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Grazing Native Warm-Season Grasses in the Mid-South

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Introduction

What Are Native Warm-Season Grasses?

Native warm-season grasses (NWSG) are those that have grown in an area prior to human settlement and were not brought in more recently from other parts of the world. Such grasses are naturally well-adapted to the region's soils, climate and the insects and diseases that may also occur naturally in the area. While there are many species of grasses native to the Mid-South, this publication will focus on five species that are important for forage production: big and little bluestem, indiangrass, switchgrass and eastern gamagrass. These are tall, deep-rooted perennials with excellent drought tolerance and high yields.

Growth Seasons

Another important characteristic of these grasses is that they grow during the summer and are thus referred to as "warm-season" grasses (Fig. 1). Switchgrass begins to grow rapidly in late April, slows the pace considerably by late June and becomes semi-dormant in August. Big and little bluestems follow a similar pattern, but do not begin their rapid growth until early May. Gamagrass begins growing rapidly by mid-April, slows down in June and maintains modest growth until early September. All will go completely dormant during October and begin to break dormancy in late March/early April.

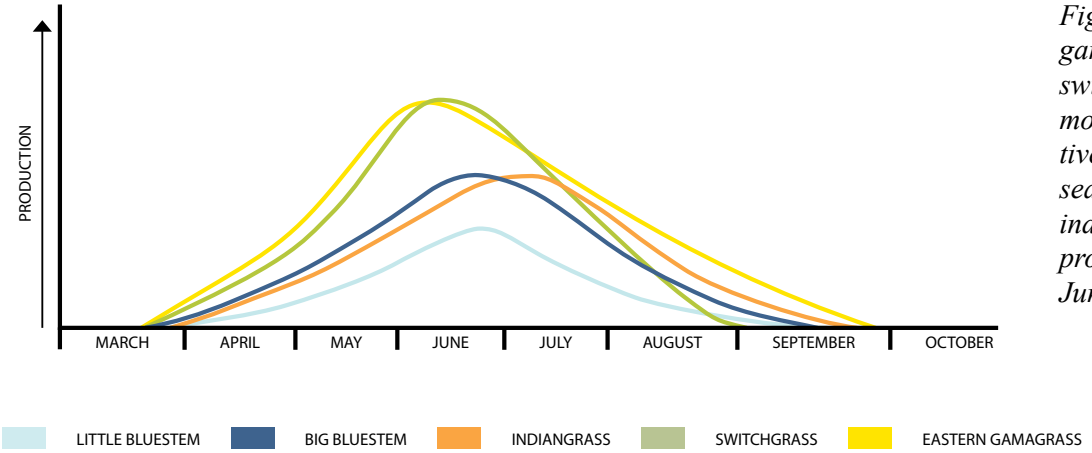

Fig. 1. Eastern gamagrass and switchgrass are more productive early in the season, while indiangrass peak production is in June and July.

How Do These Species Compare?

These five species are all similar, but have important differences in key characteristics (Table 1). Switchgrass (Fig. 2) is probably the most well-known of these five species in the Mid-South because of the recent interest in growing this species for biofuel production. While it can be a good forage, switchgrass tends to get stemmy and requires close management to ensure acceptable forage quality. Big bluestem (Fig. 3) may be best known as a major forage species of the Great Plains, where native stands are widely grazed by cattle. It is a highly palatable forage and often considered the best of the native grasses. Little bluestem (Fig. 4), as its name suggests, is much smaller than big bluestem or switchgrass and has lower yields. Indiangrass (Fig. 5) has a growth habit very similar to big bluestem and is often planted in mixed stands with big and little bluestem. Eastern gamagrass (Fig. 6) produces as much or more forage than switchgrass and requires high stocking rates for proper management. It also is the earliest maturing of these five species and appears to maintain growth later in the summer as well.

photo by Clarence Coffey

Fig. 2. Switchgrass is a tall grass with an open "panicle" seedhead produced in June.

photo by Clarence Coffey

Fig. 3. Big bluestem can be recognized by its "turkey foot" seedhead, which comes out in late June through July.

Why Should I Use Native Warm-Season Grasses?

Native grasses can make an important contribution to your forage program in a number of ways. Some of the most important issues are addressed in the following paragraphs.

Better Summer Forage Production

The vast majority of forage production in the Mid-South is based on cool-season grasses, such as tall fescue and orchardgrass, species that grow best during the cooler parts of the year (March through May and September to November). Cool-season grasses are not adapted to summer conditions and do poorly during that time of the year. Native warm-season grasses are more efficient with their

Table 1. Comparison of key attributes of five important native warm-season grass forages.

