

PM TECHNICAL NOTE

USDA - NRCS Casper, WY

WY PLANT MATERIALS NO. 3

NOVEMBER 2010

Perennial Vegetation Establishment Guide, Species, Cultivars, and Seeding Rates

Vegetative species seeding rates and dates for dryland and irrigated seedings for conservation cover, critical area plantings, pasture and hayland seedings, rangeland seedings or conservation buffers.

After the soils map and soil map units have been determined, adapted species can be found under the Forage Suitability Groups in Section II of the electronic Field Office Technical Guide at http://efotg.nrcs.usda.gov/efotg_locator.aspx?map=WY. Ecological Site Descriptions can be found here or from the Web Soil Survey soil data explorer "Ecological Site Assessment" <http://websoilsurvey.nrcs.usda.gov>.

1. Seedbed Preparation – Detailed in WY Plant Material Technical Notes 14, 15

A seedbed will be prepared that is free of competing vegetation and is not subject to excessive erosion. A firm seedbed will be provided so the seed is placed at the designed depth. The seedbed should be firm enough so that the boot heel of and average adult penetrates the soil to a depth of approximately one-half inch.

The presence or absence of weed populations, especially noxious weeds and/or annual brome, will impact seedbed preparation. Each field should be evaluated for weed pressure and those with significant weed populations will be delayed until weeds are controlled. This may mean the use of a cover crop. **The most frequent cause of seeding failure and slow establishment is poor weed control.**

When planning a seeding, the previous two to three years herbicide application should be considered. Any potential carryover problems should be addressed by delaying seeding, establishing a cover crop.

2. Seeding Dates

Seeding dates are based on climatic records, research, experience, and represent optimum periods for grass, forb/legume, or and/or shrub establishment. They vary from north to south and east to west with variation in soil temperatures and moisture conditions. Figure 1 details precipitation zones by Wyoming locations. Table 1 lists each dryland seeding date recommended by precipitation zone. Table 3 details irrigated pasture and hayland seeding dates recommended for each area of Wyoming.

Dormant seedings should be done after mid November or when the soil temperature at two inches of the soil surface is 40 degrees for ten consecutive days.

3. Seeding Rates

Attached are the seeding rates by species if the planting will be drilled. If the seeding is to be completed by broadcast methods or hydroseeding, seeding rates must be doubled. However, if the seeding will be harrowed and packed after broadcasting, the standard drilled seeding rate may be used. If the seeding is for a critical area planting (that will not be drilled), the doubled seeding rate for broadcast will again be doubled, which is four times the seeding rate in the attached spreadsheet. (Use WY-ECS-25 Seeding-Planting Plan spreadsheet to calculate seeding mixes).

4. Companion, Nurse, or Cover Crop

A companion crop is an annual that is planted with the perennial species. This crop provides a micro-environment of protection to nurse the new seedlings. However, most times the seeding rate used is calculated to also provide a forage crop for that year of establishment. At this rate the companion crop will out – compete the new seedlings for soil moisture and sunlight. For this reason, companion or nurse crops are generally discouraged. If you do use a companion crop for a dryland seeding, a small grain seeding rate of 10-15# should not be exceeded. Companion crops are less damaging under irrigated conditions if they are seeded at light rates (less than half of the normal small grain seeding rate).

A cover crop is an annual residue-producing crop, planted during the growing season before seeding the perennial vegetation. The purpose to provide cover and residue to reduce weed competition, trap snow, and provide soil protection from wind and water erosion. A cover crop is terminated at a six-inch height by mowing, spraying, or frost. The standing residue of a cover crop provides an excellent micro-environment for the new seedlings without compromising the seedling's growth. Wheat or rye is never recommended as it may provide an allelopathic (toxic) environment for new seedlings. Oats exhibits the least amount of allelopathic effect of the small grains. Warm season species can work very effectively to break annual brome competition. For warm season adapted areas; sudangrass, sorghum, or millet may be used as a cover crop instead of small grains. In extreme cases of soil erosion, slender wheatgrass (#1 PLS) may be used in a pasture/range seeding 11/15-5/15.

