Native Warm Season Grasses

Although it may be hard to imagine, Kentucky was once covered by about 3 million acres of native grasslands. The native grasses were critical in supporting the large and diverse wildlife populations present in pre-settlement days. However, with the arrival of Europeans came an intensification and modernization of agriculture that has now resulted in a landscape dominated by fescue. Research has shown that fescue provides very poor habitat for wildlife, and creates problems for livestock as well. Eradication of fescue* and restoration of native grasses is beneficial for both wildlife enthusiasts and farmers alike. Financial or other assistance for establishing native warm season grasses may be available; if interested, contact your local wildlife biologist for details.

Native warm season grasses (prairie cordgrass, eastern gamagrass, switchgrass, big & little bluestem, Indiangrass, side-oats grama) are bunch grasses, growing in clumps that provide excellent year-round cover for small game and nutritious (6-19% protein) forage for livestock while retaining enough bare ground to allow gamebird chicks to move freely in search of food. They are also summer grasses, actively growing when the soil temperature is above 65 degrees. They are an integral part of a diverse plant community whose wildflowers, legumes (lespedeza, partridge pea, etc.), and annual weeds provide abundant food, particularly for quail, and which in turn attract numerous insects important to young chicks as a source of protein in spring. Most species are fairly tall, growing to 5-8 feet in height; however, a couple of species (little bluestem and side-oats grama) are short, only growing to about knee or waist high.

Native grasses grow on a variety of sites. Little bluestem and side-oats grama need a well-drained or dry site. Big bluestem, Indiangrass, and gamagrass will grow on most any type of site, from wet to dry. Switchgrass will also grow on most any site; however, on wet sites, either Kanlow or Blackwell varieties should be used. Prairie cordgrass is also an option on wet sites; if interested, contact your local biologist for more details. Be advised, gamagrass seed has a thick coat that hinders germination. Although untreated gamagrass seed can be purchased at lesser cost, it will likely take longer to develop. For optimum results, you should use seed that has been treated to overcome this natural dormancy and increase germination the first year by either chemical (preferably) or refrigeration methods.

The various species of native grass also mature at slightly different times. Gamagrass and switchgrass mature in early summer (June), big

Figure 1. Late winter seed head of switchgrass.

Kentucky was once covered by vast expanses of native grasslands critical to the existence of large and diverse wildlife populations.

Figure 2. An excellent first year stand of big bluestem.

Research has shown that fescue provides very poor habitat for wildlife, and creates problems for livestock as well.

bluestem matures in mid-summer (July), and Indiangrass matures in late summer (August). Generally speaking, if establishing them for use primarily as pasture/hay, it is best to plant several fields each containing 1-2 species of native grass, together with some lespedeza, so individual stands of grasses may be rotationally grazed or hayed as they become mature. However, if you want to optimize benefits to both wildlife and livestock, you may want to combine 3 or more of the grasses in the same stand to increase diversity. It is also worth noting that demand for the seed of these grasses has increased greatly in recent years, such that the potential for harvesting and re-selling seed has created an economic incentive for landowners to plant them.

Site Preparation

Native warm season grasses are usually planted in spring (May-June). Preliminary work such as burning*, haying/raking, mowing, or grazing may be necessary to eradicate thick grass and/or reduce tall vegetation prior to actual conversion. In fact, unless a field has been grazed or cut for hay regularly, burning will greatly aid in establishing native grasses by removing thick, matty grass, thereby resulting in a more effective treatment of the existing sod and less competition to the native grass seedlings. However, be advised, Kentucky does have fire laws, regulated by the state Division of Forestry (800/866-0555). Basically, from February 15 through April 30 and from October 1 through December 15, you cannot burn within 150 feet of any woods or brushy area except between the hours of 6:00 p.m. and 6:00 a.m. local time. Prior to doing any burning you should consult with the Division of Forestry regarding regulations and techniques. You should also notify the local fire department and adjoining landowners.

