

# Warm Season Perennial Grasses for Forage in Kentucky

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Warm season perennial grasses can be grown in Kentucky for soil conservation, wildlife, and forage. These grasses are productive in summer when cool season grasses such as tall fescue, orchardgrass, bluegrass, and timothy are semi-dormant. Warm season perennial grasses can be classified as either native or introduced.

Native warm season perennial grasses include big bluestem, eastern gamagrass, indiagrass, and switchgrass. They were an important part of the native forage species of Kentucky, supplying food and cover for buffalo, deer, and other wildlife when settlers first moved into the area. Overgrazing, plowing, and the introduction of other forage species led to near extinction of these grasses. In recent years, there has been interest in re-establishing them, primarily for soil conservation and wildlife. However, they also have some potential as forage for domestic livestock.

Introduced warm season perennial grasses being grown in Kentucky are old-world bluestems and bermudagrass. Old-world bluestems such as caucasian and plains were introduced from Asia and are very different from the native species. All these introduced species are fine-stemmed, leafy grasses that can be grazed or mowed shorter and more frequently than is possible with the native species. However, they do not provide good wildlife habitat, especially for ground nesting birds. In Kentucky trials, they have also been more productive than the native grasses, with yields as high as 7 tons of hay/acre (Table 1). Their growth is better distributed throughout the summer when compared with the native grasses, which makes stocking rate management easier.

This publication deals primarily with native warm season grasses and old-world bluestems. See AGR-48, Bermudagrass—A Summer Forage, for information on growing and managing bermudagrass.

<p><b>Table 1. Perennial Warm Season Grass Hay Yields (T/A), Princeton, KY - 1988. (M. Rasnake, J.L. Reid and J.L. Oldham)</b></p>
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Grass	- Harvest Date -			Totals
	6/3	7/25	8/31	
Caucasian Bluestem	2.04	2.30	2.97	7.31
Switchgrass	2.96	1.10	1.25	5.31
Big Bluestem	2.44	1.61	1.34	5.39
Plains Bluestem	1.50	1.90	2.63	6.03

## Establishment

Fortunately, most of these grasses can be grown on a wide range of soils. They are not very demanding in relation to soil fertility, but they do respond to proper fertilization. Avoid areas that flood for extended periods of time (more than ten days). Also, avoid soils with poor internal drainage. Eastern gamagrass and lowland cultivars of switchgrass do better on low, less well-drained sites. Big bluestem and upland cultivars of switchgrass prefer higher, well-drained sites.

## Fertilizing

Once you have selected an area, take a soil sample to determine the need for lime and fertilizer.

- If lime is needed, apply it before the soil is tilled so it can be mixed with the soil. Doing so mixes the lime into the root zone where it is more effective. Lime for a target pH of 6.4 at establishment.
- Apply phosphorus and potassium according to soil test recommendations. In general, try to maintain medium soil test levels of P and K.
- Do not apply nitrogen fertilizer at seeding. The warm season perennial grasses in general are slow starters, and nitrogen stimulates weed competition. Some nitrogen can be applied about July after the grasses have started growing if the stand is good.

## Preparing the Soil

Till soils in the spring at least a month before grasses are to be planted. Doing so kills weeds, conserves moisture, and allows preparation of a smooth, firm seedbed. A light surface tillage at seeding time will kill newly emerged weeds and give the new grass a chance to get off to a good start. No-till seeding is possible if a suitable no-till drill is

available. Existing vegetation should be killed a month before seeding and resprayed at seeding if needed. Check with the county agricultural Extension agent for information on herbicides that are currently available. Always apply herbicides according to the label.

## Timing

The best time to seed warm season grasses in Kentucky is May or early June. These grasses need warm soils to help speed up germination and establishment. Seedings made in late June can be successful if good soil moisture is present at seeding time.

## Seeding Rates

Seeding rates are based on pounds of pure live seed (pls) per acre. To determine the percent of pls, multiply the percent germination (including hard seed) by the percent purity and divide by 100. In most cases, seed of these grasses is sold by pounds of pure live seed. Table 2 gives the seeding rates for the different species when seeded alone. When more than one species is seeded, reduce the rates in proportion to the number of species used.

<b>Table 2. Seeding Rates for Warm Season Perennial Grasses.</b>	
<b>Species</b>	<b>Lb of Pure Live Seed/Acre</b>
Old World Bluestems	4
Big Bluestem	6-10
Indiangrass	6-10
Switchgrass	6-8
Eastern Gamagrass	6-8

## Methods of Seeding

Seeding these grasses is often more difficult than seeding the common cool season grasses. The seed of big bluestem, indiangrass, and the old-world bluestems are very light and fluffy, making it difficult to get them through seeders or to spread them evenly. Switchgrass that has been hulled or de-awned has a smooth, hard seed coat and can be seeded with most drills.

- Some drills are specially equipped to handle fluffy seed. Using such drills is the best option if they are available. If debarbed seed of big bluestem is available, most drills can handle it.
- Drop the seed on the soil surface, and press it in with the packer wheels. Small, light seed may be mixed with soybean meal if more bulk is needed for good spreading. Adjust the drills to place the seed no more than 1/4 inch deep.
- A corn planter is the best equipment for seeding eastern gamagrass. The proper seeding depth is 1.5 inches.
- The seed can be mixed with fertilizer and spread with a gravity-flow fertilizer spreader. This system does a good job if the seed is mixed thoroughly with the fertilizer. First seed the field in one direction and then again in a perpendicular direction to ensure uniform coverage. Then firm the soil with a corrugated roller.
- Spinner-type fertilizer buggies and trucks can be used, but seed distribution is not as good with the light-seeded species because the seed is too light to spread very far. With spinner-type spreaders, it is necessary to go over the field at least twice. This means the fertilizer application rate must be adjusted accordingly. After the seed is broadcast, the soil must be firmed again with a corrugated roller to ensure good seed-to-soil contact.

