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G81-543 Establishing Dryland Forage Grasses

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Establishing Dryland Forage Grasses

Preparation, seed selection, seedbed preparation, fertilization, methods of seeding, time and rate of seeding, weed control and more are covered in this NebGuide.

Bruce Anderson, Extension Forage Specialist

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Grass pastures provide more total nutrients to the cattle and sheep industry in Nebraska than any other feedstuff. However, many areas often face a shortage of pasture during certain seasons of the year.

In eastern Nebraska abundant cool-season pasture usually is available during spring and fall, but during July and August there is little or no grass growth. Conversely, warm-season native range provides much forage during summer in central and western Nebraska, but not in spring and late fall.

Cool-season grasses begin growth early in spring and often produce 70 to 80 percent of their herbage by July 1. They are unproductive during the hot summer months unless irrigated. If moisture is available in fall, they will grow again until freezing.

Warm-season grasses start growth about one month later in spring than cool-season grasses and grow slowly until soil temperatures exceed 65°F and air temperatures exceed 80°F. As a result, spring soil moisture is conserved and used from June 1 to Sept. 1 when growth is most rapid. Grasses become dormant in the fall.

Preparation

Plan ahead to establish new pastures. Little grazing is available from cool-season pastures during the seeding year. Warm-season grasses establish even more slowly, sometimes taking two or more years to develop an adequate stand. Plan your grazing and livestock feeding program accordingly to allow sufficient time to establish new pastures successfully.

Begin preparation one or two years before seeding. Select sites that are likely to be productive, have access to livestock water, and can be fenced adequately. Sow crops that will permit control of problem weeds, but avoid use of herbicides that could result in carryover damage to new forage seedlings. Complete any major soil modifications well in advance of seeding.

Use research and experience-tested procedures for grass establishment to reduce seeding failures. Seeding failures are costly in terms of seed and labor, as well as lost forage the following year.

Seed Selection

The many grass species and varieties available can make it difficult to choose the proper one(s) for each situation. Wheatgrasses, bromegrasses and orchardgrass are excellent choices for pasture and/or hay during spring and fall. For summer pasture or range select switchgrass, indiangrass, the bluestems and gramas. Improved varieties of these species that are adapted to the soils and climate of your area are available.

Varieties and species adapted to all areas of Nebraska are listed in *CC 178, Crop Varieties Suggested for Nebraska*, available from your local Extension agent.

Select clean seed that has high germination. Seeding failures often are blamed on weather, fertility and other causes when the real problem is poor quality seed. Use certified seed whenever possible to assure varietal purity, vigorous seedlings, and to eliminate the possibility of introducing weed seeds. Certified seed initially may cost more, but it is usually well worth it--poor seed is never a bargain.

Seedbed Preparation

Good seed-to-soil contact is essential to maintain adequate moisture near the seeds. This moisture is necessary for germination and for the small root systems of young grass seedlings. Good seed-to-soil contact is obtained by preparing a seedbed that is firm, well-packed, and free of large clods with just enough loose surface soil for proper seed coverage. Such a seedbed enhances proper seed placement, infiltration of rainfall and storage of moisture to help prevent the drying out of the upper layer of soil.

Any tillage method that accomplishes this seedbed is satisfactory. Moldboard plowing often is necessary on sites having an existing cover of perennial species. Disking often follows plowing, but also may be done several times without plowing where perennial species can be killed without plowing or where a plant residue mulch is desired to reduce wind or water erosion. Avoid deep tillage shortly before seeding because it will dry the soil.

Before seeding, firm the seedbed by rolling or cultipacking if the soil is loose. When rolling or cultipacking are not possible, wait for rainfall to settle the loose seedbed before seeding. On a properly prepared seedbed you should sink no more than one-half inch when walking across the field. This helps prevent seeding too deeply, and allows good seed-to-soil contact. Do not over-prepare a seedbed on fine textured soils as crusting of the soil surface may occur.

Untilled, weed-free soybean stubble is one of the best seedbeds. The seedbed remains firm, the stubble and mulch provide some protection, moisture is conserved, and weed seeds are less likely to germinate.

A mulch of plant residues often is used to conserve moisture or where wind or water erosion is a problem. Mulch also helps control the growth of some weeds, and is especially helpful when establishing warm-season range grasses.

Small grain stubble provides an excellent mulch for late summer seeding of cool-season grasses. Excessive straw sometimes must be removed before seeding. Seeding into small grain stubble is not effective, however, if weedy annual grasses or volunteer grain plants are abundant.

