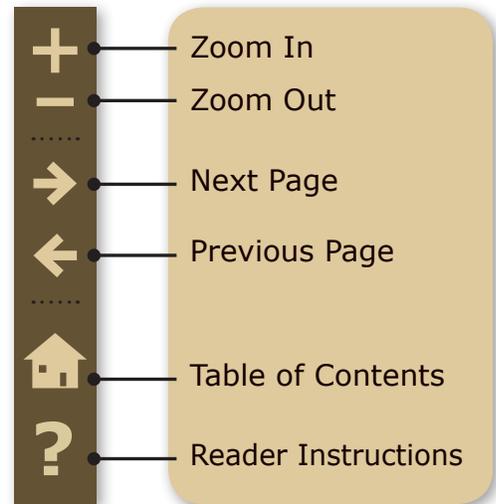
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### Using the Navigation Bar

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### Using the Navigation Panel

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## Additional Resources .....

To download a standard .pdf of the catalog

### Or visit our website

For further information about the Logan, Utah Forage and Range Research Laboratory.

# FRRL - Plants For The West



## THE FORAGE AND RANGE RESEARCH LABORATORY LOGAN, UTAH

### MISSION:

Provide improved plant materials and management alternatives for sustainable stewardship of rangelands, pastures, and turf in the western U.S.

### VISION:

The Forage and Range Research Laboratory (FRRL) is composed of a multidisciplinary team that has developed critically important plant materials presently used on the western U.S. rangelands and pastures.

The FRRL is recognized as the international center of excellence for integrated research in breeding, genomics, and ecological applications of perennial plants for dry, temperate environments. Research is accomplished through the combined efforts of plant breeders, molecular geneticists, and ecologists to enhance plants and associated agronomic practices for rangelands, pasture, and turf. These plant materials combined with best management practices will result in sustainable stewardship for these environments.



## Product Release Classes

### 1. Variety Releases

The historical objective of plant germplasm development at the FRRL is to produce varieties with documented adaptability and proven superior and/or unique characteristics that are distinct, uniform, and stable. A variety's distinctiveness is documented by evaluating its performance across multiple locations and years.

### 2. Pre-variety Selected Germplasm

As an alternative to formal variety release (above), the Association of Official Seed Certifying Agencies (AOSCA) has defined specifications for the release of Pre-variety Germplasm (PVG). Although there are several PVG release categories, the FRRL has only released "Selected" germplasm (previously designated Pre-variety germplasm-Selected Class). Selected Germplasms possess potentially desirable traits and may be the result of selection either within a population or by common-site comparisons among accessions or populations of the same species.



# FRRL Plant Materials

Plant materials are categorized into three groups:

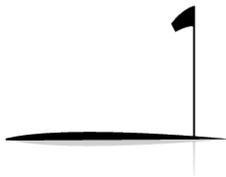
## Rangeland



## Irrigated Pasture



## Turfgrass



With each release documentation you will find these sections:

### Plant Overview

General information concerning germplasm origin, use, and optimal growing conditions

### Plant Benefits

A list of beneficial plant material characteristics

### How to order seed

Germplasm availability and ordering instructions

## Rangeland

### Native

|                          |    |
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| Western wheatgrass       | 1  |
| Bluebunch wheatgrass     | 2  |
| Snake River wheatgrass   | 3  |
| Slender wheatgrass       | 4  |
| Basin wildrye            | 5  |
| Big squirreltail         | 6  |
| Bottlebrush squirreltail | 7  |
| Bottlebrush squirreltail | 8  |
| Bottlebrush squirreltail | 8  |
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| Bottlebrush squirreltail | 10 |
| Indian ricegrass         | 11 |
| Indian ricegrass         | 12 |
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| Western prairie clover   | 16 |
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### Introduced

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| Russian wildrye     | 20 |
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## Irrigated Pasture

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\* Pre-variety germplasm

# Plant Improvement

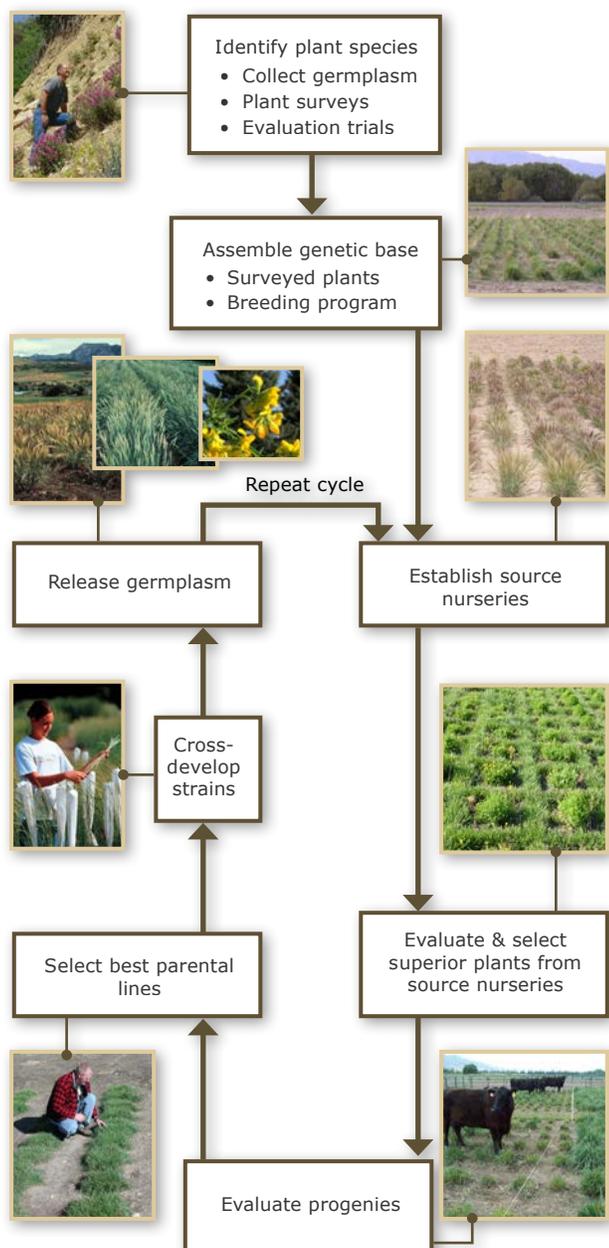
The story of our germplasm



## Breeding Strategies

The FRRL uses both simplistic and complex breeding strategies that facilitate germplasm release. These strategies range from evaluation of collected materials for Pre-variety release, to cultivar release strategies that involve intense evaluation, plant selection, and then recombination of the best plants in a cyclic fashion (below).

### Plant Breeding Scheme



## Foundation Seed Production

Foundation seed is produced from "Breeder" seed that originates from seed increases of parental plant materials under controlled conditions.

### Seed Harvest



The production conditions of Foundation seed is strictly controlled such that uniform pollination occurs in a seed increase block.



### Seed Cleaning



Seed cleaning involves careful attention to each production field's seed purity, where only the highest quality seed is retained and extraneous materials are eliminated.



### Education & Delivery



FRRL clientele are regularly invited to see our experimental and released plant materials where critical management information is disseminated.

# Recovery

## Western wheatgrass

*Pascopyrum smithii*

### Plant Overview



'Recovery' was released in 2009 by the USDA-ARS, the U.S. Army Corps of Engineers-Engineer Research and Development Center, and the USDA-NRCS.

It was developed as a rapidly establishing grass for revegetation of semiarid rangelands in the Intermountain West, Great Basin, and Northern Great Plains regions of the western U.S. It is especially intended for revegetation of frequently disturbed rangelands, military training lands, and areas where repeated wildfires occur.

Rapid establishment is one of the keys to successful revegetation in the western U.S. Thus, western wheatgrasses inherent slow establishment limits its effectiveness in reducing erosion and controlling weeds in areas with frequent, severe disturbances. Selection emphasis during Recovery's development focused on faster seedling establishment. During the establishment year, Recovery consistently demonstrated an increase in the frequency of seedlings (averaged across eight locations) when compared to 'Arriba', 'Barton', 'Flintlock', 'Rodan', and 'Rosana' western wheatgrasses. Recovery typically has superior stand until 4 to 6 years after planting, when due to their rhizomatous nature, the stand of all western wheatgrasses were equal.

On average, Recovery's establishment is better than Bozoisky Russian wildrye, similar to Bozoisky II and Vavilov Siberian wheatgrass, and lower than Vavilov II, and Hycrest and Hycrest II crested wheatgrasses.

Morphological evaluations indicated that in appearance, Recovery is most like Rosana and least like Barton western wheatgrasses. Two forage yield trials in Utah indicated that Recovery yielded comparable to/or slightly less than other western wheatgrasses.

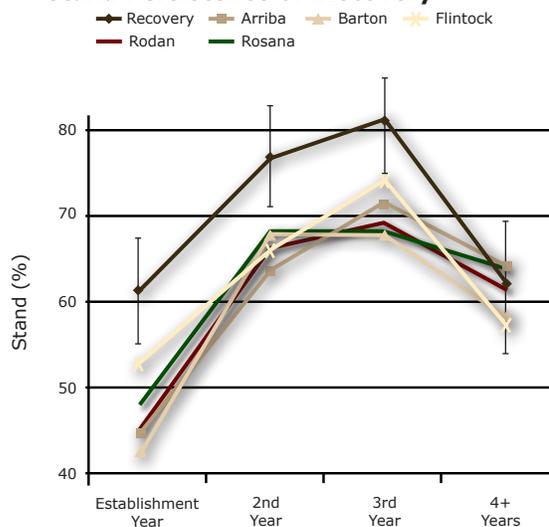
The rapid establishment of Recovery, in comparison to other western wheatgrass cultivars, will allow land managers to use this native grass species

to help limit weed infestation and soil erosion in areas where the regularity of disturbances normally prevents western wheatgrass from becoming fully established.

### Plant Benefits

- SUPERIOR SEEDLING ESTABLISHMENT
- MORE PERSISTENT
- HIGH DROUGHT TOLERANCE

Stand Persistence of 'Recovery'



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) or Idaho Foundation Seed Program (208-423-6655; Williams@kimberly.uidaho.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the following contacts; Utah Crop Improvement Association and the Idaho Foundation Seed Program.