Attribute	Switchgrass	Big bluestem	Little bluestem	Indiangrass	Eastern gamagrass
Yield	Very high	High	Moderate	High	Very high
Wet Site Tolerance	High	Moderate	Low	Moderate - Low	High
Dry Site Tolerance	Moderate	Moderate	High	Moderate - High	Low
Maturity	Early	Medium	Late	Late	Earliest
Palatability	Moderate	Highest	Moderate	High	High
Establishment	Most difficult	Moderate - easy	Easiest	Easiest	Moderate
Management	More difficult	Easier	Easier	Easier	Moderate

Fig. 4. Little bluestem, as its name implies, is shorter than the other NWSG, but still retains the "bunch" growth habit common to these species.

Fig. 5. Indiangrass can be recognized by its pale green stems and golden head. The seedhead appears in August, later than the other NWSG.

Fig. 6. Eastern gamagrass is a robust grass with an unusual seedhead that is the earliest of the NWSG to come out, typically in late May.

water use and more adapted to hot, dry summer conditions. They complement cool-season forages by providing production during the summer months. By growing both cool- and warm-season forages, your farm can produce an adequate supply of high-quality forage for a much greater portion of the year.

The Opportunity to Rest Cool-Season Grass Pasture

Better summer forage production from warm-season grasses results in less dependence on cool-season grass pastures for summer grazing. Rested pastures can remain in better condition, need less frequent reseeding and are less prone to soil erosion. This is also an opportunity to allow tall fescue to be "stockpiled;" that is, allowing late summer and fall growth to accumulate until well into the fall. In addition, cool-season pastures can be more fully utilized in the spring, because it is not necessary to conserve spring growth for summer use.

Drought and Native Warm-season Grasses

Although NWSG are drought-tolerant, the summer of 2007, the single worst drought year recorded in Tennessee, provided an unusual opportunity to measure that characteristic. This example comes from a switchgrass biofuel trial conducted in West Tennessee. In this study, switchgrass was harvested only once each year in the fall. These switchgrass stands, which had been monitored for several years, were yielding about 8 tons of biomass per year. During 2007, the yield dropped, but still remained at 5.3 tons/acre!

Table 2. Summary of cattle performance while grazing native warm-season grasses at four UTIA Research and Education Centers, 2009 and 2010.

Animals Grazed	Grazing System	Forage Species	ADG	Days Grazed	Total Animal Days/ac	Total Gain/ac
Stockers	Early season	Big bluestem/indiangrass blend	2.65	30	74	196
(600 lb)		Switchgrass	2.21	30	85	189
		Eastern gamagrass	1.70	30	98	162
	Full season	Big bluestem/indiangrass blend	2.21	60 - 95	136	299
		Switchgrass	1.65	74 - 95	169	289
		Eastern gamagrass	1.12	95	223	249
Bred heifers	Full season	Big bluestem/indiangrass blend	1.87	66 - 87	125	189
(1000 lb)		Switchgrass	1.45	66 - 87	101	180

Improved Summer Weight Gains

Cattle perform well when grazing NWSG during summer months (Table 2). Recent grazing trials in Tennessee reported gains between 1.1 and 2.4 lb/day on 650-lb weaned steers during a 90-day grazing season. This provides an excellent opportunity to hold stocker calves longer and produce additional gain. Those same Tennessee studies demonstrated that gains during the first 30 days of the summer grazing period were most impressive (1.7 to 2.8 lb/day). Such gains do not continue throughout the summer.

Reduced Acres Needed for Hay Production

Because of their higher per-acre yields (3 – 6 tons, depending on species and site quality), NWSG can meet hay production targets from fewer acres than what is required for cool-season grasses (typically 2 – 3 tons/acre). Using fewer acres for hay production can free up other acreage for grazing.

Using Native Warm-Season Grasses in a Grazing Program

How Many Acres Should I Plant?

There are no hard and fast figures that will apply to all Mid-South producers, but all forage programs in this region can benefit from having some acres devoted to producing perennial warm-season forages. Typical recommendations vary from 10 to 35 percent of your acres in such forages. One simple way to assess this figure for your operation is to determine what proportion of your total grazing occurs during the period May – August and use that as a guide.

However, as with any crop you are not familiar with, you should begin by planting smaller units (5 – 15 ac) until you reach your goal. This maintains an adequate forage base during the transition, spreads out risk and allows you to learn – and adjust your acreage goals – as you go.

