

WARM SEASON ANNUAL GRASSES FOR EMERGENCY FORAGE PRODUCTION

**John Woodruff and Dennis Hancock, Extension Agronomists,
Department of Crop and Soil Sciences, University of Georgia**

Warm season annual grasses are often planted to attain fast or temporary production when extra summer forage is needed. Most of the warm season annual grasses emerge and establish quickly and are very tolerant of drought. They can be used for grazing, hay, and silage. These species, under stress conditions, can accumulate levels of prussic acid and nitrates that are toxic to livestock. Careful management is necessary to ensure that these forage species are utilized well and are free of toxins.

In this article, basic agronomic and forage management information about the most common summer annual forage species are presented. The yield potential of each of these species will be compared in general terms. New varieties are released each year, so it is important to examine the yield comparison trials in UGA's Statewide Variety Testing Program (<http://commodities.caes.uga.edu/swvt/>).

CHOICE OF WARM SEASON ANNUAL GRASS SPECIES

Listed below are some of the warm season annual grasses that might be considered for temporary summer pasture. These species are listed in order of importance (acreage planted) in Georgia.

PEARL MILLET (*Pennisetum glaucum*) originated in Africa and is the most widely planted summer annual grass in Georgia. Varieties such as 'Tifleaf-3' or 'Pennleaf' can produce over six tons/A dry matter yields. Even under moderate drought conditions, these varieties will rarely yield less than four tons/A. This species also has a distinct advantage over sorghum, sudangrass, and sorghum x sudangrass hybrids because pearl millet does not produce prussic acid. Thus, pearl millets can be grazed or harvested at any growth stage and during droughts without the risks associated with prussic acid poisoning. Like the warm-season sorghums (*Sorghum* spp.), however, pearl millets can also have high nitrate levels.

Planting can be made in the spring as soon as soil temperature (at 2 in. depth), warms to 70° F. Seed can be broadcast (25 – 30 lbs/A) or planted in narrow (< 15 in.) or wide (up to 36 in.) rows (12-15 lbs/A). Planting depth should be at a soil depth of ½ to 1 inch.

Pearl millet can be grazed or harvested as hay or silage. Researchers at Tifton have had good results starting pearl millet grazing when plants accumulate 20 – 24 in. height and by maintaining a 9 – 12 in. stubble height. Pearl millet can make good quality hay if cut when height is 2 – 3 feet tall. This prevents the forage from maturing beyond the boot stage and therefore being too mature. If harvested prior to advanced maturity stages, the range of total digestible nutrients (TDN) can be expected to be 52-58%, while crude protein (CP) will range from 8-11%. There is some evidence to suggest that seeding rates at the high end of the aforementioned ranges will promote a higher leaf:stem ratio. This should improve forage quality and speed the drying time of the forage when it is cut for hay. Drying time for millet hay can also be sped up by the use of a conditioner.

SORGHUMS – (*Sorghum* spp.) are a class of warm season annual grasses that are also of African origin. Several forage types have been developed. However, these grasses will accumulate toxic levels of prussic acid and nitrates under stress conditions. As such, they are not preferred choices for grazing or hay production. Their primary use is for silage. The ensiling process (after 2 to 3 weeks) results in the dissipation or breakdown of prussic acid and high nitrate levels, reducing the toxicity problem for livestock.

In addition to the potential for prussic acid toxicity, some have reported the presence of an unidentified toxin in sorghum, particularly in sorghum x sudan hybrids. This toxin or factor appears to cause spinal cord degeneration and, in extreme cases, paralysis in horses. The potential for this problem and the lack of an effective treatment or cure for this syndrome has led to a general recommendation that horses should NOT be fed forage from the sorghum family.

Like pearl millet, sorghums can be planted in close or wide rows. Seeding rates are usually in the range of 140,000 to 170,000 PLS per acre and the seed should be placed at a depth of about one inch. Higher seeding rates can help to decrease stem size, but sorghums are generally more difficult to cure for hay. However, sorghums that have been seeded at higher rates will often have more lodging problems, especially relative to dwarf pearl millet stands. Brown midrib varieties (BMR) are usually preferred varieties since they have less lignin and higher digestibility than other varieties. In general, sorghums will have TDN values ranging from 53 - 60% and CP concentrations of 9 - 15%.