# P-7 Germplasm

## Bluebunch wheatgrass

*Pseudoroegneria spicata*

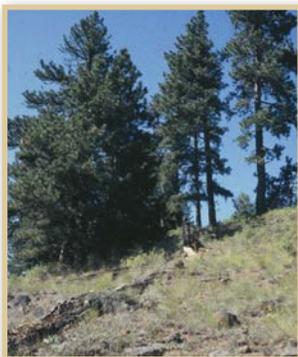


### Plant Overview



Bluebunch wheatgrass is a very important native bunchgrass found in the sagebrush-steppe ecosystem of the Intermountain Region, as well as the Rocky Mountains and western Great Plains of the U.S. This grass is highly palatable to grazing animals, but is susceptible to overgrazing. For this reason, bluebunch wheatgrass is believed to be currently less common than before the

introduction of livestock in the latter half of the 19th century. Bluebunch wheatgrass may be awned or awnless, and is predominately cross-pollinated.



Collection Site

P-7 was released in 2001 as a selected pre-variety germplasm (genetically manipulated track) on the basis of its high genetic diversity. Participating in the release were the USDA-ARS and the Agricultural Experiment Station, Utah State University, Logan, Utah.

P-7 is intended to provide genetic diversity within a single germplasm for semiarid to mesic sites where bluebunch wheatgrass was an original component of the vegetation (Larsen et al. 2003). P-7 was constructed as a multiple-origin polycross, and was developed by intermating 25 individual populations from Washington (13; WA), Idaho (3; ID), Oregon (3; OR), Utah (2), Nevada (1), Montana (1), and British Columbia (1) (Larson et al. 2000). The accessions from WA, ID, and OR represent a bluebunch wheatgrass center of genetic diversity, while the remaining accessions represent additional genetic variation from peripheral collection locations. P-7 is predominately awnless.

Larson, S.R., T.A. Jones, Z-M. Hu, A.J. Palazzo, and C.L. McCracken. 2000. Genetic diversity of bluebunch wheatgrass cultivars and a multiple-origin polycross. *Crop Science* 40:1142-1147.



Mature spikes of bluebunch wheatgrass



P-7 in replicated trials (Beaver, Utah)



Seed production field

### Plant Benefits

- **ABUNDANT SEED YIELDS**
- **HIGH GENETIC DIVERSITY**
- **BROAD ADAPTATION RANGE**

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.

# Discovery

## Snake River wheatgrass

*Elymus wawawaiensis*



### Plant Overview



Snake River wheatgrass was officially described as a new species in 1997, although this species was first reported in 1986. The first release of Snake River wheatgrass, 'Secar', was made in 1980. At the time, Secar was released as a bluebunch wheatgrass, and this confusion has persisted in the seed trade for many years.

The two species have a strikingly similar appearance, but they can easily be separated based on floral and seedling characters. Snake River wheatgrass [i.e., basic chromosome number (n)] is always awned, while bluebunch wheatgrass may be awned or awnless. The seedlings of Snake River wheatgrass are downy in appearance, while bluebunch wheatgrass seedlings have comparatively few hairs. Snake River wheatgrass has a smaller seed and is generally more drought and grazing tolerant than bluebunch wheatgrass. Bluebunch wheatgrass is



widespread throughout the Intermountain Region and the Rocky Mountains of the western U.S., but the natural distribution of Snake River wheatgrass is limited to the drainages of the Columbia River and the lower portion of the Snake River in eastern Washington, northern

and central Idaho, and northeastern Oregon. Snake River wheatgrass is always tetraploid (2n=28), while bluebunch wheatgrass may be diploid (2n=14) or tetraploid (2n=28).

Despite its limited natural distribution, Snake River wheatgrass has been widely used in restoration seed mixes throughout the Intermountain Region of the western U.S. Because of its drought and grazing tolerance, it may be regarded as a successful surrogate for bluebunch wheatgrass in environments where these traits are important. Like bluebunch wheatgrass, Snake River wheatgrass is cross-pollinating.

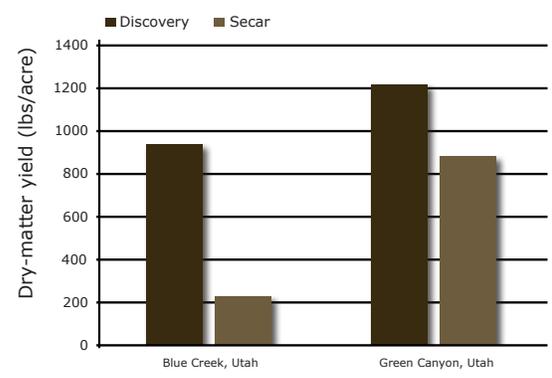
'Discovery' was released in 2007. Participating in the release were the USDA-Agricultural Research Service and the Agricultural Experiment Station, Utah State University, Logan, Utah. Discovery traces its origin to materials collected in Whitman and Asotin Counties in southeastern Washington and Idaho County in central Idaho. Discovery seedlings are more persistent during the summer drought than Secar seedlings, resulting in enhanced stand establishment. Thus, Discovery is intended as an alternative to Secar.



### Plant Benefits

- ENHANCED SEED YIELDS
- IMPROVED STAND ESTABLISHMENT
- INCREASED DRY-MATTER YIELDS

Dry-matter yield of Discovery and Secar Snake River wheatgrass (2001-2003)



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.



# FirstStrike

## Slender wheatgrass

*Elymus trachycaulus*

### Plant Overview



Slender wheatgrass is a short-lived, native bunchgrass with good seedling vigor and moderate palatability. Slender wheatgrass tolerates a wide range of

conditions and is well adapted to high altitude ranges and more favorable sites on sagebrush and pine habitats, and aspen and tall-mountain shrub regions. Due to its rapid seed germination and establishment, moderate salt tolerance, and compatibility with other species, slender wheatgrass is a valuable component in erosion-control and mine land reclamation seed mixes.

Slender wheatgrass is widely adapted throughout the western U.S. and Canada where it grows at elevations from 4,500 to 10,000 ft. along dry to moderately wet roadsides, streambanks, meadows, and woodlands from valley bottoms to subalpine and alpine elevations in aspen and open coniferous forests. It is, however, less drought tolerant than many of the wheatgrasses, including crested and bluebunch wheatgrass, and prefers loamy and sandy loamy soils in areas receiving at least 12 inches of annual precipitation.

'FirstStrike' was released in 2006 by the United States Department of Agriculture - Agricultural Research Service and the United States Army - Engineer Research and Development Center for use on arid and semiarid rangelands as a rapidly establishing revegetation grass in the Intermountain Region and Northern Great Plains of the western U.S. FirstStrike was selected for persistence and overall plant vigor in response to drought.

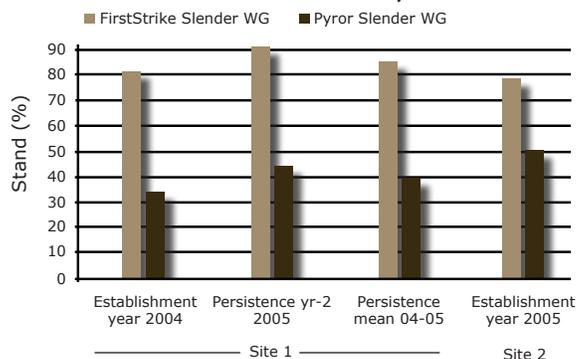
Rapid seedling establishment is the key to a successful revegetation planting in the western U.S. FirstStrike slender wheatgrass possesses enhanced germination and seedling establishment on dry rangelands. In seeded trials at Yakama Training Center (YTC), Yakima, WA; Camp Guernsey, Guernsey, WY; Fillmore, UT; and Malta,

ID, FirstStrike had significantly more seedlings per unit area than Pryor during the establishment year. At Guernsey, WY, forage production was 27% greater in FirstStrike than Pryor. FirstStrike also germinated five days earlier than Pryor on three different soil types (sandy loam, loam, and sandy).

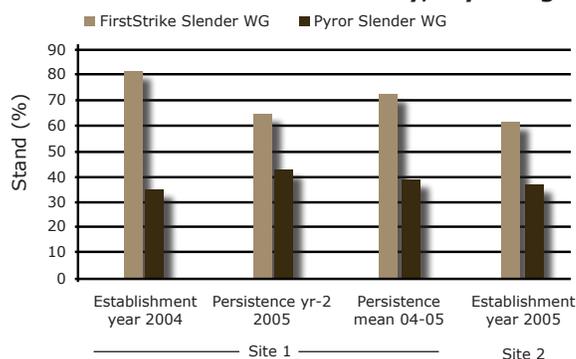
### Plant Benefits

- **MORE PERSISTENT**
- **HIGH DROUGHT RESISTANCE**
- **HIGHER DRY-MATTER YIELDS**
- **SUPERIOR SEEDLING ESTABLISHMENT**

#### Stand Persistence at Fillmore, Utah



#### Stand Persistence at Guernsey, Wyoming



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.

# Continental

## Basin wildrye

*Leymus cinereus*



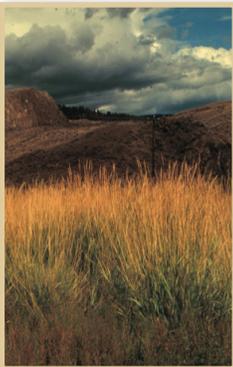
### Plant Overview



Basin wildrye is a statuesque late-maturing bunchgrass that is widespread throughout the Intermountain Region of the western U.S. It is highly drought tolerant once established, but in more arid regions, it tends to occupy ravines where water occasionally accumulates. The use of this species has been limited by its weak seedling vigor and poor seedling

establishment. Basin wildrye consists of two races having distinct chromosome numbers [i.e., basic chromosome number (n)]. Tetraploids (2n=28) are found east of the continental divide and in Utah, southern Idaho, Montana, Wyoming, New Mexico, and Arizona, while octoploids (2n=56) are found in the northern Intermountain Region in Washington and British Columbia. Tetraploids and octoploids overlap in northeastern California, northern Nevada, and Oregon. Basin wildrye is predominately cross-pollinating.