How Should I Manage My NWSG Grazing?

A key to proper grazing of NWSG is maintaining the proper height in the pasture. They should not be grazed too close or allowed to get too tall. Managing grazing pressure is the key to both.

Don't Allow NWSG to Get Too Short

Because all of these grasses are tall-growing, they have few leaves close to the ground and growing points much higher above ground than many of the other forage species grown in this region. Consequently, they are more prone to overgrazing and should not be grazed closer than about 12 inches tall. If they are grazed below this height,

Fig. 7. Grazing below 12 inches weakens NWSG and allows weed encroachment.

regrowth will be slowed, root energy reserves will be lowered, weeds will be able to encroach and stands will begin to thin (Fig. 7). Longer recovery periods will be needed when NWSG are grazed too short.

Don't Allow NWSG to Get Too Tall

During the first 6 – 8 weeks of the growing season, forage production from these grasses is quite impressive. Often, producers do not stock heavily enough and the forage gets ahead of the cattle, at which point it becomes mature and stemmy (Fig. 8). Allowing the forage to get more than 30 inches tall will make grazing management difficult, particularly during the early portion of the summer, and forage quality will be reduced. When NWSG reach the appropriate height to initiate grazing (see **When Do I Start Grazing**, on page 6), you may still have ample forage in your cool-season grass pastures. In that case, you will need to make a decision on which forage you should use based on the class of animals (cow-calf, heifers, steers, etc.) you are grazing and their nutritional needs. Be prepared to harvest unused forage on the pasture that you do not graze.

Fig. 8. Without adequate grazing pressure, NWSG, especially switchgrass (above), can become too stemmy and forage quality will decline.

Managing Grazing Pressure

The key to successfully managing grass height and maintaining viable, productive stands over the long term is to manage grazing pressure. Even if you start the season with a good stocking rate (see sections **Stocking During the Early Season** and **Stocking During the Late Season,** on page 6), you cannot count on being able to maintain those rates all summer long. You will have to make some adjustments to accommodate changing growth rates of the grass – and to take full advantage of the available forage in your NWSG pastures. There are basically three ways to handle these adjustments, all of which are similar and are simply variations in matching grass height and available forage to cattle numbers. Each is described below.

Adjust as Needed

This approach involves monitoring the height of your pastures once a week or perhaps once every two weeks and adjusting the number of animals as needed to maintain the proper grass height (Fig. 9). When the grass in your pasture drops below 15 – 18 inches in average canopy height, remove some animals to reduce grazing pressure. On the other hand, if it gets above 20 to 24 inches in average canopy height, be prepared to increase stocking rate. If you use this approach, you need to have additional pasture of some type to be able to hold the animals you have pulled off the NWSG. The key is to regularly observe your pastures and know their condition so you can anticipate adjustments. With some experience, you should only have to make minor adjustments. For example, following the guidelines provided below for stocking rates, only two or maybe three adjustments will be needed all summer to manage bluestems or indiangrass. Switchgrass, on the other hand, may require more frequent adjustments, especially early in the season when growth is most rapid. In terms of numbers to adjust, generally you will only need to increase or decrease by about 20 percent at any given time.

Fig. 9. Maintaining proper grazing pressure will result in grass canopy heights between 15 and 20 inches tall, an ideal situation for maintaining high-quality forage and vigorous NWSG stands.

During the late season, there are two circumstances where average canopy height of the grass may not be a good guide for making stocking adjustments. First, if the stand has gotten stemmy, you could have plenty of height, but cattle will respond by stripping leaves. The result will be a very low leaf surface area for the plants, not unlike the conditions where the plant is grazed too short. Second, grazing can be irregular, resulting in patches where grass height is only 6 inches and others where it is 24 inches or taller. The average may be fine, but too many close-cropped plants can result in a weakened stand. In both of these cases, judgment will be required to decide appropriate adjustments or cessation. It is better to err on the side of maintaining a vigorous stand of these long-lived perennial grasses than to try to squeeze out a few more days of grazing.

What about Rotational Grazing?

An alternative to periodically adjusting stocking rates is to rely on a system in which you move all cattle onto and off of two or more pastures. This approach is normally referred to as rotational grazing. This system may require additional fencing and water sources, but it can produce very satisfactory results. A simple guideline to using this system is to begin grazing when a stand reaches about 24 inches in height, graze down to about 12 inches and remove cattle. Once adequate regrowth is present, typically about 4 – 6 weeks, depending on what part of the summer it is, you can rotate cattle back onto that pasture. Regardless, with rotational grazing, decisions on when to move cattle from one pasture to another should be based on the condition of the grass itself and not a pre-conceived date or number of days between moves.

