

AGRICULTURAL GUIDE

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Sudangrasses and Other Crops for Temporary Forage

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Warm season annuals are excellent supplemental forages for summer grazing. They are heat tolerant and very productive when moisture and fertility are available. They furnish high quality forage when grazed but have some deficiencies when used for hay or silage.

Warm season annuals are usually classified in three general groups:

- sudangrass and hybrid sudangrass,
- crosses between sudan and sorghum and
- pearl millet.

Sudangrass. Varieties of sudangrass have finer stems and are higher in digestibility than the other groups, but they usually produce lower yields. However, in some experiments where four or more cuttings were removed to simulate grazing, some sudangrasses were equal in yield to the other groups. The true sudangrasses, especially the Piper variety, are also the lowest in prussic acid potential.

Hybrid sudangrass produces more pounds of forage than sudangrass but has a slightly greater potential for prussic acid poisoning.

In general, animals grazing sudangrass and hybrid sudan perform about the same.

Pearl millet. This species is not a sorghum but a cattail millet, not to be confused with foxtail millet. There is no danger of prussic acid poisoning when grazing millet. Animal performance is good; however, several experiments have shown that pearl millet lowers butterfat levels in dairy cows.

Sudan-sorghum crosses. Widely available from commercial outlets, these crosses are the highest yielding of the three groups. However, they are noted for the lowest animal performance. Researchers in Kansas reported that more than 50 percent of the yield of these crosses is in the stems. This probably accounts for the lower animal productivity. Sudan-sorghum crosses also have the greatest potential for prussic acid poisoning.

Varieties. The most common varieties of sudangrass are Piper and Greenleaf. Piper is a good choice because of its low potential for prussic acid poisoning and excellent animal performance.

Many good commercial varieties of pearl millet are available, but they are sometimes difficult to find in Missouri. Usually, you can get them from major seed companies who obtain the seed from southern states. Some of the better varieties are Millex 22 and 23, Pearlux 21 and 24 and Gahi-I.

During the last 20 years, dozens of sorghum-sudan crosses have been released by commercial seed companies. It's almost impossible to test all of them. Consult dealers for their recommendations.

Total dry matter yield is probably not the most important consideration. Varieties with small stems, a high leaf-to-stem ratio, and low potential for prussic acid poisoning are the most desirable.

Selecting Forages for Livestock

Sudangrass as well as the newer hybrids and crosses are good choices for dairy cows. Pearl millet is not as successful with lactating cows because the butterfat content of their milk drops.

All the groups are good for beef cattle, although weight gain per animal is usually higher with sudangrass, hybrid sudan and pearl millet than with the sorghum-sudan crosses.

Sudangrass should always be the first choice for sheep pastures. The next best choice is a hybrid sudangrass. The crosses should probably not be used at all. Research has shown lamb gains to be about twice as high on sudangrass as on the sudan-sorghum crosses.

Occasionally, there are reports of an urinary infection (*Cystitis Syndrome*) in horses grazing the sudan-sorghum crosses. It has never been reported when horses have been

grazing pearl millet or the true sudangrasses such as Piper or Greenleaf.

Seeding

Prepare the seedbed as for corn or beans. Then drill 20 to 25 pounds of sudangrass or sorghum-sudan hybrid seed per acre in 8-inch rows. Heavy seeding rates tend to reduce the plant's stem size.

You can get the highest yields if you plant about mid May. Seedlings may start slowly but will grow rapidly as the weather becomes warmer. If seeded in June, production will not be as great.

Limited research shows that seeding sudangrass in wide rows to prevent trampling by livestock does not lower field losses. You can get reasonable stands by broadcasting the seed on the prepared seedbed and then harrowing or cultipacking the seedbed one more time. Sometimes the seed is mixed with the fertilizer, and they are broadcast together.

For the sorghums, the soil should be warmer than for corn. In Missouri, the best time for seeding the sudangrasses and crosses is between May 5 and 20. They germinate sooner and develop faster if the soil is at least 65 degrees F at the 4-inch depth. Pearl millet requires even warmer soil. At the 4-inch level, the temperature should be at least 70 degrees F for best results.

Fertility

If possible have your soil tested to determine fertility needs. Usually, phosphorus and potassium are applied at the same rate you would if you were growing 100 to 150 bushels of corn per year.

As with all grasses, these plants require high rates of nitrogen for high production. Apply nitrogen in at least two and, in some cases, three applications to prevent nitrate poisoning.

When preparing the seedbed and applying phosphorus and potash, include 50 to 80 pounds of nitrogen per acre. For top production, follow the first grazing or harvest with another application of 40 to 50 pounds of nitrogen per acre.

Grazing Management

Pearl millet, sudangrass and hybrids, and sorghum crosses respond best to rotational grazing. Do not graze until the plants have reached a height of at least 15 to 20 inches. Except for pearl millet, there is some danger of prussic acid poisoning when grazing grasses shorter than 15 to 20 inches.

To enhance animal production and plant growth, graze the plants down to a 4-inch stubble over about seven days. Then move the livestock and allow regrowth to occur.

