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Cool-season Grasses for May and June

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FS 547
Replaces FS 298 and 299

cool-season grasses for may and june



Smooth bromegrass • Intermediate
wheatgrass • Pubescent wheatgrass
• Western wheatgrass • Slender
wheatgrass • Green needlegrass
• Needle-and-thread • Porcupine grass

Cooperative Extension Service
South Dakota State University
U. S. Department of Agriculture

Cool-Season Grasses for May and June

The low production of certain native or permanent pastures has long been a problem in South Dakota. These pastures are frequently bluegrass or native short-grasses. These grasses are palatable and highly nutritious, but do not produce as much TDN (total digestible nutrients) per acre as recommended tame grasses. More productive grasses can be used to good advantage on many pastures.

Grasses recommended for use in May and June are discussed in this Fact Sheet, while grasses for other seasons are considered in three other publications: "Cool-season Grasses for Early Spring and Fall," "Warm-season Grasses for July and August," and "Grasses for Special Purposes."

Several species of tame grass and several natives are most productive during late May and June. They usually become somewhat dormant during July and August but resume growth again in September.

Hay yields of various grasses have been obtained at several locations in the state. Intermediate wheatgrass and brome-grass were superior to crested wheatgrass under favorable moisture conditions, but the difference was smaller under conditions of less rainfall. At Cottonwood, crested yielded more than brome-grass, but less than intermediate wheatgrass. Western wheatgrass, a native grass, has yielded approximately the same as crested wheatgrass and brome-grass in central and western areas of the state.

Beef production from tame grasses is generally greater than from native grasses in eastern South Dakota. Under irrigation at Huron, a smooth brome-alfalfa pasture produced an average 295 pounds of beef per acre while a western wheatgrass-blue grama pasture produced an average of 95 pounds. Likewise, at the Pasture Research Center in Faulk County, native range provided an 8-year average 0.96 AUM/A* over 192 days, while smooth brome - intermediate wheatgrass - pasture type alfalfa provided 1.33 AUM/A over 130 days, and a group of four seasonal pastures provided 1.74 AUM/A

over a 194-day period. The brome-intermediate-alfalfa pasture in the group of seasonal pastures produced 2.0 AUM/A when grazed during its most productive period of growth—40 days between May 25 and July 5, and 25 days after August 15.

Numerous studies show that while tame grasses outproduce native grasses over a 3- to 5-year period, the native grasses become more productive in later years unless tame grasses are managed properly.

In the past, the additional cost of maintenance and re-establishment of tame grasses often nullified the advantages of increased production. Tame grasses generally became sod-bound

*Animal Unit Months per Acre.

and production was seriously reduced in 4 or 5 years unless nitrogen fertilizer was applied. In most cases fertilizer was not used. Hay-type alfalfas were often planted in a mixture to furnish nitrogen for the grasses and to improve quantity of forage produced. As a general rule, the stand of alfalfa was depleted in 4 or 5 years and the grass then became sod-bound. Cost of re-establishment reduced the net profit from the pasture.

These problems can be overcome by using the newer, pasture-type alfalfa varieties. Pasture-type alfalfas are more persistent under grazing than the

Smooth brome-grass. Plant X2/5; plant parts X4 1/3.



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older hay-type varieties. When a pasture-type alfalfa is planted with tame grasses and is fertilized properly, it is anticipated that tame pastures will continue to be productive for 12 to 15 years. At Brookings, pastures composed of Teton alfalfa and either brome-grass or intermediate wheatgrass were more productive after 7 years than at the end of the first season. At the Pasture Research Center, pastures planted to Teton alfalfa, Oahe intermediate wheatgrass, and Lincoln smooth brome-grass were grazed from 1966 to the present. Productivity and stands of alfalfa and brome-grass did not diminish, but the density of intermediate wheatgrass was reduced.

TAME GRASSES

Usually one or two grasses seeded with a single legume is better than a "shotgun" mixture. Early growing, intermediate wheatgrass. Plant X2/5; plant parts X5 1/4.

cool-season grasses should not be mixed with later, cool-season grasses and cool-season grasses should not be mixed with warm-season grasses. All are not ready for grazing or mowing at the same time. If early- and late-maturing grasses are mixed and then grazed when the earlier grasses are ready, the later species suffer a loss of root reserves and do not give maximum forage production.