Corn, sorghum, sudangrass or millet stubble or residue makes good cover for winter and spring seedings, especially when rows are at right angles to the prevailing winds or slope. Leave 12 to 18 inches of stubble to adequately protect seedlings from erosion and drying out. If more than 18 inches of stubble remain, harvest and remove the extra growth by clipping or grazing. Use properly equipped drills to seed through the mulch with no additional tillage.

Fertilization

Successful establishment is associated with soils having favorable pH and fertility. Always take soil tests well in advance of seeding to allow time to correct any deficiencies before or at seeding.

Grass establishes best if soil pH is between 5.5 and 8.0. Extremely acid soils should be limed at least six months before seeding. Lime corrects soil acidity, supplies calcium and magnesium, and makes other minerals more available to the plant.

Phosphorus is particularly important for grass establishment to encourage rapid root development. Incorporate phosphorus prior to seeding or place with the seed at seeding time when needed. Nitrogen should not be applied at seeding except in soils that are very deficient in nitrogen. Even small amounts of nitrogen will stimulate weed growth and slow the establishment of the grasses. However, where AAtrex has been used and excellent weed control is expected in switchgrass or big bluestem, small amounts of nitrogen may encourage seedling growth.

Methods of Seeding

Grass seeds should be covered with soil 1/4 to 1/2 inch deep in fine textured soils and from 3/4 to one inch deep in sandy soil. Many stands fail because seed was planted too deeply.

Use the proper equipment. It is best to use a grassland drill specifically designed to seed grasses. These drills are equipped with a large seedbox that contains agitators to prevent light and chaffy seed from bridging over the seed openings. The drill should have a positive feed mechanism to meter seed out uniformly to produce even stands. Seeds should pass freely through the seedtubes into furrows opened by double disk openers with attached depth bands. Packer wheels should be present to firm soil around the seed. A roller may be towed immediately behind the drill if it doesn't cover seeds too deeply.

On smooth, residue-free fields where moisture is expected to be plentiful, specialized cultipacker seeders that seed and pack in one operation work well with seed that is not fluffy. Seed drops freely from a seedbox mounted above and between two corrugated rollers. The rollers firm and pack soil around the seed. This type of equipment is not suited to sandy soils.

To obtain uniform stands on rough surfaces and reduce the chance of skips it sometimes is helpful to drill half of the seed in one direction and the remainder at right angles to it. This also allows faster seedling growth and quicker, dense stand development.

Broadcast seeding is not recommended. However, when grass seed is broadcast rather than drilled, rolling after seeding provides some good contact between seed and soil. This helps to partially overcome some of the disadvantages of broadcast seedings. Higher seeding rates also can help, but increased seeding rates cannot replace proper establishment practices.

Time and Rate of Seeding

Seed warm-season grasses between April 1 and May 15. Early seeding provides for faster establishment. If a severe weed problem is expected, use light tillage to kill successive weed crops, followed by seeding around

May 15.

In some areas of Nebraska, winter or dormant seedings of warm-season grasses also can be successful if soils are dry and soil temperatures are too cool for germination (about 45°F). Dormant seedings usually are made between Nov. 15 and April 1.

Cool-season grasses most successfully are seeded between Aug. 1 and Sept. 5, but depend on late summer and fall rains for establishment. Do not seed into dry soil. Spring seedings often are successful when done between March 1 and April 30, but are more likely to have problems with summer annual weeds. Dormant seedings of cool-season grasses are less successful because soil temperatures often exceed the germination temperature (about 35°F) for several days during the "dormant" period.

Usually only one or two species are seeded together for pastures or hay because mixtures of several grasses are more difficult to manage. Mixtures of warm- and cool-season grasses are especially difficult to manage and are not recommended except for certain range seedings. Diverse mixtures are desirable, however, for many range seedings.

Seeding rates listed in Table I and Table II are based on pure live seed (PLS). Always purchase and sow grass seed on the basis of PLS in order to accurately compare prices of different seedlots and to ensure accurate seeding rates. The percentage of PLS of a seedlot is determined by multiplying the germination percentage by the purity percentage and then dividing by 100. Germination and purity percentages are listed on the seed tag. To determine the recommended seeding rate of bulk seed, divide the recommended seeding rate (Table 1) by the percentage of PLS and then multiply by 100.

