



Grass Drills

Photo of no-till seed drilling. Seeding natives with a Truax FLXII grass and grain drill. No tillage is necessary prior to seeding because this drill is designed to plant the seed into existing sod.

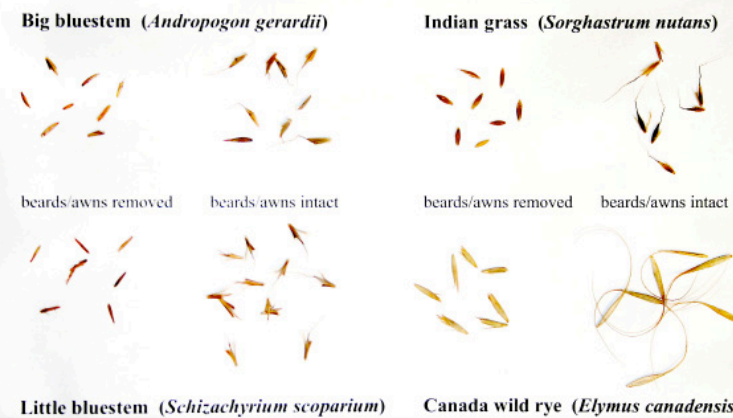


Figure 1 – Prairie grass seed that are de-bearded and de-awned and seed of the same species with beards and awns intact.

### Tips on No-Till Seeding — Drill Seeding

» Add inert material to the seed to increase the volume. Filler should be similar in size to the seed in the mixture. Add scoopable cat litter to the seed that is to go in the front small seed box. For seed in the fluffy seed box, add an equal part of vermiculite. For seed in the cool season/ grain box add an equal part of cracked corn.

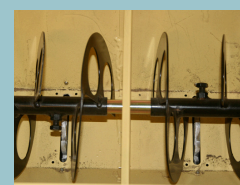
» Calibrate each box separately

» Always operate a grass drill at the recommended ground speed. Excessive ground speed will cause the drill to improperly plant the seed.

» Adjust the drill when operating. Look for seed not planted in the rows and adjust the drill accordingly.

» Inspect the drill while operating. Avoid drilling in wet conditions. Mud buildup on the depth bands can change the seeding depth. A stiff putty knife works well to remove mud on the depth bands.

» Periodically squeeze and shake the feeder tubes connected to the fluffy and cool-season boxes. Individual compartments within the small seed box should have similar quantities of seed remaining while drilling. A compartment with more seed than the other compartments may indicate a plugged feeder tube.



Closeup of inside of the middle "fluffy" seed box on a no-till drill. The augers and picker wheels are designed to pull apart prairie seed that have their beards and awns intact.



Different types of filler material that can be mixed with prairie seed to increase its bulk and improve flow through a grass drill.

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Table 1 – Seed Drill Box Designations of Selected Prairie Species