Smooth Brome-grass

Smooth brome-grass, *Bromus inermis* Leys., is an introduced, leafy, sod-forming, cool-season perennial with a rhizomatous root system and jointed stems. Plants grow to a height of 3 to 4 feet and produce an abundance of basal and stem leaves. Leaf blades are 8 to 12 inches long and 1/4 to 1/2 inch wide. They have a characteristic restriction near the middle of a fully expanded

blade that resembles the letter "W." The leaf sheaths are smooth and closed, forming a tube. The seedhead is a panicle, 6 to 8 inches long.

Smooth brome is recommended for use in controlling erosion and for mixing with alfalfa in a hay-crop or pasture mixture. Use hay-type alfalfa (Vernal, Agate, Iroquois, Dawson or Ladak 65) in the hay-crop mixture, but use pasture-type alfalfa (Teton, Rambler, or Travois) for grazing. Intermediate wheatgrass is a valuable addition to either mixture. Use an alfalfa-brome-grass and/or intermediate wheatgrass pasture from mid-May to mid-July. Graze rotationally. It may be grazed until mid-September if the stocking rate is reduced during the latter 2 months.

Smooth brome-grass produces excellent yields (2 to 3 tons an acre) of palatable high quality forage in many areas of South Dakota. Considerable nitrogen is taken from the soil and when too little is readily available old stands become "sod-bound," stands become sparse, plants become lighter green in color and produce less forage. Legumes in combination with smooth brome and proper fertilization help ensure vigorous growth. Old stands respond markedly to nitrogen fertilization if moisture is not limiting.

Brome is a highly palatable grass and remains palatable over a much longer period than many other grasses. Forage quality is comparable to that of other grasses. Crude protein is high during periods of rapid growth, especially on fertile soils. In early stages of growth, crude protein may range from 12% to 20% and may exceed this amount with high nitrogen availability. Protein content decreases rapidly with maturity.

The growing point in each smooth brome-grass stem holds the key to maximum forage production. If the stem and leaves are removed closely by grazing or mowing before the plant has reached the boot stage, the growing point will also be removed. Regrowth from the base will be slow. If the growing point is removed after the plant reaches the boot stage, regrowth from the base of the plant is rapid. If the plant is allowed to "head out," regrowth will not occur. Removal of seedheads by mowing tends to stimulate vegetative growth and forage production. Maximum pasturage is obtained if plants are allowed to reach the boot stage before being grazed. Following a period of rest, aftermath



growth is produced by secondary tillers. Brome can be grazed when the secondary tillers reach a height of 8 to 10 inches and basal crown buds are ready to grow. Thus, rotational grazing has a distinct advantage over continuous grazing. More AUM's of grazing can be obtained if this grass is grazed intensively from late May to early July than if a lighter stocking rate is used for a longer period. Bromegrass grazed during July and August should be understocked during the early part of the season to allow growth to accumulate for use later.

Heavy grazing during April and early May is detrimental. Maximum production of good quality hay is obtained by mowing at early heading. Quality decreases after heading. Growing

bromegrass with alfalfa, either for pasture or hay, is ideal. The grass is important in decreasing bloat danger, and it also extends the grazing season. The legume increases palatability and nutritive value resulting in better animal performance.

Smooth bromegrass is adapted to all soil types, but makes its best growth on fertile, sandy loam or silt loam soils with adequate moisture. Its extensive root system fills the surface soil with many roots and rhizomes. This makes the soil structure conducive to better moisture absorption and provides ground cover that aids in controlling erosion.

Smooth bromegrass may be classified into northern, intermediate, or southern types as determined by growth habit. The northern type is not aggressive in its spreading habit be-

cause it does not have abundant rhizomes. It is not as high yielding as the intermediate or southern types under most conditions in South Dakota and it is more subject to leaf disease. Bromegrass imported from Canada is of this type. Intermediate bromegrass is between the northern and southern types in spreading habit. The southern types have been selected in the southern regions, are high yielding and disease resistant, but tend to be poorer seed producers. They become sod-bound sooner and require nitrogen fertilizer to maintain high yields. Examples of these are Lincoln, Lancaster, Achenbach, and Sac.