'Continental' was released in 2008 by the USDA-ARS, the Upper Colorado Environmental Plant Center, the USDA-Natural Resources Conservation Service, and the Agricultural Experiment Station, Utah State University, Logan, Utah. Continental was developed by hybridizing 'Magnar' (2n=56) and a chromosome-doubled version (2n=56) of 'Trailhead' (2n=28). Continental was then developed



by selection for seedling and mature-plant vigor.

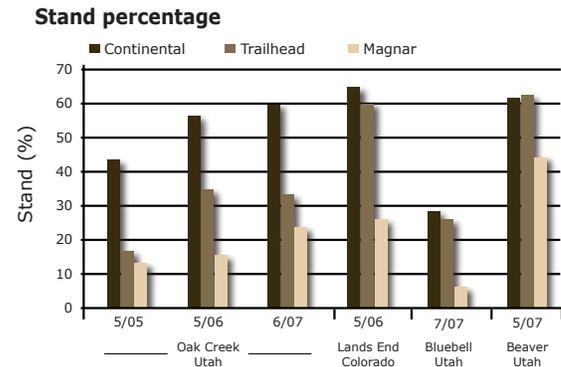
During summer, Magnar develops a distinct bluish wax on its leaves and stems, while Trailhead remains green. In Continental, about three-fourths of the plants are bluish. Continental has displayed similar or superior stand establishment to Trailhead and Magnar in evaluation trials in west-central Utah, northeastern Utah, southwestern Wyoming, and northwestern Colorado. Continental is expected to

be adapted in areas of the Intermountain Region where Trailhead and Magnar have been used successfully.

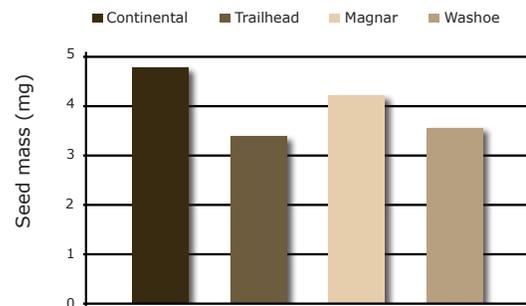
### Plant Benefits

- **RAPID SEEDLING ESTABLISHMENT**
- **ABUNDANT SEED YIELD**

Stand percentage and Seed Mass of basin wildrye



Seed mass at Millville, UT (2009)



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.



# Sand Hollow Germplasm

## Big squirreltail

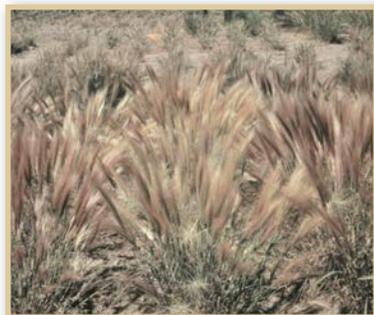
*Elymus multisetus*

### Plant Overview



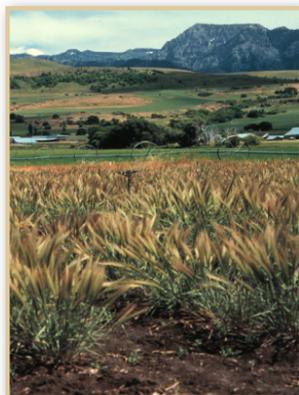
Big squirreltail is a native short-lived perennial bunchgrass that is noted for its ability to compete with invasive annual weeds such as cheatgrass and medusahead wildrye. This grass is most common in California, Nevada, Oregon, and Idaho. Because of its prominent awns, this grass is not considered to be an important forage species, but it is popular in restoration mixes.

Sand Hollow was released in 1996 as a selected pre-variety germplasm (natural track) and is predominately self-pollinated. Participating in the release were the USDA-ARS, Agricultural Experiment Station, Utah State University, Logan and the USDA-Natural Resources Conservation Service.



Awns of Sand Hollow

Sand Hollow was collected in Gem County, Idaho near the town of Emmett. The collection site was a west-facing slope consisting of loamy coarse sand where the average annual precipitation is about 11 inches.



Seed production of Sand Hollow

In general, big squirreltail is found in wetter habitats than bottlebrush squirreltail. However, Sand Hollow was collected from the driest portion of big squirreltail's distribution. Seed harvest of Sand Hollow requires close attention because of its tendency to shatter.

Care must also be taken in debearding during threshing, so as not to damage the seed and reduce viability. Sand Hollow was the first squirreltail release and today (2010) remains the only released big squirreltail.



Typical rangeland seeding

### Plant Benefits

- **ABUNDANT SEED YIELDS**
- **COMPETITIVE WITH INVASIVE ANNUAL GRASSES**

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.

# Toe Jam Creek Germplasm

## Bottlebrush squirreltail

*Elymus elymoides ssp. californicus*

### Plant Overview



Bottlebrush squirreltail is an important early-seral grass that is utilized for rangeland restoration. The *californicus* subspecies can be found in montane habitats from British

Columbia to California and east to Nevada, central Idaho, northern Utah, northwestern Wyoming, and southwestern Montana. Bottlebrush squirreltail is predominately self-pollinated, but when it coexists with bluebunch wheatgrass, sterile hybrid plants are not uncommon. The seed of *ssp. californicus* squirreltail is larger than the more common *ssp. elymoides* bottlebrush squirreltail, but the general appearance and stature of these two squirreltails is similar. Like the other squirreltails, *ssp. californicus* is susceptible to seed shattering.

Toe Jam Creek was released in 2003 as a selected pre-variety germplasm (natural track). Participating in the release were the USDA-ARS, the Agricultural Experiment Station, Utah State University, Logan, Utah, the USDA-Natural Resources Conservation Service, and the USDI-Bureau of Land Management. Toe Jam Creek was collected in northwestern Elko County, Nevada, about eight miles west of the town of Tuscarora. Elevation at the collection site was 6,000 ft., and average annual precipitation at Tuscarora is 12 inches. Toe Jam Creek's intended area of use is the northern Great Basin and the lower Snake River Plain of the western U.S.



Toe Jam Creek in replicated trial (Beaver, Utah)



Seed production field

### Plant Benefits

- **HIGH SEED WEIGHT**
- **ENHANCED SEEDLING VIGOR**
- **ABUNDANT SEED YIELDS**
- **POPULAR IN RESTORATION SEED MIXES**

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



# Pleasant Valley & Antelope Creek Germplasms

## Bottlebrush squirreltail

*Elymus elymoides*

### Plant Overview

A new bottlebrush squirreltail subspecies has recently been recognized based on DNA data (Larsen et al. 2003). Pending taxonomic revision, Pleasant Valley and Antelope Creek germplasms are provisionally referred to as *Elymus elymoides* ssp. "C". This subspecies is most common in central and eastern Oregon, but it also extends into northeastern California, northern Nevada, and southern Idaho. This subspecies is taller, later in maturity, and more common at higher elevations than the *elymoides* or *californicus* subspecies of bottlebrush squirreltail.

Pleasant Valley was released in 2010 as a selected pre-variety germplasm (natural track). Participating in the release were the USDA-ARS and the Agricultural Experiment Station, Utah State University, Logan, Utah (AEUSU). Pleasant Valley was chosen for release based on its high seed yield relative to other accessions from the eastern Blue Mountains of Oregon. It was collected on a southwest-facing slope near Interstate-84 exit 315 in Baker County, Oregon, about nine miles southeast of Baker City. Elevation at the site is 3,825 m, and average annual precipitation is 14 inches. Pleasant Valley is intended for use in the eastern Blue Mountains of Oregon, Washington, and Idaho.

Antelope Creek was released in 2009 as a selected pre-variety germplasm (natural track). Participating in the release were the USDA-ARS and the AEUSU. Antelope Creek was chosen for release based on its high seed yield relative to other accessions collected at sites of similar precipitation level in the western Blue Mountains and slopes and foothills of the Eastern Cascade Range in Oregon. Antelope Creek was collected in Wasco County, Oregon, about seven miles east of the town of Antelope. Elevation at the site is 3,650 ft., and average annual precipitation is 14 inches. Antelope Creek is intended for use in central Oregon.



Typical collection site of bottlebrush squirreltail

### Plant Benefits

#### PLEASANT VALLEY

- ABUNDANT SEED YIELDS
- ADAPTED TO THE EASTERN BLUE MOUNTAINS OF OREGON

#### ANTELOPE CREEK

- ABUNDANT SEED YIELDS
- ADAPTED TO THE WESTERN BLUE MOUNTAINS & EASTERN CASCADES OF OREGON

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.

Larsen, S.R., T.A. Jones, C.L. McCracken, and K.B. Jensen. 2003. Amplified fragment length polymorphism in *Elymus elymoides*, *E. multisetus*, and other *Elymus* taxa. Canadian Journal of Botany 81:789-805.

# Fish Creek Germplasm

## Bottlebrush squirreltail

*Elymus elymoides ssp. elymoides*

### Plant Overview



The *elymoides* subspecies of bottlebrush squirreltail is the most common and widespread of all western U.S. squirreltails. It is common on valley floors throughout

much of the Intermountain Region of the western U.S. Like the other squirreltails, *ssp. elymoides* is short lived, self-pollinating, and susceptible to shattering. Its primary use is in restoration seed mixes.

Fish Creek was released in 2003 as a selected pre-variety germplasm (natural track). Participating in the release were the USDA-ARS, the Agricultural



Typical heavily awned spike

Experiment Station, Utah State University, Logan, Utah, the USDI-Bureau of Land Management, and the USDA-Natural Resources Conservation

Service. When compared with other *ssp. elymoides* populations, Fish Creek possessed high seedling emergence rates and the latest heading date. Fish Creek was collected in Blaine County, Idaho, about six miles northeast of the town of Carey. Elevation at the site is approximately 4,750 ft., and average annual precipitation is about 12 inches.



Seed production field



Fish Creek in replicated trial (Beaver, Utah)

### Plant Benefits

- **RAPID SEEDLING EMERGENCE**
- **ORIGINATES IN THE SNAKE RIVER PLAIN**
- **POPULAR FOR RESTORATION SEED MIXES**

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



# Rattlesnake Germplasm

## Bottlebrush squirreltail

*Elymus elymoides* ssp. *elymoides*

### Plant Overview



The most widespread of all the bottlebrush squirreltails is the subspecies *elymoides*. It frequently inhabits valley floors throughout much of the Intermountain Region of the western

U.S. Like the other squirreltails, ssp. *elymoides* is short-lived, self-pollinating, and susceptible to shattering. Its primary use is in restoration seed mixes.

