



Figure 1. The original 80-plant seed-production nursery of 'Continental' basin wildrye (L-45) at North Park Farm, Hyde Park, Utah. Photo by Thomas A Jones

NOTICE OF RELEASE OF

'CONTINENTAL' BASIN WILDRYE

I Thomas A Jones, Steven D Parr, Susan R Winslow,
and Manuel A Rosales

ABSTRACT

'Continental' basin wildrye (*Leymus cinereus* (Scribn. & Merr.) A. Löve [Poaceae]) has been released as a cultivar for use in rangeland seedings. It was developed from a hybrid between an induced octoploid ($2n = 56$), generated from the natural tetraploid 'Trailhead' ($2n = 28$), and the natural octoploid 'Magnar' ($2n = 56$). Continental has shown similar or superior stand establishment to Trailhead and Magnar in evaluation trials in west-central Utah, northeastern Utah, southwestern Wyoming, and northwestern Colorado.

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KEY WORDS

Leymus cinereus, Poaceae, Triticeae, rangeland

NOMENCLATURE

USDA NRCS (2008)

COLLABORATORS

USDA Agricultural Research Service Forage and Range Research Laboratory, Logan, Utah; Upper Colorado Environmental Plant Center, Meeker, Colorado; USDA Natural Resources Conservation Service Bridger Plant Materials Center, Bridger, Montana; Utah Agricultural Experiment Station, Logan, Utah.



Species | *Leymus cinereus* (Scribn. & Merr.) A. Löve
Common Name | basin wildrye, Great Basin wildrye
Plant Symbol | LEC14
Accession number | L-45

This cultivar was jointly released by the USDA Agricultural Research Service (ARS), the Upper Colorado Environmental Plant Center (UCEPC), the USDA Natural Resources Conservation Service (NRCS), and the Utah Agricultural Experiment Station on 5 May 2008. 'Continental' was tested under the experimental designation L-45. Continental was developed from an interploidy *Leymus cinereus* hybrid. Because it was developed by crossing a significant genetic barrier, it qualifies as a tertiary restoration gene pool plant material (Jones 2003; Jones and Monaco 2007).

COLLECTION SITE INFORMATION

Continental was developed from 2 previously existing cultivars, Trailhead (Cash and others 1998), originating near Roundup, Montana, and Magnar (Alderson and Sharp 1994), believed to have originated in southeastern British Columbia. Trailhead is a tetraploid ($2n = 28$), and Magnar is an octoploid ($2n = 56$) (Ogle 2003).

DESCRIPTION

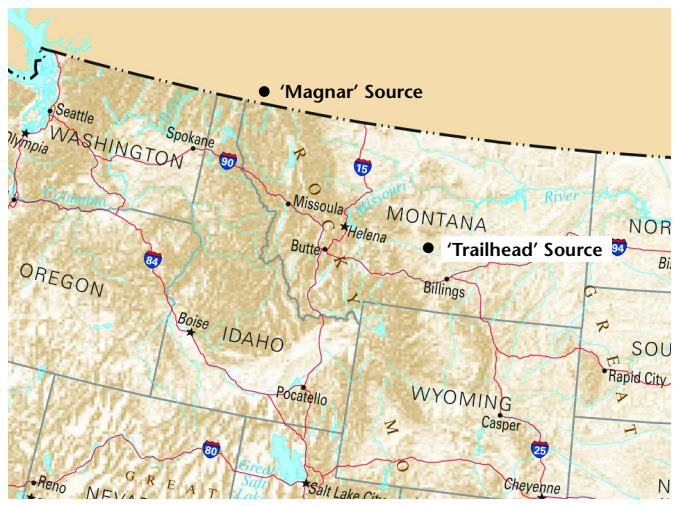
Basin wildrye consists of 2 chromosome races, tetraploid ($2n = 28$) and octoploid ($2n = 56$), which are somewhat allopatric. The octoploid race predominates west of the Continental Divide in British Columbia and Washington. The tetraploid race predominates in southern Idaho, Utah, Colorado, Wyoming, Montana, Alberta, and Saskatchewan. Both races are commonly found in Oregon, Nevada, and northeastern California.

Continental ($2n = 56$) can be distinguished from Trailhead and Washoe Germplasm ($2n = 28$) on the basis of its chromosome number. Continental is also the only basin wildrye plant material that segregates for glaucousness. Of 232 Continental plants examined in the breeder seed field, 162 (69.8%) were glaucous, which fits a χ^2 ratio at the 5% level for 3 glaucous:1 non-glaucous. In basin wildrye, octoploid materials, for example, Magnar, are generally glaucous, and tetraploid materials, for example, Trailhead and Washoe Germplasm, are generally non-glaucous.