Clearly, it is important to have several pastures to rotate between (and accessible water for all of them). Also, be aware that stocking rate and pasture size exert a strong influence on one another. Therefore, many rotational grazing set-ups rely on fairly small pastures to ensure adequate cattle numbers are available to graze the pastures in a timely manner.

Consider Cutting Some for Hay

One other relatively easy option for managing grazing pressure is to set aside a portion of your NWSG to cut for hay during the spring growth flush. As growth slows, and stocking rates need to be reduced on the grazed portion, some of your cattle can be moved off the pasture and onto the regrowth behind the hay harvest. Conversely, if you do not anticipate having enough grazing pressure during the spring, or see that grazing pressure is getting behind the grasses' growth, haying is recommended. Once you have adequate regrowth following the hay harvest, normally after about six weeks, you can resume grazing. You may even decide, especially in the case of switchgrass, which can get stemmy quickly, to always take the early growth by haying. In that case, the cut would ideally be taken the first week of June (when the plants are in boot stage) when quality and quantity are optimized. See UT Extension publication, *Producing Hay for Native Warm-Season Grasses in the Mid-South* (SP731-D), for additional information on harvesting hay.

When Do I Start Grazing?

Grazing should be initiated in the spring when the average height of the grass canopy in the pasture has reached 15 inches. This will typically occur during late April and early May in the Mid-South. Eastern gamagrass will be ready sooner, bluestems and indiangrass later, but all will vary a week or so either way depending on the weather patterns each year. Starting earlier may weaken the grasses by preventing them from developing adequate leaf surface area to support grazing. It should be noted that all of the recommendations in this section pertain to fully established, mature stands. During the seedling year, NWSG should not be grazed. See UT Extension publication *Establishing Native Warm-season Grasses for Livestock Forage in the Mid-South* (SP731-B) for additional details on establishment and management of second year stands.

Stocking During the Early-Season

Switchgrass can go from 15 inches tall on May 5 to 50 to 70 inches tall, depending on soil quality and available moisture, within 30 days. Therefore, stocking rates at this point should be quite high. A good rule of thumb is to stock at about 1,600 – 2,000 lbs of animal/ac during this period for switchgrass and gamagrass. This works out to be either three weaned steers, two bred heifers or two cow-calf pairs per acre. For big bluestem or indiangrass-dominated pastures, target stocking rates for early-season grazing are about 1,200 – 1,400 lbs of animal/ac. During this early grazing period, rainfall will not have a strong effect on yield. Later in the season, though, it will have a greater impact – and, therefore, may alter stocking targets. As you move into late June, be prepared to reduce the stocking rate.

Stocking During the Late-Season

As the end of June approaches, growth rates for NWSG will slow and acceptable stocking rates will drop. Some good targets for late June through early August are 1,400 – 1,600 lbs of animal/ac for switchgrass and gamagrass, and 900 – 1,200 lbs of animal/ac for big bluestem

or indiangrass. As mentioned above, rainfall can impact regrowth of grazed plants and will influence stocking decisions. Also, keep in mind that while NWSG thrive at temperatures from the low 80s up into the lower 90s (F), temperatures in the mid to upper 90s will slow regrowth and can impact stocking rates. Continue to monitor your pastures on a weekly or biweekly basis during this period.

When Do I Stop Grazing?

During August, you will need to keep an eye on the grass to determine when to cease grazing for the summer. Normally, September 1 is a good target. For much of the Mid-South, this will allow six weeks before the average first frost date and will allow these perennial plants to restore root reserves for winter dormancy. This is very important to maintaining the stand's vigor and ensuring a strong start the following spring. If average stand height drops below the targets mentioned above, 15 – 18 inches, regardless of date, reduce stocking. If average stand height drops below about 12 inches, cease grazing for the season and allow the plants to have a recovery period before fall dormancy.