Rattlesnake was released in 2007 as a selected pre-variety germplasm (genetically manipulated track). Participating in the release were the USDA-ARS, the Agricultural Experiment Station, Utah State University, Logan, Utah, and the USDI Bureau of Land Management.



Rattlesnake under replicated evaluation (Beaver, UT)

Rattlesnake was developed from accession T-1175, a population collected four miles northwest of the overpass of old Highway 30 over Interstate-84 northwest near Mountain Home in Elmore County, Idaho. Elevation at the site is 3,835 ft., and estimated average annual precipitation is 12 inches.



Seed production field of Rattlesnake

Rattlesnake is a bulk of eight lines selected from T-1175 for biomass, number of seedheads, and height. This material is intended to be used primarily in its area of origin, in the Lower Snake River Plain of Idaho.



Typical bottlebrush squirreltail habitats

### Plant Benefits

- **ADAPTED TO DROUGHT CONDITIONS**
- **ORIGINATES IN THE SNAKE RIVER PLAIN**

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.

# Star Lake Germplasm

## Indian ricegrass

*Achnatherum hymenoides*

### Plant Overview



Indian ricegrass is an important bunchgrass that is found on light-textured soils throughout much of the Intermountain Region of the western U.S. Broad use of this

highly variable species has been hampered by poor seedling establishment due to very high levels of seed dormancy.

Star Lake was released in 2004 as a selected pre-variety germplasm (genetically manipulated track). Participating in the release were the USDA-



Flowering habit

ARS, the Agricultural Experiment Station, Utah State University, Logan, Utah, the USDA-Natural Resources Conservation Service, and the USDI-Bureau of Land Management. Star Lake was collected in northeastern McKinley County, New Mexico, about 14 miles northwest of the town of Torreon. Elevation at the collection site is 6,750 ft., and average annual

precipitation is about 10 inches. Star Lake was released on the basis of its high germinability, which is attributed to the thinness of the brown coverings that encapsulate the seed. Star Lake seed is relatively small and elongate in shape.

Star Lake is one of three seed morphs found at the Star Lake collection site (See image below).

#### Comparison of Indian ricegrass seed morphs



Jumbo (JS)

Globose (GS)

Star Lake

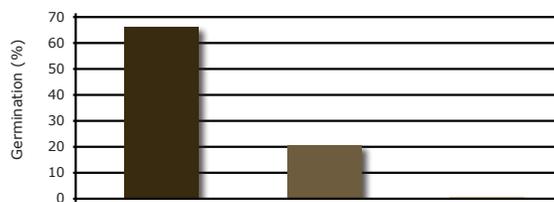


### Plant Benefits

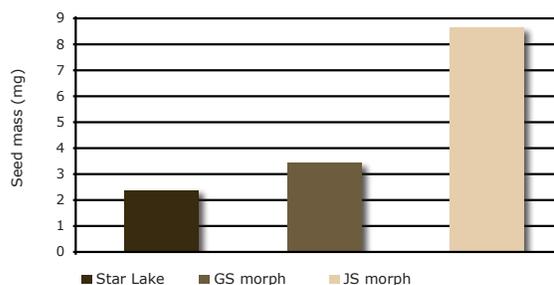
- **EXCELLENT GERMINABILITY**
- **ADAPTED TO THE FOUR CORNERS REGION & THE LOWER COLORADO PLATEAU**

#### Germination and seed mass of Indian ricegrass

##### Germination



##### Seed Mass



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



# White River Germplasm

## Indian ricegrass

*Achnatherum hymenoides*



### Plant Overview



Indian ricegrass is an important bunchgrass found on light-textured soils throughout much of the Intermountain Region of the western U.S. Broad use of this highly variable species has been hampered by poor seedling establishment due to very high levels of seed dormancy. Indian

ricegrass is a highly self-pollinating species, but hybrids with several needlegrass species are known to occur.

White River was released in 2006 as a selected pre-variety germplasm (genetically manipulated track). Participating in the release were the USDA-Agricultural Research Service (ARS), the Agricultural Experiment Station, Utah State University, Logan, Utah, and the USDI-Bureau of Land Management. The



Seed production

parental population of White River, PI 232329, was collected along route 64 about 24 miles east of the town of Rangely, Colorado. Average annual precipitation at the collection site is 10-12 inches, and elevation is about 5,400 ft. Thirty-two lines were selected from PI 232329 based on high germinability and seed yield, and these lines were bulked to form White River. It is anticipated

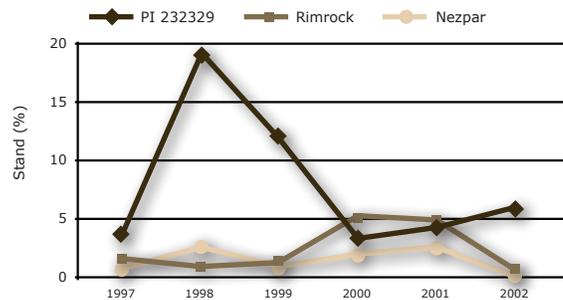
that White River will be used in the Upper Colorado Plateau of eastern Utah and western Colorado and the Basin Province of southern Wyoming.



### Plant Benefits

- **VIGOROUS PLANT**
- **GOOD SEED YIELD**
- **HIGH GERMINABILITY**

Stand percentage at Soda Lake, WY (1997-2002)



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



Nezpar (1), Rimrock (2), and White River (3) Indian ricegrass

# Reliable Germplasm

## Sandberg bluegrass

*Poa secunda*

### Plant Overview



Reliable was released in 2004 by the USDA-ARS and the Agricultural Experiment Station, Utah State University, Logan, Utah, as a Selected Class (natural track) germplasm, which is eligible for seed certification under Association of Seed Certifying Agencies

guidelines. Reliable was developed in cooperation with the United States Army Corps of Engineers and the Strategic Environmental Research and Development Program (SERDP) project to identify resilient plant characteristics and develop wear-resistant plant cultivars for use on military training lands. Reliable Sandberg bluegrass is a multi-origin germplasm assembled to ensure adaptation across a broad range of ecological sites and provide a source of abundant seed. Reliable has been successfully established in rangeland trials in Utah, Idaho, and Washington where it has displayed better establishment and persistence than standard Sandberg check cultivars.

Sandberg bluegrass is an important understory grass in bluebunch wheatgrass-sagebrush ecological sites of the Intermountain and Northwest Regions of the western U.S. It is a medium-lived, perennial bunchgrass valuable for soil erosion control, spring livestock and wildlife grazing, and biodiversity.



Reliable was developed by compositing seed from plants originating from 28 locations, with each location potentially containing unique co-adapted gene complexes. Three-hundred fourteen Sandberg bluegrass plants were initially collected as live plants from

28 locations at the U.S. Army Yakima Training Center (YTC) in Yakima, Washington. The collection locations had the following range of characteristics: annual precipitation (5 to 12 in.); surface soil texture (loam to sand); soil depth (6 to 72 in.); slope (0 to 45%); aspect (north, south, east, and west); and elevation (800 to 3400 ft.). Collections were made in foothill,

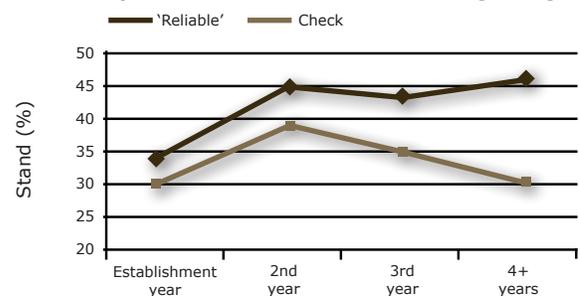
plain, canyon bottom, canyon summit, ridge top, canyon side, and bottom flat environments.

Sandberg bluegrass resists trampling and is often one of the first species to naturally reestablish on sites disturbed by fire, large equipment and vehicles, and animals. Thus, Reliable's intended use is for rehabilitation and restoration of western rangelands. It may be particularly useful as a pioneer plant species in severely disturbed environments, such as military training sites and after wildfires.

### Plant Benefits

- **SUPERIOR PERSISTENCE**
- **BROAD GENETIC VARIATION**
- **HIGH DROUGHT TOLERANCE**
- **ORIGINATES FROM FREQUENTLY DISTURBED SITES**
- **RELIABLE SEEDLING ESTABLISHMENT IN DIVERSE ENVIRONMENTS**

Stand persistence of 'Reliable' Sandberg Bluegrass



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



# Cucharas Germplasm

## Green needlegrass

*Nassella viridula*



### Plant Overview



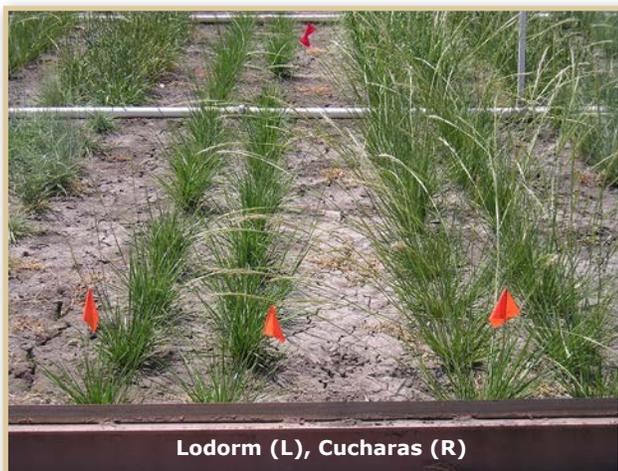
Green needlegrass is an important native bunchgrass in the western Great Plains and Rocky Mountains, ranging from New Mexico to Alberta, Canada. It is a useful forage species and is especially tolerant of grazing. Green needlegrass is an excellent seed producer, but stand establishment has been limited

by high levels of seed dormancy. Although green needlegrass is predominately self-pollinated, it can produce sterile progeny upon hybridization with Indian ricegrass.