Table I. Seed weights and seedling rate of selected perennial grasses seeded alone.			
	Seeds per pound, thousands	Pounds of PLS to provide 30 PLS per square foot	Recommended seeding rates, PLS lbs/acre
Cool-season grasses			
Smooth brome	134	9.7	8-12
Orchardgrass	590	2.2	3-6
Meadow brome	90	14.5	10-15
Intermediate wheatgrass	88	14.9	12-15
Crested wheatgrass	190	6.9	6-10
Western wheatgrass	110	11.9	10-12
Tall wheatgrass	79	16.5	12-18
Timothy	1,230	1.1	2-4
Reed canarygrass	550	2.4	5-10
Creeping foxtail	750	1.7	3-6
Green needlegrass ¹	185	7.1	6-10
Warm-season grasses			
Switchgrass	390	3.4	2.5-5
Big bluestem	160	8.2	6-9

Indiangrass	175	7.5	5-8
Little bluestem ¹	260	5.0	3.5-6
Sand bluestem ¹	110	11.9	8-12
Sideoats grama ¹	200	6.5	4.5-7
Prairie sandreed ¹	275	4.8	3-5
Blue grama ¹	850	1.5	2-3
Sand lovegrass ¹	1,300	1.0	1-2
¹ Rarely seeded alone, usually used in mixtures			

For example, when seed is 90 percent pure and has 80 percent germination, what seeding rate will give nine lbs of PLS per acre?

Percentage of PLS = $(90 \times 80) \div 100 = 72$ percent

Seeding rate of bulk seed = $(9 \div 72) \times 100 = 12.5$ lbs/A

Most dryland grass plantings in Nebraska should provide at least 30 PLS per square foot when planting only one species, and at least 20 PLS per square foot when a mixture is planted. However, individual establishment characteristics of some grasses will cause some recommendations to be slightly lower or substantially higher than these general recommendations.

Companion Crops

Companion crops can be used for seedling protection and to reduce soil erosion. Sandy soils or hilly sites are most likely to benefit from companion crops. Do not fertilize or manage companion crops for grain or high forage yields because this creates extreme competition for grass seedlings. Graze or cut hay from companion crops early to reduce competition.

The most desirable companion crop for fall- or spring-seeded cool-season grasses is oats. When seeded in the spring at 15 to 20 lb/A (pounds per acre) and cut for hay before heading, adequate protection is provided without the oats becoming too competitive with grass seedlings. Fall-seeded oats will winter-kill, eliminating its competition to grass seedlings. Wheat, rye and barley are too competitive to seedlings to be used as companion crops.

Companion crops are not recommended for establishing warm-season grasses. Where soil or seedling protection is needed, stubble seeding and mulches are more effective.

Weed Control

Grass seedlings grow slowly and compete poorly with weeds. ***The most frequent cause of seeding failure and slow establishment of warm- and cool-season grasses is poor weed control.***

When establishing only switchgrass and/or big bluestem, AAtrex 80W at 2.5 lbs/A or AAtrex 4L at 2 qts/A can be used preemergence to control weeds. On sandy, high pH, or low organic matter soils reduce the AAtrex rate by 50 percent. When possible, delay applying AAtrex until 10 to 14 days after planting or until the new planting has had a rain shower to increase the tolerance of the planted grasses to AAtrex. This is a very effective method of weed control for establishing these two warm-season grasses. Unfortunately, AAtrex can not be used to establish any other warm- or cool-season grass and actually will prevent the growth of most cool-season and other warm-season grasses.

Late summer seeding of cool-season grasses will avoid many summer annual weed problems, although winter annual grasses can be a problem. Otherwise, seeding in spring before weeds germinate offers the best opportunity to establish warm- and cool-season grasses before weed competition becomes severe,

If grassy weeds threaten grass seedlings, allow the weeds to grow until they seriously are shading the forage seedlings. If forage seedlings have not become so tall and spindly that mowing will remove most of their leaves and growing points, clip the weeds at two to three inches to remove as many actively growing buds on the weeds as possible. Do not clip when forage seedlings are tall and spindly. Use mowing equipment that will not smother the young forage plants with clippings. Avoid clipping warm-season grass seedlings after Aug. 1 and cool-season grass seedlings after Aug. 15.

Broadleaf weeds can be controlled in grass seedings using 2,4-D at a rate of 1 pt/A (4 lbs of acid equivalent/gal). Do not spray 2,4-D until grass seedlings have at least four leaves or the weed canopy is so dense that nearly all the herbicide spray will be intercepted by the weeds with little or no herbicide contacting the small grass seedlings below the canopy.

On CRP acres weeds can be controlled by some herbicides not permitted for use on other sites. These include Glean, Ally and Buctril. Current recommendations for these special uses are listed in the extension circular *EC 130, Herbicide Use in Nebraska*, available at local Extension offices.

