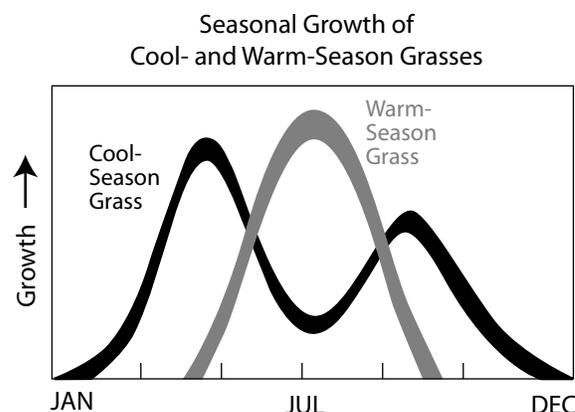


Native Warm-Season Perennial Grasses for Forage in Kentucky

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Native warm-season perennial grasses, such as switchgrass and big bluestem, are well adapted for production in Kentucky's climate and soils. In contrast to the cool-season grasses such as tall fescue, bluegrass, and orchardgrass that are the predominant grasses grown for forage in Kentucky, warm-season grasses grow best in late spring and summer. They can be grazed during summer when cool-season grass pastures are less productive. They can also be harvested as hay or used for conservation and wildlife purposes.

Switchgrass, big bluestem, indiagrass, and eastern gamagrass were an important part of about 3 million acres of grassland in Kentucky when Europeans first came into the area. These grasses supplied food and cover for native wildlife such as the



Native Warm-Season Grasses

Origin: Kentucky and other states

Characteristics: Long-lived perennial bunchgrasses
 Some have short rhizomes
 Tall (3 to 10 feet)
 Become stemmy with maturity
 Need a fall rest period
 Sensitive to overgrazing

Uses: Hay, rotational pasture, conservation, and wildlife

Seed: Small with many appendages (little and big bluestems and indiagrass), medium and smooth (switchgrass), large, cylindrical (eastern gamagrass)

Seeding rate: 7 to 10 pounds pure live seed per acre

Seeding depth: 1/8 to 1/4 inch for all except 1/2 to 1 inch for eastern gamagrass

Primary seeding date: Mid-May to mid-June

Secondary seeding date: Late June

First harvest: Mid-May to mid-June

Yield: 4 to 8 tons/acre/year

American bison, elk, whitetail deer, and numerous bird species. Because the area had very few trees, these grasses were some of the first to be plowed and planted to crops. Plowing, overgrazing, and encroachment of introduced grass species quickly led to the near-extinction of native warm-season grasses in the state. Over the last 20 years, interest has increased in preserving local ecotypes of these grasses and evaluating their potential as forage.

In this publication, we describe the native warm-season perennial grasses that have the greatest forage potential and discuss the management techniques necessary to establish stands and keep them productive.

Species Adapted to Kentucky

Switchgrass is a tall growing (3 to 9 feet), wide-leaved grass that produces short rhizomes. The seed are relatively large and smooth, so they will flow through most drills. Switchgrass becomes quite stemmy as it matures, so it needs to be harvested at an immature stage (before seed heads emerge) for good quality forage. The first harvest should be in late May or early June. Upland varieties such as Cave-in-Rock and Blackwell are shorter and better adapted to well drained (even droughty) soils on side slopes and ridge tops. Lowland cultivars such as Alamo and Kanlo are taller, have coarser stems, and do better on sites that may be flooded for short periods or are somewhat poorly drained. Switchgrass works well as a hay crop but can also be rotationally grazed.

Eastern gamagrass is a bunchgrass that produces short, thick rhizomes near the soil surface. The clump enlarges in a circular

pattern, with the center often becoming open after a few years. The large clumps make hay harvesting difficult. Leaves of gamagrass emerge from the base of the clump and may reach a length of 3 feet. The seed are large, enclosed in a cylindrical seed coat, and tend to be very dormant. Seed treatments such as wet-chilling increase seed germination. Eastern gamagrass does



Switchgrass in July, with tall fescue on left.



