Landscaping, Reclamation, Site Stabilization, and Ground Cover Grass Mixtures

To reestablish native plant communities on building sites, access corridors and small acreages there are several native 'cultivars' or 'pre-release varieties' available from commercial seed growers in Montana (see Montana Native Plant Society (MNPS) Native Plant Source List @Native Plants Landscaping (mtnativeplants.org)).

Several federal and state agencies make their own native grass mixture recommendations (e.g., US Forest Service, Bureau of Land Management, Montana Department of Environmental Quality and Montana Department of Transportation). These recommendations are specific to lands for which these agencies manage and administer. Some recommended species are not readily available or are limited in their adaptability to a wide variety of sites.

The following seed mixtures are recommended by the MNPS Landscaping and Revegetation Committee. When creating a site specific mixture the seeds/pound of each species should be considered, as there is a wide range of seed sizes in these recommended species (largest: mountain brome (*Bromus marginatus)* 80,000 seeds/lb to the smallest: Sandberg bluegrass (*Poa secunda)* 900,000 seeds/lb). Many recommended seed mixtures include slender wheatgrass. This species is a short-lived perennial that establishes quickly, often at the expense of other slower establishing long-lived perennials. It has been found that slender wheatgrass should be limited to 5% or less in complicated seed mixes (Bridger Plant Materials Center 2015).

Grasses are the basic component of most reclamation mixtures, however, wildflowers can and should be added to increase plant diversity and add aesthetics to the newly established native plant communities. Following the grass mixture recommendations are suggested commercially available wildflower species.

Prior to any native grass seeding the site must be properly prepared. All weeds and unwanted vegetation must be eradicated either mechanically or chemically. Sites with smooth brome (*Bromus inermis)*, crested wheatgrass (*Agropyron cristatum)* and/or quackgrass (*Elytrigia repens* aka *Agropyron repens)* must be cleaned up or your new planting is doomed for failure. Compacted soil, particularly around construction sites, must be addressed prior to planting.

It is recommended that all seed be purchased on a Pure Live Seed (PLS) basis. PLS takes into account the % purity and the % viability (germination rate) of the seed lot. In individual seed lots there may be inert matter (stems, chaff, leaves), and other crop and weed seed that reduce the purity of the desired crop. Germination, either by lab germination or tetrazolium (TZ) testing, is an indication of the % of viable seed in each lot of seed. Also, when calculating seed mixtures, each species amount must be calculated on a PLS basis.

Example: Purity=92% Germination=95%

PLS= .92 X .95 = .87 or 87%

Recommended seed amount 7 lbs/acre

7/.87= 8.05 Thus for a seeding rate of 7 lbs PLS you must use 8 lbs of bulk seed

All seed for sale in Montana is required to have a lab analysis (any state certified seed lab) which will include purity, germination and a list/amounts of weeds and other crops. No seed lot with more than 2% weed seed can be sold in Montana. Any lot with restricted noxious weeds (Canada thistle (*Cirsium arvense)*, bindweed (*Convolvulus arvensis)*, quackgrass, etc. can not legally be sold in Montana.

Landscaping & Ground Cover Seed Mixtures

Mountain

	Seeds/lb	%	lbs/acre
bluebunch wheatgrass (*Pseudoroegneria spicata* aka *Agropyron spicatum)* **Secar, Goldar**	139,000	30	5.0
Idaho fescue (*Fesctuca idahoensis*) **Joseph, Nezpurs**	450,000	25	1.0
big bluegrass (*Poa secunda/Poa ampla*) **Sherman**	882,000	15	0.5
or Nevada bluegrass (*Poa secunda/Poa nevadensis)* **Opportunity**			
mountain brome (*Bromus marginatus)* **Garnet, Bromar**	80,000	15	4.0
blue wildrye (*Elymus glaucus*) **Arlington, Elkton**	131,000	15	2.5
			13.0