Varieties of smooth bromegrass recommended for South Dakota are Achenbach developed in Kansas, Lincoln developed in Nebraska, Sac developed in Wisconsin and Fox, developed in Minnesota. When fertilized, average yields for these varieties have been 2.7 tons per acre at Brookings, 2.3 tons at Watertown, 2.6 tons at Centerville, 2.2 tons at Highmore, 1.5 tons at Norbeck, 1.3 tons at Eureka, 1.0 tons at Presho, and 0.95 tons at Cottonwood.

Intermediate Wheatgrass

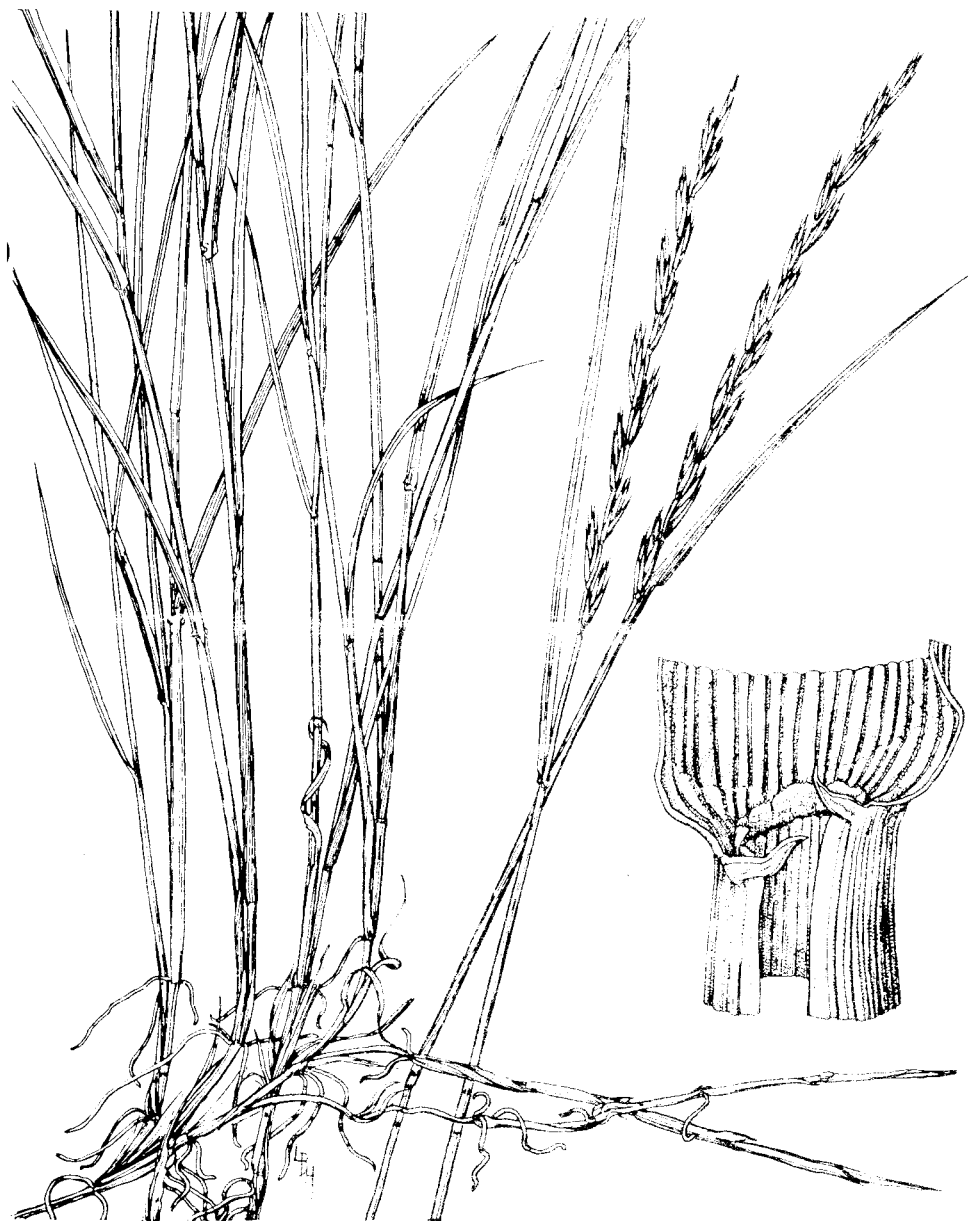
Intermediate wheatgrass, *Agropyron intermedium* (Host) Beauv., is an introduced, sod-forming, cool-season, perennial. It has a rhizomatous root system and jointed stems. Plants grow to a height of 3 to 4 feet. They produce an abundance of basal and stem leaves. Leaf blades are 8 to 12 inches long and $\frac{1}{4}$ to $\frac{1}{2}$ inch wide. Like other wheatgrasses, it has a characteristic restriction near the end of the fully expanded leaf blade. It resembles the "W" on smooth bromegrass but is closer to the leaf tip. The sheath is not enclosed. The seedhead is a spike, 4 to 6 inches long.

