

SEEDING RATE SPECIFICATIONS AND RECOMMENDED CULTIVARS AND GERMPLASM FOR ALL VEGETATIVE PRACTICES IN THE MONTANA FOTG. ALL SEEDING RATES ARE FOR PURE STANDS OF INDIVIDUAL SPECIES. WHEN SEEDING MIXTURES, USE A PERCENTAGE OF THE SEEDING RATE FOR EACH SPECIES IN THE MIXTURE

SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ¹²	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVARS
Grasses						
alkali sacaton	N	1,758,000	1.0	W/D/NP	COMMON	
bluegrass, big	N	882,000	2.0	W/D/NP	Sherman	
bluegrass, Canada	I	1,600,000	2.0	C/I/NP	Foothills, Reubens, Talon	Foothills
bluegrass, Canby	N	900,000	1.0	C/D/NP	Canbar	
bluegrass, Kentucky	N	2,156,000	3.0	C/I/NP	COMMON	
bluegrass, Sandberg	N	900,000	2.0	C/D/NP	High Plains	
bluestem, big	N	130,000	6.0	W/D/S	Bison, Bonilla, Champ, Sunnyview	Sunnyview
bluestem, little	N	260,000	4.0	W/D/S	Badlands, Blaze, Camper,	Badlands
bluestem, sand	N	113,000	8.0	W/D/S	Garden, Goldstrike	
bromegrass, smooth	I	125,000	5.0	C/I or D/NP	Lincoln, Manchar, Rebound	
bromegrass, meadow	I	93,000	10.0	C/I or D/NP	Fleet, MacBeth, Montana, Regar, Paddock	
bromegrass, mountain	N	80,000	10.0	C/I or D/NP	Bromar, Garnet	Garnet
buffalograss (bur)	N	48,000	10.0	W/D/NP	Bison, Plains, Tatanka, Cody, Bismarck (veg)	Tatanka
fescue, hard	N	565,000	3.0	C/D/NP	Durar, Serra	Durar
fescue, Idaho	N	450,000	3.0	C/D/NP	Joseph, NezPurs, Winchester	Nezpurs
fescue, sheep	N	680,000	3.0	C/D/NP	Big Horn, Covar	Covar
fescue, spike	N	200,000	4.0	C/D/NP	COMMON	
fescue, tall	I	242,000	4.0	C/I or D/NP	Alta, Kenmont, Fawn, Forager	Forager (endophyte free)
foxtail, creeping	I	720,000	3.0	C/I/NP	Garrison, Retain	Garrison
foxtail, meadow	I	500,000	4.0	C/I/NP	COMMON	
grama, blue	N	825,000	2.0	W/D/S	Alma, Bad River, Birdseye, Willis	Bad River
grama, sideoats	N	191,000	4.5	W/D/S	Butte, Pierre, Trailways, Killdeer	Pierre, Killdeer
hairgrass, tufted	N	2,500,000	1.5	C/D/NP	Peru Creek	
Indiangrass	N	170,000	5.0	W/D/NP	Tomahawk	
Indian ricegrass	N	235,000	6.0	C/D/F	Nezpar, Paloma, Rimrock	Rimrock

¹ See Page 6 for calculations and formulas for Pure Live Seed (PLS), pounds per acre and respective seeds per row foot in 12-inch or less row spacing.

² See Page 6 for calculations and formulas for pounds per acre and respective seeds per row foot in 12-inch or greater row spacing.

³ C = Cool Season, W = Warm Season, I = Irrigated, D = Dryland, S = Spring Preferred Seeding, F = Fall Preferred Seeding, NP = No Seasonal Seeding Preference.

SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ¹²	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVARS
Grasses CONTINUED						
needleandthread	N	115,000	6	C/D/NP	COMMON	
needlegrass, green	N	186,000	5	C/D/F	Lodorm	
nuttall alkaligrass	N	2,108,000	1.0	C/I/NP	COMMON	
orchard grass	I	464,000	3.0	C/I/NP	Chinook, Latar, Potomac, Paiute	
prairie cordgrass	N	183,000	5.0	W/D/NP	Red River	
prairie junegrass	N	2,315,000	1.0	C/D/NP	COMMON	
prairie sandreed	N	273,000	4.0	W/D/S	Goshen, Pronghorn	Goshen
reed canarygrass	N	602,000	4.0	C/I/NP	COMMON	
ryegrass, perennial	I	247,000	4.0	C/I or D/NP	Friend, Linn	
sand dropseed	N	5,680,000	1.0	W/D/NP	COMMON	
squirreltail, bottlebrush	N	192,000	5.0	C/D/NP	Sand Hollow	
switchgrass	N	389,000	3	W/I/S	Dacotah, Forestburg, Sunburst	Sunburst
timothy	I	1,300,000	2.0	C/I/NP	Climax, Drummond, Engmo	
wildrye, Altai	I	80,000	12.0	C/D/NP	Ejay, Pearl, Prairieland	
wildrye, basin	N	125,000	6.0	C/D/NP	Magnar, Trailhead, Washoe	Trailhead
wildrye, beardless	I	181,000	6.0	C/D/F	Shoshone	
wildrye, Canada	N	115,000	7.0	C/D/NP	Mandan	
Wildrye, Dahurian	I	72,600	12.0	C/D/NP	James, Arthur	
wildrye, Mammoth	I	47,000	15.0	C/DNP	Volga	
wildrye, Russian ⁴	I	170,000	5.0	C/I or D/NP	Bozoisky-Select, Mankota, Swift, Vinall, Bozoisky II	Bozoisky-Select
Wheatgrasses						
beardless	N	109,000	6.0	C/D/NP	Whitmar	
bluebunch	N	139,000	6.0	C/D/NP	Secar, Goldar, P7	Goldar
crested, fairway	I	200,000	4.0	C/D/NP	Ephraim, Fairway, Parkway, Roadcrest, Ruff	
hybrid (quack x bluebu)	I	134,000	8.0	C/I or D/NP	Newhy	
intermediate	I	79,000	10.0	C/I or D/NP	Amur, Greenar, Oahe, Rush, Reliant	Rush
pubescent	I	80,000	10.0	C/I or D/NP	Luna, Manska, Greenleaf	Manska
Siberian	I	163,000	5.0	C/D/NP	P-27, Vavilov	
slender	N	140,000	6.0	C/D/NP	Pryor, Revenue, San Luis	Pryor
standard crested	I	188,000	5.0	C/D/NP	Douglas, Nordan, Summit	
standard x fairway	I	175,000	5.0	C/D/NP	Hycrest, CDII, Hycrest II	Hycrest
streambank	N	152,000	5.0	C/D/NP	Sodar	
tall	I	79,000	10	C/D/NP	Alkar, Jose, Largo, Orbit	Jose
thickspike	N	145,000	6.0	C/D/NP	Bannock, Critana	Critana
western	N	93,000	8.0	C/D/NP	Rodan, Rosana	Rosana

⁴ Minimum row spacing (width) is 18 inches.

SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ¹²	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS
Introduced Legumes					
alfalfa ⁵	I	225,000	5.0	N/A ¹⁰ /I or D/NP	SEE FOOTNOTE #5
alsike clover	I	700,000	3.0	N/A/ I or D/NP	COMMON
birdsfoot trefoil	I	418,000	3.0	N/A/ I or D/NP	Empire, Leo
white clover (ladino)	I	800,000	4.0	N/A/ I or D/NP	COMMON
milkvetch, cicer	I	134,000	7.0	N/A/ I or D/NP	Lutana, Monarch, Windsor
red clover	I	272,160	4.0	N/A/ I or D/NP	COMMON
small burnet	I	42,243	20	N/A/D/NP	Delar
sainfoin	I	18,500	34.0	N/A/ I or D/NP	Eski, Melrose, Remont, Shoshone
strawberry clover	I	300,000	3.0	N/A/I or D/NP	COMMON
sweetclover, white	I	262,000	4.0	N/A/ I or D/NP	COMMON
sweetclover, yellow	I	258,000	4.0	N/A/ I or D/NP	COMMON

⁵ 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.

SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ^{8,9,12}	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS	PREFERRED CULTIVARS
Native Forbs and Legumes^{8,9}						
Globe Mallow	N	500,000	2	N/A ¹⁰ /D/NP	COMMON	
Indian Blanket Flower	N	157,000	7	N/A/D/NP	COMMON	
Lewis flax	N	286,690	3	N/A/D/NP	Appar, Maple Grove	
Maximilian sunflower	N	250,000	1	W/D/NP	Prairie Gold, Medicine Creek	Medicine Creek
prairie coneflower	N	737,000	1.2	N/A/D/NP	Stillwater	
purple prairieclover	N	275,000	3	N/A/D/NP	Kaneb, Bismarck	Bismarck
Rocky Mtn. Penstemon	N	478,000	1.5	N/A/D/F	Bandera	
dotted gayfeather	N	136,000	6.4	N/A/D/NP	COMMON	
white prairieclover	N	278,000	3	N/A/D/NP	Antelope	
Western yarrow	N	4,500,000	0.5	N/A/D/NP	Great Northern	

SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ^{8,9,12}	FT ² PER PLANT @ FULL SEEDING RATE	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS
Shrubs/Trees^{8,9}						
American plum	N	870	1.0	50	N/A ¹⁰	COMMON
antelope bitterbrush	N	15,400	1.0-2.0	~2	N/A	COMMON
big sagebrush	N	2.4-3.2 x 10 ⁶	1	.016	N/A	COMMON
black cottonwood	N	NI	N/A	NA	N/A	COMMON
black hawthorn	N	22,600	0.5-1.0	~2.6	N/A	COMMON
box elder	N	13,400	0.25-0.5	~8.6	N/A	COMMON
Buffaloberry	N	40,00	0.5-1.0	~1	NA/D/F	Sakakawea
bur oak	N	75	25	23.2	N/A	COMMON
chokecherry	N	4,790	1.0-2.0	~6.1	N/A	COMMON
common juniper	N	36,500	<1.0	1.2	N/A	COMMON
common snowberry	N	76,000	1.0-3.0	~.29	N/A	COMMON
cudweed sagewort ⁶	N	3.0-4.5 x 10 ⁶	<0.25	.05	N/A	Summit
curlleaf mt. mahogany	N	51,900	.05	16.8	N/A	COMMON
forage kochia	N	400,000	.1	1.1	N/A	Immigrant
fourwing saltbush	N	49,000/24,500 ⁷	.25/.50 ⁷	3.6	N/A	Wytana
Gardner's saltbush	N	111,500	0.5	0.78	N/A ¹⁰	COMMON
green ash	N	17,260	<0.25	10.1	N/A	COMMON
green rabbitbrush	N	782,000	<0.5	0.11	N/A	COMMON
green sagewort	N	4.5-4.7 x 10 ⁶	<0.5	0.02	N/A	COMMON
horizontal juniper	N	29,500	<1.0	1.5	N/A	COMMON
narrowleaf cottonwood	N	NI ¹¹	N/A	N/A	N/A	COMMON
Ponderosa Pine	N	12,595	N/A	N/A	N/A	Hunter Select
Plains cottonwood	N	350-447,000	N/A	N/A	N/A	COMMON
redosier dogwood	N	18,500	1	2.3	N/A	COMMON
Rocky Mountain Juniper	N	27,100	<1.0	1.6	N/A	Bridger Select
rubber rabbitbrush	N	693,000	<1.0	0.06	N/A	COMMON
serviceberry	N	82,000	0.5-1.0	~.71	N/A	COMMON
shrubby cinquefoil	N	>1,000,000	<1.0	.04	N/A	COMMON
silverberry	N	3,800	1.0-2.0	~7.6	N/A	COMMON
skunkbush sumac	N	20,300	1.0-2.0	~1.4	N/A	Big Horn
western snowberry	N	74,400	1.0-3.0	~.39	N/A	TRAPPER

Shrubs/Trees CONTINUED ^{8,9}						
SPECIES	ORIGIN	SEEDS/LB. ¹	PLS LBS./ACRE ² FOR FULL SEEDING ^{8,9,12}	FT ² PER PLANT @ FULL SEEDING RATE	COOL/WARM ³ IRR/DRY SPRING/FALL	CULTIVARS
willow	N	2-3 x 10 ⁶	N/A	NA	N/A	COMMON
winterfat	N	48,000/160,000 ⁷	<.5	1.8	N/A	Open Range
Wood's rose	N	50,000	0.5-1.0	~1.16	N/A	COMMON
yucca	N	25,000	<1.0	1.7	N/A	COMMON

⁶ Also known as Louisiana sagewort.

