NATIVE warm-season Grass Restoration IN MISSISSIPPI

Natural resource managers often promote establishment and management of native warm-season grasses for wildlife habitat. This is because a diverse mixture of native grasses and forbs generally provides better food and cover resources for wildlife species than nonnative grasses such as bermudagrass and tall fescue. Nonnative grasses were introduced for soil stabilization and livestock forage because they were easily established and highly productive, and because they could be grazed heavily. However, because nonnative grasses provide poor habitat for most wildlife, there has been greater interest in restoring native grasses for wildlife habitat.

Native warm-season grasses also provide excellent forage for livestock, making them more compatible for operations striving to produce livestock forage and good wildlife habitat simultaneously. With some careful planning and preparation, native warm-season grasses can be successfully established to meet your grassland habitat goals. Many assistance and cost-share opportunities are available to help you meet these goals. Thus, native warm-season grasses can be successfully managed for multiple objectives in Mississippi.

What Are Native Warm-Season Grasses?

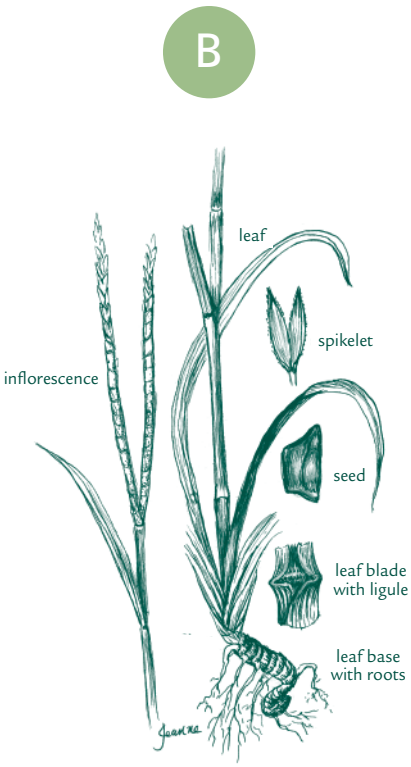
Native warm-season grasses are annual and perennial grasses that were native to Mississippi prior to the introduction of nonnative grasses. "Warm-season" means these grasses primarily grow during summer months (but also during portions of spring and fall). Typically, the native forbs (e.g., broadleaf plants like wildflowers and legumes) that historically occurred with these grasses are included when someone generically refers to native warm-season grass management or restoration. Some examples of native warm-season grass species include: big bluestem, little bluestem, broomsedge, indiangrass, switchgrass, and eastern gamagrass. Some native forbs include partridge pea, beggarweeds, and blackeyed susan.

Presently, native grassland systems are some of the most highly degraded ecosystems in Mississippi. When people think of grasslands, they often may think of pastures or open prairies. Indeed, native warm-season grasses were the dominant plant species that historically covered the Black Belt and Jackson Prairie regions of Mississippi. However, the understory (ground layer) communities of many fire-adapted forest systems (e.g., longleaf and loblolly pine) in Mississippi were also historically composed of grasses and forbs that were maintained by fire. Many of the same native warm-season grass species (little bluestem, indiangrass, etc.) that occurred in nonforested grasslands were also prevalent in the understory of pine-grasslands.

Many native warm-season grass species historically were prevalent in the understory of fire-maintained forests.

Most of the historic native prairies in Mississippi have been converted for agricultural uses. In modern agricultural landscapes, native warm-season grasses typically either exist in mixed stands with or have been completely out-competed by nonnative forage grasses. Most historically longleaf pine-dominated systems have been converted to slash or loblolly pine, and most pine-grasslands in general have been negatively affected by fire suppression and high

