

GRASSES FOR REVEGETATION OF MOUNTAIN SITES

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ABSTRACT: Cool-season grasses are important to revegetation seed mixtures for mountain sites in the Intermountain West. Selection of species depends on knowing their characteristics and adaptation. Twenty-four recommended species are described.

INTRODUCTION

Many mountain ranges in the Intermountain region of the Western United States have relatively high precipitation and support mountain shrubs, woodlands, and alpine vegetation. A variety of grasses are found growing throughout these vegetative zones.

In this paper, mountain sites are defined as areas where mean annual precipitation exceeds 18 inches (46 cm). These areas have shrub and grasslands in the high mountain parks and valleys and contain ponderosa pine, Douglas-fir, spruce-fir, and alpine communities. The sagebrush and pinyon-juniper woodland communities are generally excluded.

Several perennial grasses native to mountain sites and useful in reseeding programs are commercially available. Other potentially useful native grasses are not currently available or are in short supply. Some introduced grasses having similar attributes and adaptations are commercially available and can be substituted for these.

We describe 18 major and 6 minor native or introduced grass species recommended for revegetation of mountain sites. Table 1 lists selected characteristics of all 24 species, and table 2 describes their range of environmental adaptation. Information is based on the references listed at the end of this paper and on work by three USDA Soil Conservation Service Plant Materials Centers (PMC's) in the Intermountain region. The PMC's are at Aberdeen, Idaho; Pullman, Wash.; and Meeker, Colo.

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Only cool-season grasses are considered. These grasses grow actively during mild winters, develop rapidly and flower in spring and early summer, become relatively dormant during the summer, and resume growth in the fall. Cool-season grasses have C-3 photosynthetic pathways.

With two exceptions, all species described flower in May to June and produce mature seed in June to July. The exceptions are alpine timothy and tufted hairgrass, which flower in June to July and produce mature seed in July to August, except at higher elevations, such as alpine meadows, where mature seed may not be produced until late August or early September.

INTERPRETATION OF THE TABLES

Table 1: Selected Characteristics of the Grasses

Longevity.--Short-lived (S) stands begin to decline dramatically after 3 or 4 years and are gone 10 years after planting. Long-lived (L) stands do not begin to decline for at least 5 to 7 years, and usually last 10 to 20 years with proper management on adapted sites.

Seeding growth.--Ratings are relative. Perennial ryegrass is a standard rapidly developing grass; hard fescue is slow developing. Under optimum conditions, ryegrass may provide greater than 50 percent cover in 45 days; hard fescue would require an entire growing season. Many rapidly developing grasses are short-lived. Erosion-control seed mixtures usually include both rapidly developing species, and persistent, but slowly developing species.

Herbage volume.--Ratings are relative. Production of herbage varies by site, season, use, and other factors in addition to inherent capability.

Forage quality.--Ratings are relative. Cool-season pasture grasses are rated high; native range grasses may be rated somewhat lower. Grasses for special uses such as turf or erosion control may also be low in forage quality.

Table 2: Environmental Adaptation

Precipitation.--The minimum or range of mean annual precipitation tolerated by each species is recorded. For example, intermediate wheatgrass is adapted where mean annual precipitation is at least 14 inches (35 cm).

Table 1.--Selected characteristics of cool-season grasses for mountain sites (See text for explanations of columns 2, 3, 5, and 6)