## **Mowing**

These grasses grow slowly during the year of establishment and their seedlings cannot tolerate much shading. Therefore, some mowing may be necessary during the first summer to help control weeds. Mowing tall weeds, especially broadleaf weeds, reduces competition and improves stand establishment.

- Native grasses and old-world bluestems have different mowing requirements. For native grasses, do not mow any closer than 6 inches. However, old-world bluestems tolerate mowing to about 4 inches.
- It may be necessary to mow twice during the first summer, but do not mow the field after the end of August. Not mowing during the fall encourages seed production and gives the plants time to recover before winter.
- Do not graze during the first year to avoid damaging the stand.

## **Managing Established Stands**

A good stand of warm season perennial grass should last indefinitely if managed properly. These stands should be managed to give them a competitive advantage over weeds and cool season grasses. For big bluestem, switchgrass, eastern gamagrass, and indiagrass, management should include rotational grazing and leaving a 6- to 8-inch

stubble. Begin grazing when the grass is 12 to 18 inches tall and don't graze shorter than 6 inches. Stop grazing these grasses by mid-September or earlier.

**Table 3. Quality Analysis of Perennial Warm Season Grasses Grown at Princeton, KY (% DM).**

Grass	Crude Protein	IVDMD	NDF	ADF	RFV*
Caucasian Bluestem	8.0	55.4	70.5	43.0	73.0
Switchgrass	11.0	57.4	66.6	35.2	85.8
Big Bluestem	10.5	56.3	68.7	38.3	90.7
Plains Bluestem	9.8	55.1	71.8	41.7	73.0

\*Relative Feed Value--an estimate of a forage's ability to supply energy in livestock diets, calculated from ADF and NDF measurements. Higher scores indicate higher energy values.

The old-world bluestems are tolerant of extended and close grazing. However, rotational grazing improves yield and quality of forage. Grazing should begin when they are 6 to 8 inches tall. Cut for hay no later than the boot stage. Once seed heads emerge, the quality has gone down drastically. Leave about 8 inches of cover in the fall for winter protection. This usually means not harvesting after September 25.

The forage quality of some warm season perennial grasses is shown in Table 3. If they are harvested at the boot stage or before, quality can be quite good. For example, crude protein content of early cut caucasian bluestem has been measured as high as 12% and total digestible nutrients (TDN) as high as 63%. However, if they are allowed to become too mature, protein can drop to 7% or lower, and TDN can fall to 54% or below. This shows why harvesting at the right time is so important for these grasses.

## Grazing and Mowing

Grazing studies have shown that cattle perform well on warm season perennial grasses. During July and August, performance of cattle grazing these grasses has been better than those grazing cool season grasses.

The warm season grasses should work best in systems containing cool season grasses and legumes in some fields and warm season grasses in others. An example of such a system would be to have 25% of forage acreage in tall fescue, 50% in tall fescue mixed with clover, and 25% in warm season perennials. The tall fescue fields would be fertilized with nitrogen in early February and grazed in late February through May

and early June. Fertilizer nitrogen could be applied again in early August and the growth allowed to stockpile for grazing in December to January. The fescue-clover could be grazed as needed in late spring and early fall. Any surplus growth would be cut for hay in May.

If not needed for grazing, the early growth of the warm season grass could be cut for hay about mid-June. The regrowth could then be rotationally grazed through August or early September. Livestock should be moved back to tall fescue and clover pastures in early September to allow the warm season grasses to accumulate root reserves for the winter.

## **Fertilization**

Fields should be soil sampled regularly—at least every third year. Apply lime, phosphorus, and potassium according to soil test recommendations. Although these grasses tolerate low fertility situations, they must have adequate fertility to produce good yields. Nitrogen (N) is also necessary for good production. The amount to use depends on how much forage is needed and when. These grasses are known to respond to 150 lb or more of nitrogen/acre/year. If more early forage is needed, the first application of 50 to 60 lb of N/acre can be made in early May. Eastern gamagrass and the old-world bluestems can efficiently utilize 200 lb of N/acre/year.

It is important to not apply nitrogen before the grass begins growing in the spring because it can stimulate weed growth. Other times to apply nitrogen are after the first and second harvests. Use about 50 to 75 lb of N/acre each time depending on the grass species and forage need. Late applications are especially important for good production in July and August. If urea is to be used, the rates should be about 20% higher to compensate for losses likely to occur when urea is broadcast onto sodfields during the summer.

## **Summary**

Warm season perennial grasses have the potential to supply grazing for Kentucky livestock during summer when most cool season forages are least productive. Some important points to remember about them are:

- Some are difficult to seed and all are slow to become established. Expect very little production the first year.
- They need careful management. Use rotational grazing for production, quality, and stand maintenance. The old-world bluestems are more flexible than the native species. Good forage quality depends on harvesting at the proper stage

of growth. When these grasses become overmature, forage quality and animal acceptance drops drastically.

- Fertility needs to be maintained. Nitrogen is needed for good production.
- The native species are better for wildlife.
- Old-world bluestems tolerate closer grazing.