Cucharas was released in 2003 as a selected pre-variety germplasm (natural track). Participating in the release were the USDA-ARS and the Agricultural Experiment Station, Utah State University, Logan, Utah. The original collection of Cucharas was made near Cucharas Junction,

Huerfano County, Colorado, approximately four miles northeast of the town of Walsenburg. Cucharas was chosen for release because of its high productivity and seed yield relative to 'Lodorm', which originated in North Dakota, U.S.



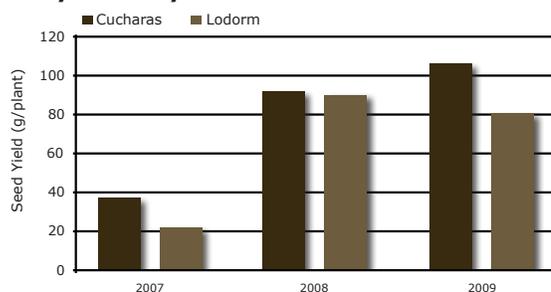
Lodorm (L), Cucharas (R)

Establishment year

### Plant Benefits

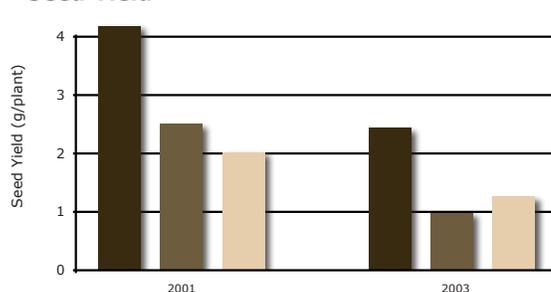
- **ABUNDANT SEED YIELDS**
- **TOLERANT OF GRAZING**

#### Dry-matter yield

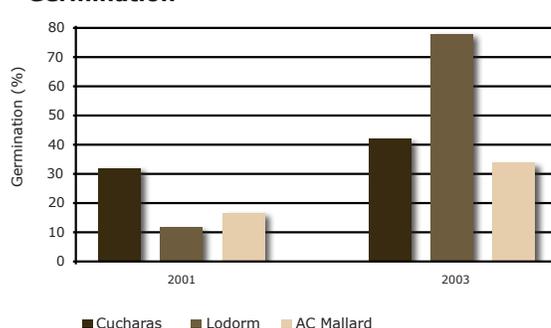


#### Seed yield and germination of green needlegrass germplasm (2001,2003)

##### Seed Yield



##### Germination



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.

# Yakima Germplasm

## Western yarrow

*Achillea millefolium*

### Plant Overview



Yakima was released in 2004 by the USDA-ARS and the Agricultural Experiment Station, Utah State University, Logan, Utah, as a Source Identified Class (natural track) germplasm, which is eligible for seed certification under Association of Seed

Certifying Agencies guidelines (AOSCA, 2001). Yakima was developed in cooperation with the United States Army Corps of Engineers and the Strategic Environmental Research and Development Program (SERDP) project to identify resilient plant characteristics and develop wear-resistant plant cultivars for use on military training lands. Yakima western yarrow is a multi-origin germplasm assembled to ensure adaptation across a broad range of ecological sites and provides a source of readily available seed.

Yakima western yarrow demonstrated vigorous growth in field nurseries near Logan, Utah, and has been successfully established in field trials in Utah, Idaho, and Washington where it established and persisted equal to or better than a common variety of western yarrow. A range of phenotypic (visual) differences have been observed in the seed production field indicating the broad range of phenotypic diversity within this germplasm.

Yakima was initially developed by combining germplasm from multiple environments, each possibly possessing a different co-adapted gene complex to enhance its establishment across a range of semiarid ecosystems. This wildland seed (generation G0) was collected from 27 locations representing seven different ecological sites at the U.S. Army Yakima Training Center (YTC) in Yakima, Washington. The collection locations had the following range of characteristics: annual precipitation (6 to 11 in.); surface soil texture (loam to sand); soil depth (6 to 72 in.); slope (1 to 30%); aspect (north, south, east, and west), and; elevation (1600 to 2800 ft.). The collections were made in foothill, plain, canyon

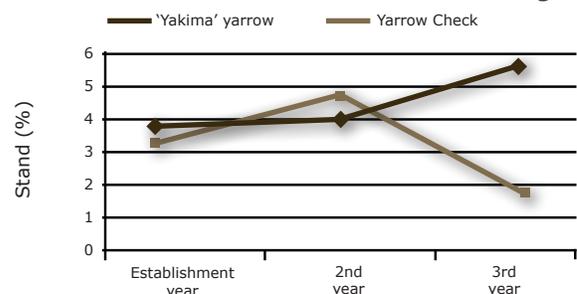
bottom, canyon summit, ridge top, canyon side, and bottom flat environments.

Western yarrow is an important, abundant forb in bluebunch wheatgrass-sagebrush plant communities of the Intermountain and Northwest Regions of the U.S. It is rhizomatous and drought tolerant enabling it to recruit into disturbed areas and often competes well with invasive weedy plant species. Yakima western yarrow is intended for use in rehabilitation and restoration of western U.S. rangelands. It will be particularly useful in helping to stabilize and diversify severely disturbed sites, such as military training lands and burned areas.

### Plant Benefits

- **ENHANCED PERSISTENCE**
- **BROAD GENETIC VARIATION**
- **HIGH DROUGHT TOLERANCE**
- **ORIGINATES FROM FREQUENTLY DISTURBED SITES**

Stand Persistence of 'Yakima' in Washington



### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Early generation seed is maintained by the USDA-ARS-FRRL at Logan, UT. Stock seed is available through Utah Crop Improvement Association.



# Majestic & Spectrum Germplasms

## Western prairie clover

*Dalea ornata*



### Plant Overview



Use of a diversity of species in rangeland revegetation can help minimize weed invasion. Diverse species occupy available ecosystem niches that could otherwise be colonized by invasive weeds. Legumes are of particular interest because they biologically

fix nitrogen, which can increase the productivity of associated species in plant communities. Legumes also typically contain more protein and less fiber than many other plants at similar stages of maturity. Few North American legumes, however, are commercially available for revegetation of arid and semiarid western rangelands.

Western prairie clover is a perennial, North American legume that is non-toxic to livestock and wildlife. It is found in Idaho, Nevada, Washington, Oregon, and California.



Western prairie clover develops a taproot that reaches a length of 1 to 2 ft. The species is primarily insect-pollinated. A

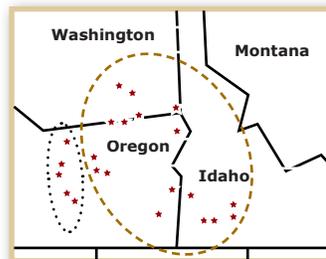
cluster of stems arises from the crown, and stems die back during late-fall and early winter. Flowers are typically pinkish to purple in color and occur in dense, cylinder-shaped spikes. The flowers of prairie clover bloom upward from the base of the spike to its tip during a three-week period in June and July, depending on location and year.

Majestic and Spectrum Germplasm are intended for use in revegetation of arid and semiarid rangelands. They are useful in increasing biodiversity, enhancing forage quality, providing a food source for birds and wildlife, and biologically fixing nitrogen. They also can be used in habitat



enhancement programs for native pollinators and in the beautification of roadsides, rest areas, and parks. Similarly, their beautiful, showy flowers make them ideal for use in home xeriscaping applications.

Majestic Germplasm was selected for use in western Columbia Plateau (Washington) and western Blue Mountains (Oregon). Spectrum Germplasm was selected for use in the central and eastern Columbia Plateau, central and eastern Blue Mountains, northern Great Basin, and Snake River Plain of the western U.S. (see image below).



- Majestic Germplasm
- Spectrum Germplasm
- ★ Collection Site

### Plant Benefits

- **NITROGEN FIXER**
- **DROUGHT TOLERANT**
- **SHOWY FLOWERS**

### To order seed:

G0 and G1 seed is maintained by the USDA-ARS Forage and Range Research Laboratory at Logan, UT. Stock seed is available through: Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu).

# NBR-1 Germplasm

## Basalt milkvetch

*Astragalus filipes*



### Plant Overview



Arid and semiarid rangelands are usually nitrogen-limited, and only a few native legumes are commercially available for revegetation of arid and semiarid western U.S. rangelands. Legumes in rangelands and pastures fix atmospheric nitrogen (N) in association with rhizobia bacteria, enhance plant diversity, and increase the quantity and quality of forage for livestock and

wildlife. They also increase the productivity of associated species in plant communities by releasing symbiotically fixed N through root exudates and decaying plant materials. Legumes also generally contain more protein and less fiber than grasses at similar stages of maturity.

Basalt milkvetch, also known as threadstalk milkvetch, is



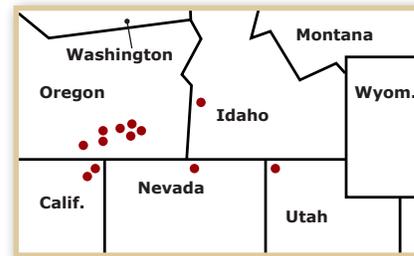
a perennial, North American legume that is found in California, Idaho, Nevada, Oregon, Utah, Washington, northern Mexico, and British Columbia, Canada. It is a relatively tall (up to 3 ft.), sparsely leafed plant with creamy white to pale-yellow flowers. Basalt milkvetch has a thick, woody taproot with clumped

stems arising from the crown. Its long, thin seedpods (which dry to a papery texture) are attached to the stem with a characteristic thread-like attachment. Basalt milkvetch occurs commonly on basalt-derived, sandy, loamy or gravelly soils in sagebrush-steppe, pinyon-juniper woodland, ponderosa pine forest, or chaparral ecosystems.

Its upright growth habit and prominence in recently burned areas makes basalt milkvetch a promising species for rangeland revegetation. Its prevalence after fire may be especially important considering the increasing

fire frequency on western U.S. rangelands and the importance of fire as a management tool. Although many species of *Astragalus* are toxic to livestock, basalt milkvetch has non-detectable or extremely low levels of toxic compounds.