Forage sorghums (*Sorghum bicolor* (L.) Moench) are high yield producers that may have from 0 to 50 percent grain in the forage, depending upon the hybrid and stage of maturity at harvest. As plants mature, lignification increases sharply reducing digestibility and quality. Careful selection of BMR hybrids and timing of harvest are necessary to get highest total digestible nutrients (TDN). Highest crude protein and digestibility will usually be obtained by harvesting in the vegetative growth stage while dry matter production will be increased from more mature plants. Harvesting in the late grain dough stage will maximize the TDN harvested per acre. Although grain sorghum is the same species, grain sorghum varieties are typically lower in forage quality than forage sorghum cultivars.

Sudangrass (*Sorghum sudanese*) has finer stems, tillers more profusely, and is leafier than forage sorghums. They produce very few seed. Their rate of regrowth after cutting or grazing is superior to that of sorghums. For this reason, they are sometimes used for temporary rotational grazing. They tend to have less prussic acid accumulation than forage sorghums, and the levels decrease with maturity. For this reason, care should be taken to let sudangrass accumulate to at least 24 inches of regrowth before grazing.

Sorghum x sudan hybrids are the most common summer annual sorghums planted in Georgia. These hybrids have the highest yield potential of any of the summer annuals. If a stand can be irrigated during a drought, then sorghum x sudan varieties are superior to pearl millet or other summer annuals. Sorghum x sudans can be used for grazing or silage, but like other annual sorghums, their forage is very difficult to dry to moistures suitable for hay production. If grazed, the sorghum x sudan hybrids should be rotationally grazed allowing regrowth height to reach 24 inches before grazing (i.e., managed like sudangrass).

BROWNTOP MILLET (*Urochloa ramosa* (L.) Nguyen) originated in South East Asia. Because it is commonly used for wildlife (dove fields) and erosion control, many farm supply stores carry browntop millet varieties. Thus, it is occasionally used for grazing or hay production. However, browntop typically grows only to 2 - 5 ft tall and produces only 60 - 70% of the dry matter of other summer annual forages. However, it can be planted as late as August. The seeding rate for Browntop millet is 25 - 30 lbs/A and it should be seeded to a depth of ½ inches in a firm seed bed.

FOXTAIL MILLET (*Setaria italica*) is an annual warm season grass which can grow 2 - 4 ft tall with cultivation. Foxtail millet was cultivated in China as early as 2000 BC, and later introduced to Europe. It was brought to the US in about 1850, and is often used as emergency summer grazing, or hay, or stabilization for construction and disturbed soil sites. Foxtail millet may have a place in pasture systems where the primary grass fails or is in short supply. Foxtail millet, though, has been largely replaced by other summer annuals as they are typically superior in quality and yield. When used, foxtail millet should be planted at 20 – 30 pounds seed per acre, at a soil depth of ¼ to ½ inch, and on a firm seed bed.

PEST MANAGEMENT IN WARM SEASON ANNUAL GRASSES

It is important to prevent yield damage from pests. Though options are limited for weed control in summer annual grasses, pearl millet and the sorghums are typically fast growing and competitive with weeds. However, insect damage to summer annual grasses can be very problematic. For example, chinch bugs often limit yields during a drought year and reportedly are more severe when the summer annuals are planted into small grain stubble. Additional details on weed control options and treatment thresholds for insect pressure are presented in the [Georgia Pest Management Handbook](#)'s section on "[Temporary Grazing](#)."

FERTILIZATION OF WARM SEASON ANNUAL GRASSES

Summer annual forages must be fertilized to reach their yield potential. As with all crops, fertilization and lime application should be done according to recommendations based on the results of a soil test. Warm season annual grasses generally perform well on soils with water pH values around 6.0 or higher. However, pearl millet is less sensitive to soil acidity than the sorghums. Nitrogen (N) is needed in large quantities and is most often the least limiting nutrient. Apply 60 - 80 lbs of N/A at planting and after the first two cuttings for a seasonal total of 180 - 240 lbs of N/A. Summer annuals grown under irrigation should receive N rates on the upper end of these ranges.

SUMMARY

Warm season annual grasses can provide substantial forage yield in a short period of time. However, producers should pay particular attention to selecting the appropriate species to meet their needs. Pearl millet tends to be more applicable to dryland production, where soil pH is somewhat low, and when hay production is required. Sorghum x sudangrass hybrids generally provide more forage yield per acre, especially when irrigated. Regardless of species, fertilization and pest management is critical to obtain high yields.