Grasses	Genus-Species	Awns, Beards, Hulls	
		Removed	Intact
Big bluestem	Andropogon gerardii	Rear Box	Middle or Rear Box
Side-oats grama	Bouteloua curtipendula	NA*	Middle or Rear Box
Prairie brome	Bromus kalmii	NA	Middle or Rear Box
Copper-shoulder oval sedge	Carex bicknellii	Front or Rear Box	Front or Rear Box
Plains oval sedge	Carex brevior	Front or Rear Box	Front or Rear Box
Long-awned bracted sedge	Carex gravida	Front or Rear Box	Front or Rear Box
Field oval sedge	Carex molesta	Front or Rear Box	Front or Rear Box
Lance-fruited oval sedge	Carex scoparia	Front or Rear Box	Front or Rear Box
Common fox sedge	Carex stipata	Front or Rear Box	Front or Rear Box
Brown fox sedge	Carex vulpinoidea	Front or Rear Box	Front or Rear Box
Canada wildrye	Elymus canadensis	Middle or Rear Box	Middle Box
Virginia wild rye	Elymus virginicus	Middle or Rear Box	Middle Box
Switchgrass	Panicum virgatum	Front or Rear Box	NA
Little bluestem	Schizachyrium scoparium	Rear Box	Middle Box
Indian grass	Sorghastrum nutans	Middle or Rear Box	Middle or Rear Box
Prairie cordgrass	Spartina pectinata	Middle or Rear Box	Middle or Rear Box
Tall dropseed	Sporobolus compositus	Front or Rear Box	Front or Rear Box
Prairie dropseed	Sporobolus heterolepis	Front or Rear Box	Front or Rear Box
Porcupine grass	Hesperostipa spartea	Rear Box	Middle Box
Forbs			
Wild garlic	Allium canadense	Middle or Rear Box	NA
Leadplant	Amorpha canescens	Front or Rear Box	Middle or Rear Box
Thimbleweed	Anemone cylindrica	Front or Rear Box	Middle or Rear Box
Tall thimbleweed	Anemone virginiana	Front or Rear Box	Middle or Rear Box
Swamp milkweed	Asclepias incarnata	Front or Rear Box	Front or Rear Box
Butterfly milkweed	Asclepias tuberosa	Front or Rear Box	Front or Rear Box
Whorled milkweed	Asclepias verticillata	Front or Rear Box	Front or Rear Box
Upland white aster	Aster ptarmicoides	Front or Rear Box	Middle or Rear Box
Milk vetch	Astragalus canadensis	Front or Rear Box	NA
Partridge pea	Cassia fasciculata	Front or Rear Box	NA
Prairie coreopsis	Coreopsis palmata	Front or Rear Box	NA
White prairie clover	Dalea candida	Front or Rear Box	NA
White wild indigo	Baptisia alba	Front or Rear Box	NA
Purple prairie clover	Dalea purpurea	Front or Rear Box	Front or Rear Box
Showy tick trefoil	Desmodium canadense	Front or Rear Box	Front or Rear Box
Pale purple coneflower	Echinacea pallida	NA	Rear Box
Rattlesnake master	Eryngium yuccifolium	NA	Rear Box
Joe pye weed	Eupatorium maculatum	Front or Rear Box	Middle or Rear Box
Tall boneset	Eupatorium altissimum	Front or Rear Box	Middle or Rear Box
Bigtooth sunflower	Helianthus grosseserratus	NA	Front or Rear Box
Western sunflower	Helianthus occidentalis	NA	Front or Rear Box
Prairie sunflower	Helianthus pauciflorus	NA	Front or Rear Box
Ox-eye sunflower	Heliopsis helianthoides	NA	Front or Rear Box
Round-headed bush clover	Lespedeza capitata	Front or Rear Box	Front or Rear Box
Rough blazingstar	Liatris aspera	Front or Rear Box	Middle or Rear Box
Meadow blazingstar	Liatris ligulistylis	Front or Rear Box	Middle or Rear Box
Prairie blazingstar	Liatris pycnostachya	Front or Rear Box	Middle or Rear Box
Michigan lily	Lilium michiganense	NA	Rear Box
Wild lupine	Lupinus perennis	NA	Front or Rear Box
Wild bergamot	Monarda fistulosa	NA	Front or Rear Box
Dotted mint	Monarda punctata	NA	Front or Rear Box
Stiff goldenrod	Oligoneuron rigidum	Front or Rear Box	Middle or Rear Box
Wild quinine	Parthenium integrifolium	Front or Rear Box	Middle or Rear Box
Large fl. beardtongue	Penstemon grandiflorus	NA	Front or Rear Box
Prairie phlox	Phlox pilosa	NA	Front or Rear Box
Prairie buttercup	Ranunculus rhomboides	NA	Front or Rear Box
Yellow coneflower	Ratibida pinnata	NA	Front or Rear Box
Wild rose	Rosa spp.	NA	Middle or Rear Box
Black-eyed Susan	Rudbeckia hirta	NA	Front or Rear Box
Sweet coneflower	Rudbeckia subtomentosa	NA	Front or Rear Box
Wild petunia	Ruellia humilis	NA	Front or Rear Box
Rosinweed	Silphium integrifolium	NA	Middle or Rear Box
Compass plant	Silphium laciniatum	NA	Middle or Rear Box
Smooth blue aster	Symphotrichum laevis	Front or Rear Box	Middle or Rear Box
New england aster	Symphotrichum novae-angliae	Front or Rear Box	Middle or Rear Box
Purple meadow rue	Thalictrum dasycarpum	NA	Front or Rear Box
Prairie spiderwort	Tradescantia bracteata	NA	Front or Rear Box
Ohio spiderwort	Tradescantia ohioensis	NA	Front or Rear Box
Blue vervain	Verbena hastata	NA	Front or Rear Box
Hoary vervain	Verbena stricta	NA	Front or Rear Box
Ironweed	Vernonia fasciculata	Front or Rear Box	Middle or Rear Box
Heartleaf alexanders	Zizia aptera	NA	Front or Rear Box
Golden alexanders	Zizia aurea	NA	Front or Rear Box

\* NA – Not Applicable



# 8 Seeding

Content by Dave Williams  
PRAIRIE RESTORATION SERIES

Deciding when to plant a prairie is a challenge. Some species establish better when spring planted, other species establish better when fall planted and some species are hard to establish whenever they are planted. Seeding rates of some species may need to be increased depending on when and how they are planted.

Prairie seed can be planted by broadcast seeding, hydroseeding and drill seeding. Regardless of the seeding method used, it is essential that seed be planted at the proper depth and with good seed-to-soil contact.