NBR-1 basalt milkvetch selected pre-variety germplasm was derived from 12 collections that originated from the northern Great Basin in Utah, Idaho, Oregon, and California. Elevations of these collection sites ranged from (4,049 to 6,148 ft.), and precipitation varied from 8 to 18 in. NBR-1 Germplasm is intended for rangeland revegetation, rangeland diversity enhancement, and wildlife and pollinator habitat improvement. Its showy flowers and drought-resistant characteristics make it of interest for xeriscaping applications in home gardens.



● Collection Site

### Plant Benefits

- **NITROGEN FIXER**
- **DROUGHT RESISTANT**
- **AESTHETIC FLOWERS**

### To order seed:

G0 (original generation) and G1 seed is maintained by the USDA-ARS Forage and Range Research Laboratory at Logan, UT. Stock seed is available through: Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu).



# Vavilov II

## Siberian wheatgrass

*Agropyron fragile*

### Plant Overview



Vast areas of semiarid rangeland in the western United States are severely disturbed, frequently burned, increasingly eroded, and infested with troublesome weeds. Reseeding disturbed rangelands with genetically improved plant materials that are competitive enough to replace existing

undesirable vegetation is often the most plausible and economically feasible way to reclaim such sites.

One such cultivar is the newly released Siberian wheatgrass 'Vavilov II' which was developed by the USDA-ARS and released in 2008 in cooperation with the United States Army - Engineer Research and Development Center, and the USDA Natural Resources Conservation Service.

Vavilov II is an improved cultivar of Siberian wheatgrass that was derived from collections originating from the steppes of Kazakhstan and selected clones of the cultivar Vavilov. This new cultivar was selected for increased seedling establishment and stand persistence in response to drought. Vavilov II expands the genetic base of the cultivar Vavilov, and has been evaluated extensively on ecological sites in the western United States. It has superior seedling establishment and stand persistence when compared to Vavilov.

In North America, Vavilov II is well adapted to a wide range of ecological sites and zones receiving as little as 7 to 8 inches of precipitation in regions of the northern and central Great Plains, and the Intermountain Region, where it is a long-lived, drought-tolerant, bunch-type grass.

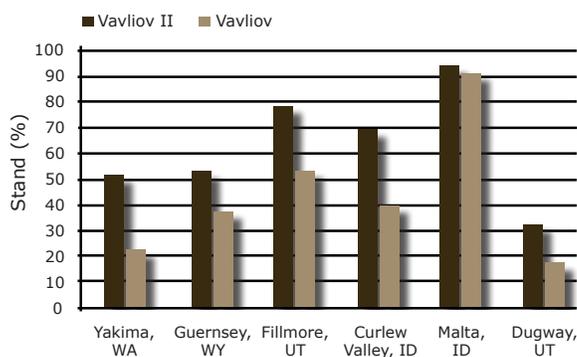
Vavilov II is noted for its ability to establish quickly on sandy soils. It is adapted to foot hills, sagebrush, ponderosa pine, mountain brush, and pinyon-juniper ecological zones. Vavilov II is one of the few grasses that can compete with difficult to control weeds such as cheatgrass, halogeton, and medusahead wildrye in arid environments. Vavilov II is recommended primarily for soil conservation on dry sandy soils

where it is tolerant to grazing by wildlife and livestock.

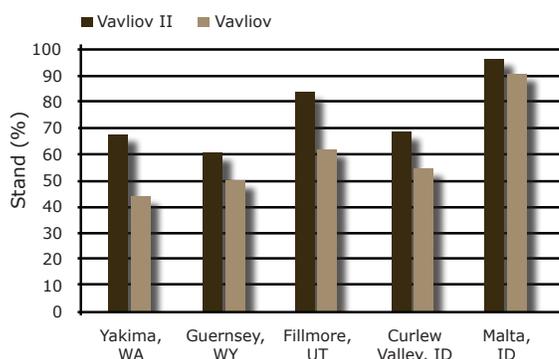
### Plant Benefits

- **HIGH STAND PERSISTENCE**
- **IMPROVED DROUGHT TOLERANCE**
- **SUPERIOR SEEDLING ESTABLISHMENT**

#### Stand Establishment



#### Stand Persistence



ID=Idaho, UT=Utah, WA=Washington, WY=Wyoming

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) or Idaho Foundation Seed Program (208-423-6655; Williams@kimberly.uidaho.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the following contacts; Utah Crop Improvement Association and the Idaho Foundation Seed Program.

# Hycrest II

## Crested wheatgrass

*Agropyron cristatum*

### Plant Overview

It has been estimated that cheatgrass (*Bromus tectorum*) has displaced approximately 10 million ha of perennial vegetation in the Great Basin. During the past 20 years, the frequency and size of cheatgrass infestations have continued to increase, which enhances fire frequency, destroys soil structure, and reduces the economic profitability of western U.S. rangelands. The control of cheatgrass without replacement by desirable perennial species frequently results in the reestablishment of cheatgrass or other noxious weeds on disturbed rangeland. Rapid seedling growth and ability to compete against cheatgrass are two characteristics that perennial grasses must have for successful establishment on semiarid western rangelands.

Crested wheatgrass is one of only a few grasses that has the ability to compete with difficult to control weedy annuals such as cheatgrass, halogeton, and medusahead on semiarid rangelands receiving between 10 to 15 inches of annual precipitation. Crested wheatgrass is a long-lived, drought-tolerant, bunch to moderately rhizomatous range grass that is adapted to a wide range of ecological sites including foothills, sagebrush, ponderosa pine, mountain brush, and pinyon-juniper habitats.

#### Competitiveness of crested wheatgrass



'Hycrest II' crested wheatgrass was released by the United States Department of Agriculture-Agricultural Research Service and the Utah Agricultural Experiment Station, Utah State University, Logan, Utah in 2008, and is intended for use on arid and semiarid rangelands as a rapidly establishing revegetation grass in the Intermountain Region and Northern Great Plains of the western U.S. Hycrest II was selected for improved seedling establishment under dryland conditions.

Hycrest II produces more seedlings per unit area

during the establishment year than Hycrest at Bluecreek, UT; Green Canyon, UT; Mandan, ND; Miles City, MT; Dugway, UT, and; Curlew Valley, ID.



Hycrest II      Hycrest

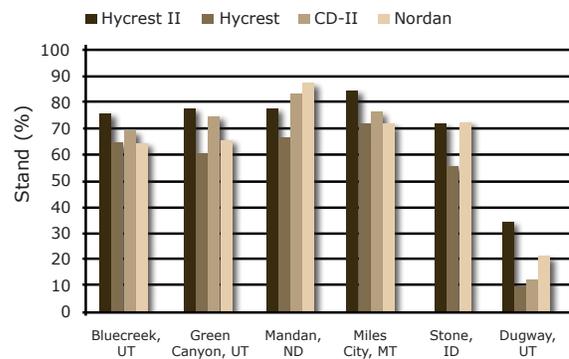
Due to Hycrest II's increased seedling establishment potential (particularly under harsh dry environments), it is intended to replace Hycrest for reseeding

of severely disturbed range sites on heavier soils receiving less than 15 inches of annual precipitation. It is recommended that Hycrest II be planted as a component in seed mixes and not as a monoculture.

### Plant Benefits

- **RAPID SEEDLING ESTABLISHMENT**
- **INCREASED DROUGHT TOLERANCE**
- **INCREASED STAND PERSISTENCE UNDER DROUGHT**

#### Stand Establishment



ID=Idaho, MT=Montana, ND=North Dakota, UT=Utah

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.



# Bozoisky - II

## Russian wildrye

*Psathyrostachys juncea*

### Plant Overview



Russian wildrye is a long-lived bunchgrass. Most of the forage of this species is produced in the basal leaves that grow rapidly in spring and remain palatable throughout the summer

and fall as long as soil moisture is available. In North America, this species has been successfully seeded most often on arid and semiarid rangelands of the Northern Great Plains and Intermountain Regions in areas receiving above 8 inches of annual precipitation. It is adapted to heavy grazing, and once established, Russian wildrye competes effectively with undesirable plants (e.g., weeds, annuals).

Russian wildrye is best adapted to the highly fertile loam and clay soils of the Intermountain Region of the western U.S., although acceptable stands can be obtained on a wide range of soil types. Forage production and stand persistence decline on low fertility soils. Nevertheless, Russian wildrye is exceptionally tolerant of cold and drought. Although its resistance to drought exceeds that of crested wheatgrass, it is more difficult to establish. Within the Intermountain Region, Russian wildrye is adapted to sagebrush, mountain-brush, and pinyon-juniper environments. It is moderately



Bozoisky

Bozoisky II

tolerant of saline and alkaline soils, and is particularly productive on soils too alkaline for crested wheatgrass and too dry for tall wheatgrass.

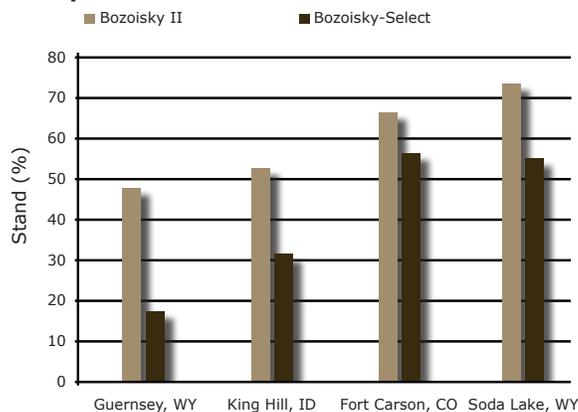
'Bozoisky II' Russian wildrye was released in 2006 for use on arid and semiarid rangelands

as a revegetation and winter forage grass in the Intermountain Region and Northern Great Plains of the western United States. Bozoisky II was selected for seedling establishment, seed mass, seed yield, plant vigor, forage production, and response to drought. It has been extensively evaluated on rangeland sites in the western U.S., where it has been shown to have equal or greater seedling establishment than commercially available cultivars. In seeded trials at Guernsey, WY, King Hill, ID, and Soda Lake, WY, Bozoisky II had significantly more seedlings per unit area than did Bozoisky-Select.

### Plant Benefits

- **RAPID SEEDLING ESTABLISHMENT**
- **INCREASED DROUGHT TOLERANCE**
- **INCREASED STAND PERSISTENCE AND FORAGE PRODUCTION UNDER DROUGHT**

#### Superior Stand Establishment



CO=Colorado, ID=Idaho, WY=Wyoming

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.