Some Examples of Native Warm-Season Grasses



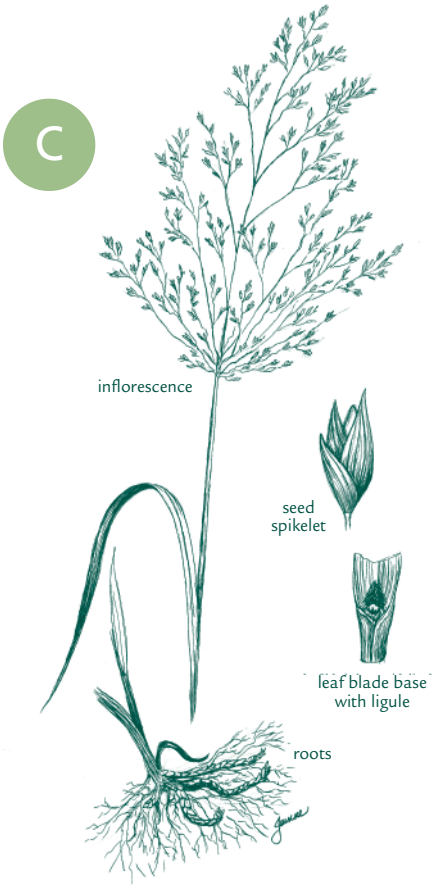
A. Big Bluestem

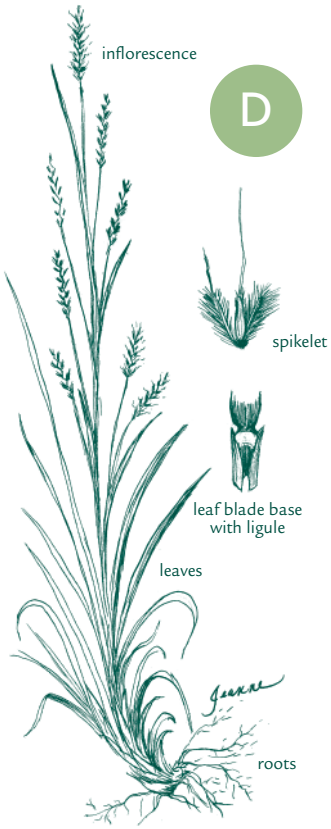
B. Eastern Gammagrass

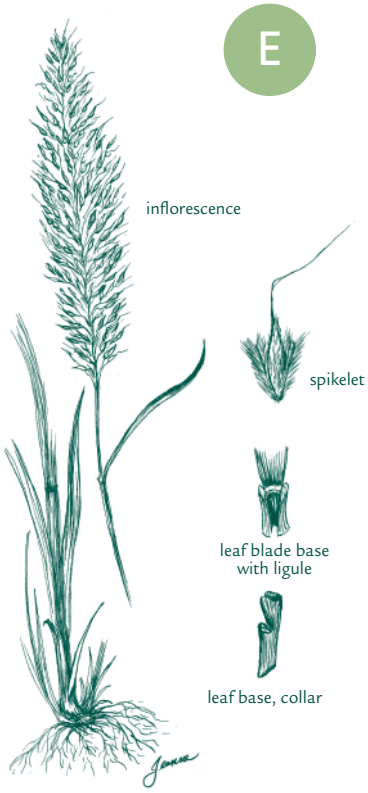
C. Switchgrass

D. Little Bluestem

E. Indiangrass







stocking densities. Pine forest communities also have been adversely affected by invasive, nonnative vegetation. Converting stands of nonnative grasses to native grasses and forbs and restoring pine-grasslands can greatly improve the quality of such stands as wildlife habitat and grassland ecosystems. Sites restored to native warm-season grasses also can be very productive hay and grazing lands with proper management. However, native warm-season grass restoration need not be limited to large acreages. Restoring only portions of agricultural fields (e.g., buffers along field edges) to native warm-season grasses can integrate grassland wildlife habitat with agricultural production.

Native warm-season grasses were the dominant plant species that historically covered the Black Belt and Jackson Prairie regions of Mississippi.