Managing New Seedlings

New cool-season, and especially warm-season, grass seedlings lack sufficient vigor to recover rapidly from grazing or clipping. It is best not to graze or clip warm-season grasses during the seeding year except for emergency weed control. If weeds have been controlled and a vigorous stand develops with many plants in head, some light grazing may be possible in October or November, preferably after frost. Only light, once over grazing is recommended until a thick, vigorous stand develops.

Where stands of warm-season grasses are slow to establish or weeds are not well-controlled the first season, two or three years may be necessary to establish a vigorous stand. Dormant seeds that did not germinate the first year may germinate during year two to help thicken stands.

Controlled burning of warm-season grass plantings can hasten development of thick stands. Conduct these burns when established warm-season grasses break dormancy (about May 1) on sites that contain sufficient fuel to carry a fire and where proper safety measures can be followed.

To help hasten establishment and thicken stands of switchgrass and big bluestem, AAtrex at 2.5 lbs 80W or 2 qts 4L per acre can be applied early in April or after burning to control annual weeds. Winter annual grasses, such as downy brome, are controlled in established warm-season range grasses using AAtrex at 1.25 lbs 80W or 1 qt 4L per acre during fall. Other warm-season grasses will tolerate AAtrex during year two if seedlings from year one survived the winter.

Spring sown cool-season grasses should be grazed during the first season just often enough to reduce competition from companion crops and weeds. Avoid grazing during wet weather. Light, rotational grazing which leaves a four to six inch stubble should be practiced the season following seeding. Do not graze beyond Sept. 1 the first full grazing season to allow plants a chance to store energy and harden for winter.

Additional Information

Establishing grass can be complex and confusing. Government programs frequently will help with the cost of seeding grasses for range, wildlife and conservation purposes. However, certain cultural practices that differ from those recommended here may need to be followed to remain eligible for payments. If you are considering cost-sharing or need assistance to plan, develop seed mixtures and fine-tune cultural practices,

contact your local Extension agent, the Soil Conservation Service, or an ASCS office for more information *before* seeding.

Table II. Seedling rates of selected mixtures of cool- or warm-season grasses.			
Grass mixture		Area of adaptation or range site	Recommended seeding rate, lbs PLS/acre
Cool-season grasses			
1)	Smooth brome Orchardgrass	Eastern 2/3 of state	4-8 3-4
2)	Smooth brome Orchardgrass Intermediate wheatgrass	Eastern 2/3 and non-sandy western 1/3 of state	3-4 2-3 4-5
3)	Reed canarygrass Creeping foxtail	Wetlands	4-6 3-5
Warm-season grasses¹			
1)	Switchgrass Big bluestem	Eastern clayey, silty, and subirrigationd	.5-2 1.5-6
2)	Big bluestem Indiangrass	Eastern clayey silty, and subirrigationd	1.5-5.5 1.2-5.0
3)	Switchgrass Big bluestem Indiangrass	Eastern clayey, silty, and subirrigationd	.5-1 1.0-5 .5-3
4)	Big bluestem Indiangrass Switchgrass Little bluestem Sideoats grama Western wheatgrass ²	Silty overflow, clayey overflow, and silty upland	1-3 .5-2 .3-1 .3- .5 0-1 0-2
5)	Big bluestem Indiangrass Switchgrass Little bluestem Sideoats grama Blue grama Buffalograss Western wheatgrass ²	Silty and limy upland	.6-2 .5-1 .2-.5 .5-1 .4-1 0-.4 0-.6 0-2
6)	Sand bluestem Sand lovegrass Prairie sandreed Little bluestem Switchgrass Blue grama Indiangrass Western wheatgrass ²	Sands, sandy, and sandy lowland	1.2-2.5 .1-.3 .2-.8 .3-.8 .2-.6 0-.2 0-1 0-1.5

7)	Big bluestem Indiangrass Switchgrass Little bluestem Reed canarygrass ² Western wheatgrass ²	Subirrigationd	1.2-3 .5-2 .3-1.2 .3-.6 0-.3 0-1
8)	Blue grama Sideoats grama Little bluestem Western wheatgrass ² Green needlegrass ²	Western clayey	.2-.5 0-1.2 0-.8 2-5 .5-2
¹ Lowest and highest rates provide approximately 10 and 40 PLS per square foot, respectively. The mixture actually seeded should contain at least 20 PLS per square foot. ² Cool-season grass used in range mixture.			

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Forages

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