Plant name	Longevity ¹	Seedling growth ²	Season of forage use by livestock only	Herbage volume ³	Forage quality ⁴	No. seed/lb	Seed/ft ² at 1 lb/acre
Alpine timothy	L	S-M	summer	L	F	1,680,000	38
Arizona fescue	L	S-M	summer	L	F-G	550,000	13
Big bluegrass	L	M	spring	M	G	917,000	21
Blue wildrye	S	R	spring, early summer	M	F	131,000	3.1
Canada bluegrass	L	S-M	early summer	L	F	2,500,000	57
Canby bluegrass	L	S	spring	L	F-G	296,000	21
Columbia needlegrass	L	S-M	spring, early summer	M	F-G	200,000	4.6
Creeping foxtail	L	S-M	late spring, summer	M-H	G	900,000	21
Creeping red fescue	L	S	late spring, summer	L	F-G	615,000	14
Hard fescue	L	S	late spring, summer	L	F-G	565,000	13
Intermediate wheatgrass	L	M-R	late spring, early summer	M	VG	100,000	2.4
Kentucky bluegrass	L	S-M	late spring, summer	L	F-G	2,100,000	50
Meadow brome	L	R	spring, summer	M	E	80,000	1.8
Mountain brome	S	VR	spring, early summer	M	VG	90,000	1.9
Orchardgrass	L	M	spring, early summer	M	E	540,000	12
Perennial ryegrass	S	VR	spring	M-H	G	247,000	5.7
Prairie junegrass	L	S-M	summer	M	G	700,000	16
Sheep fescue	L	S	late spring, early summer	L	F-G	680,000	16
Slender wheatgrass	S	R	spring	M	G	167,000	3.7
Smooth brome	L	R	spring, summer	M	E	125,000	2.9
Tall fescue	L	M	spring, early summer	M-H	G	230,000	5.3
Tall oatgrass	S	R	spring, early summer	M	G	150,000	3.5
Timothy	L	M	spring, early summer	M	VG	1,300,000	30
Tufted hairgrass	L	M	summer	M	F	2,500,000	57

1 L = long lived; S = short lived.

2 S = slow; M = moderate; R = rapid; VR = very rapid.

3 L = low; M = medium; H = high.

4 F = fair; G = good; VG = very good; E = excellent

Table 2.--Environmental adaptation of cool-season grasses for mountain sites (See text for explanations of columns 2, 3, 4, 5, 7, 9, 10, and 11)

Plant Name	Precipitation, inches	Temperature, °F	Inundation, days	Fertility Requirements ¹	Soil Texture	Shallow Soils ²	Reaction, pH	Salinity Tolerance ³	Drainage ⁴	Heat Tolerance
Alpine timothy	>20	-50	⁶ 49-63	L	clay loam to sandy loam	Y	5.5-7.5	MS ⁶	P-W	F
Arizona fescue	>10	-40	⁶ 14-21	L	clay loam to sandy loam	Y	6.0-7.5	MS ⁶	MW-W	G
Big bluegrass	>10	-40	⁶ 7-14	L	clay loam to sandy loam	Y	6.0-8.0	MS ⁶	SP-W	G
Blue wildrye	>16	-30	⁶ 21-35	L	clay loam to sandy loam	N	5.5-7.5	MS ⁶	W	G
Canada bluegrass	>18	-40	⁶ 21-35	L	clay loam to sandy loam	Y	5.0-7.5	MS	SP-W	F
Canby bluegrass	>7	-40	⁶ 7-14	L	clay to sandy loam	Y	6.0-8.0	MT ⁶	SP-W	G-E
Columbia needlegrass	>14	-40	⁶ 14-21	L	clay loam to sandy loam	Y	6.0-8.0	MT ⁶	W	G
Creeping foxtail	>20	-40	49-63	M	clay to loam	N	5.0-8.0	MT	P-W	G
Creeping red fescue	>18	-40	21-35	L	clay to sandy loam	Y	5.0-7.5	MS	SP-W	F-6
Hard fescue	>14	-40	⁶ 21-35	M	clay to sandy loam	Y	5.5-7.5	MS	SP-W	G
Intermediate wheatgrass	>14-30	-30	21-35	M	clay loam to sandy loam	N	6.0-7.5	MS	MW-W	G
Kentucky bluegrass	>18	-40	21-35	M	clay loam to sandy loam	Y	6.0-7.5	MS	MW-W	F-G
Meadow brome	>16	-40	24-38	M-H	clay to sandy loam	N	5.5-7.5	MT ⁶	SP-W	F-G
Mountain brome	>18	-40	⁶ 24-28	M	clay to sandy loam	N	5.5-7.5	MS	SP-W	F
Orchardgrass	>18	-20	14-21	H	clay to sandy loam	N	6.0-7.5	MS	MW-W	F-G
Perennial ryegrass	>18	-30	14-21	H	clay to sand	N	6.0-8.0	MT	P-SE	G
Prairie junegrass	>14	-40	⁶ 14-21	L-M	clay loam to sand	Y	6.5-8.0	MT ⁶	W-SE	G
Sheep fescue	>10	-40	⁶ 14-21	L	clay to sandy loam	Y	5.5-7.5	MS ⁶	MW-W	G
Slender wheatgrass	12-30	-40	49-63	M	clay loam to loam	N	6.0-9.0	T	MW-W	G
Smooth brome	>15	-40	24-28	M-H	clay loam to sandy loam	N	5.5-7.5	MT	SP-W	F-G
Tall fescue	>18	-40	21-35	M	clay to sandy loam	N	5.5-8.5	MT	P-W	G
Tall oatgrass	>20	-30	⁶ 21-35	L-M	silt loam to loamy sand	N	5.5-7.5	MS ⁶	W-SE	F
Timothy	>20	-40	49-63	M	clay to sandy loam	N	5.0-7.5	MS	P-W	F
Tufted hairgrass	>20	-40	⁶ 49-63	L-M	clay to sandy loam	N	5.0-7.5	T ⁶	P-W	F