Cover Crops – Do not exceed recommended seeding rates and dates

Barley/S. Wheat	36 lbs./ac	April 1 – July 1	Aug. 15 – Sept 1
Oats	24 lbs./ac	April 15 – June 1	Aug. 15 – Sept 1
Winter Triticale/W. Wheat	45 lbs./ac	Aug. 15 – Sept 15	
Sorghum/Sudangrass	8 lbs./ac	May 15 – July 15	
Millet	10 lbs./ac	May 15 – July 15	
Austrian Peas	100 lbs/ac	Mar. 15 – June 1	

5. Seeding on fields with significant weed populations will be delayed until weeds are controlled. Weeds such as cheatgrass or noxious weeds must be controlled prior to planting. Plantings shall be evaluated for weed pressure prior to planting and during the growing season. A history on the previous two years of herbicide applications should be considered for any potential carryover problems. Delay the seeding, establish a cover crop and/or changing species are alternatives for herbicide carryover. (Legumes and forbs are especially vulnerable to herbicide carryover.)

TABLE 1

SPECIES	ORIGIN	SEEDS/LB ¹	SEEDS/SQ FT @ 1#PLS/AC	LBS/ACRE ² FOR FULL SEEDING	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVAR (COMMENTS)
Grasses							
alkali sacaton	N	1,758,000	40.36	1.0	W/D/NP	common	
bluegrass, big	N	882,000	20.25	2.0	W/D/NP	Sherman	
bluegrass, Canada	I	1,600,000	36.73	2.0	C/I/NP	Foothills, Reubens,	Foothills
bluegrass, Canby	N	900,000	20.66	1.0	C/D/NP	Canbar	
bluegrass, Kentucky	I	2,156,000	49.49	3.0	C/I/NP	common	
bluegrass, Sandberg	N	900,000	20.66	2.0	C/D/NP	High Plains	
bluestem, big	N	130,000	2.98	6.0	W/D/S	Bison, Bonilla, Champ,	Sunnyview
bluestem, little	N	260,000	5.97	4.0	W/D/S	Badlands, Blaze,	Badlands
bluestem, sand	N	113,000	2.59	8.0	W/D/S	Garden, Goldstrike	
bromegrass, smooth	I	125,000	2.87	5.0	C/I or D/NP	Lincoln, Manchar,	
bromegrass, meadow	I	93,000	2.13	10.0	C/I or D/NP	Fleet, MacBeth,	
bromegrass, mountain	N	80,000	1.84	10.0	C/I or D/NP	Bromar, Garnet	Garnet
buffalograss (bur)	N	48,000	1.1	10.0	W/D/NP	Bison, Plains, Tatanka,	Tatanka
fescue, hard	I	565,000	12.97	3.0	C/D/NP	Durar, Serra	Durar
fescue, Idaho	N	450,000	10.33	3.0	C/D/NP	Joseph, NezPurs,	Nezpurs
fescue, sheep	N	680,000	15.61	3.0	C/D/NP	Big Horn, Covar	Covar
fescue, spike	N	200,000	4.59	4.0	C/D/NP	common	
fescue, tall	I	242,000	5.56	4.0	C/I or D/NP	Alta, Kenmont, Fawn	
foxtail, creeping	I	720,000	16.53	3.0	C/I/NP	Garrison, Retain	Garrison
foxtail, meadow	I	500,000	11.48	4.0	C/I/NP	common	
galleta	N	159,000	3.65	4.0	W/D/NP	Viva	
grama, blue	N	825,000	18.94	2.0	W/D/S	Alma, Bad River,	Bad River
grama, sideoats	N	191,000	4.38	4.5	W/D/S	Butte, Pierre, Trailways,	Killdeer
hairgrass, tufted	N	2,500,000	57.39	1.5	C/D/NP	Peru Creek	
Indiangrass	N	170,000	3.9	5.0	W/D/NP	Tomahawk	
Indian ricegrass	N	235,000	5.39	6.0	C/D/F	Nezpar, Paloma,	Rimrock

¹ Seeds per linear foot calculations:

$$\frac{\text{Seed/Lb} \times \text{Bulk Seeding Rate}}{43,560} \times \frac{\text{Row Spacing (In.)}}{12 \text{ In.}} = \text{Seeds/Linear Foot}$$

² All seeding rates are shown for 12" spacing. For row spacing wider than 12", calculate seeding rates by:

$$(\text{Lb. PLS/Ac}) \times (12'' \text{ divided by actual row spacing}) = \text{Actual Lb. PLS/Ac}$$

³ C = Cool Season, W = Warm Season, I = Irrigated, D = Dryland, S = Spring Preferred Seeding, F = Fall Preferred Seeding, NP = no seasonal seeding preference. In general, spring seedings are preferred in Wyoming, particularly on dryland sites.