Eastern gamagrass develops “clumps” that spread from short rhizomes.



Big bluestem ready for first harvest.

best on deep, well-drained soils but can withstand short periods of flooding. Corn planters are usually used to seed gamagrass in 30-inch or narrower rows. Gamagrass can be stored as haylage or hay or used for rotational grazing.

Big bluestem is a tall growing (6 to 8 feet), stemmy, bunchgrass that provides excellent wildlife habitat. Yield potential is generally less than switchgrass and eastern gamagrass; however, big bluestem is more drought tolerant and can be grown on less productive soils—especially those that are more shallow and steep. The seed are small and have appendages that impede flow through seeder tubes. Seed should be debarbed, and even then, specially modified drills may be necessary for even seed distribution. Big bluestem produces most of its growth after June 1, a date that coincides with the decline in production of cool-season grasses. Big bluestem makes good hay or can be used for grazing, especially in July and August.

Indiangrass is also a tall growing (5 to 7 feet) bunchgrass that becomes very stemmy if allowed to mature. It provides excellent wildlife habitat because of its clumpy growth and a canopy that stands up well during the winter. It produces more of its growth later in the summer, which makes it a good match for cool-season grasses. Indiangrass yield potential is comparable to that of big bluestem, but its yeild potential is less than switchgrass and eastern gamagrass. It is very drought tolerant and can be grown on steeper, shallower soils. Indiangrass makes a good hay crop but may be best used for summer grazing. The seed is similar to big bluestem and must be debarbed for good seeding. Indiangrass is relatively easy to establish, and it is very competitive in mixed stands.

Little bluestem is less productive than the other native warm-season grasses. It is best used on the most marginal soils or in mixtures that are primarily intended for wildlife habitat. It can be harvested as hay or rotationally grazed.

Establishing New Stands

Native warm-season grasses are very different in establishment requirements from the cool-season grasses with which most Kentucky farmers are familiar. It is important to learn as much as possible about them before trying to get them established. This publication gives some basic information, but other sources of information should be sought. One of the best ways to learn is from other farmers who have been successful in growing native warm-season grasses. Because these grasses are somewhat slow in becoming established (usually it takes a full growing season) and few options exist for chemical weed control, it is important to start with a weed-free seedbed.

Preparing the Seedbed

Soils should be tilled in the spring at least a month before seeding time. This practice kills existing weeds, conserves soil moisture, and allows time to prepare a smooth, firm seedbed. A light, shallow tilling followed by cultipacking (packing the soil) should kill newly emerged weed seedlings and leave the surface ready for seeding. Native warm-season grasses can be no-till seeded if the soil surface is suitable (not too rough) and

weed pressure is not too heavy.

Another system involves tilling the ground in the fall before native grasses are to be seeded and using a winter cover crop of wheat or other small grain. The cover crop can be grazed, harvested as hay, or killed with a herbicide in the spring before seeding the grass. Always use herbicides in accordance with label directions.

Timing

In Kentucky, the best time to seed native warm-season grasses is late May or early June. A soil temperature above 55° F is needed for these seed to germinate. Seeding too early will result in the loss of some seed due to decay, birds or other animals eating the seed, etc. Also, seeding too early allows weed seed to germinate before the crop seed, which will increase weed competition.

Seeding after mid-June increases the risk of drought damage to the new stand. If it is necessary to seed in late June, it is important that good soil moisture is present at the time of seeding to provide adequate moisture to get the crop started. After the seed has germinated, it can survive moderate droughts.

Seeding Rates

Native warm-season grasses intended for hay or grazing purposes will require more seed than conservation or wildlife seedings. Use the following table when seeding a single species.