# Mustang

## Altai wildrye

*Leymus angustus*

### Plant Overview



Altai wildrye is a long-lived perennial bunchgrass with short creeping rhizomes that has excellent winter hardiness and drought resistance. Altai wildrye is native to western Siberia, in the Altai mountain region between Siberia and Mongolia, and is widely distributed throughout Kazakhstan.

It is most often found on semi-desert, alkaline meadows, steppes, and on sandy or rocky river edges and in lake valleys. It is well adapted to loam and clay soils. Altai wildrye is almost as productive as tall wheatgrass on saline soils.

Forage of Altai wildrye cures well and maintains its nutritional value better during the late summer and early fall than many cool-season grasses. Erect culms and moderate forage quality make Altai wildrye a valuable species for extending the grazing season into the fall and winter.

In the past, the major limitation for the use of Altai wildrye was its poor seedling establishment and low seed yields. In 2004, the Agricultural Research Service, United States Department of Agriculture, and the Agricultural Experiment Station, Utah State University, Logan, Utah, released 'Mustang' Altai wildrye with increased seedling establishment and forage yield.

'Mustang' Altai wildrye has been evaluated at Blue Creek, UT; Green Canyon, UT; Mead, NE; Sidney, NE; Mandan, ND, and; Miles City, MT for forage production, stand establishment, and persistence.



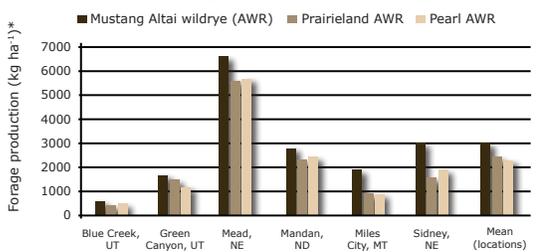
Mustang      Prairie land

Mustang produced significantly more forage than cultivars Prairie land and Pearl Altai wildrye, and Magnar and Trailhead basin wildrye. Except at Mead, NE, Mustang had superior initial stands over the other Altai and basin wildrye cultivars examined. After four years, Mustang was more persistent than Prairie land and Pearl.

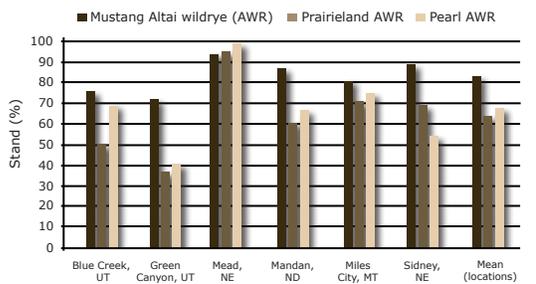
### Plant Benefits

- HIGHER DRY-MATTER YIELDS
- SUPERIOR PERSISTENCE
- SUPERIOR INITIAL STANDS

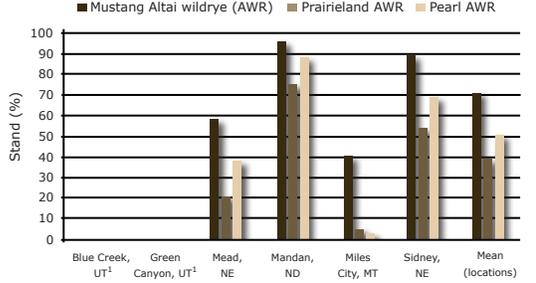
Northern Plains Area Regional Trials  
Dry-matter forage yields



Initial Stand Establishment in 2001



Persistence in 2003



<sup>1</sup> Not evaluated  
\* lbs/Acre = 0.893 x kg/ha      NE=Nebraska, MT=Montana, UT=Utah

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.



# NewHy

## RS Hybrid

*Elymus hoffmannii*



### Plant Overview



'NewHy' RS hybrid wheatgrass is a cross between quackgrass and bluebunch wheatgrass. This cross combines the vigor, productivity, salinity tolerance, and persistence of quackgrass with the drought resistance, bunch growth habit, and seed

and forage quality of bluebunch wheatgrass. The rhizome development in NewHy is comparable to intermediate wheatgrass.

This new hybrid cultivar is recommended for range sites and pastures with moderate salinity problems that receive at least 14 to 16 inches of effective annual precipitation. The forage quality of NewHy is excellent. NewHy begins growth early in the spring and retains a more succulent and palatable forage for livestock and wildlife later in the growing season than all other wheatgrass germplasm evaluated on semiarid sites. Under high soil fertility and adequate irrigation, forage yields of NewHy are lower than other pasture grasses (i.e., orchardgrass, meadow brome, and tall fescue). However, on saline soils where irrigation is limited or absent, NewHy will persist and provide high quality forage when other pasture grasses are short lived and lack productivity. Salinity tolerance of NewHy approaches tall wheatgrass.



Meadow brome, **NewHy**, Meadow brome, Tall Fescue

Under hay management, NewHy should be cut at the pre-heading stage to maximize forage quality. When harvested later, forage quality declines as plant maturity increases. Under proper management, one can expect two crops of hay from a NewHy field per

year. Another management option is to harvest a hay crop in early summer and graze the regrowth in late fall and early winter as winter forage.



NewHy

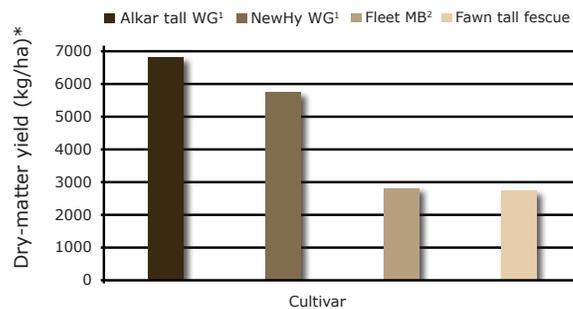
Alkar tall wheatgrass

On saline soils, as either a hay or pasture crop, the forage quality (palatability and nutritional value) of NewHy is better than that of tall wheatgrass.

### Plant Benefits

- **EXCELLENT QUALITY FORAGE**
- **HIGH DROUGHT RESISTANCE**
- **HIGH SALT TOLERANCE**

#### Evaluation in Utah County for dry-matter yield (2004-2006)



\* lbs/Acre = 0.893 x kg/ha

<sup>1</sup> WG=wheatgrass

<sup>2</sup> MB=meadow brome

### To order seed:

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# Don

## Falcata alfalfa

*Medicago sativa ssp. falcata*



### Plant Overview



'Don' was developed for use exclusively in mixed plantings and is meant for use on semiarid rangelands and irrigated pastures.

Don is a persistent and non-aggressive legume that can be used in land reclamation. When grown in mixtures with grasses, alfalfa cultivars Ladak, Spredor3, Amerigaze, and P53V08, showed long-term mortality ranging from 25 to 50 percent. In contrast, there was no measurable mortality in Don when grown in these grass mixtures. Over a four-year period at Nephi, Utah, which has a long-term annual precipitation of 13 inches, Don showed 9% mortality compared to Ladak (46%) and Vernal (38%).

Don has small, fine leaves and stems that bear bright yellow flowers. Don has a semi-decumbent growth habit that does not deter grazing but makes mechanical harvesting difficult. Don has moderately fibrous roots with a crown typically 1-2 inches below the soil surface. The top part of the crown can be removed, and plants will initiate growth from well below the soil surface.



Don mixed with kochia & altai wildrye

When Don was used in mixtures with tall fescue and meadow brome, the production increased from 10 to 32 percent. Similar production advantages are

expected when Don is grown with crested wheatgrass on dry rangelands. It has a low growth habit and stays well below the canopy of most cool-season grasses. Thus, it will not dominate when grown in mixtures with grasses. When grown in monocultures, however, forage yield of Don is less than *sativa* type alfalfas. Consequently, Don is only recommended for growing in mixtures with grass.

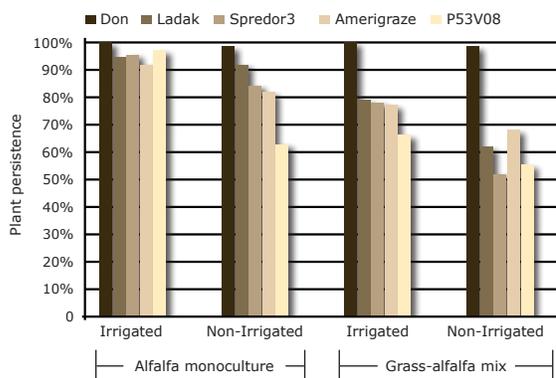
When moisture is limiting, Don will go dormant.

Seeds of Don are smaller when compared to typical alfalfa. Don's seeding rate is 1 lb per acre. Don also has a high percentage of hard seed that should prove to be an advantage when it is used in dormant seedings with grasses.

### Plant Benefits

#### • INCREASED FORAGE PRODUCTION UNDER DROUGHT CONDITIONS

Persistence of Don is greater than standard commercial alfalfa varieties



#### Using Don in mixtures increases yield potential

|                      | Harvest 1   | Harvest 2   | Harvest 3   | Harvest 4   | Seasonal production |
|----------------------|-------------|-------------|-------------|-------------|---------------------|
| <b>Irrigated</b>     |             |             |             |             |                     |
| Don                  | 2.40        | 2.31        | 1.25        | 0.47        | 6.42                |
| Meadowbrome          | 2.59        | 2.20        | 1.25        | 0.83        | 6.88                |
| <b>MB/Don</b>        | <b>3.06</b> | <b>2.42</b> | <b>1.63</b> | <b>0.82</b> | <b>7.93</b>         |
| Tall fescue          | 2.07        | 1.84        | 0.84        | 0.58        | 5.33                |
| <b>TF/Don</b>        | <b>2.92</b> | <b>2.59</b> | <b>1.36</b> | <b>0.99</b> | <b>7.86</b>         |
| <b>Non-irrigated</b> |             |             |             |             |                     |
| Don                  | 2.31        | 0.83        | 0.32        | 0.03        | 3.47                |
| Meadowbrome          | 3.64        | 1.35        | 0.22        | 0.07        | 5.28                |
| <b>MB/Don</b>        | <b>3.84</b> | <b>1.68</b> | <b>0.27</b> | <b>0.08</b> | <b>5.87</b>         |
| Tall fescue          | 3.40        | 1.43        | 0.17        | 0.03        | 5.03                |
| <b>TF/Don</b>        | <b>4.02</b> | <b>1.65</b> | <b>0.32</b> | <b>0.05</b> | <b>6.03</b>         |

### To order seed:

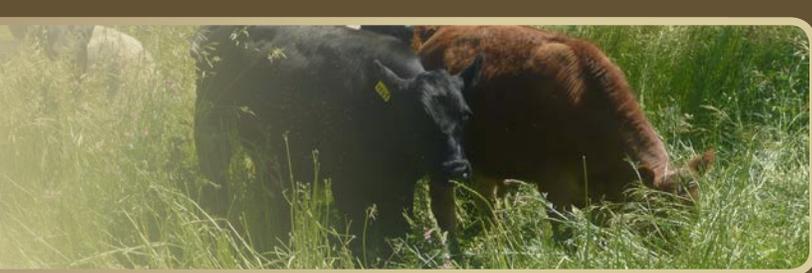
Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.