SPECIES	ORIGIN	SEEDS/LB ⁴	SEEDS/SQ FT @ 1#PLS/AC	LBS/ACRE ⁵ FOR FULL SEEDING	COOL/WARM ⁶ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVAR (COMMENTS)
Grasses cont'd							
needleandthread	N	115,000	2.64	6	C/D/NP	Common	
needlegrass, green	N	186,000	4.27	6	C/D/F	Lodorm	
nuttall alkaligrass	N	2,108,000	48.39	1.0	C/I/NP	common	
orchard grass	I	464,000	10.65	3.0	C/I or D/NP	Paiute	
orchard grass	I	464,000	10.65	3.0	C/I/NP	Chinook, Latar, Potomac	
prairie cordgrass	N	183,000	4.2	5.0	W/D/NP	Red River	
prairie junegrass	N	2,315,000	53.15	1.0	C/D/NP	common	
prairie sandreed	N	273,000	6.27	4.0	W/D/S	Goshen, Pronghorn	Goshen
reed canarygrass	N	602,000	13.82	4.0	C/I/NP	common	
ryegrass, perennial	I	247,000	5.67	4.0	C/I or D/NP	Friend, Linn	
sand dropseed	N	5,680,000	130.39	1.0	W/D/NP	common	
squirreltail,	N	192,000	4.41	5.0	C/D/NP	<14" Sand Hollow or	
switchgrass	N	389,000	8.93	2.5	W/I/S	Dacotah, Forestburg,	Sunburst
timothy	I	1,300,000	29.84	2.0	C/I/NP	Climax, Drummond,	
wildrye, Altai	I	80,000	1.84	12.0	C/D/NP	Ejay, Pearl, Prairieland	
wildrye, basin	N	125,000	2.87	6.0	C/D/NP	Magnar, Trailhead	Trailhead
wildrye, beardless	I	181,000	4.16	6.0	C/D/F	Shoshone	
wildrye, Canada	N	115,000	2.64	6.0	C/D/NP	Mandan	
wildrye, Mammoth	I	47,000	1.08	15	C/DNP	Volga	
wildrye, Russian ⁷	I	170,000	3.9	6.0	C/I or D/NP	Bozoisky Select,	Bozoisky Select
Wheatgrasses							
beardless	N	109,000	2.5	7.0	C/D/NP	Whitmar	
bluebunch	N	139,000	3.19	7.0	C/D/F	Secar, Goldar	Goldar
crested, fairway	I	200,000	4.59	4.0	C/D/NP	Ephraim, Fairway,	
intermediate	I	79,000	1.81	10.0	C/I or D/NP	Amur, Greenar, Oahe,	
pubescent	I	80,000	1.84	10.0	C/I or D/NP	Luna, Maska	Maska
siberian	I	163,000	3.74	6.0	C/D/NP	P-27, Vavilov	
slender	N	140,000	3.21	6.0	C/D/NP	Pryor, Revenue, San Luis	Pryor
standard crested	I	188,000	4.32	5.0	C/D/NP	Douglas, Nordan,	

⁴ Seeds per linear foot calculations:

$$\frac{\text{Seed/Lb} \times \text{Bulk Seeding Rate} \times \text{Row Spacing (In.)}}{43,560 \times 12 \text{ In.}} = \text{Seeds/Linear Foot}$$

⁵ All seeding rates are shown for 12" spacing. For row spacing wider than 12", calculate seeding rates by:

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⁶ C = Cool Season, W = Warm Season, I = Irrigated, D = Dryland, S = Spring Preferred Seeding, F = Fall Preferred Seeding, NP = no seasonal seeding preference. In general, spring seedings are preferred in Wyoming, particularly on dryland sites.

⁷ Minimum row spacing (width) is 18 inches.