Western Foothills sandy/coarse soils

bluebunch wheatgrass **Secar, Goldar**	139,000	25	4.0
Idaho fescue **Joseph, Nezpurs**	450,000	20	1.0
green needlegrass (*Nassella viridula* aka *Stipa viridula*) **Lodorm**	186,000	20	2.5
Indian ricegrass (*Achnatherum hymenoides* aka *Oryzopsis hymenoides*) **Rimrock**	235,000	15	1.5
Sandberg bluegrass (*Poa secunda*) **High Plains**	900,000	15	0.5
slender wheatgrass (*Elymus trachycaulus* aka *Agropyron trachycaulum*) **Pryor, Copperhead**	140,000	5	0.75
			10.25

Western Foothills clay/heavy soils

western wheatgrass (*Pascopyrum smithii aka Agropyron smithii*) **Rosana**	95,000	30	7.0
thickspike wheatgrass (*Elymus lanceolatus* aka *Agropyron dasystachyum)* **Critana**	145,000	30	4.5
green needlegrass **Lodorm**	186,000	25	3.0
Sandberg bluegrass **High Plains**	900,000	10	0.25
slender wheatgrass **Pryor, Copperhead**	140,000	5	0.75
			15.5

Landscaping & Ground Cover Seed Mixtures (cont'd)

Prairie/Grasslands

bluebunch wheatgrass **Secar, Goldar**	139,000	25	4.0
thickspike wheatgrass **Critana**	145,000	20	3.0
Indian ricegrass **Rimrock**	235,000	20	2.0
blue grama (*Bouteloua gracilis*) **Bad River, Birdseye**	825,000	15	0.5
needle & thread grass (*Hesperostipa comata* aka *Stipa comata*) **Sharptail**	115,000	15	2.5
slender wheatgrass **Pryor, Copperhead**	140,000	5	0.75
			12.75

Eastern Prairie/Grasslands

bluebunch wheatgrass **Secar, Goldar**	139,000	20	3.0
thickspike wheatgrass **Critana**	145,000	20	3.0
western wheatgrass **Rosana**	95,000	20	4.5
blue grama **Bad River, Birdseye**	825,000	15	0.5
Indian ricegrass **Rimrock**	235,000	10	1.0
sideoat grama (*Bouteloua curtipendula*) **Pierre, Killdeer**	191,000	10	1.0
slender wheatgrass **Pryor, Revenue**	140,000	5	0.75
			13.75

Lowlands/Riparian

western wheatgrass **Rosana**	95,000	40	9.0
green needlegrass **Lodorm**	186,000	30	3.5
basin wildrye (*Leymus cinereus* aka *Elymus cinereus*) **Trailhead, Washoe**	125,000	20	3.5
slender wheatgrass **Pryor, Copperhead**	140,000	10	1.5
			17.5

Scientific Name Changes Worth Noting:

	New	Old
bluebunch wheatgrass	*Pseudoroegneria spicata*	*Agropyron spicatum*
thickspike wheatgrass	*Elymus lanceolatus*	*Agropyron dasystachyum*
western wheatgrass	*Pascopyrum smithii*	*Agropyron smithii*
slender wheatgrass	*Elymus trachycaulus*	*Agropyron trachycaulum*
quackgrass	*Elytrigia repens*	*Agropyron repens*
basin widrye	*Leymus cinereus*	*Elymus cinereus*
Indian ricegrass	*Achnatherum hymenoides*	*Oryzopsis hymenoides*
green needlegrass	*Nassella viridula*	*Stipa viridula*
needle & thread grass	*Hesperostipa comata*	*Stipa comata*
slender white prairieclover	*Dalea candida*	*Petalostemon candidum*
Purple prairieclover	*Dalea purpurea*	*Petalostemon purpureum*

Warnings & Precautions:

+**Indian ricegrass** has a hard seedcoat (fused lemma and palea). It is recommended that it be 'dormant fall' seeded (after Oct 15) allowing Mother Nature to do the stratification.

+**Needle & thread grass** has a sharp callus on the end of the seed which can be hazardous to pets and other farm animals. It is recommended to substitute western wheatgrass if this is a potential problem.