### Seeding Time

Tallgrass prairie plants exhibit a wide range of growth characteristics. With adequate soil moisture, cool-season grasses and many forbs germinate in early spring when minimum soil temperatures are between 39° to 45° F (3° to 7° C), while warm-season grasses germinate in late spring when soil temperatures reach 50° to 56° F (10° to 13° C) (Smith et al. 1998). Real time soil temperatures for the tallgrass prairie region can be found at [www.greencastonline.com/SoilTempMaps.aspx](http://www.greencastonline.com/SoilTempMaps.aspx). Native seed mixes often contain both cool and warm-season species, and there is no single best time to plant. However, choosing a planting time to maximize germination and establishment depends upon the species selected and their contribution to the seed mix. A seed mix with a strong forb component (50 percent or greater forb seed) should be dormant seeded. By contrast, a seed mix of mostly warm-season grasses (70 percent or greater grass seed) should be seeded in mid-spring.

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Tallgrass Prairie  
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### Dormant Seeding (Soil temperatures between 38° to 32° F)

A dormant seeding is defined as planting seed during a time when there is the least chance of germination and seed will lie dormant for several months. For most of the tallgrass prairie region dormant seeding can begin in early November. Early onset of very cold weather in the fall, or cold weather into late winter can extend the calendar times for dormant seeding. The benefits of dormant seeding are twofold. First, seeding when soil temperatures are below 39° F ensures that there is no germination of the natives until the following spring when environmental conditions are suitable for germination and growth. Second, dormant seeding benefits forbs by permitting stratification which improves germination. We recommend that dormant seeding be done only if the seed can be planted into the soil (1/8 to 1/4 inch deep) and packed. Seed broadcasted onto ice or frozen ground is not recommended as it will expose the seed to wind erosion and predation. Dormant planting mimics the natural process of seed ripening and autumn/winter dispersal of many prairie species. However, dormant seeding of most native grasses, except switchgrass, (*Panicum virgatum*) and Canada wild rye (*Elymus canadensis*) increases seed mortality (Meyer and Gaynor 2002). If the seed mix contains 50:50 forb seed to grass seed or greater, dormant seeding should be considered. Grass seed should be increased by 25 percent if dormant seeded to compensate for seed loss (Henderson and Kern 1999).

### Spring Seeding (Late March to Mid-June)

There is a wide range of soil temperatures in spring. Spring soil temperatures (1 inch deep) in Iowa range from 35° F (2° C) in late March to over 70° F (21° C) in mid June (Riley 1957). The specific time of year the site is seeded will determine which species are favored in the seed mix. Early spring seeding favors cool-season grasses, sedges and some forbs. The window for germination of cool-season plants diminishes as soil temperatures increase throughout spring. A late spring seeding favors warm-season grasses and some forbs. Spring seeding may not permit adequate stratification for some forbs to break dormancy. Non-germinated seed will remain in the soil until conditions are appropriate for germination.

### Summer Seeding (July to September)

Planting mid and late-summer is risky business. New germinates exposed to excessive heat and drought will perish. In addition, many prairie species require 2–6 weeks to germinate. By the end of the growing season, it is likely that seedlings may be too small to survive the winter. Seeding natives during this time is not recommended.



Frost Seeding (February to March)

Seeds on cracked soil  
Prairie seeds can become incorporated into the soil by the cracks that are created by freeze-thaw cycles in late winter.

Frost seeding is a special form of dormant seeding done at the tail end of winter when temperatures are below freezing at night and above freezing during the daytime. If the soil surface is free of snow or ice, seed can either be drilled or broadcast. The freeze-thaw action creates small cracks in the soil and allows seeds to settle into it. The effect on germination of prairie grass and forb seed by a frost seeding as compared to other seeding times is unknown. However, research on non-native legumes has shown that frost seeding can improve seed germination, but an unusually dry and warm spring can result in poor establishment (Barnhart 2002). In addition, the effect on germination of non-native cool-season grasses that are frost seeded can vary and is not recommended for some species (West et al. 1997). The benefit of frost seeding prairie seed may be related to the length of time the seed remains in the soil before germinating. As compared to a dormant seeding in November, frost seeding reduces the time seed remains in the soil before germination and may reduce seed mortality from pathogens and/or granivory (Hemsath 2007). We believe that frost seeding can be a good time to seed for most native seed mixes. We recommend seeding with a no-till grass drill to maximize seed-to-soil contact. If broadcast seeding is used, the seeding rate should be increased by 25% to compensate for seed loss due to wind erosion and predation (Henderson and Kern 1999). Frost seeding is not recommended on eroded sites with rills and gullies. If the site is prone to erosion, sow oats (up to 1 bushel per acre) with the prairie seed and/or a mulch should be applied and crimped into the soil to keep the seed in place.