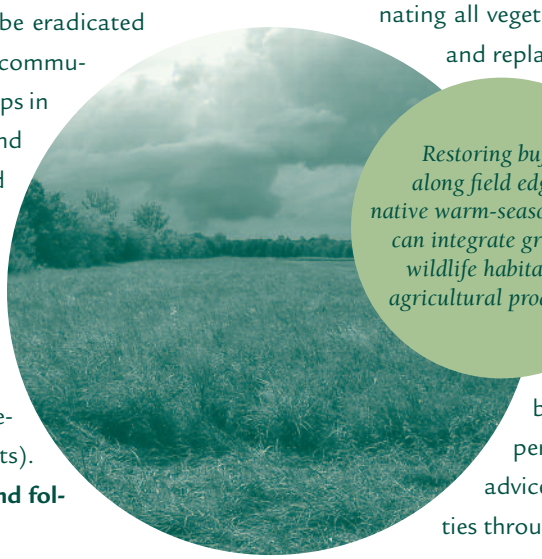
Why Restore Native Warm-Season Grasses?

Restoration of native warm-season grasses can accomplish one or more goals for landowners. Some examples of specific goals to be achieved through native warm-season grass restoration include: 1) wildlife habitat (e.g., bobwhite quail, grassland songbirds, butterflies); 2) livestock forage (native warm-season grasses provide high-quality forage during summer and produce high-quality hay); and 3) ecosystem restoration (e.g., prairie, oak woodland savannah, or pine woodland savannah restoration).

Most of the historic native prairies in Mississippi have been converted for agricultural uses.

Restoring Native Warm-Season Grasses

Where nonnative forage grasses or other undesirable vegetation is present, the undesirable vegetation must be eradicated before attempting to establish native plant communities. This is one of the most important steps in native warm-season grass restoration, and consultation with a professional experienced in native warm-season grass management prior to beginning any restoration efforts is recommended. Most often, control of undesirable vegetation is achieved through herbicide treatments (although in some cases, treatments such as disking or prescribed fire may produce the desired results). **When using herbicides, be sure to read and follow product labels.**



Restoring buffers along field edges to native warm-season grasses can integrate grassland wildlife habitat with agricultural production.

Releasing Existing or Establishing New Native Plant Communities

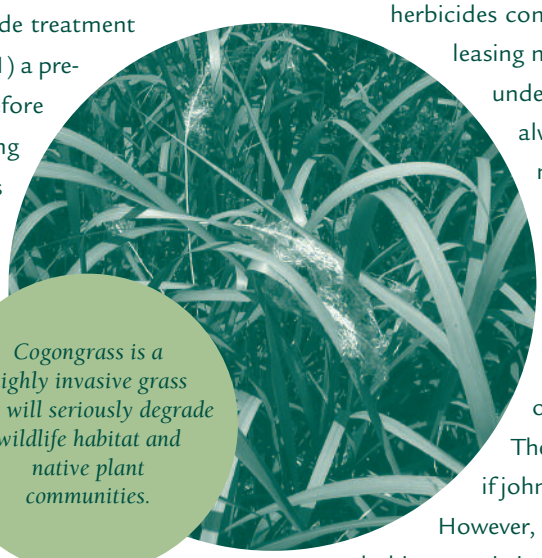
At some sites, a native warm-season grass and forb community is already present, but it is being suppressed by competition with nonnative forage grasses. In this case, an herbicide treatment to release the native plants may satisfactorily restore the native plant community. Grasses such as broomsedge and forbs such as partridge pea may potentially be released from competing nonnative grasses such as tall fescue. Once undesirable vegetation is controlled, additional plantings may enhance the existing native plant community.

A wildlife biologist or other experienced professional can provide technical advice to determine if a particular site might be restored to a good native plant community through herbicidal treatments. When attempting to release an existing stand of native grasses from nonnative grass competition, the selectivity of the herbicide and timing of application are critical. Nonnatives can be controlled and native grasses released either by using a selective herbicide to which native warm-season grasses are tolerant (i.e., imazapic) or by applying a nonselective herbicide (i.e., glyphosate) during a time when nonnative, cool-season vegetation (e.g., tall fescue) is actively growing and native warm-season grasses are dormant.

For some sites, native plants are not sufficiently abundant, or undesirable species cannot be controlled without essentially eliminating all vegetation. In these cases, herbicidal treatment and replanting with desirable vegetation may be the only alternative. If bermudagrass or cogongrass is present, native grasses will almost always have to be replanted due to the intensive herbicidal requirements to control the nonnative grasses. After undesirable vegetation is controlled, a native plant community may be replanted. A wildlife biologist or other experienced professional can provide technical advice for restoration of native plant communities through herbicidal treatments.