+**Slender wheatgrass** should not be used as a cover-crop, especially on irrigated or sub-irrigated sites. It is just too competitive with slower establishing perennial natives. Limit this species to less than 5% of any mixture.

+**Common yarrow** can have up to 5,000,000 seeds/lb: including 1 ounce/acre in a seed mix will be seeding 7 seeds/ft^2.

Yarrow is quite aggressive given the right conditions. Use with caution and use less than 1 oz/acre.

+Both **Phacelia and Penstemon** have a very hard seedcoat. Dormant Fall seeding is strongly advised.

Commercially Available Native Wildflower Seed

Released by USDA-NRCS Plant Material Centers

	Seeds/lb
'Appar' 'Maple Grove' Lewis blue flax (*Linum lewisii) (ID)*	**295,000**
'Bismarck' purple coneflower (*Echinacea angustifolia) (ND)*	**135,000**
'Stillwater' prairie coneflower (*Ratibida columnifera) (MT)*	**500,000**
'Meriwether' blanketflower (*Gaillardia aristata) (MT)*	**132,000**
'Medicine Creek' Maximilian sunflower (*Helianthus maximiliani) (ND)*	***150,000***
'Bismarck' purple prairieclover (*Dalea purpurea)* (ND)	**290,000**
'Antelope' slender white prairieclover (*Dalea candida) (MT)*	**354,000**
'Old Works' fuzzytongue penstemon (*Penstemon eriantherus) (MT)*	***358,000***
'Great Northern' western yarrow (*Achillea millefolium) (MT)*	***2,850,000***
'Stucky Ridge' silver leaf phacelia (*Phacelia hastata) (MT)*	***153,000***
'Richfield' firecracker penstemon (*Penstemon eatonii) (ID)*	***315,000***
'Clearwater' venus penstemon (*Penstemon venustus) (ID)*	***1,090,00***
'Cedar' Palmer penstemon (*Penstemon palmerii) (ID)*	***507,000***
'Bandera' Rocky Mtn penstemon (*Penstemon strictus) (NM)*	***490,000***
'Bismarck' stiff sunflower (*Helianthus pauciflorus) (ND)*	***64,000***

Native Wildflowers Released by USDA-NRCS Plant Materials Centers—Seed Commercially Available

Linum lewisii (ID)

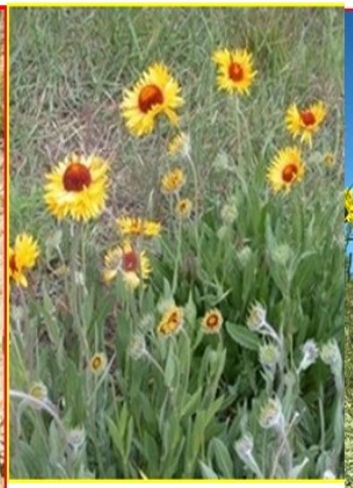
'Appar' Lewis blue flax

Echinacea angustifolia (ND)

'Bismarck' purple coneflower

Ratibida columnifera (MT)

'Stillwater' prairie coneflower



Gaillardia aristata (MT)

'Meriwether' blanketflower

Helianthus maximiliani (ND)

'Medicine Creek'

Maximillian sunflower

Dalea purpurea (ND)

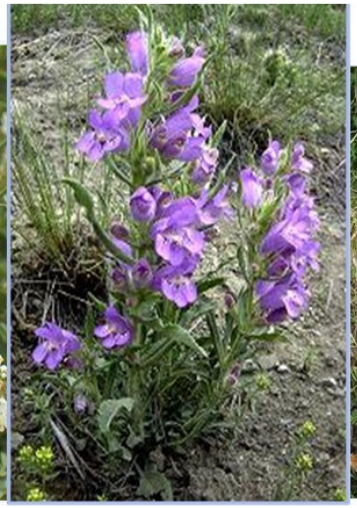
'Bismarck' purple

prairieclover

Dalea candida (MT)

'Antelope' slender white

prairieclover



Penstemon eriantherus (MT)

'Old Works' fuzzytongue

penstemon

Achillea millefolium (MT)

'Great Northern'

western yarrow

Phacelia hastata (MT)

'Stucky Ridge'

silver leaf phacelia

Seed Certification

Both in the United States and Canada commercially grown or wildland collected seed can be 'certified' to guarantee species identity, origin, purity, and quality. Standards for each plant species are established and administered by the Association of Official Seed Certifying Agencies (AOSCA) and seed testing is standardized and regulated by the Association of Official Seed Analysts (AOSA).