Intermediate wheatgrass is recommended for use in the same manner as smooth bromegrass.

Intermediate wheatgrass is similar to smooth bromegrass. It starts growth early in the spring, a few days earlier than brome. It produces excellent yields (2 to 3 tons an acre) of palatable high quality forage. Because of its high yield it is similar to smooth brome in its nitrogen requirements. Like smooth bromegrass, old stands become sod-bound. Heavy early spring grazing is detrimental.

Forage quality is comparable to other grasses. Crude protein is high during periods of rapid growth, especially on fertile soils. Protein content decreases with maturity. Intermediate

Western wheatgrass. Plant X2/5; seed head X2/3; ligule X8 1/2.



wheatgrass is highly palatable and remains palatable over a relatively long period of time.

As with smooth brome grass, the growing point regulates forage production. More pasturage can be obtained by intensive rotational grazing for about 60 days than by continuous grazing or less intensive grazing for a longer period. Also more high quality hay can be obtained by mowing shortly after heading. It is well suited for growing in a mixture with alfalfa and smooth brome grass.

The extensive root system of intermediate wheatgrass improves soil structure conducive to good moisture absorption. A dense stand provides ground cover that reduces soil erosion. The rhizomes are easily killed when a stand is plowed. Stems are somewhat coarser than most brome grass varieties, but the many leaves produce highly satisfactory forage.

Other virtues of the grass are its large seed, ease of stand establishment, and rapid growth. It is more drought resistant than smooth brome grass, but it is not as winter hardy or as long-lived as crested wheatgrass, and good pasture stands are difficult to maintain for more than 6 years. However, with the variety Oahe, a prolific seed producer, good pasture management allows sufficient self-seeding to promote the longevity of the stand. Under conditions of 14- or 15-inch rainfall, intermediate wheatgrass does not maintain stands as well as crested wheatgrass, but does produce more forage during the first few years after establishment.

The recommended variety for South Dakota is Oahe, developed by the South Dakota Agricultural Experiment Station. When fertilized, average yields of this variety have been 2.3 tons per acre at Brookings, 1.9 tons at Watertown, 2.2 at Centerville, 2.0 at Highmore, 1.6 tons at Norbeck, 1.2 tons at Eureka, 1.7 tons at Presho, and 1.5 tons at Cottonwood.

Pubescent Wheatgrass

Pubescent wheatgrass, *Agropyron trichophorum* (Link) Richt., is an introduced, sod-forming, cool-season, perennial grass with a rhizomatous root system and jointed stems. Although it has been classified as a separate species, recent research indicates that it is the same species as intermediate wheatgrass. Strains that have been classified as pubescent wheatgrass have short stiff hairs on the heads

and seed. Otherwise they are the same as other strains of intermediate wheatgrass. Certain strains or varieties appear to be more drought resistant and are better adapted to low fertility soils, but are less productive than Oahe intermediate wheatgrass.

NATIVE GRASSES

Native grasses may be divided into two main classes: cool-season grasses and warm-season grasses. Cool-season grasses grow best in the spring and fall seasons while warm-season grasses make their growth in the summer. Since grass should be harvested (mowed or grazed) during periods of maximum production, the two groups of grasses should be harvested at different times. The cool-season grasses that start growth in April and are most productive from mid-May until early July are discussed in this Fact Sheet. The warm-season natives are discussed for use as mid-summer pastures in another Fact Sheet. Cool-season and warm-season natives generally grow in association with one another and cannot be grazed separately. However, if they are found in pure stands or are planted, the cool-season natives, discussed below, give the best production if grazed between mid-May and early July.