Native Warm-Season Grass Seeding Rates for Hay or Pasture	
	(Pounds of pure live seed per acre)
Switchgrass	8-10
Big Bluestem	10
Indiangrass	10
Little Bluestem	7
Eastern Gamagrass	8

Note: If mixtures are used, above seeding rates should be reduced in proportion to the number of species used. For example, if three species are used in a mixture, use one-third of the rate listed in the table for each species.

Mowing to Control Weed Competition

Since very few herbicides are labeled for use on native warm-season grasses, especially for residual weed control, it is usually necessary to do some mowing during the establishment year. Mowing tall weeds, especially broadleaf weeds, reduces weed competition and improves stand establishment. A rotary mower set to cut to a 6-inch height will be most effective. It may be necessary to mow twice during the establishment year, but do not mow after the end of August. These grasses need a rest period in late summer and early fall similar to alfalfa in order to build up food reserves for winter. If grass growth is sufficient by the end of August, these grasses can be harvested as hay. However,

they should not be grazed during the establishment year because they may be damaged by trampling or may be pulled out of the ground.

Managing Established Stands

Once established, a good stand of native warm-season grasses will last indefinitely if properly managed to give the grasses a competitive advantage over weeds and cool-season grasses. If the grasses are harvested by grazing, it is necessary to use a rotational grazing system and leave at least 6 inches of stubble. Overgrazing may lead to rapid stand loss. Leave cattle or other livestock on an area no more than five days at a time. Plan to allow five weeks for regrowth before grazing again. This means a field will need to be divided into at least seven paddocks—even more to add flexibility. If grazing is started in late May, it will be possible to graze some of the paddocks three times before the end of the grazing season in early September.

The first hay cutting of some of these species can be taken in late May (i.e., eastern gamagrass), while others should not be cut until mid-June or later (i.e., indiangrass). These grasses should be harvested before seed heads emerge in order to make good quality hay. Forage quality declines rapidly as plants head out. Early grazing or haying can begin once plants reach a height of 18 inches or more. When grazing at this early stage, it may be necessary to rotate to new areas more quickly—perhaps after two to three days rather than five.

Fertilization

Lime and fertilizer applications to native warm-season grasses should be based on regular soil testing, with at least one sample taken every third year. Although these grasses tolerate low fertility, fertilizer will need to be applied for good production and stand maintenance. Regular applications of nitrogen (N) fertilizer are needed in order to increase yields and improve forage quality, since legumes are not compatible with these grasses. An early application of 50 to 60 pounds of N per acre should be made in spring just as the grass begins to green up. Additional applications of N should be made following each harvest for a total rate of 150 to 200 pounds per acre per year. Eastern gamagrass and switchgrass should receive the higher rate because they have a greater yield potential. The bluestems typically do not need as much N fertilizer.

It is important to not apply N before native warm-season grasses begin to green up in the spring, as this will stimulate weed growth before the grass is ready to grown and compete. If urea is to be used as the N fertilizer source after mid-May, N rates should be increased by about 20% to compensate for N volatilization losses that are likely to occur.

Summary

Native warm-season perennial grasses have the potential to supply grazing for Kentucky livestock during summer when our cool-season pastures are less productive. Including up to 20 to 25% of the forage acreage as warm-season grasses may reduce the risk of a pasture shortage in July and August. It may also permit resting of the cool-season pastures when they are stressed

by heat and drought. Native warm-season grasses can also be harvested as hay during the summer. Drying conditions are likely to be better than in May, when cool-season grasses need to be cut.

Some important points to remember when considering native warm-season grasses:

- They are quite different from cool-season grasses in establishment requirements.
- One growing season is needed to get them established and ready to utilize.
- They must be carefully managed through rotational grazing or timely hay harvest.
- Livestock should only be allowed access to the fields from May through August.
- Soil fertility must be maintained. Nitrogen fertilization is required for good production.

Related publications from the University of Kentucky Cooperative Extension Service:

AGR-1 Lime and Nutrient Recommendations

AGR-175 Forage Identification and Use Guide

ID-143 Rotational Grazing