SPECIES	ORIGIN	SEEDS/LB ⁸	SEEDS/SQ FT @ 1#PLS/AC	LBS/ACRE ⁹ FOR FULL SEEDING	COOL/WARM ¹⁰ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVAR (COMMENTS)
<i>Wheatgrasses cont'd</i>							
standard x fairway	I	175,000	4.02	5.0	C/D/NP	Hycrest, CDII	Hycrest
streambank	N	152,000	3.49	6.0	C/D/NP	Sodar	
tall	I	79,000	1.81	10	C/D/NP	Alkar, Jose, Largo, Orbit	Jose
thickspike	N	145,000	3.33	6.0	C/D/NP	Bannock, Critana,	Critana
western	N	93,000	2.13	6.0	C/D/NP	Ariba, Rodan, Rosana ¹¹	Rosana
<i>Introduced Forbs/Legumes</i>							
alfalfa ^{12&7}	I	225,000	51.7	10.0	N/A/I	see footnote #6 & 7	
Alfalfa ⁶	I	225,000	5.17	5.0	D/NP	see footnote #6	
alsike clover	I	700,000	16.07	3.0	N/A/ I or D/NP	common	
birdsfoot trefoil	I	418,000	9.6	5.0	N/A/ I or D/NP	Empire, Leo	
white clover (ladino)	I	800,000	18.37	3.0	N/A/ I or D/NP	common	
milkvetch, cicer	I	134,000	3.08	7.0	N/A/ I or D/NP	Lutana, Monarch,	
red clover	I	272,160	6.25	4.0	N/A/ I or D/NP	common	
sainfoin	I	18,500	0.42	34.0	N/A/ I or D/NP	Eski, Melrose	
small burnet	I	42,243	0.97	20	N/A/D/NP	Delar	
strawberry clover	I	300,000	6.89	3.0	N/A/I or D/NP	common	
sweetclover, white	I	262,000	6.01	4.0	N/A/ I or D/NP	common	
sweetclover, yellow	I	258,000	5.92	4.0	N/A/ I or D/NP	common	
<i>Native Forbs/Legumes</i>							
Globe Mallow	N	500,000	11.48	2	N/A/D/NP	common	
Indian Blanket Flower	N	157,000	3.6	7	N/A/D/NP	common	
Lewis flax	N	286,690	6.58	3	N/A/D/NP	Appar	
Maximilian sunflower	N	250,000	5.74	.1	W/D/NP	Prairie Gold, Medicine Creek	Medicine Creek
prairie coneflower	N	737,000	16.92	1.2	N/A/D/NP	common	
purple prairieclover	N	275,000	6.31	3	N/A/D/NP	Kaneb, Bismarck	Bismarck
Rocky Mtn. Penstemon	N	478,000	10.97	1.5	N/A/D/F	Bandera	

⁸ Seeds per linear foot calculations:

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¹¹ Ariba is acceptable in the southern half of Wyoming. Barton is only acceptable in MLRA 67.

¹² Alfalfa should have a fall dormancy rating of three (3) or less. See the latest Certified Alfalfa Seed Council Fall Dormancy and Pest Resistance ratings.

⁷ Alfalfa production for dairies will have higher rates.

SPECIES	ORIGIN	SEEDS/LB ¹³	SEEDS/SQ FT @ 1#PLS/AC	LBS/ACRE ¹⁴ FOR FULL SEEDING	COOI/WARM ¹⁵ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVAR (COMMENTS)
<i>Native Forbs cont'd</i>							
dotted gayfeather	N	136,000	3.12	6.4	N/A/D/NP	common	
white prairieclover	N	278,000	6.38	3	N/A/D/NP	Antelope	
Yarrow	N	4,500,000	103.31	0.5	N/A/D/NP	common	
<i>Shrubs/Trees</i>							
American plum	N	870	0.02	20	N/A	common	
antelope bitterbrush	N	15,400	0.35	1.0-2.0	N/A	common	
big sagebrush	N	2.4-3.2 x 10 ⁶		1	N/A	common	
black cottonwood	N	NI		N/A	N/A	common	
black hawthorn	N	22,600	0.52	0.5-1.0	N/A	common	
box elder	N	13,400	0.31	0.25-0.5	N/A	common	
bur oak	N	75	0.0	25	N/A	common	
chokecherry	N	4,790	0.11	1.0-2.0	N/A	common	
common juniper	N	36,500	0.84	<1.0	N/A	common	
common snowberry	N	76,000	1.74	1.0-3.0	N/A	common	
cudweed sagewort ¹⁶	N	3.0-4.5 x 10 ⁶		<0.25	N/A	Summit	
curlleaf mt. mahogany	N	51,900	1.19	1	N/A	common	
forage kochia	I	400,000	9.18	2	N/A	Emigrant	
fourwing saltbush	N	49,000/24,500 ¹⁷		5/10	NA	Wytana	
Gardner's saltbush	N	111,500	2.56	0.5	N/A	common	
green ash	N	17,260	0.4	<0.25	N/A	common	
green rabbitbrush	N	782,000	17.95	<0.5	N/A	common	
green sagewort	N	4.5-4.7 x 10 ⁶		<0.5	N/A	common	
horizontal juniper	N	29,500	0.68	<1.0	N/A	common	
narrowleaf cottonwood	N	NI		NI	N/A	common	
Ponderosa pine	N	12,595	0.29	N/A	NA	Hunter Select	
Plains cottonwood	N	350-447,000		N/A	N/A	common	
redosier dogwood	N	18,500	0.42	1	N/A	common	
Rocky Mountain juniper	N	27,100	0.62	<1.0	N/A	Bridger Select	