Western Wheatgrass

Western wheatgrass, *Agropyron smithii* Rydb., is a long-lived, sod-forming, cool-season, drought resistant perennial native grass with a rhizomatous root system and jointed stems. Plants grow to a height of 2 to 3 feet. Leaf blades are 8 to 12 inches long and less than ¼ inch wide. Leaf blades do not droop but are more or less stiff and erect, and rough on the lower side. The entire plant is usually covered with a grayish or bluish bloom, which gives it a distinctive coloration. Seedheads are 2 to 6 inches long. Usually there is but one spikelet at each node of the rachis.

Western wheatgrass is recommended for use in controlling erosion, as a hay crop, or for grazing in late May, June and early July in the western two-thirds of the state.

Pure stands are found on heavy and more or less alkaline soils characteristic of the valleys of meandering, "gumbo flats," intermittent swales, and shallow lake beds subject to overflow. In South Dakota it is also an important grass in native mixtures on upland soils.

It is one of the best yielding and most palatable grasses adapted to heavy soils. It is drought resistant and persistent. Western wheatgrass is one of the first grasses to grow on the range in the spring. It produces an abundance of forage early in the season and makes high quality hay if cut just after heads have emerged from the boot. It is readily eaten by livestock, but becomes somewhat harsh and fibrous during late summer. The grass cures well on the stem and retains its protein content—which provides for good winter grazing. Sheep are particularly fond of the heads. If grazed too closely over an extended period of time, the plants are weakened and die.

Few other economically important grasses are as tolerant to alkali soils. In the Great Plains (central and western South Dakota) western wheatgrass is one of the few grasses to become re-established on "go-back" land. It occurs in nearly pure stands on abandoned cultivated fields where the original stand of wheatgrass was not entirely eliminated by cultivation. Dense pure stands often develop during a period of 4 to 6 years after the last cultivation. These "go-back" fields are dependable for the production of hay or seed.

Good stands can be established by seeding. Most seed harvested is from native stands, but the crop is uncertain and seed supply is often short. You should use seed that originated in South Dakota for best results.

Slender Wheatgrass

Slender wheatgrass, *Agropyron trachycaulum* (Link) Malte, is a short-lived perennial, native bunchgrass with a fibrous root system and jointed stems. Plants grow to a height of 3 feet. The dense, leafy bunches enlarge by tillering and may reach a foot or more in diameter. Leaves are from 3 to 13 inches long and ¼ to ½ inch wide. Most of the leaves are basal, although there are few stem leaves.

The numerous flowering stems are erect and coarse. Spikelets are usually not awned. This gives the seedhead a characteristic slender appearance that distinguishes this grass from the other wheatgrasses. Propagation is entirely by seed.

Slender wheatgrass is not recommended except for occasional use as a companion crop to other native grasses or for use as a short-term native pasture in the western half of the state. In mixtures, it should not exceed 15% of the mixture.

Slender wheatgrass begins growth rather early in the spring and provides an abundance of palatable forage that is well liked by all classes of livestock.

Seedling vigor is exceptionally good and excellent vegetative cover is provided a few weeks after planting. It is useful for a short time, and is sometimes used in a mixture with longer-lived grasses. It becomes established quickly and dies; the long-lived species then replace it.

Most seed is harvested from native stands. Plant seed that originated in South Dakota for best results.

NEEDLEGRASSES

Needlegrasses, sometimes called Stipa grasses, are long-lived cool-season,

perennial bunchgrasses native to the Great Plains. Common species are green needlegrass, *Stipa viridula* Trin., needle-and-thread, *Stipa comata* Trin.; and porcupine grass, *Stipa spartea* Trin.

Needlegrasses rank fairly high as forage grasses on western ranges because of their abundance, wide distribution, long-growing period, and capacity to cure well on the ground.

Green Needlegrass

Green needlegrass, also known as feather bunchgrass, is a leafy, native, cool-season perennial with a deep penetrating fibrous root system. Plants grow to a height of 3 feet. Leaves mostly basal, are $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, and 8 to 12 inches long. Seedheads are

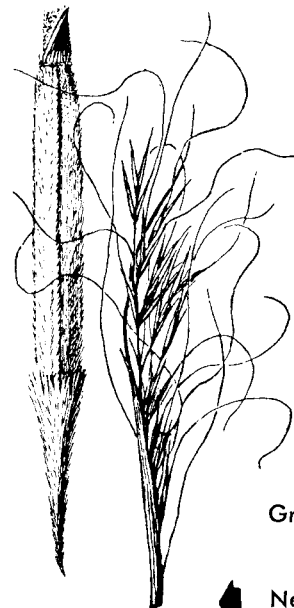
compact panicles 4 to 8 inches long. Seed spikelets have short, bent awns about an inch long that are conspicuous. They do not have the sharp awl-like end of other needlegrasses and are not nearly so troublesome to grazing animals or in seed handling as the awns of needle-and-thread grass. Green needlegrass is abundant on the upland prairie and ranges of central and western South Dakota. It is seldom found as the major constituent in the native association except where it receives additional moisture from flooding or where it invades abandoned cropland. It seems to be well adapted to most soil types but makes its best growth on the fine textured soils.

