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Cooperative Extension

Native Warm-Season Grasses

Native Warm-Season Perennial Grasses for Drought Management in Forage Production

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Drought conditions affect most farmers, including those raising livestock. Understanding ways to manage this risk is important for the future productivity of the farm. One way that these risks can be mitigated is by planting a diversity of forages that include drought-tolerant varieties.

What are they?

Native warm-season perennial grasses evolved in the mid-South region of the U.S. and typically grow the most biomass between June and August when temperatures are between 85 and 95°F (Fig. 1). They are C_4 grasses

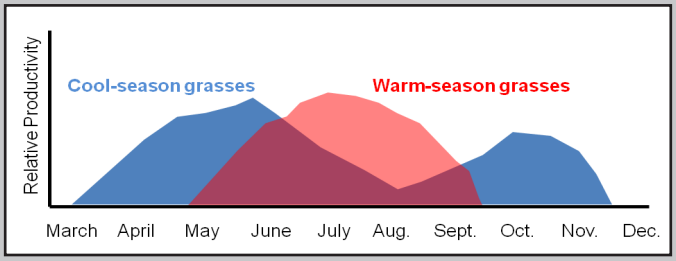

Fig. 1. Change in relative productivity for cool- and warm-season grasses.

which means they undergo photosynthesis differently from C_3 grasses. Examples of C_4 and C_3 grasses can be found in the table below:

C_3 Forages	C_4 Forages
Tall fescue	Switchgrass
Orchardgrass	Big bluestem
Kentucky bluegrass	Little bluestem
Timothy	Indiangrass
Smooth bromegrass	Eastern gamagrass
Reed canarygrass	Broomsedge
Perennial ryegrass	Sideoats grama

Uses

These grasses can be used in a number of different applications including wildlife habitat, forage, erosion prevention, and even bioenergy.

Examples

Some examples of native warm-season perennial grasses include switchgrass, big bluestem, little bluestem, indiangrass, and eastern gamagrass. In addition to pure stands of each grass, mixed stands of big bluestem, little bluestem, and indiangrass can also be grown. Each grass type has different characteristics but can all be used for forage.

Drought management

Native warm-season perennial grasses are important for drought management in forage production because they typically grow during the summer months when cool-season grasses become dormant. Once these grasses are established, they can be extremely useful during periods of drought because they have deeper root systems than most grasses and can access water and nutrients that other grasses would not be able to access. The C_4 photosynthetic pathway also allows these grasses to be more water-efficient, making them more durable during water-limited seasons.

During the 2012 drought, many producers were either trying to purchase hay at elevated prices or considering selling their cattle. Producers growing native warm-season perennial grasses were still able to continue growing forage even though much of the other forages had ceased to produce (Fig. 2).

Fig. 2. Field of Eastern gamagrass in Giles County during the 2012 drought (June 29). The field had already been cut and was regrowing well while other pastures (background)were no longer productive.

These grasses, therefore, could be used under summer drought conditions to maintain a herd until conditions improved.

Advantages

1) **Nitrogen use-efficiency:** The C_4 activity of these grasses allows them to require less nitrogen for the same level of photosynthesis.

2) **Prevent overgrazing:** Using these grasses as a forage in conjunction with cool-season grasses can allow the cool-season pastures to rest and prevent overgrazing.

3) **Reduced costs:** The perennial nature of these warm-season grasses can reduce costs associated with annual establishment and can also reduce the risk of establishment failure.

4) **Yield:** These grasses typically yield 4 to 5 tons per acre.

Disadvantages

1) **Establishment:** These grasses can be difficult to establish and require shallow seeding with advanced weed control the August prior to spring planting. Full establishment and maximum yields may take a couple of seasons as the grasses focus more on root development than shoot development.

2) **Nutrition:** While these grasses can produce protein levels of 15% or higher, these levels drop significantly with time (Fig. 3).

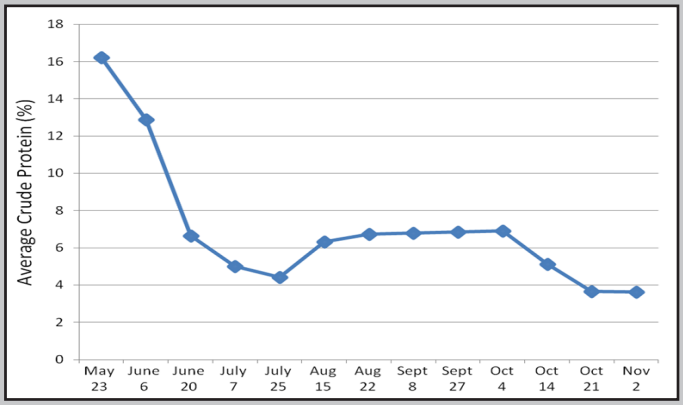

Fig. 3. Change in crude protein content of switchgrass with time. The switchgrass data is from 2011 and harvested at the Tennessee State University Agriculture Research and Education Center in Nashville. The increase in N in the later part of the season is most likely due to seed development.

3) **Management:** Due to changes in nutrition and growth rate, stocking rates for cattle change through the season. It is important to maintain adequate height (15-18") to maintain stand vigor. Also, during the early part of the growing season, it is important to keep enough cattle in the field to prevent the grasses from becoming too coarse.

Additional resources

de Koff, J.P., and C. Robbins. 2012. Calibrating seed drill seeding rates for native warm-season grasses. Tennessee State University Cooperative Extension Program, ANR-B2. Available at: http://www.tnstate.edu/extension/documents/warm%20season%20grasses.pdf

Keyser, P., C. Harper, G. Bates, J. Waller, and E. Doxon. 2011. Native warm-season grasses for mid-South forage production. University of Tennessee Cooperative Extension Program, SP731-A. Available at: https://utextension.tennessee.edu/publications/Documents/SP731-A.pdf

Keyser, P., C. Harper, G. Bates, J. Waller, and E. Doxon. 2011. Establishing native warm-season grasses for livestock forage in the mid-South. University of Tennessee Cooperative Extension Program, SP731-B. Available at: https://utextension.tennessee.edu/publications/Documents/SP731-B.pdf

Keyser, P., G. Bates, J. Waller, C. Harper, and E. Doxon. 2011. Grazing native warm-season grasses in the mid-South. University of Tennessee Cooperative Extension Program, SP731-C. Available at: https://utextension.tennessee.edu/publications/Documents/SP731-C.pdf

Keyser, P., G. Bates, J. Waller, C. Harper, and E. Doxon. 2011. Producing hay from native warm-season grasses in the mid-South. University of Tennessee Cooperative Extension Program, SP731-D. Available at: https://utextension.tennessee.edu/publications/Documents/SP731-D.pdf

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