Plants can be released to the public in the following ways:

Cultivar (culti-vated **var-**iety**):** This type of release involves the testing of plant material at multiple sites, over multiple years and for 2 or more generations to ensure that they maintain their distinguishing morphological or physiological features form one generation to the next. They can be released as a *Natural* strain (no genetic manipulation of original germplasm) or *Manipulated* strain (purposeful genetic manipulation, ie., multiple crosses, recurrent selection, selection of superior traits). Once released cultivars have four levels or categories of seed or propagules (in the case of vegetative releases).

Breeders- Seed or propagules that are directly controlled by the releasing organization and are to be used for the production of Foundation seed stock or vegetative propagules only.

Foundation- This is the progeny of breeder or foundation seed, so handled to maintain the genetic integrity and identity of the cultivar germplasm. Foundation seed is provided to commercial growers for the establishment of Registered or Certified fields. Foundation fields are inspected and supervised by each respective State Foundation Seed Program.

Registered- The progeny of Breeders or Foundation seed which is handled to maintain genetic integrity and identity of the cultivar. Because of genetic instability of some natural and manipulated strains, the Registered class may not be allowed, thus limiting generations beyond the original germplasm.

Certified- The progeny of Foundation or Registered seed which is so handled to maintain satisfactory genetic integrity and purity and is eligible for sale to customers, but not for planting for recertification.

Foundation, Registered and Certified fields are inspected the establishment year and in all subsequent production years just prior to harvest. To meet certification standard the field must meet field history standards (no same species or contaminant species in previous 3 years), have proof of being seeded with Foundation or Registered seed stock and be isolated from fields or natural stands of the same species. Foundation, Registered and Certified seed also must meet species specific standards for germination, purity, other crops and off-types, and weed seed.

Pre-Varietal germplasm: To meet the increasing demand for site-specific germplasm and to shorten the testing and development stages of a release, a new release mechanism has been established nationwide. The Pre-Varietal release mechanism allows for the release and certification of germplasm, but with less confidence in the range of adaptation, genetic stability, and hardiness. The generations beyond the original germplasm are expressed as G_1, G_2, G_3, etc. rather than Foundation, Registered and Certified. Releases vary by the extent of testing and are certifiable by Seed Certification Agencies.

Source Identified- Seed or plants from a native population occupying a specific geographical area. Seed for commercial sale can be directly collected from the native stand or reestablished under cultivated conditions. The certifying agency will document location, elevation, associated species, and verify species identification. Certification will Assure the buyer that it is the species as stated, approximate origin, and whether the seed meets species specific germination and purity standards. Certified seed is available for sale the year of harvest or two years after establishment of a production field.

Selected- Seed or plants that have been through some testing and exhibit some desirable superior traits when compared with other accessions of the same species at a common site. The field performance has not been fully tested at multiple sites and there is no proof that desirable characteristics will be expressed in subsequent generations. Certified seed can be available in 4-6 years following initial collection.

Tested- Seed or plants that have been through additional testing at more than one site and for more than one generation to document heritability of desirable traits. The plant material has proven genetic superiority or possesses distinctive traits for which heritability is stable. The extent of the 'area of adaptation' may not be known. Certified seed can be available in 7-9 years following initial collection.

Pre-varietal germplasm release material is usually given a descriptive name related to the original source of collection, identifies the level of testing and must be accompanied by the word 'germplasm'. For example: High Plains Selected Class Germplasm Sandberg bluegrass.