Once such preliminary work has been completed, grassy fields should be sprayed with herbicide (Roundup® and/or Plateau®) to kill fescue* and other vegetation before seeding. Spraying can be done mid to late spring (April-May), or if preferred, during the previous fall (September). Vegetation should be sprayed on a warm sunny day when it is about 8 inches tall and actively growing (bright green). Fall sprayings should consist of Roundup® only (1 qt/ac); Plateau® herbicide should only be used in spring to capitalize on its residual weed control. One good technique is to do a fall spraying of Roundup® (1 qt/ac), followed by a spring spraying of a Roundup®/Plateau® tank mix (1 qt/ac Roundup® & 4-8 oz/ac Plateau®). If only spraying in the spring, you can use Roundup® only (2 qts/ac), Plateau® only (12 oz/ac), or a combination of both Roundup® (2 qts/ac) and Plateau® (4-8 oz/ac). Spring herbicide applications should be done 2-4 weeks prior to planting. Be sure to consult the Plateau® herbicide label regarding limitations on rates for pasture/hayland, land enrolled in the Conservation Reserve Program (CRP), and situations where substantial amounts of wildflowers are going to be planted with the native grasses. Also, do NOT use Plateau® herbicide if trying to establish substantial amounts of switchgrass or gamagrass!

Planting native grass into fields where row crops, such as corn and soybeans, have recently been planted and harvested is also a viable option. Regardless of the particular type of crop, the stubble should be mowed fairly short prior to planting. If using this approach, be cautious of potential residual effects of chemicals used to control weeds on the crop field in previous years because these may kill native grass seedlings. If desired, fields could be sprayed and planted to winter wheat in fall, bush-hogged the next spring prior to the formation of seed heads, then planted to native grass.

Seed Mixtures

Native grass plantings done strictly for wildlife habitat should consist of several species of grass, together with some forbs (wildflowers and/or legumes). Switchgrass is excellent for rabbits due to its thick growth form. Little bluestem is ideal for quail, providing excellent nesting cover while maintaining enough bare ground to allow chicks to move freely. As discussed previously, native grass plantings done for production purposes (pasture/hay/seed) should generally consist of 1-2 species of grass (gamagrass, switchgrass, big bluestem, or Indiangrass), together with some lespedeza. For wildlife plantings, a total grass seeding rate of 4-6 pounds per acre should be used, depending on the species being planted and the herbicide mixture used to eradicate the pre-existing sod. For production plantings, 6-8 pounds per acre is more appropriate. Refer to the tables and list included in this handout for seeding rates, sample seed mixtures, and native grass vendors. Note that seeding rates are listed in pounds per acre of Pure Live Seed; be sure to specify Pure Live Seed (PLS) when placing your order! Also, be sure to order early to ensure availability and shop around since prices can vary greatly. With mixtures, you should request that the dealer pre-mix the grasses for you. There is usually little, if any, charge for such service. Do NOT have them mix in the forbs to be included in the planting. Except for wildflowers, you should withhold the forbs from the planting initially and overseed them early the second spring so as to minimize competition to the native grass seedlings during their establishment year. The wildflower seed can simply be scattered on top of the grass seed within the seed box of the no-till drill at the time of planting. If planting native grasses with fluffy seed (bluestems, Indiangrass, side-oats grama), be sure to use a total seeding rate of at least 4 PLS pounds per acre to facilitate use of no-till drills. Also, note that a cover crop (temporary vegetation such as winter wheat, spring oats, and annual ryegrass) is generally NOT used when planting native grass, except on potentially erodible sites. In those situations, apply a light straw mulch in spring then sow a cover crop in fall and bush-hog the following spring prior to formation of seed heads.

Native grasses grow on a variety of sites.

Planting Options

There are 3 basic ways to plant native warm season grass. It can be drilled into a herbicide-treated stand of grass, drilled into a prepared seedbed, or broadcast seeded onto a firm, bare seedbed. Although excellent results can be obtained with any of the methods, the first two are the most popular. Broadcast seeding requires seeding rates to be increased, and native grass seed can be expensive. Consequently, that option is likely best suited to plantings done on small fields where the extra cost is minimal.

Drilling into a herbicide-treated stand of grass is simplest, likely results in less weed problems due to smothering by the residual stand of grass, and eliminates the risk of soil erosion. However, seed-to-soil contact, and subsequent germination, may not be quite as good due to the same residual stand of grass. Drilling into a prepared seedbed will likely result in better seed-to-soil contact and germination. However, it requires more field preparation and could result in more weed problems due to exposure of ungerminated seeds, unless Plateau® herbicide is used in conjunction with the planting. Also, loose soil of a tilled seedbed could be eroded as well. Overall, most people usually choose to plant native grass by no-till seeding into a herbicide-treated stand of grass, with very good results.

Figure 3. Side-oats grama makes excellent wildlife habitat.

The various species of grasses mature at different times.

Most native grasses need to be planted no more than 1/4 inch deep using a special no-till drill.

Weed control is critical to the survivial and productivity to native grasses.