Controlling Nonnative Grasses

In general, herbicides are most effective when applied to actively growing plants in a manner that achieves maximum contact of the herbicide with foliage and/or soil surface (depending on whether the herbicide is foliar or soil active). For any of the following herbicide treatment options, one of the following management practices applied two to four weeks prior to herbicide treatment will usually increase herbicide effectiveness: 1) a prescribed burn during fall to early spring before herbicide application; 2) grazing; 3) haying and raking; or 4) mowing. These treatments reduce dead plant material (except mowing) and allow for new plant growth, which improves the foliar contact surface for herbicides. It should be noted that cogongrass burns at extremely high temperatures, so burning cogongrass in woodland stands may not be advisable due to potential damage to trees. Grazing will likely not be effective on cogongrass either, given that cogongrass has practically no forage value. Extreme care should be used if cogongrass must be mowed; avoid moving cut plant parts to new areas and spreading this noxious grass. After initial herbicide treatments of nonnative, invasive grasses, follow-up treatments (e.g., spot spraying) may be necessary to effectively remove residual plants. Periodic monitoring of treated sites is essential to determine whether undesirable grasses are still present; if still present, they should be further treated with herbicides to reduce future spread.



Cogongrass is a highly invasive grass that will seriously degrade wildlife habitat and native plant communities.

Tall Fescue *(Schedonorus phoenix)*

Actively growing tall fescue can be eradicated with combined fall and spring treatments of glyphosate (e.g. Roundup®) at a labeled rate. Apply one treatment of glyphosate in the fall, then another the following spring to control tall fescue that may germinate from seed. These treatments should be adequate to release existing native warm-season grasses or to prepare a site for planting native warm-season grasses if tall fescue is the only grass problem present. However, some apparently tall fescue-dominated sites may have a bermudagrass component that is not easily recognizable underneath the tall fescue canopy. If there is any presence of nonnative, warm-season grasses such as johnsongrass, bahiagrass, or bermudagrass, it is best to treat the site as recommended below for these species after the tall fescue has been controlled.

Johnsongrass *(Sorghum halepense)*

Johnsongrass may be controlled with sulfosulfuron (e.g., Outrider®) after full green-up. Imazapic (e.g., Plateau®) applied before seeds germinate is effective for controlling johnsongrass establishment from seed. Glyphosate (e.g., Roundup) applied after seedhead initiation may also be effective for controlling johnsongrass. Although herbicides containing glyphosate can be effective for releasing native warm-season grass seedlings growing underneath johnsongrass, be aware that there is always a risk of killing or injuring established native warm-season grasses if herbicides containing glyphosate are applied when native warm-season grasses are growing. Sulfosulfuron applied at appropriate label rates will not harm native warm-season grasses and thus can be applied over developing native warm-season grass seedlings. The previous treatments likely will be adequate if johnsongrass is the only grass problem present. However, if there is any presence of bermudagrass or bahiagrass, it is probably best to treat the site as recommended below.

Bahiagrass *(Paspalum notatum)*

For bahiagrass-dominated sites, apply a labeled rate of metsulfuron methyl (e.g., Escort®) in spring after full green-up. Native warm-season grasses are mostly tolerant of metsulfuron methyl, but observe applicable replanting intervals on the product label. Metsulfuron methyl can be absorbed through the roots, so be cautious of applications around desirable hardwood trees and shrubs. Closely note label indications if using near nontarget trees or shrubs. Applied at lower rates (less than 1 ounce per acre), metsulfuron methyl will probably not injure most desirable hardwood trees. However, if there is any doubt, do not apply within two times the width of the drip line of any desirable hardwood trees.