METHOD OF DEVELOPMENT

Continental traces to a cross (L-28) generated by pollinating an induced-octoploid line with the natural octoploid, Magnar. The female parent of the cross was induced by chromosome-

doubling germinating seeds of Trailhead using the colchicine-doubling technique, as described by Jones and others (1997). The objective of the cross was to overcome the genetic barrier separating the two historically isolated chromosome races (ploidy levels), thereby increasing the potential for genetic improvement. This is similar to the approach used to develop 'Hycrest' crested wheatgrass (*Agropyron cristatum* [L.] Gaertn. X *A. desertorum* (Fisch. ex Link) Schult.) (Asay and others 1985). Two cycles of recurrent selection (L-44, L-45) were completed on L-28 at North Park Farm, Hyde Park, Utah, after a single generation of recombination. A 935-plant nursery of L-28 was established 3 May 2001 on 0.7-m (2.3-ft) centers. In 2002, 5 spikes of an unspecified number of plants with at least 10 spikes were harvested in bulk to form L-44. Of 980 plants of L-44 started in the greenhouse, the last 411 to produce a second tiller were discarded. In 2003, a 540-plant spaced-plant nursery on 0.5-m (1.6-ft) centers was established from the remaining plants. On 11 June 2004, 80 plants were selected visually based on superior vegetative vigor and upright growth habit. Heads were removed from the unselected plants before pollination, and seeds were harvested in bulk as L-45.



Collection sites for germplasm used in developing Great Basin wildrye.

ECOLOGICAL CONSIDERATIONS

Continental is a genetically manipulated plant material. It was deemed to be "OK to release" when scored using the Worksheet for Conducting an Environmental Evaluation of NRCS Plant Releases.

ANTICIPATED CONSERVATION USE

The primary characteristic limiting the use of basin wildrye has been relatively poor stand establishment resulting from inadequate germination and seedling vigor (Evans and Young 1983). In short, material is needed with improved stand establishment. Because of its improved seedling vigor and establishment, Continental is expected to be a viable alternative to Magnar and Trailhead for use in restoration, reclamation, and rehabilitation of rangelands. Primary beneficiaries are expected to be land management agencies, ranchers, landowners enrolled in USDA conservation programs, and the seed industry.

Because it was developed by bridging a genetic barrier between 2 chromosome races, Continental qualifies for the tertiary restoration gene pool (Jones 2003; Jones and Monaco 2007). Use of the tertiary restoration gene pool is preferred when use of primary or secondary restoration gene pools is not feasible or is not expected to succeed.

DATA SUPPORTING RELEASE

Continental was compared with Magnar and Trailhead in fall 2004 plantings at Oak Creek (upper enclosure), Millard County, Utah, and at Land's End Trail near Whitewater, Mesa County, Colorado. They were also compared in a fall 2005 planting at the Shell site near Pinedale, Wyoming, and in fall 2006 plantings near Bluebell, Duchesne County, Utah, and near Beaver, Beaver County, Utah. In addition, they were compared in a spring 2007 transplanting in an irrigated trial near Providence, Utah. For all trials, materials were tested for statistically significant differences at $P < 0.05$ using the LSD statistic, and results are reported below.

At Oak Creek, Continental stand percentage was 42% on 9 May 2005, statistically greater than both Trailhead (19%) and Magnar (12%). On 9 May 2006, Continental stand percentage at Oak Creek was 56%, statistically greater than Magnar (15%) but similar to Trailhead (34%). On 8 June 2007, Continental stand percentage at Oak Creek was 60%, statistically greater than both Trailhead (32%) and Magnar (22%). At Land's End on 28 June 2005, stand rating (1 to 5 scale with 5 being best) for Continental was 3.75, statistically greater than Magnar (2.75) but similar to Trailhead (3.25). Likewise, at Land's End



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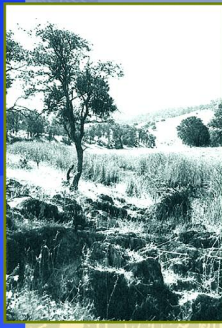