¹³ Seeds per linear foot calculations:

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¹⁶ Also known as Louisiana sagewort.

¹⁷ Dewinged/winged

<i>Shrubs/Trees cont'd</i>							
rubber rabbitbrush	N	693,000	15.91	<1.0	N/A	common	
Serviceberry	N	82,000	1.88	0.5-1.0	N/A	common	
shrubby cinquefoil	N	>1,000,000		<1.0	N/A	common	
Silverberry	N	3,800	0.09	1.0-2.0	N/A	common	
skunkbush sumac	N	20,300	0.47	1.0-2.0	N/A	Big Horn	
western snowberry	N	74,400	1.71	1.0-3.0	N/A	common	
Willow	N	2-3 x 10 ⁶		N/A	N/A	common	
Winterfat	N	111-210,000		<1.0	N/A	Open Range	
Wood's rose	N	50,000	1.15	0.5-1.0	N/A	common	
Yucca	N	25,000	0.57	<1.0	N/A	common	

TABLE 2

DRYLAND SEEDING DATES BY PRECIPITATION ZONE

ZONE	PRECIPITATION	SEEDING DATE
1	20"+	Anytime except 8/20 to 9/20
2	15 – 19"	Anytime except 8/20 to 9/20
3	10 – 14"	9/20 to 5/20
4	7 – 9"	9/20 to 5/1
5	5 – 9"	10/15 to 4/15
6	15 – 19"	8/20 to 9/20
7	10 – 14"	10/1 to 5/15
8	5 – 9"	10/15 to 4/15
9	10 – 14"	10/1 to 5/15
10	15 – 19"	Anytime except 8/20 to 9/20
11	12 – 14"	10/25 to 5/1
12	15 – 17"	10/15 to 5/10
13	15 – 19"	10/25 to 5/20
14	10 – 14"	10/25 to 5/20
15	15 – 17"	10/25 to 5/20
16	15 – 19"	10/15 TO 5/25
17	20 – 24"	Anytime except 8/20 to 9/20

TABLE 3

IRRIGATED PASTURE AND HAYLAND SEEDING DATES

Location	Anytime Except:
Afton	August 1 to September 20
Baggs	August 1 to September 20
Buffalo	August 5 to October 25
Casper	August 5 to October 1
Cheyenne	August 15 to October 15
Cody	August 5 to October 15
Cokeville	August 1 to September 20
Douglas	August 5 to October 25
Dubois	August 5 to October 1
Farson	August 1 to September 20
Gillette	August 10 to October 25
Greybull	August 10 to October 15
Jackson	August 1 to September 20
Kaycee	August 1 to October 25
Lander	August 15 to October 1
Laramie	August 1 to September 20
Lovell	August 10 to October 15
Lusk	August 5 to October 15
Lyman	August 1 to September 20
Medicine Bow	August 1 to October 1
Newcastle	August 15 to October 25
Pinedale	August 1 to September 20
Powell	August 10 to October 15
Riverton	August 15 to October 15
Saratoga	August 1 to September 20
Sheridan	August 10 to October 25
Sundance	August 5 to October 15
Thermopolis	August 10 to October 15
Torrington	June 1 to Aug 10 & Sep 1 to Oct 25
Wheatland	June 1 to Aug 10 & Sep 1 to Oct 25
Worland	August 10 to October 25

Data from Wyoming Climate Atlas by Brooks (in cooperation with Wyoming Water Resources Center, University of Wyoming). Approximately 6 weeks prior to fall 32-degree F mean.