1 L = low; M = moderate; H = high.

2 Y = yes; N = no.

3 MS = moderately sensitive; MT = moderately tolerant; T = tolerant.

4 P = poorly; SP = somewhat poorly; MW = moderately well; W = well; SE = somewhat excessively.

5 F = fair; G = good.

6 Unknown but probable.

7 'Paiute' is adapted where precipitation is greater than 10 inches.

Temperature.--The figures are general guidelines, corresponding to plant hardiness zones (USDA-ARS 1960). For example, intermediate wheatgrass can be expected to do well in zones where the minimum winter temperature is above -30° F (34° C) (the expected minimum in hardiness zone 4).

Inundation.--This indicates the number of days of inundation to a depth of at least 12 inches (30 cm) a species can withstand in the early to late spring during the normal period of peak runoff and prolonged flooding.

Fertility requirements.--Fertility depends on site conditions that vary widely. Therefore, the requirements are expressed in relative terms. Cool-season pasture grasses such as tall fescue, which have high moisture requirements, usually need high levels of nutrients, particularly nitrogen. Native range grasses generally have lower fertility requirements.

Shallow soils.--This is a rating of the suitability of the species for long term cover on shallow soils without maintenance practices such as irrigation and fertilization. Many of the rapidly developing grasses can provide temporary cover on shallow soils.

Salinity tolerance.--This is usually expressed as a function of salinity (electrical conductivity, ECe, in millimhos per cubic centimeter) and percentage of relative crop yield (Maas and Hoffman 1977).

Rating	Upper limit of salinity for--		
	100% yield-	50% yield-	No live plants
	--millimhos per cubic centimeter--		
Sensitive	1.5	5.0	8.0
Moderately sensitive	3.0	10.0	16.0
Moderately tolerant	6.0	15.0	24.0
Tolerant	10.0	20.0	32.0

Drainage.--Standard terminology of the National Cooperative Soil Survey is used (USDA-Soil Survey Staff 1982).

Heat tolerance.--The relative ratings are based on the ability of plants to withstand high-intensity sunlight and high summer temperatures. Desert grasses that can withstand several days of temperatures above 100° F (38° C) are considered to have excellent heat tolerance. Grasses seldom are well adapted to cool, shaded locations, and most species have at least fair heat tolerance.

DESCRIPTIONS OF MAJOR GRASSES

Arizona fescue. See "Hard Fescue."

Big Bluegrass. See "Canada bluegrass."

Canada bluegrass

Canada bluegrass (*Poa compressa* L.), a low-growing, sod-forming introduced grass, provides good ground cover on open, dry, infertile soils.

It tolerates acid soils and low fertility and is generally used for erosion control on roadsides, borrow pits, and dam sites, and as a low-maintenance turf in recreation areas. It is the most widely used bluegrass for conservation on mountain sites in the Intermountain area. Kentucky bluegrass (*P. pratensis* L.) is a common turf plant, but it is less preferred for reclamation because it has higher fertility requirements and less shade tolerance than Canada bluegrass.

Big bluegrass (*P. ampla* Merr.) and canby bluegrass (*P. canbyi* [Scribn.] T. Howell) are drought-tolerant native bunchgrasses that can be used on very dry mountain sites.

'Reubens' Canada bluegrass is the recommended cultivar for mountain sites in the West and is widely used. It was selected from a naturalized stand in northern Idaho and has better seeding vigor, ground cover, and seed production than common types. 'Draylar' upland bluegrass (*P. glauantha* Gaudin) is a closely related species with similar attributes. Both are commercially available.

