contact. Free flowing grass seed (e.g. wheatgrass) can be successfully planted with a small grain drill if proper, shallow, and consistent seeding depth is maintained.

Drills should be calibrated to monitor seeding rate. Seeding rate can be determined by counting dropped seeds after traveling a given distance on a hard surface, collecting seed from openers after traveling a given distance, or turning the drive wheel on the drill and collecting seed from openers. Contact the local NRCS office for additional information.

Key #4—Seed Quality

All seed must meet the requirement of the States' seed laws. The seed should be tested for purity and germination. Purity specifies any weeds and inert matter in the seed lot. Germination is an indication of the percentage of seed that will sprout and grow. Seed is usually purchased and planted on a Pure Live Seed (PLS) basis. This is calculated by multiplying purity by germination (including dormant). A high PLS usually indicates high quality seed. Seed of adapted species and recommended cultivars within the species should be planted. It is best to select cultivars whose origin is closest to the planting site when seeding warm-season grasses. Cool-season species are more broadly adapted. Your local NRCS office can provide information on adapted species, varieties, and seeding rates.

Seed with awns or other appendages is called "fluffy" or bearded. Debearded seed has part or all of the appendages removed and is more flowable. Flowability depends on degree of debearding.

Key #5—Weed Control

Weeds compete for moisture and light with young seedlings. Competitive weeds can be controlled mechanically by clipping or chemically. Dense residue clippings should be removed from the seeded area. Weeds should be controlled with herbicides before they reach 4 inches tall.

Successful seeding

The two main reasons grass seedings fail are planting too deep and lack of weed control.

For more information, contact:
USDA-NRCS
Plant Materials Center
3308 University Drive
Bismarck, ND 58504
Phone: (701) 250-4330
Fax: (701) 250-4334
http://Plant-Materials.nrcs.usda.gov

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NRCS Natural Resources Conservation Service

United States Department of Agriculture
Natural Resources Conservation Service
Plant Materials Center
Bismarck, North Dakota

Five Keys to Successful Grass Seeding

- Seeding Date
- Seedbed
- Seed Placement
- Seed Quality
- Weed Control

Establishing a stand of grass requires proper planning and attention to detail. Perennial grasses differ in establishment requirements compared to annual grain crops. Five keys to successful grass seeding and establishment are presented in the following narrative. Adhering to these guidelines will greatly improve your chances of a successful grass stand.

Key #1—Seeding Date

Grasses should be seeded when soil moisture and temperature are optimum for germination. Grasses are designated either "cool" or "warm" season based on their growth cycle. Cool-season grasses can be planted when temperatures are cooler and day lengths shorter. Warm-season grasses need warmer temperatures and longer day lengths to grow. Following are recommended planting dates for cool-season and warm-season grasses in the Northern Great Plains.

Cool-Season Grasses	Warm-Season Grasses
Spring (April-May)	Late spring (mid May-late June)
Late summer (July-August)	Late summer is NOT recommended
Late fall as a dormant planting (end of October or later)	Late fall/dormant is NOT optimum

Key #2—Seedbed

A proper seedbed is firm and free of competing vegetation. Correct firmness is when an adult footprint is only slightly visible on the prepared bed prior to the seeding operation. The seedbed can be firmed, if needed, by pulling a commercial or homemade packer or roller. A firm seedbed is essential for proper seeding depth. A loose, fluffy bed will place seeds too deep for proper germination. Seed requiring light for germination will be hindered by a deep planting depth. Seed that germinates but does not have enough nutrient reserve for the shoot to reach the surface is also hindered by a deep planting depth. Most species should be planted at a shallow depth of ¼ to ½ inch. Larger seeds can be planted up to 1 inch deep. Most seedings are too deep if you cannot see a few seeds on the soil surface.

Average Percent Emergence from Same Number of Viable Seed on Loam Soil

Species	Depth of Planting (inches)						Optimum Depth
	1/2	1	1 1/2	2	2 1/2	3	
bromegrass	94	94	83	62	40	8	1/2 - 1
intermediate wheatgrass	92	98	90	77	38	6	1/2 - 1
tall wheatgrass	93	90	83	61	27	3	1/2 - 1
reed canarygrass	76	73	67	54	37	9	1/2 - 1
crested wheatgrass	87	79	44	6	0	0	1/2 - 1
western wheatgrass	71	72	54	0	0	0	1/2 -1
switchgrass	75	65	45	0	0	0	1/2 - 1
big bluestem	65	59	38	0	0	0	1/2 -1
sideoats grama	62	39	0	0	0	0	1/2
blue grama	61	33	0	0	0	0	1/2
alfalfa	74	40	no data	7	no data	0	1/2
sweet clover	62	30	no data	4	no data	1	1/2

Note: Data on introduced grasses from Canada, Scientific Ag., 26:9 September 1946. Data on native grasses from SCS Nursery, Mandan, ND, June 1949. Data on legumes from University of Minnesota reproduced in the Journal of American Society of Agronomy.

Grasses can be successfully seeded into a tilled or no-tilled seedbed, provided weeds are controlled and residue is managed prior to planting. Weeds compete with seedlings for moisture and light. Optimum control comes with several years of weed management prior to seeding. At seeding time, there should be no actively growing weeds. Weeds can be controlled with tillage and/or herbicides applied before or just after seeding. Like a weed, companion crops can compete with the seeded species for water and light. Unless erosion is a problem, companion crops are generally not recommended in grass seedings.

Residue affects seeding depth and seed soil contact. Tillage, fire, and mowing can be used to manage residue prior to seeding. Tolerable residue amounts are dependent on seeding equipment to be used. Residue should be harrowed to spread extra chaff and straw. Late summer and dormant seedings are best planted into standing stubble.

Key #3—Seed Placement

The seeding equipment should provide proper seed depth, uniform seeding rate, and good seed to soil contact. Grass seed can be broadly categorized into three types; fluffy or chaffy, smooth small seed, and smooth large seed. Grass drills are equipped with separate boxes to properly place and meter each of the three seed types. Picker wheels and agitators in the fluffy/chaffy box and oversized feeder tubes keep rough coated seed flowing evenly. Depth bands on grass drills are essential for planting depth control. Press/packer wheels contribute to close seed/soil


Picker wheel


Agitators


Press/packer wheel