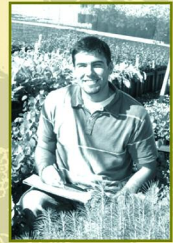
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on 10 May 2006, percentage stand for Continental was 65%, statistically greater than Magnar (25%) but similar to Trailhead (60%). At the Shell site on 5–6 July 2006, cover percentage for Continental was 29%, statistically greater than both Washoe Germplasm (19%) and Trailhead (16%) but similar to Magnar (23%). Near Bluebell, Continental stand percentage on 24 July 2007 was 28%, statistically similar to Trailhead (26%) but greater than Magnar (6%). Near Beaver, stand percentage on 24 May 2007 was statistically similar for Trailhead (62%), Continental (62%), and Magnar (43%). In an irrigated trial near Providence, transplanted 25 April 2007 and harvested 14 September 2007, Continental biomass was 23.6 g (0.8 oz) per plant, statistically similar to Trailhead (22.1 g [0.8 oz]) but less than Magnar (28.4 g [1.0 oz]).

In summary, Continental was statistically superior to Trailhead at 2 of 5 dryland test sites (Oak Creek, Utah; Shell, Wyoming) but statistically similar at the 3 others. Continental was statistically superior to Magnar at 3 of 5 dryland test sites (Oak Creek, Utah; Land's End, Colorado; Bluebell, Utah) but statistically similar at the 2 others. Continental was statistically similar to both Trailhead and Magnar at one dryland test site (Beaver, Utah). In the irrigated trial (Providence, Utah), Continental was statistically similar to Trailhead but statistically inferior to Magnar.

ANTICIPATED AREA OF ADAPTATION

Continental is expected to be adapted in areas of the Intermountain Region and northern Great Plains where Trailhead and Magnar have been used successfully.

AVAILABILITY OF PLANT MATERIALS

Breeder seeds will be maintained by the USDA ARS Forage and Range Research Laboratory, Logan, Utah. Seeds will be made available to commercial growers for production of foundation, registered, and certified seeds by the Utah Crop Improvement Association: Stanford Young, Utah Crop Improvement Association, Utah State University, Logan, Utah 84322-4820; phone: 435.797.2082; e-mail: sayoung@mendel.usu.edu.

Small quantities of seeds will be provided to researchers on request to the corresponding author. Appropriate recognition should be made if this material contributes to the development of a new breeding line or cultivar.

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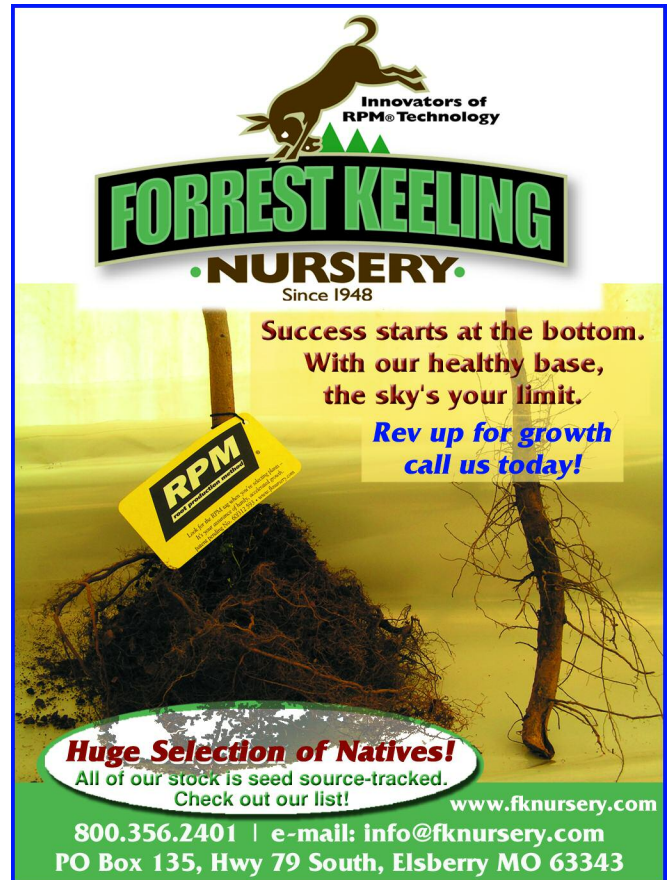
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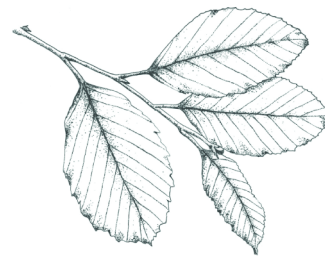
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