Numerous Kentucky bluegrass cultivars are available, primarily for turf. 'Troy' was released for horse pasture and is taller than the others. Cultivars with proven adaptation to a particular locality should be used.

'Sherman' big bluegrass and 'Canbar' canby bluegrass are the only cultivars of their species. Both were developed by the Pullman PMC and are commercially available.

Canby bluegrass. See "Canada bluegrass."

Creeping foxtail

Creeping foxtail (*Alopecurus arundinaceus* Poir.) is a cold-tolerant, sod-forming introduced grass that is adapted to wet meadowland sites in the Intermountain West. It forms a dense sod with strong rhizomes. It is very cold-tolerant and can persist where the frost-free period averages less than 30 days. Creeping foxtail is well adapted for meadowland and hay and for shoreline stabilization on ponds, lakes, streams, and waterways.

'Garrison' is the only cultivar of this species. It produces good quality forage on wet sites where it generally is superior to reed canarygrass and other wetland grasses. Seed is light and difficult to drill without rice hulls or a similar diluent. Seed is available from several commercial sources.

Creeping red fescue. See "Hard fescue."

Hard fescue

Hard fescue (*Festuca longifolia* Thuill.) is a low-growing bunchgrass introduced from Europe and widely used for highway plantings, airport strips, and other areas where a low-growing, persistent, competitive ground cover is needed. Although seedlings are slow to establish, plants become competitive through the development of abundant fibrous roots. Arizona and sheep fescue (*F. arizonica* Vasey and *F. ovina* L.) are similar to hard fescue but are more drought tolerant. Creeping red fescue (*F. rubra* L.) is less drought tolerant than hard fescue but is

sod-forming. All these fescue species are low growing and fine leaved.

'Durar' hard fescue, developed by the Pullman PMC, is a widely used cultivar in the West for seeding cut-over or burned timberland and for erosion control. Seed is readily available.

'Covar' sheep fescue is a recent release by the Pullman PMC. It has performed well on fire-breaks by preventing invasion of tall weedy species and brush and providing a low-volume, fire-resistant cover. 'Covar' performs well on dry, harsh sites. Seed is available from commercial sources.

'Redondo' Arizona fescue, a native cultivar selected by the Los Lunas, New Mexico, PMC, is adapted to the southern part of the Intermountain area in woodland and forest plant communities. Some commercial seed is available.

Numerous cultivars of creeping red fescue are available, mostly for turf uses. 'Pennlawn,' a Northeast variety, can be used on mountain sites in the Intermountain West where precipitation exceeds 18 inches (46 cm). 'Fortress' is also adapted for erosion-control seedings.

Intermediate wheatgrass

Intermediate wheatgrass (Agropyron intermedium [Host] Beauv.) is a sod-forming, introduced grass. It is commonly planted with alfalfa for hay or pasture and is also frequently seeded after burns and used for erosion control work. It has good seedling vigor on mountain sites and can survive unseasonal drought or cold. Intermediate wheatgrass is one of the better choices for forage plantings, approaching the value of smooth or meadow brome, but more tolerant of harsh sites.

'Greenar' intermediate wheatgrass, developed at Pullman, Wash., is typical of the species and was selected for forage production and compatibility with alfalfa. It is mildly sod-forming. Seed is available in low to moderate amounts--about 10,000 to 15,000 lb (4,500 to 7,000 kg) each year.

'Oahe' is a four-clone synthetic developed in South Dakota for improved seed production, forage yield, and rust resistance. It is well adapted to the Intermountain region, popular, and readily available.

'Tegmar' is a low-growing cultivar selected at Aberdeen, Idaho, for erosion-control attributes, including sod-formation and seedling vigor. Seed supplies fluctuate, but nearly 50,000 lb (23,000 kg) were produced in 1980.

Kentucky bluegrass. See "Canada bluegrass."

Meadow brome.

Meadow brome (Bromus biebersteinii Roem. and Schult.) is similar to smooth brome in characteristics and adaptation. It differs from smooth brome in that it has a bunchgrass or only slightly spreading habit, lacks abundant rhizomes, and is more susceptible to frost heaving at high eleva-

tions. 'Regar' meadow brome is a high producing, high quality forage that should be considered for the better mountain soils.

'Regar' meadow brome was developed by the Aberdeen PMC, and seed is readily available. In use and characteristics, it is similar to 'Manchar' smooth brome, except 'Regar' is slightly earlier. In erosion-control mixtures, 'Manchar' is more competitive than 'Regar' and more likely to form solid stands.