Planting Techniques

Planting depth on native grasses is critical! Gamagrass, having a hard seed the size of a corn kernel, is planted 1-1.5 inches deep on 30 inch rows using a no-till corn planter. All other native grasses are planted ONLY 1/4 inch deep. If you plant them too deep, they will not germinate! It is better to have the seed laying on top of the ground than to have it planted too deep. Switchgrass has a small, hard seed capable of being sown with standard grass drills or broadcast seeders. However, the seed of most native grasses has hairy appendages that cause it to stick together and not flow smoothly through conventional seed drills. Therefore, such seed must be sown using a special type of drill available from the Kentucky Department of Fish and Wildlife Resources, a local conservation district, or a local farm store. These native grass drills have agitators and picker wheels within the seed box to mix the fluffy seed and pull it down through the drop tubes. If using a native grass drill, be sure to keep the box at least half full during most of the planting to keep the seed flowing smoothly. You can normally expect to see as much as 30% of your seed on top of the ground in the drill rows. As mentioned previously, on fairly small, flat sites, broadcast seeding onto a firm, bare, fine-textured seedbed can also be effective. Plow, disk, and cultipack the site as necessary to prepare it. The ideal seedbed should be smooth and barely show footprints. Then use a lime or fertilizer truck, a conventional cyclone seeder, or a hand-held or ATV/pick-up mounted seeder to plant the seed. Increase seeding rates 25%, mix the seed with a carrier (sawdust, lime, fertilizer, oats, cracked corn), criss-cross the field overlapping swaths, and lightly drag, roll, or cultipack the site when done broadcasting to cover the seed and enhance germination. Do NOT disk the site after planting since that will push the seed too deep into the soil! If oats are used as the carrier, they should be clipped off the top of the stand prior to formation of seed heads to minimize reseeding and subsequent competition to the native grasses. Note that it may be possible to purchase native warm season grass seed that has the hairy appendages removed by a process called “debearding”. Debearded seed costs more, but may be sown using common broadcast seeding techniques or conventional seed drills.

Lime & Fertilizer

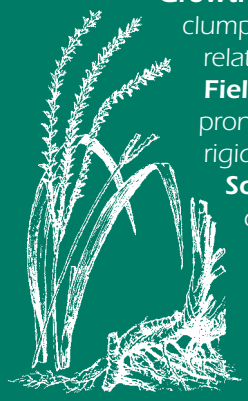
Addition of lime and fertilizer to native grass plantings usually is not necessary, provided the soil pH is above 5. Native grasses are quite hardy and normally do fine on their own, making efficient use of available nutrients. Since such soil amendments* can be quite expensive, landowners may opt to skip this step. However, plantings done for production purposes (pasture/hay/seed) should definitely be limed and fertilized in accordance with a soil test (contact the county Extension office for assistance). Lime should be applied several months prior to planting to allow time for it to become incorporated into the soil (aim for a pH of 6.5). Fertilizer should be applied in mid-summer (July) after seedlings have grown a few inches. Nitrogen should only be used in conjunction with Plateau® herbicide (if appropriate). If needed, nitrogen can be top-dressed the second year. Note that some federal programs may require the addition of lime and fertilizer to all native grass plantings, even those that are done strictly for wildlife habitat.

Weed Control

Native grasses have typically taken a few years to become fully established because the first couple years they tend to put most of their energy into developing an extensive root system and generally do not produce much growth above ground. However, research has shown that native grass stands become established much quicker if competing, undesirable plants are controlled. Since weed control is so critical to the survival and productivity of native grasses, the use

Native Warm Season Grasses Identification Guide

Figure 1. Eastern Gamagrass
Tripsacum dactyloides L.



Flowering Period: May-September
Growth Form: Stout, perennial clump grass with thick rhizomes; related to corn.
Field Marks: Seed head multi-pronged, coarse, and somewhat rigid.
Soil Type/Wetness: Well-drained to somewhat wet soils of moderate fertility.
Shade Tolerance: Intolerant
Height: Up to 8 feet tall (usually 5-6 feet).

Figure 2. Switchgrass *Panicum virgatum* L.

Flowering Period: June-September
Growth Form: Perennial bunch grass with branching rhizomes.
Field Marks: Tuft of hairs in leaf axil next to stem; panicle type of seed head
Soil Type/Wetness: Tolerant of various fertility and moisture levels, depending on variety.
Shade Tolerance: Intolerant
Height: Up to 7 feet tall (usually 5-6 feet)

Figure 3. Big Bluestem
Andropogon gerardii Vitman

Flowering Period: June-September
Growth Form: Tufted, perennial clump grass from stout rhizomes.
Field Marks: Seed head multi-pronged, bluish-gray, and soft, fuzzy, & hairy; scattered hairs on lower half of leaves near stem.
Soil Type/Wetness: Tolerant of various fertility and moisture levels.
Shade Tolerance: Intolerant
Height: Typically 6-8 feet tall.

