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(Revised January 1986)



Summer Annual Forage Grasses

This NebGuide discusses production practices, methods of use, and precautions for using summer annual grasses.

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Summer annual grasses are used for summer pasture, green chop, hay, silage, and winter pasture. They are often used as sources of emergency forage. In addition, residues of summer annuals make an excellent seedbed mulch for new stands of perennial grass, particularly on sands.

The summer annual grasses most often used for forage in Nebraska are sudangrass, hybrid sudangrass, sorghum-sudangrass hybrids, and forage sorghums. Foxtail millet and pearl millet are used occasionally. Each of these grasses has unique growth characteristics that require proper management for optimum production.

Some of the desirable characteristics of summer annuals are rapid growth (especially in mid-season), excellent drought resistance, and good response to fertilizer and water. Alkali soils can reduce yields considerably, but plants will tolerate a moderate amount of salinity. They are well adapted to most areas of the state and grow rapidly following planting in late May or June. They provide good growth from mid-July through August, and then moderate growth until stopped by fall frost.

Sorghum-sudangrass hybrids produce about the same amount of feed as sudangrass when used for pasture. When used for green chopped forage, yields of sorghum-sudangrass hybrids usually exceed sudangrass or forage sorghum. Forage sorghums are usually best for silage. Making sorghum-sudangrass into hay can be difficult because drying is slow.

Table I. Comparative yields of sudangrass, hybrid sudangrass, and sorghum-sudangrass for a green chop program.

	Yield level (Percent)
Sorghum-Sudangrass	100 ^a
Sudangrass	72
Hybrid Sudangrass	81

^aBased on ave. yield of 5.9 tons dry matter per acre.

Plant Descriptions

Sudangrass

True sudangrasses have fine stems, tiller extensively when conditions permit, and can regrow rapidly. Thus, they are more suited to pasturing than other types of sorghum. Piper and Wheeler are the most popular varieties in Nebraska. Piper has low prussic acid content and is generally regarded as safe to graze. Wheeler has a slightly higher level of prussic acid, but it presents little danger to grazing livestock.

Hybrid Sudangrass

Hybrid sudangrasses are crosses among true sudangrass strains that are available primarily as commercial varieties. They are similar to true sudangrass varieties, but yield slightly more in a three-cut green chop or hay system. Their prussic acid content is generally between that of Piper sudangrass and sorghum-sudangrass hybrids.

Sorghum-Sudangrass Hybrids

Sorghum-sudangrass hybrids are the most numerous of the various types of summer annual grasses. Most of these are available as commercial hybrids. They are high producing forage grasses, but more than 50 percent of their yield usually comes from their stems. Their rate of regrowth after repeated clippings or grazing is lower than that of sudangrass. Thus, sorghum-sudangrass hybrids are best suited for green chop.

Cattle consuming some sorghum-sudangrass hybrids sometimes gain or milk less than those consuming other summer annuals, apparently due to a lower energy content. When these hybrids are cut at immature stages, quality is higher but yields are much lower.

Forage Sorghum

Forage sorghums are usually tall growing, and mature late in the growing season. Often called "cane," "sweet sorghum," or "sorgo," forage sorghums often have sweet and juicy stems, and many have relatively small grain heads.

Forage sorghums usually yield more silage dry matter per acre than dryland corn, and will yield similarly to corn under irrigation. However, yields of TDN per acre are usually lower from forage

sorghums than from corn.

Grazing of forage sorghums is not recommended. They usually contain much higher levels of prussic acid than other summer annual grasses and can be dangerous to graze even when plants are completely headed, especially when young shoots are present. Forage sorghums can be cut for hay, although their stems dry very slowly after cutting.

Foxtail Millet

Foxtail millet has relatively coarse stems and is used primarily as an emergency hay or silage crop, especially in dry years. It is more dependable than other summer annuals on light, sandy soils, and will usually produce higher hay yields than other summer annuals following a late planting in the western two-thirds of Nebraska.

Foxtail millet does not root securely into the soil during early growth and is slow to regrow following grazing. Thus, it is not recommended for grazing except in an emergency.

Pearl Millet

Pearl millet has become increasingly popular for grazing in recent years due to the development of commercial varieties adapted to Nebraska. It is very leafy, regrows well after grazing, yields about the same as sudangrass, and does not cause prussic acid poisoning.

Methods of Use

Summer Pasture

Sudangrass, pearl millet, and sorghum-sudangrass can provide supplemental summer pasture when cool-season grasses go dormant and the feed supply is short.

Sudangrass and pearl millet produce better pasture than sorghum-sudangrass because they are usually leafier. They also provide a more uniform supply of feed for grazing and support higher daily gains or milk production. Sorghum-sudangrasses produce higher yields, but are better used to support livestock on maintenance or lower productivity levels.