Quality and Feeding

Animal performance on sudangrass, hybrid sudan and pearl millet is usually better than when grazing the sudan-sorghum crosses.

This problem is the result of the higher stem to leaf ratio of the sudan-sorghum crosses. The crosses grow taller and quickly become too mature for desirable feed. As the plant becomes tall and coarse it is less palatable and higher in crude fiber. Hence, it is lower in feeding value.

Maintain sudangrass and the crosses at an early stage of maturity for dairy cows. This practice takes advantage of the higher protein and lower fiber content of the grasses and also results in higher intake by the grazing animal.

Hay and Silage

Sudangrass, pearl millet and the crosses are much better for grazing than for hay or silage. If you want silage, there are better alternatives. Research at the University of Missouri has identified several varieties of forage sorghums with good yields, a reasonably high grain content, and a higher feeding value than the plants discussed in this Guide. (See University of Missouri Special Report 265 for details.)

If hay must be made, sudangrass should be the first choice followed by hybrid sudangrass and then the sudan-sorghum crosses.

Research at Kansas State University shows that hay quality is higher if the forage is harvested at the 36-inch stage of growth. Harvesting at this stage, rather than waiting until grasses are headed, increases animal performance by nearly 40 percent. The crude protein content of all these grasses falls rapidly after reaching about 36 inches in height. Protein content can easily be reduced anywhere from 12 to 14 percent to 6 to 7 percent by the time the grasses reach the dough stage.

Any grass harvested after reaching the late dough stage is seldom worth the harvesting expense unless you need bedding material.

All the groups are difficult to cure without high nutrient losses. Energy levels of sudangrass or sorghum-sudangrass hay are usually much lower than legume-grass hay. Crude protein content also is usually low, as little as 6 to 8 percent. Compare this to the protein content of early-cut legume-grass hay which usually ranges from 15 to 20 percent. Soybeans are a much better choice than sudangrass or the crosses if an emergency hay crop is needed. This is especially true for dairy producers.

Remember that sorghums and pearl millet are much more difficult to cure than conventional hay crops. Follow these suggestions to speed drying time and decrease leaf shattering.

- Don't attempt to make hay out of these materials unless a hay conditioner is available.
- Remember that it is impossible to over-crush the stems of the sorghum plants. Use more roller pressure than used on conventional hays. Drive slowly in a low gear, and run the engine at maximum governed speed.
- Don't windrow until all plants on the top of the sward are dry enough for baling.
- Try to avoid driving over the conditioned material.

Greenchop

Greenchopping is not widely practiced in Missouri, except by an occasional dairy producer or cattle feeder. During a drought or feed shortage, greenchopping is an efficient way to stretch the feed supply.

Follow these rules for greenchopping.

- ✓ Do not cut lower than 8 inches. New growth comes from nodes on the lower part of the stubble. If these nodes are removed, regrowth will be very slow. In some cases, the plant will die if cut too low (This practice also reduces the danger of nitrate poisoning during drought periods).
- ✓ Do not harvest more feed than cattle will consume in four or five hours because of the danger of prussic acid poisoning.
- ✓ Never harvest a load of greenchop, and let it sit on the wagon overnight.

Hazards to Animals

The two most common problems with sorghum forages are prussic acid poisoning and nitrate poisoning. A third problem, *Cystitis Syndrome* occurs only with horses, especially mares. For this reason, sorghum crops are not recommended for use by horses. There are no recorded cases of *Cystitis Syndrome* occurring in horses grazing pearl millet.

Prussic acid. Plants cells contain substances called dhurrin and emulsen. When the plant cells are immature or when the cell walls are crushed as a result of frost or drought, these two substances form prussic acid or hydrogen cyanide (HCN). Dhurrin and emulsen are prevalent in young cells (when plants are less than 15 to 20 inches in height) in the leafier parts of the plant. In general, ruminants (cows and sheep) are more susceptible to prussic acid poisoning than pigs or horses. Be especially cautious of plants that were wilted during a drought or frost. After a slight frost, wait three or four days until the plants have a normal appearance before resuming grazing.

After hard frosts in the fall, grass may be safely grazed after the stubble is cured and dry. Hay and silage, after the silage process is complete, is seldom dangerous to feed.

HCN release is widely different among the types of sorghums. Usually, the sudan-sorghum crosses have a higher potential for danger than the hybrid sudans. Piper sudangrass has the lowest potential. Other plants that often cause problems are wilted wild cherry leaves and Johnsongrass. Pearl millet does not cause prussic acid poisoning.

In recent years, there has been some speculation that HCN poisoning has occurred when the sorghums have been put into large round bales. Large bales are so dense that the HCN does not dissipate into the air as it does in conventional bales, in silage during handling, or on the dried stubble that remains in the field.

To prevent this problem, do not cut grasses when the presence of HCN is suspected. After cutting, make sure that the grasses are thoroughly dried before baling. Never bale material with HCN until it contains less than 18 percent moisture. Much of the problem probably occurs because of wet clumps or spots in the windrow. Wait until **all** the hay is dry; averages do not apply in this case.