Figure 4. Indiangrass *Sorghastrum nutans* L.

Flowering Period: July-October
Growth Form: Coarse, perennial clump grass with scaly rhizomes.
Field Marks: Leaf axil has structure resembling rifle sight; seed head often has yellowish tinge.
Soil Type/Wetness: Tolerant of various fertility and moisture levels.
Shade Tolerance: Intolerant
Height: Typically 6-8 feet tall.

Figure 5. Little Bluestem
Schizachyrium scoparium (Michx.) Nash

Flowering Period: July-October
Growth Form: Coarse, perennial clump grass.
Field Marks: Seed heads naked (unlike broom sedge); plume bluish-green, turning orange in fall.
Soil Type/Wetness: Tolerant of poor, dry soils; also suitable for well-drained, fertile soils.
Shade Tolerance: Intolerant
Height: Up to 5 feet tall (usually about 1 1/2 – 3 feet).

Figure 6. Side-oats Grama
Bouteloua curtipendula (Michx.) Torr.

Flowering Period: July-October
Growth Form: Coarse, perennial clump grass.
Field Marks: Seeds only on one side of head; plume usually bluish-gray, with purple tint.
Soil Type/Wetness: Well-drained soils of moderate fertility.
Shade Tolerance: Intolerant
Height: Up to 3 feet tall (usually about 1 1/2 feet).

Photos and drawings courtesy of UK Cooperative Extension Service, Sharp Bros. Seed Co., Brian Clark (KDFWR Wildlife Biologist), and Texas A&M University Bioinformatics Working Group.

Table 1. Native Warm Season Grass Seeding Rates (PLS Lbs/Ac)

Species	As Part of Mix	In Pure Stand
Eastern Gamagrass	3	8
Switchgrass	1.5	4-6
Big Bluestem	2	6-8
Indiangrass	2	6-8
Little Bluestem	1.5	6
Side-oats Grama	1.5	6

Table 2. Native Warm Season Grass Mixtures

General Mix

Switchgrass	1 PLS lb/ac
Big Bluestem	2 PLS lbs/ac
Indiangrass	2 PLS lbs/ac

Rabbit Mix

Switchgrass	3 PLS lbs/ac
Big Bluestem	5 PLS lbs/ac

Quail Mix

Little Bluestem	3 PLS lbs/ac
Side-Oats Grama	3 PLS lbs/ac

Habitat Mix

Big Bluestem	1.8 PLS lbs/ac
Indiangrass	2.0 PLS lbs/ac
Little Bluestem	1.5 PLS lbs/ac
Side-Oats Grama	0.5 PLS lb/ac
Switchgrass	0.2 PLS lb/ac

Economy Mix

Big Bluestem	1 PLS lb/ac
Indiangrass	1 PLS lb/ac
Little Bluestem	2 PLS lbs/ac

Note – All seeding rates listed above are in pounds per acre of Pure Live Seed (PLS). Be sure to specify PLS when placing your order! Also, be sure to include some forbs (wildflowers &/or legumes) in all native grass plantings. Except for wildflowers, we recommend overseeding forbs the spring following the planting year. Seeding rates for various forbs are:

Mixed Wildflowers	4 oz/ac
Illinois Bundleflower	8 oz/ac
Partridge Pea	5 lbs/ac
Korean or Kobe Lespedeza	10 lbs/ac