Graze these summer annual grasses in a short, rotational grazing system. Subdivide fields into three or more pastures so that each pasture can be grazed down in 7 to 10 days. Stagger the date of planting each pasture by about 10 days so that grazing will begin on each pasture when growth is at the appropriate height. This rotation system allows maximum production of nutritious forage. Pastures can be irrigated and fertilized after each grazing period if desired.

Graze sudangrass and pearl millet when they reach 15 to 20 inches in height and sorghum-sudangrass hybrids when they are 18 to 24 inches tall. Danger from prussic acid poisoning will be low when grazing is delayed until grass is this tall. Graze down rapidly to 6 inches of stubble before moving livestock to a fresh pasture, and do not graze regrowth until 18 inches of growth accumulates. If growth is more than 36 inches tall, harvest as hay, green chop, or silage since grazing cattle will trample and waste much of the growth. Regrowth will be more rapid following cutting this taller growth than if it is trampled.

Table II. Plan for rotation grazing.		
When to SEED		
Field A	Field B	Field C
During late May or early June.	10 days later than Field A.	10 days later than Field B.
How to PASTURE		
Field A	Field B	Field C
About July 1. After grass is 15-20" high and for 7 to 10 days. Then move livestock to Field B.	Graze for 7 to 10 days. Then move livestock to Field C.	Graze for 7 to 10 days. Then move livestock to Field A.

Summer grazing lasts about two months. During this time each acre of these pastures can provide feed for one to six mature dairy or beef animals. Grazing management and soil fertility and moisture will determine production at any location.

Sudangrass, sorghum-sudangrass hybrids, and forage sorghum pastures are not recommended for horses because kidney ailments may develop.

Winter Pasture

Some sorghum-sudangrasses make acceptable winter pasture for beef cows and dry dairy cows. The quality of this feed will be higher if planting is delayed so that the crop does not reach maturity before frost. Tonnage of dry matter per acre will be lower, but protein content of the forage will be higher, and less lodging should occur if frost catches the crop prior to the flowering stage of maturity compared to later stages of maturity.

Trampling and field losses will be lower during pasturing if the crop is planted in rows 20 inches wide or wider, and cattle are limited to areas that furnish only a week to 10 days supply of feed at a time. Only mineral and vitamin A supplementation should be needed when cattle are grazing immature forage during early winter. If the crop matures before frost, protein supplementation may be desirable for cows within 60 to 90 days of calving.

Green Chop

Sorghum-sudangrasses are well suited to a green chop program. Under a 3- to 4-cut system, these forages produce higher yields than other summer annual grasses.

Field losses are less from green chopping than from grazing or haying. However, the fast rate of growth of sorghum-sudangrass results in variable amounts and quality of feed throughout the growing season. When grass is young and growing rapidly it may contain 20 percent crude protein and produce a highly succulent feed. As the crop grows taller and nears maturity the protein content may drop to 7 percent or less, and a coarse, fibrous, low quality green chop is produced.

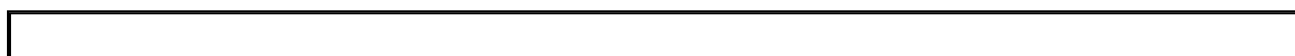


Table III. Feed value of sorghum-sudangrass forage at six stages of maturity.

Stage of Maturity	TDN	Crude Protein
	percent	
Early Vegetative	71.5	19.7
Late Vegetative	70.9	16.6
Boot	67.7	13.6
Heading	65.3	12.6
Bloom	61.5	11.0
Dough	58.8	7.8

Nitrates can become a problem in a green chop program under certain growing conditions. Never feed green chop that has heated in the wagon, feed bunk, or stack, or that has been held overnight. Nitrates are converted to nitrites as plants respire; nitrites are about 10 times more toxic than nitrates.

Hay

For good quality hay, harvest sudans, sorghums, and pearl millet before heads emerge or when they are 30 to 40 inches tall. These hays will contain slightly less protein than alfalfa hay and as much energy as good quality prairie or alfalfa hay. Use a hay conditioner to speed drying of the stems. Even then it will normally take several extra days to dry to satisfactory moisture levels.

Foxtail millet should be harvested in the late boot to early bloom stage for good quality hay. Crude protein will then be about 8 to 10 percent and TDN about 55 to 60 percent. Later harvest will lower quality and cause feeding problems due to seedhead bristles.

Do not feed horses foxtail millet hay as a major component of their diet. Damage to the kidneys, liver, and bones can occur due to a glucoside called setarian.

Silage

Forage sorghums for silage production are frequently planted on dryland acres throughout Nebraska. Generally, forage sorghum silage has 75 to 85 percent of the energy value of corn silage per unit of dry matter, while other summer annual grasses have 60 to 80 percent of the value of corn silage.

Most summer annual grasses need to be wilted or mixed with dry feeds to make a satisfactory silage. Silage is often cut after frost to reduce moisture, especially with forage sorghums.