Fertilization of NWSG Pastures

Because NWSG are adapted to low-nutrient environments, they are not particularly responsive to fertilization. Thus, do not fertilize native grass pastures with P or K unless they test in the low category. If they test low, follow soil lab recommendations for supplementing P and K. Similarly, studies of switchgrass for biofuel production suggest there is no growth response once soil pH is above 5.0. If soil pH tests below that level, lime should be added per soil test recommendations. In a grazing setting, modest N inputs – up to 60 lb/ac – will provide increased production where needed. An additional 30 lb/ac could be added prior to late June if additional yield is desired. Regardless, do not fertilize above a total of 90 lb of N/ac, as yields will not increase and weed competition may respond.

In terms of timing, avoid fertilizing too early in the season, prior to mid- to late April, because cool-season weeds may benefit more than the grass. A good guideline is to fertilize once the stand is about 12 inches tall and outgrowing the early weeds. Also, evidence shows such applications are preferable to mid-season applications. Where an initial hay cutting was taken and you plan to graze the aftermath, an application of N (once the grass has started to regrow vigorously) prior to late June may be a good investment if moisture is adequate, but do not exceed 30 – 45 lb/ac. Do not fertilize thin stands. You are more likely to help the competition than the NWSG. Instead, consider resting the stand or possibly overseeding it to allow it to thicken-up first. Another alternative would be to control the weeds prior to fertilizer application.

What about Prescribed Burning?

Native warm-season grasses respond favorably to fire and burn readily during the dormant season. Burning increases palatability and nutrient value of NWSG and was used historically by both Native Americans and stockmen. When used properly, it can be a good practice for Mid-South forage growers. If you decide to burn your NWSG pastures, take all necessary precautions, including checking weather forecasts, burning only when conditions are safe (moderate wind and humidity conditions), preparing adequate fire lines in advance, and having enough help and equipment on hand to contain any spot-overs. Native grasses should be burned during early April (just after dormancy break) in the Mid-South for best results when grazing or haying. Earlier burns may encourage cool-season grass and weed encroachment, while later burns may set back growth of the NWSG. Ideally, stands should be burned once every two to three years.

Potential Pitfalls

Although NWSG can provide many benefits, they, like any other forage option, have a few pitfalls for which you should be prepared. All are related to the basic biology of these species. Further detail is provided in the three sections below.

Getting Behind

Native grasses can grow quite quickly during the late spring and early summer. If adequate grazing pressure is not provided, plants can reach heights of greater than 6 feet and become stemmy, reducing palatability. Cattle gains will be reduced, utilization will be poor and the grasses will become difficult to manage in a grazing program. Proper grazing pressure should be applied to keep the stand between 15 – 18 inches tall, as mentioned earlier. In that condition, palatability and nutritive value will remain high and gains can be impressive. Be prepared for a grass that can put on three or even four tons of growth in four to six weeks or less. The potential to get behind in grazing is greater for switchgrass and eastern gamagrass

than bluestems and indiangrass. If you do get behind and grasses begin to head, utilization can be increased greatly by harvesting hay or using ultra-high stock density grazing (mob grazing).

Grazing Too Low

All five species require maintenance of adequate root reserves to keep the plant healthy. A stand can last for 15 – 20 years or longer with proper management. But with persistent over-grazing, stands can be weakened and gradually lost to weed competition. For these reasons, it is very important to maintain stand height above 15 inches and cease grazing once stand height drops below 12 inches. Sustained grazing at heights of less than 15 inches will severely thin a stand in two to three years. The later in the season overgrazing occurs, the more serious the potential impact.

Fig. 10. A properly grazed mixed stand of big bluestem and indiangrass (above) can provide high-quality forage during hot, dry summer months, providing an excellent complement to cool-season forages.

Grazing Too Late in Fall

As is the case with grazing too close, grazing too late into the fall can also deprive these grasses of the root reserves they require to stay vigorous and able to outcompete weeds. An absolute minimum of four weeks rest should be provided before frost. Since frost is unpredictable and can come early, provide six weeks of rest to help ensure strong root reserves are stored before winter. Any forage not grazed in early September is not nearly as valuable as the opportunity for all the plants to replace root carbohydrates going into winter.

Summary

Native warm-season grasses can be a valuable tool for Mid-South forage producers and complement existing cool-season forages. They can provide large volumes of high-quality forage, produce excellent gains and provide considerable protection against drought (Fig. 10). In addition, they require minimal fertilizer or lime to sustain productivity, and have few known insect or disease pests. On the other hand, they require closer management of stocking to capture their potential and prevent weakening the stand. If you would like to learn more about how these grasses might fit into your system, please contact your county Extension office or the Natural Resources Conservation Service (NRCS).

Center For Native GRASSLANDS Management

www.nativegrasses.utk.edu

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