⁷ Fourwing saltbush Dewinged/winged. Winterfat fluffy/naked.

⁸ Shrubs, forbs, and trees will not be planted at a full seeding rate.

The purpose of including tree and shrub species is to add species diversity and mimic a native plant community.

⁹ Maximum mixture rates determined for % species composition averaged from Montana Ecological Site Descriptions.

¹⁰ Not Applicable.

¹¹ No information.

¹² Standard drilled seeding rate will be doubled for broadcast and critical area seeding.

Pounds per acre and seeds per foot for various row spacings can be calculated as follows:

ROW SPACING (INCHES)	PLS POUNDS / ACRE	SEEDS / ROW FOOT
6	Same as 12-inch rows	Multiply 12-inch row spacing seeds/foot by 0.5
7	Same as 12-inch rows	Multiply 12-inch row spacing seeds/foot by 0.58
9	Same as 12-inch rows	Multiply 12-inch row spacing seeds/foot by 0.75
10	Same as 12-inch rows	Multiply 12-inch row spacing seeds/foot by 0.83
14	Divide lbs./acre at 12-inch row spacing by 1.17	Same as 12-inch rows
18	Divide lbs./acre at 12-inch row spacing by 1.50	Same as 12-inch rows
20	Divide lbs./acre at 12-inch row spacing by 1.67	Same as 12-inch rows
21	Divide lbs./acre at 12-inch row spacing by 1.75	Same as 12-inch rows
28	Divide lbs./acre at 12-inch row spacing by 2.33	Same as 12-inch rows
30	Divide lbs./acre at 12-inch row spacing by 2.50	Same as 12-inch rows
35	Divide lbs./acre at 12-inch row spacing by 2.91	Same as 12-inch rows
40	Divide lbs./acre at 12-inch row spacing by 3.33	Same as 12-inch rows
42	Divide lbs./acre at 12-inch row spacing by 3.50	Same as 12-inch rows

CONTINUATION FROM PAGE 1:

- ¹ Bulk seed is used for drill calibration, and is either counted within the row or ft² or weighed for a given unit area. Bulk seed required for applying the proper PLS rate is calculated by:
- Percent PLS = Percent Germination X Percent Purity ÷ 100
 - PLS lbs./acre seeding rate ÷ (Percent PLS ÷ 100) = bulk seed (lbs./acre)
 - PLS seeds/linear or ft² ÷ (Percent PLS ÷ 100) = bulk seed/linear or ft²

Pounds per acre and seeds per foot within a row for various row spacing can be calculated as follows:

-- Seeds per linear foot for 12 inches or less between rows

$$\text{Seeds/lb.} \times \text{PLS seeding rate (lbs./acre)} \div 43,560 \text{ ft}^2/\text{acre} \times \text{desired between-row spacing (inches)} \div 12 \text{ inches/foot} = \text{PLS seeds/linear row foot or ft}^2$$

- ² All seeding rates are shown as PLS lbs./acre for 12 inches between-row spacing.
- Row spacing wider than 12 inches, the PLS lbs./acre is calculated:

$$\text{Pounds PLS/acre rate in a 12 inches between-row spacing (recommended seeding rate)} \times [12 \text{ inches} \div \text{actual between-row spacing (inches)}] = \text{PLS lbs./acre.}$$

Reference: Montana Plant Materials Technical Note MT-30, Drill Calibration.

Note: Bulk or PLS seeds/linear row foot will be less in a 12-inch or less between-row spacing while bulk or PLS lbs./acre remains constant. Bulk or PLS seeds/linear row foot (~20) will remain constant in 12-inch or greater row spacing, but bulk or PLS pounds per acre will decrease.

The constant within row seed density provides interspecies competition against weed establishment, increases planted seed establishment and survival for wind and water erosion and provides an initial population to obtain a site occupancy balance with the existing environmental conditions. Decreasing the PLS seeds/linear within row foot in less than one foot row spacing, i.e., 10 seeds per linear foot in 6 inch rows, still provides ~20 seeds per square foot.