The moisture content should be 70 percent or less for good preservation in upright silos. Wilting high moisture forage can be difficult because the crop dries slowly and regrows rapidly when soil moisture is adequate. Silage between 70 and 75 percent moisture can be stored in trench or bunker silos. Dry feed can be added to high-moisture forage to reduce the overall moisture level.

Seeding

Seedbed Preparation

A firm, well-prepared seedbed is essential for good stands of summer annuals. As in all grass seedings, firm seed-soil contact is necessary for rapid germination. Stands can be established using minimum tillage methods, but other methods, such as interseeding sudan and sorghum-sudangrasses into grass sod, generally have not been effective in Nebraska.

Date

Sudangrass and sorghum are warm-season grasses. Growth is slow during cool weather and seeding into cold soil can result in poor stands and stunted growth. Soils should be above 60°F when seed is planted. Seedings made about two weeks after corn planting, in late May and early June, usually give the best results in Nebraska.

Pearl millet and foxtail millet cannot tolerate cold, wet soils. Soils should be 65 to 70°F before seeding in June. Seedings can be made as late as July 15 and still produce a respectable hay crop if moisture is available.

Plan your seeding date to produce desirable feed when you need it. Stagger planting dates to aid rotational grazing. Seed about August 1 for winter pasture. Remember: little usable forage is available until about 6 weeks after planting.

Method

The best method for planting sudangrass and pearl millet for pasture or hay is with a grain drill at a depth of 1 to 1 1/2 inches into moist soil. Plant sorghum-sudangrass and forage sorghum in 28- to 40-inch rows. Foxtail millet should be planted 1/2 to 1 inch deep with a grain drill.

For good stands, plant high germinating seed that has been treated with a fungicide.

Rate

Seed sudangrass, sorghum-sudangrass, and foxtail millet at 15 to 25 pounds of seed per acre. Use 6 to 12 pounds per acre for forage sorghum and pearl millet. Use the lower rates in dry areas and higher rates in humid and irrigated areas. Higher seeding rates will help produce finer stems, which is often desirable for pasture and hay. Some varieties and hybrids have larger seeds that may require higher seeding rates to assure good stands.

Fertilization

Summer annual grasses do best on fertile soil, but will grow successfully on most soil types from heavy clays to light sands. Because they can grow rapidly, moisture and nutrients must be adequate for high production.

Use soil tests to determine phosphorus and other fertilizer needs. Apply 40 to 80 pounds of N per acre around seeding time. Where moisture is adequate, higher rates may be justified. Split applications of nitrogen will provide a better distribution of grass growth and lessen the nitrate poisoning potential, especially when the total amount of N to be applied exceeds 60 pounds per acre.

Weed Control

Weeds are seldom a problem when summer annuals are planted into well-prepared, warm, moist soils

due to rapid growth of the forage. Cultivation will control many weeds in row plantings. Up to 2 quarts of atrazine 4L per acre can be used on fine textured soils for sorghums and sudangrass. Do not use atrazine on sandy soils. Use 1/2 to 1 pint of 2,4-D to control broadleaf weeds in summer annual grasses that are over 4 inches tall in plantings for silage. Use drop nozzles and delay application until grasses are over 12 inches tall. Nitrate and prussic acid levels may increase for a short period of time following spraying with 2,4-D.

Prussic Acid Poisoning

The young plants and leaves of sudangrass, sorghum-sudangrass hybrids, and forage sorghum contain a chemical that breaks down and is released as prussic acid (hydrocyanic acid). Its content in plants can be affected by climate, soil fertility, and plant maturity as well as variety. Its presence should not deter producers from realizing the potential value of these annual forage crops.

Avoid feeding hungry animals young succulent feed of these grasses. Allow plants to reach heights of 15 inches for sudangrass and 18 inches for sorghum-sudangrass crosses before grazing to dilute the concentration of prussic acid in the plant. Do not graze forage sorghums unless they are several feet tall. Give animals a full feed of hay before first turning them onto pasture, and always have plenty of clean, fresh water available. Free choice salt and mineral with added sulfur will help minimize the toxin's effect. See NebGuide G86-775, *Prussic Acid Poisoning*, for more information.

Pearl millet and foxtail millet have not caused prussic acid poisoning and prussic acid has not been found in the plants.

Nitrate Poisoning

The nitrate content of summer annual grasses can be high under a variety of growing conditions. While not usually a problem in pasture unless cattle consume the lower one-third of the stalk, nitrates can become important in a green chop or hay program. When in doubt, put the crop into the silo where the nitrate content is often reduced by 40 to 60 percent during the ensiling process, or feed only limited amounts of green chop and hay in the total ration to limit nitrate intake. For more information on nitrates, refer to NebGuide G74-170, *Nitrates in Livestock Feeding*.

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