Mountain brome

Mountain brome (Bromus carinatus Hook. & Arn.) is a rapidly developing, somewhat short-lived native bunchgrass with a deep, well-branched root system. This species occurs on mountain sites throughout the Intermountain West. It is valuable for erosion control, and is well adapted for subalpine erosion-control seedings where a rapid, vigorous, cold-tolerant ground cover is desired. Plants are tall and erect and are heavy seed producers.

'Bromar,' released by the Pullman PMC, is the only cultivar. It is taller, leafier, and up to 2 weeks later than most other strains. Commercial seed production recently has increased substantially to annual production of 5,000 to 15,000 lb (2,300 to 7,000 kg).

Orchardgrass

Orchardgrass (Dactylis glomerata L.), an introduced bunchgrass, is highly palatable to livestock and is a preferred hay, pasture, or silage. It is compatible with alfalfa and clovers, but is less winterhardy than timothy and smooth brome. It also is included in erosion-control mixtures, particularly on cut-over or burned timberland, primarily for its forage value.

'Latar' orchardgrass was developed by the Pullman PMC. A commonly used variety for forage, it is lower in lignin and more highly digestible than other orchardgrasses. It is a late-season strain. Seed is available in quantity.

'Potomac,' developed in the Northeast, is an early-season variety often used in erosion-control seedings. This cultivar has proven widely adapted to mountain sites in the West. Seed is available.

'Paiute' was selected by the USDA Forest Service, Intermountain Forest and Range Experimental Station, Utah Division of Wildlife Resources, and the Aberdeen Plant Materials Center, and was released in 1982. It is more drought tolerant than other strains. Seed will be available in spring 1985.

'Pomar' is a low-growing cultivar selected by the Aberdeen PMC for erosion control and for use as a cover crop in orchards. In mixtures, it is also adapted for roadbank stabilization in mountainous areas where a low-volume cover is desired. Seed is not available at this time.

Numerous other orchardgrass cultivars are commercially available, but they vary widely in adaptation and attributes. Substitutions for the

above varieties should be made only after consultation with qualified specialist.

Perennial ryegrass

Perennial ryegrass (Lolium perenne L.) is a nutritious, palatable, introduced bunchgrass that develops rapidly from seed. It has high nutrient requirements, and therefore usually is a short-lived component of erosion-control seed mixtures. It does best where winters are mild, but will perform adequately where they are severe. In the Intermountain West, perennial ryegrass is recommended for use as rapid cover only if mountain brome or slender wheatgrass are not available. Perennial ryegrass is preferred over annual ryegrass (L. p. var. multiflorum [Lam.] R. Parnell), which is very competitive and can be allelopathic to other plants in the seed mixture.

Numerous cultivars of perennial ryegrass are available, although no specific recommendations are made for the Intermountain area. Many are turf types, but several vigorous tetraploid varieties have been developed for short-rotation pasture or green chop. Tetraploid varieties are preferred for erosion control.

Sheep fescue. See "Hard fescue."

Slender wheatgrass

Slender wheatgrass (Agropyron trachycaulum [Link] Malte ex H.F. Lewis) is a short-lived native bunchgrass with good seedling vigor. It is a valuable component of erosion-control seed mixtures because it develops rapidly, is compatible with other species, and tolerates a wide range of site conditions. New selections are proving well adapted to high elevations but are a few years away from official release and commercial seed production.

'Revenue,' a Canadian variety originating from Saskatchewan, was selected for salinity tolerance, seed set, and forage yield. It is not well tested in the Intermountain West but probably can be used with success. Most slender wheatgrass planted is common seed harvested mainly from fields in the north-central United States. Check pure live seed and weed content, as well as source before buying.

Smooth brome

Smooth brome (Bromus inermis Leyss.) is a rapidly developing, sod-forming, introduced grass widely used for pasture, hay, silage, and erosion control. It rates high in palatability and nutritive value. Smooth brome is separated into northern and southern types. For mountain sites in the Intermountain West, northern or intermediate types should be used.

'Manchar' is the preferred and most commonly used variety of smooth brome for mountain sites. Developed by the Pullman PMC, the seed is readily available. It germinates rapidly, grows vigorously, produces large amounts of forage, and is compatible with alfalfa or hay. It can be used in erosion-control mixtures.