### Seeding Methods

Planting seed at the proper depth with good seed-to-soil contact is essential. Seed planted too deep will not emerge resulting in poor stand establishment. Likewise, seed not covered by soil can germinate, desiccate and die. It's the responsibility of the person(s) actually doing the seeding to ensure that seed is planted correctly. This requires periodic checking of the planted seed and the equipment during seeding.

### Broadcast Seeding

Broadcast seeders range from tractor and ATV mounted implements to hand-held seeders or simple hand broadcast seeding. This method can be a low cost way to seed your prairie. An inexpensive hand held fertilizer spreader, available at your local hardware store can be used for seeding.

To assure that the seed is evenly distributed and dispersed over the planting site the seed must be properly mixed and the seeding rate carefully calculated. The seed should be mixed in equal parts with inert material such as vermiculite, cracked corn or kitty litter. This will increase the volume of the seed. Because of improvements in seed cleaning, the volume of prairie seed needed to plant a smaller site (1 acre or less) may not fill a 5-gallon bucket. Mixing any of these materials with the prairie seed will improve the seed flow through the seeder, and will make calculating the seeding rate much easier. Seed can be mixed in a plastic tub by hand or on a concrete slab using a flat shovel. If you use a mechanical seeder, calibrate the equipment before sowing seed and follow the calibration procedure as listed in the owner's manual. If seed is hand broadcasted, divide seed by half and sow each half over the entire site so the site is seeded twice. This will ensure even seed dispersal and distribution over the site. After seeding, seed should be incorporated into the soil to improve seed-to-soil contact. Incorporating seed into the soil can be done by dragging a piece of heavy chain, or a piece of chain link fencing, or using a drag harrow, or raking seed in with a garden rake. Drag, harrow, or rake until the seed disappears. Finally, pack the soil with a cultipacker or lawn roller.



Broadcast seeding with a Viacon fertilizer spreader and dragging a piece of fencing to incorporate the seed into the soil.



Seeding natives with a Brillion grass seeder. Seed is dropped in between two steel wheel gangs-one conditions the soil and the other cultipacks the seed.

### Table 2 — Seed that Should be Broadcasted

Small seeded prairie species that can be broadcasted onto the surface without incorporating into the soil.

Grasses/Sedges	Scientific Name	Moisture Class*	Seeds/Oz.
Blue Joint Grass	<i>Calamagrostis canadensis</i>	W-M	248,880
Brown Fox sedge	<i>Carex vulpinoidea</i>	W-M	100,000
Fowl Manna Grass	<i>Glyceria striata</i>	W-M	160,000
June Grass	<i>Koeleria macrantha</i>	D	400,000
Forbs			
Prairie Sage	<i>Artemisia ludoviciana</i>	M-D	250,000
Heath Aster	<i>Symphyotrichum ericoides</i>	M-D	200,000
Silky Aster	<i>Symphyotrichum sericeus</i>	D	476,000
Harebell	<i>Campanula rotundifolia</i>	D	900,000
Bottle Gentian	<i>Gentiana andrewsii</i>	W-M	280,000
Sneezeweed	<i>Helenium autumnale</i>	W-M	130,000
Great St. Johns Wort	<i>Hypericum ascyron</i>	W-M	190,000
Great Blue Lobelia	<i>Lobelia siphilitica</i>	W-M	500,000
Foxglove Beardtongue	<i>Penstemon digitalis</i>	M	130,000
Common Mt. Mint	<i>Pycnanthemum virginianum</i>	W-M	220,000
Grass Leaved Goldenrod	<i>Euthamia graminifolia</i>	W-M	200,000
Old Field Goldenrod	<i>Solidago nemoralis</i>	D	300,000
Showy Goldenrod	<i>Solidago speciosa</i>	M-D	103,600
Culver's Root	<i>Veronicastrum virginicum</i>	W-M	800,000

W

Wet soils- Water drains very slowly resulting in standing water at or near the surface for most of the year.

M

Mesic soils - Water drains readily from the soil but soil remains moist for most of the year.

D

Dry soils - Water drains rapidly resulting in dry soil for most of the year.

### Hydroseeding

Hydroseeding is a unique seeding method where seed is mixed with water, mulch and tackifier to form a slurry that is sprayed directly on the ground. Many county road departments and some landscaping companies use hydroseeding to seed prairie. While this method of seeding is restricted to professionals, you may decide to hire a local company to hydroseed your prairie. We recommend that your seeding contractor hydroseed with a two step process. The first step is to broadcast the seed (see the Broadcast Seeding subsection). The second step is to spray the hydromulch slurry (without seed) over the seeded area. This two-step process will help insure that the seed is not suspended in the mulch where it can desiccate. Additives can be included in the slurry to reduce soil erosion (Meyermann 2008).