Nitrate poisoning. Nitrate poisoning usually occurs when high rates of nitrogen fertilizer are used in one application and then a drought occurs. Unlike prussic poisoning, high nitrite levels are found in the stems, especially the lower portion, and not in the leaves and young growth material. The nitrite in plants harvested for hay does not dissipate as it cures, so problems can occur when the hay is fed. There can also be problems in grazing the stubble in the fall and winter, especially after the leaves and upper parts of the plant are consumed and cattle begin eating the lower part of the stalk. Nitrate poisoning can occur in pearl millet as well as in the sudangrasses and crosses.

What to do if you suspect HCN or nitrate. You can get kits to test for these problems from local extension area agronomists. If possible, dilute the suspected material with other feeds that are known to contain little or no toxic material. What counts is the total amount of toxic material that the animal consumes and not the percentage found in the suspected material. In fact, high energy grain not only dilutes the amount of toxic material but tends to counteract its effect. This is especially true with feeds containing high amounts of nitrites.

If possible, allow the suspected plants to become taller and more mature. This will almost always dilute the dangerous substances.

The probability of prussic acid poisoning in milo or grain sorghum stubble following harvest is usually not great. The parts of the plant containing the substance causing HCN problems have been shredded by the combine. If allowed to dry, there will be no problems.

The one exception occurs if there has been an exceptional amount of tillering at the base of the stalk followed by a heavy frost. Then, it is best to remove the cattle for several days until the tillers have completely dried or cured.

When grazing milo stubble, the danger of nitrate problems are greater than the danger of HCN poisoning. The reason is that the concentration of nitrates (if present) is in the lower or butt portion of the stalk. The HCN would have been in the upper or newer growth of the plant.

Growing and Grazing Pearl Millet

Pearl millet may be used as you would sudangrass. It may be safely grazed at any stage of growth or at any time of year.

Pearl millet is not recommended for the northern half of Missouri. In the southern half of the state, it may yield more than sudangrass if the weather is drier and warmer than usual. If cool conditions persist throughout the growing season, pearl millet may yield less than sudangrass.

Cultural practices for pearl millet are about the same as for sudangrass. Seed after normal corn planting time when the soil temperature is above 60 degrees F.

There is little difference in yield between seeding in 7-, 14- or 21-inch drill rows. The rate of seeding should be about 20 pounds per acre. Fertilize as for sudangrass.

Pearl millet recovers more slowly from close grazing than sudangrass. For best yields, don't graze the stubble

closer than 6 to 8 inches. In general, pearl millet has slower regrowth than sudangrass, and its growth rate may be greatly reduced by cool weather.

Pearl millet's sensitivity to temperature makes it difficult to compare yields to sudangrass or sorghum-sudan crosses. In some cases, it has yielded 30 percent less dry matter than a commercial sorghum-sudan cross. Performance of grazing steers on pearl millet has been about the same as on sudangrass.

Some research stations have reported lower butterfat levels from dairy cows grazing pearl millet than from sudangrass.

Rape

Rape, *Brassica napus*, is neither a grass nor a legume but belongs to the same plant family as cabbage and turnips. It is the best emergency pasture available for swine and is sometimes used for sheep pasture. In nutritional value, it is comparable to alfalfa and ladino clover. In fact, in some experiments with hogs it was nearly equal in feeding value and exceeded alfalfa in carrying capacity.

In Iowa experiments, rape contained 28 percent protein on a dry matter basis compared to 30 percent for alfalfa. Stocking rate is usually about 20 shoats per acre.

Rape will grow on any soil adapted to corn but has especially high nitrogen and lime requirements. The soil

should have a pH of at least 6.0 as rape will have little growth on acid soils.

Nitrogen, phosphorus and potash should be supplied as for 100 bushels for corn per acre.

Dwarf Essex is the variety best adapted to Missouri and is generally available. Rape does best when seeded on a prepared seedbed early in the spring with spring oats, but may be seeded as late as June. However, late May or early June seedings will yield considerably less than those made in February, March or early April. A seeding rate of 5 or 6 pounds of rape and $\frac{3}{4}$ to 1 bushel of oats is suggested. Heavier seedings rates of oats tend to provide excessive competition for the rape and to reduce yields. Rape may also be seeded alone with a wheat drill on a prepared seedbed. If a drill is used, the rape seed should be seeded through the grass seed attachment. If rape seed is broadcast, it should be lightly covered with a cultipacker.

Since the young rape plants are seldom injured by frost, early seedings will reach about 10 inches in height in about six to eight weeks and are then ready to graze. Rape should never be grazed so heavily that only the bare stalks remain because this delays new growth.

In the south, rape is often fall seeded and used for fall and winter pasture. However, Missouri is too far north for this practice to consistently result in high yields of forage.

Sun scald or blistering have been reported on white hogs grazing rape, but they are easily controlled.

While rape is primarily for swine and sheep, it also is satisfactory for cattle. Although rape is not a legume, there is some danger of bloat for ruminant animals.