Tall fescue

Tall fescue (Festuca arundinacea Schreb.) is a tall, coarse, flat-bladed, introduced bunchgrass that has wide climatic and soil adaptation. It is widely used in pastures but also provides a tough, vigorous, competitive ground cover where desired. Tall fescue is less palatable than other pasture grasses, which may be grazed out of a stand if mixed with it. However, its value as a forage should not be overlooked.

'Alta' and 'Fawn' are standard cultivars that are well adapted to the Intermountain area. Both were developed in Oregon and are heavy, good quality forage producers, and excellent seed producers. Seed is readily available.

'Kenhy' is a hybrid of tall fescue and perennial ryegrass. It is more palatable than regular strains of tall fescue, but retains its wide adaptation, production, and resiliency. Seed is available.

Timothy

Timothy (Phleum pratense L.) is an introduced bunchgrass adapted to cool, humid areas. It does well on wet meadowland sites. Timothy hay is sold at premium prices for horse feed and is compatible with alfalfa. It also is used for ground cover on cut- or burned-over timberland and is not overly competitive with tree regeneration.

'Climax' and 'Drummond' timothy are Canadian cultivars that have been commonly used in the West. Private breeding efforts are resulting in new cultivars that may prove useful in the Intermountain area. 'Climax' is the most readily available cultivar.

DESCRIPTIONS OF THE MINOR SPECIES

Several other grasses could be used to revegetate mountain sites in the Intermountain West if seed were more readily available or if cultivars were developed and released for commercial production. For some of these grasses, the seed is available sporadically and in limited quantities, often from harvests of native stands.

Alpine timothy

Alpine timothy (Phleum alpinum L.) is a low-growing native bunchgrass in high mountain meadows and moist seeps. It shows promise for revegetation of disturbed sites in alpine and subalpine areas. Seed is occasionally available in very small quantities. Because little is known about this plant, local seed sources should be used.

Blue wildrye

Blue wildrye (Elymus glaucus Buckley) is a rapidly developing, short-lived native bunchgrass with attributes similar to those of mountain brome and slender wheatgrass. It is unusual in that test plantings show it to be compatible with tree regeneration. Blue wildrye is widespread throughout mountainous areas of the West and has many forms.

If seed happens to be available, use only local sources from within 300 miles (500 km) and 1,500 ft (500 m) elevation of the intended site. Selection work is under way to develop adapted cultivars.

Columbia needlegrass

Columbia needlegrass (*Stipa columbiana* JN. Macoum.) is a long-lived native bunchgrass in mountainous areas of the West, including subalpine areas. It is drought tolerant and can form good ground cover on dry, rocky, infertile sites. Seed is not available, but testing is under way to develop adapted cultivars. A similar species is Letterman needlegrass (*S. lettermanii* Vasey), which occurs at higher elevations and holds promise for erosion-control.

Green needlegrass (*Stipa viridula* Trin.) occurs mostly east of the Continental Divide. It is available commercially and could be considered for use in seed mixtures in the eastern portion of the Intermountain area. The adaptation information in tables 1 and 2 applies only to Columbia and Letterman needlegrass.

Prairie junegrass

Prairie junegrass (*Koeleria cristata* [L.] Pers. Nutt.) is a native bunchgrass on rocky slopes and in woodlands and open forests. It forms scattered stands and is seldom abundant. It is drought tolerant and is a useful component of ground-cover mixtures if seed is available. Prairie junegrass greens early and is readily grazed in spring. Commercial seed is not available.

Tall oatgrass

Tall oatgrass (*Arrhenatherum elatius* [L.] J. & K. Presl) is a rapidly developing, short-lived, introduced bunchgrass with uses similar to those of slender wheatgrass. 'Tualatin' is an old variety that once was commonly used for seeding logging roads, cut-over timberland, and other disturbed areas. Seed shattering, with resultant low seed yields, has been the major obstacle to greater acceptance. Very little commercial seed is available.

Tufted hairgrass

Tufted hairgrass (*Deschampsia cespitosa* [L.] Beauv.) is a native bunchgrass in wet meadows and along streambanks at high elevations. It has good potential for erosion control and streambank plantings at high elevations. Limited seed is available from native harvests, but selection work is under way to develop adapted cultivars.

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