Native Warm Season Grass Seed Vendors

Adams-Briscoe Seed Co.
P.O. Box 18
Jackson, GA 30233
404-775-7826

Bamert Seed Co.
Rt. 3, Box 1120
Muleshoe, TX 79347
806-272-5506

Bluestem Seed Co.
Rt. 3, Box 32
Grant City, MO 64456
816-786-2241

Caudill Seed Co.
1201 Story Ave.
Louisville, KY 40206
502-583-4402

C.P. Daniel's Sons, Inc.
P.O.Box 119
Waynesboro, GA 30830
404-554-2446

Gamagrass Seed Co.
Rt. 1, Box 114A
Falls City, NE 68355
800-367-2879

Hamilton Seeds
16786 Brown Rd.
Elk Creek, MO 65464
417-967-2190

Kester's Nursery
P.O. Box U
Omro, WI 54963
414-685-2929

LaFayette Home Nursery
RR 1, Box 1A
LaFayette, IL 61449
309-995-3311

Mangelsdorf Seed Co.
P.O. Box 327
St. Louis, MO 63166
314-421-1415

Melot's Inc.
8900 W. Memorial Rd.
Oklahoma City, OK 73142
405-721-4394

Osenbaugh Grass Seeds
Rt. 1, Box 44
Lucas, IA 50151
515-766-6476

Riders Mill Farms
9758 Raider Hollow Rd.
Upton, KY 42784
270-531-3034

Sharp Bros. Seed Co.
396 SW Davis St.-Ladue
Clinton, MO 64735
660-885-7551

Shepherd Farms
Route 1
Clifton Hill, MO 65244
816-261-4567(gamagrass only)

Shooting Star Nursery
444 Bates Rd.
Frankfort, KY 40601
502-223-1679

Stock Seed Farms
28008 Mill Rd.
Murdock, NE 68407
402-867-3771

Turner Seed Co.
P.O. Box 4479
Winchester, KY 40392
877-350-7331

Wildlife Nurseries
P.O. Box 2724
Oshkosh, WI 54903
920-231-3780

Zoeller, Bruce
1654 320th St.
Hiawatha, KS 66434
785-742-3880
(big bluestem & switchgrass)

SUMMARY OF OPTIONS:

Seed Mixture:
Gamagrass, Switchgrass, Big Bluestem, Indiangrass, Little Bluestem, Side-Oats Grama

Site Preparation:
Burning, Haying/Raking, Mowing, Grazing

Herbicide Treatment:
Roundup®, Plateau®, Mixture of Roundup® & Plateau®

Planting Technique:
-No Till Drilling into Herbicide-Treated Grass
-No-Till Drilling into Tilled Seedbed
-Broadcast Seeding onto Tilled Seedbed

Lime & Fertilizer:
Yes/No

Weed Control:
Mowing, Herbicide Application

Maintenance:
Burning, Disking, Haying, Raking, Mowing, Grazing

of special herbicides (Plateau®) is very important. Still, the goal of weed control is to regulate their density, not to totally eliminate them. As mentioned previously, in terms of wildlife habitat, the primary purpose of the native grass stands is to provide cover; the wildflowers, legumes, and annual weeds contained within the stand are the main source of food. In fact, many common "weeds", such as foxtail and ragweed, are actually excellent natural food sources for wildlife, especially quail. These valuable native plants are not a problem unless they occur in such dense stands that they outcompete the native grasses for sunlight, nutrients, and moisture.

On most native grass stands, Plateau® herbicide can be used to control weeds. On switchgrass, because it is sensitive to Plateau®, other techniques must be used. The stand could be top-clipped (mowed above the native grass seedlings) repeatedly during the summer as necessary. Wick-type herbicide applicators, containing booms or arms with cloth wicks hanging off them, can sometimes be used to selectively apply Roundup® herbicide directly to taller vegetation without harming native grasses. If broadleaf weeds are the problem, 2,4-D herbicide can be sprayed over the entire field without harming any grasses; however, it will kill legumes and wildflowers within the stand. On gamagrass, standard corn herbicides are effective (atrazine; Accent®; 2,4-D). Be sure to follow label directions when using any herbicides. Also, use of some herbicides is regulated and requires a special restricted use permit; check with your local farm store for details.

Maintenance

Once established, native warm season grasses, like all grasses, need to be maintained through periodic disturbance. Sometimes this may be done by moderate grazing* beginning in the second year. In other situations, they may be cut (no lower than 8 inches) for hay*, preferably in July or August to avoid disturbing ground-nesting wildlife. Mowing of native grasses (and all grasses for that matter) for hay should be done when they are in the early boot or seedhead stage to capture maximum nutritional content. It is possible, given two cuttings, to get 4-5 tons/acre/year of forage from some of the native grasses. If not being cut for hay or grazed, native grasses should be maintained by prescribed burning*, strip disking*, or mowing* on a 3 year rotation. A good technique is to plan ahead and install 15-25 foot wide fire lanes of either clover* or annual grains* around the perimeter of your warm season grass stands in preparation for burning them at a later date.

Note: Mention of tradenames does not constitute an endorsement of specific products. Consult your local farm store regarding availability of equivalent herbicides.

Planning For My Property:

***Related *Habitat How-To* references:**

Prescribed Burning
Soil Amendments
Strip Disking
Wildflowers
Annual Grains
Fescue Eradication
Grazing and Haying
Mowing
Legumes