Green needlegrass is recommended for use as hay or for native pasture during late May, June and early July. It has the same season of growth as western wheatgrass, but is more drought tolerant.

Growth starts early in spring and continues into the fall when enough moisture is available. It makes excellent recovery after grazing or clipping and provides good pasture forage for all classes of livestock. Hay of excellent quality may be produced. If the plants are permitted to stand, fairly good winter grazing is furnished.

Green stipagrass is a variety of green needlegrass selected in North Dakota and released in 1946. It produced 4- or 5-year average yields of about 1.4 tons per acre at Eureka and Cottonwood. Lodorm is the variety of

Porcupine grass. Plant X 1/2; seed and awn X2.



Green needlegrass. Seed X1; leaf sheath X5.

Needle-and-thread. Seedhead X1/2; lemma X5.

green needlegrass without the seed dormancy problem, characteristic of native grasses. It is recommended for use in South Dakota. Seed originating from native South Dakota stands is also suitable.

Needle-and-Thread

Needle-and-thread is a deep-rooted, long-lived, native bunchgrass with a fibrous root system. Seedstalks grow 1 to 4 feet high, with leaves less than $\frac{1}{8}$ inch wide and 8 to 12 inches long. Leaf auricles are absent, but the ligule is membranous, notched, and prominent. Seed awns, also prominent, are usually 4-6 inches in length. Seed is sharp-pointed and has a long, bent, twisted, threadlike awn that looks like a threaded sewing needle. Needle-and-thread occurs generally on the western ranges and most abundantly on the lighter-textured soils. It grows

in almost pure stands as an invader on some of the abandoned croplands. It derives its name from the appearance of the seed.

Growth starts in early spring, usually before associated native grasses green up, and continues throughout the summer if enough moisture is available, however, it generally is somewhat dormant during July and August. Growth is resumed after a drought if favorable moisture and temperatures are present in the fall.

Flowering of this species usually begins early in June, and the seed matures and is shed in July. Livestock graze the plants sparingly during this period. Palatability is reduced by the sharp points of the seeds, which injure livestock by working into the mouth parts and the hide. Except for the period when seeds are present, livestock

eat the forage readily. They make good use of the standing cured forage for winter grazing.

Porcupine Grass

Porcupine grass is a cool-season, perennial, bunchgrass. It is common on the silty and sandy soils of uplands in the eastern part of the state. It provides excellent forage early in the season and again in the fall. If cut for hay, this grass should be cut before the long-awned seed is produced or after it has shattered.

ACKNOWLEDGMENT

The authors have drawn freely from the USDA Yearbook "Grasses" and SCS Agriculture Handbook No. 339 "Grasses and Legumes for Soil Conservation in the Pacific Northwest and Great Basin States." The line drawings were taken from SCS Agriculture Handbook 339 and SCS-TP-151 "Key to Perennial Grasses." All production data, however, were obtained in South Dakota, except where otherwise specified.

Fact Sheets for Additional Information

Additional information on grasses, their utilization and management can be obtained from the following publications:

Cool-Season Grasses for Early Spring and Fall, FS 546

Warm-Season Grasses for July and August, FS 548

Grasses for Special Purposes, FS 549

Grazing Management Based on How Grasses Grow, FS 302

Alternative Pasture and Forage Systems, EC 709

Planting Tame Pastures and Hayland, FS 503

Fertilizing Pasture and Hayland, FS 425

Chemical Weed Control in Pasture, Range and Hayland, FS 426

Interseeding and Modified Renovation for Pastures and Range, FS 422

Identification of 22 Grasses Common to South Dakota, FS 600

Prairie Hay at its Best, FS 581

Grass Species and Variety Performance in South Dakota, Bull