# Cache

## Meadow bromegrass

*Bromus riparius*



### Plant Overview



Meadow brome is a long-lived perennial grass that offers promise on non-irrigated or irrigated pastures. It "greens up" 2 to 3 weeks earlier in the spring than other pasture

grasses, increasing the grazing season as well as forage production under reduced irrigation. It is adapted to slightly acidic to mildly alkaline soils on dryland pastures where annual precipitation exceeds 15 inches. It is extremely winter hardy (see image below), and recovers quickly after grazing. Meadow brome is adapted to the mountain brush, aspen, conifer forests, and subalpine environments. It is less dormant under high summer temperatures than smooth brome.

'Cache' meadow bromegrass was released in 2004 by the USDA-ARS, Forage and Range Research Laboratory in cooperation with the Agricultural Experiment Station, Utah State University, Logan. Cache meadow bromegrass possesses enhanced seedling establishment and increased forage yields on irrigated and semi-irrigated pastures in the Intermountain and Northern Great Plains Regions of the western U.S.



Cache

Fleet

At different irrigation rates ranging from 0.5 inches to 1.5 inches per week, Cache produced significantly more forage than the cultivar Fleet at all irrigation rates and significantly more forage than the cultivar



Orchard grass Meadow brome

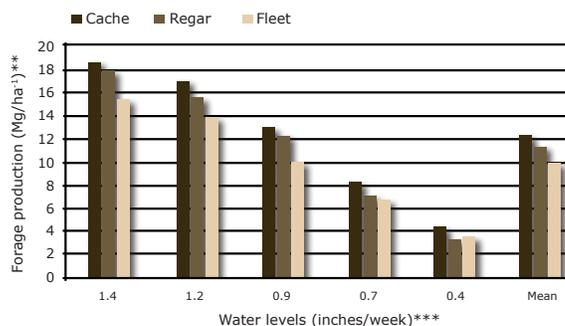
Regar at the two lowest irrigation rates. In forage trials at Powell, WY, Cache produced more forage (5.52 t/ac) than Paddock (4.90), Montana (4.71), and Regar (4.39)

meadow brome and Lincoln (5.07), and Big Foot (4.76) smooth bromegrass. Likewise, under multiple harvests (6 harvests per year), Cache produced more forage than orchardgrass cultivars Ambassador and Latar under irrigation in northern Utah.

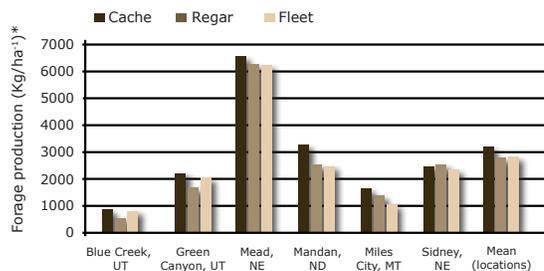
### Plant Benefits

- EXCELLENT EARLY SPRING FORAGE
- RAPID SEEDLING ESTABLISHMENT
- INCREASED FORAGE PRODUCTION UNDER DROUGHT

#### Meadow brome forage production under five irrigation levels - Dry-matter yield (2001-2002)



#### Dry-matter forage yield from the Northern Plains Area Regional Trials



NE=Nebraska, MT=Montana, UT=Utah

\* lbs/Acre = 0.893 x kg/ha \*\* lbs/Acre = 893 x mg/ha \*\*\* 1 inch = 25.4 mm

### To order seed:

Check with local seed companies to determine availability or call the Utah Crop Improvement Association (435-797-2082; stanford.young@usu.edu) to find commercial seed growers. Breeder, Foundation, Registered, and Certified seed classes will be recognized. Foundation seed is available through the Utah Crop Improvement Association.

# RoadCrest

## Crested wheatgrass

*Agropyron cristatum*

### Plant Overview



'RoadCrest' is an improved cultivar of crested wheatgrass that was released by the USDA-ARS Forage and Range Research Laboratory in cooperation with the Agricultural Experiment Station, Utah State University, Logan, Utah, in 1998. The parental plant materials

were collected in Turkey, but in contrast to typical bunch-type crested wheatgrass, the original breeding population displayed varying degrees of rhizome development. RoadCrest is named such because of its rhizomatous nature, and the ease of establishment in harsh environments, which make it a leading choice for reducing soil erosion along roadsides and highways in the western U.S. RoadCrest was released after three cycles of selection for rhizomatous growth habit, short stature, and fine leaves under low-maintenance conditions.

RoadCrest is a long-lived perennial that is significantly more rhizomatous than any other crested wheatgrass. RoadCrest has finer leaves, produces less biomass, and is 15 to 25 % shorter in stature than forage-type crested wheatgrass cultivars. Although it is adapted to areas receiving from 10 to 20 inches of annual precipitation, seedling diseases may be a problem if precipitation and irrigation exceeds 25 inches.



Sod-forming characteristics typical of RoadCrest

Germination and seedling vigor compare favorably with other crested wheatgrasses, which makes it easier to establish than other low-maintenance turf grasses including Kentucky bluegrass, 'Sodar' thickspike wheatgrass, and hard fescue.

Turf quality and color are not as good as Kentucky bluegrass, tall fescue, and perennial ryegrass under optimum environmental conditions. Nevertheless, RoadCrest "greens up" in early spring and remains green until mid-summer in climates similar to Logan, Utah. Like other crested wheatgrasses, RoadCrest turf goes and remains dormant during the summer until temperatures decline in fall. However, summer dormancy is not as pronounced at higher elevations of 5,000 to 7,000 feet.



RoadCrest used as low-maintenance turf along highways RoadCrest is recommended for use along roadsides and other disturbed sites including mining, wildfire, and construction, and in traditional low-maintenance turf settings such as summer cabins and golf course roughs in the Northern Plains and western United States.

### Plant Benefits

- **DROUGHT RESISTANT**
- **ENHANCED SEEDLING VIGOR**
- **MODERATELY RHIZOMATOUS SOD-FORMER**
- **SHORTER STATURED AND FINER LEAVED THAN TYPICAL CRESTED WHEATGRASSES**
- **USED FOR ROADSIDES, LOW-MAINTENANCE TURF, AND SOIL CONSERVATION**

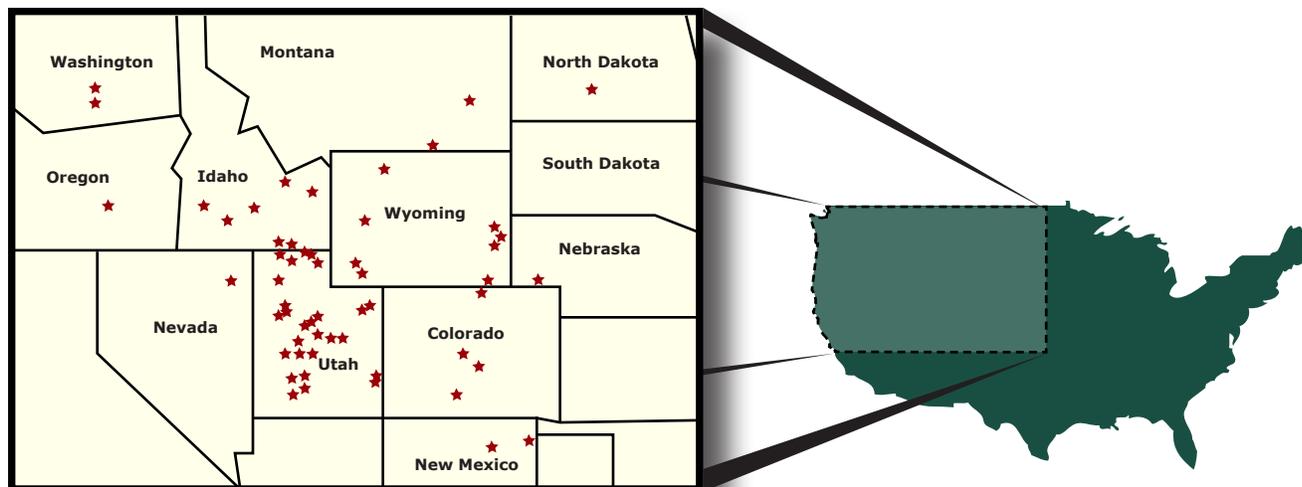
### To order seed:

RoadCrest was released as a protected variety and three western seed companies are licensed to sell it. Please check with these companies for seed availability (Utah Seed, Clearfield, UT, 801-774-0525; Bruce Seed Farm Inc., Townsend, MT, 406-266-3103; and Round Butte Seed Growers Inc., Culver, OR, 866-358-7001)





Each year the Forage and Range Research Laboratory conducts numerous trials at sites throughout the western United States to thoroughly evaluate its varieties under production and natural conditions for factors such as yield, persistence, forage quality, drought tolerance, and disease resistance. Only the very highest performing varieties are commercialized as a result of stringent selection trialing standards which are imposed upon breeding populations.



★ - FRRR Range Evaluation Site

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The Forage and Range Research Laboratory is organized of four working groups:

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- (2) Irrigated Pastures
- (3) Reduced-Input Turfgrass, and
- (4) Biomass/Biofuels

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