In desirable hardwood areas that cannot be treated by metsulfuron methyl or if johnsongrass is also present, apply a labeled rate of imazapic (e.g., Plateau) or imazapic plus glyphosate (e.g., Journey) after bahiagrass has reached full green-up. These treatments may be adequate to release existing native warm-season grasses or to prepare a site for planting native warm-season grasses if bahiagrass is the only grass problem present. Be aware that herbicides containing glyphosate may kill native warm-season grasses if applied when they are actively growing. Another treatment option for areas that cannot be treated by metsulfuron methyl is application of a labeled rate of glyphosate after bahiagrass seedhead initiation. However, multiple glyphosate-only applications will likely be required to control bahiagrass, and this treatment will also kill any desirable

vegetation. If there is a significant presence of bermudagrass, it is best to treat the site as recommended below; otherwise, spot-treat bermudagrass if it occurs in patches.

Bermudagrass *(Cynodon dactylon)*

Bermudagrass is very competitive and difficult to control with a single application of most herbicides. Because of its aggressive nature and warm-season growth pattern, it is absolutely essential to completely eradicate bermudagrass before planting native warm-season grasses. However, sites dominated by bermudagrass can be converted by applying labeled rates of imazapyr (e.g., Arsenal®, Chopper®). Imazapyr applications for bermudagrass control are most effective if applied during July through September.

If imazapyr is used, the application should be made a growing season prior to establishing native warm-season grasses. The residual soil activity of imazapyr will kill germinating native warm-season grasses if planted within six months (plus or minus) of application of imazapyr. Closely note label precautions if using near nontarget trees or shrubs. Imazapyr will kill hardwoods and should not be applied within two times the width of the drip line of any desirable hardwood trees. In areas that cannot be treated by imazapyr, apply a labeled rate of glyphosate (e.g., Roundup) after bermudagrass seedhead initiation. Glyphosate will not eradicate bermudagrass as effectively as imazapyr, and multiple applications of glyphosate will be required.

Cogongrass *(Imperata cylindrica)*

Cogongrass is a highly invasive grass that will seriously degrade wildlife habitat and native plant communities. It has no forage value to livestock or wildlife. Cogongrass spreads by wind-blown seeds and rhizomes that are transported by mowing or logging equipment that has come into contact with seeds or the plant. This grass was also spread as an ornamental and forage plant in some states until federal and state regulations listed it as a noxious weed, restricting its intentional planting. Because this grass can degrade property values, limit land use alternatives, and damage forest resources and wildlife habitat, landowners should learn to recognize it and take immediate actions to control it. Cogongrass is still sold by some nurseries under the name Japanese blood grass. Do not use this grass for ornamental plantings.

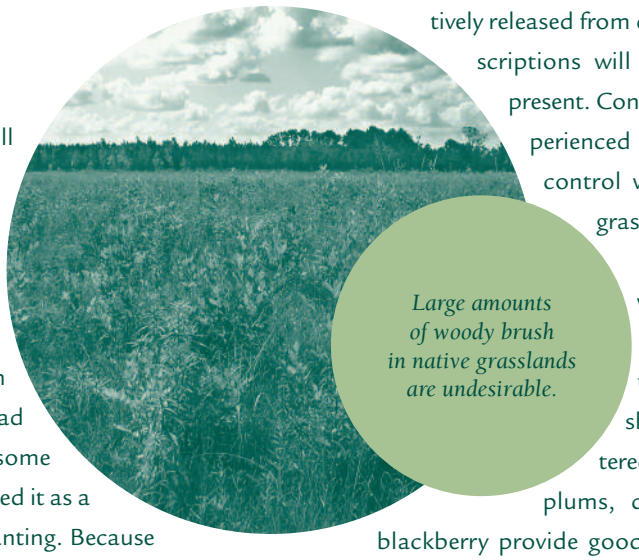
Treat cogongrass with labeled rates of imazapyr (e.g., Arsenal) plus glyphosate (e.g. Roundup) during late summer or early fall. Although imazapyr will kill desirable hardwood trees and shrubs, it may be worth sacrificing desirable plants in order to control the spread of cogongrass. The sooner this invasive pest is treated, the more effective control efforts will be. After initial herbicide treatments, treated cogongrass stands should be carefully monitored, as further herbicide treatments will likely be necessary for effective control. If you suspect you have cogongrass on your property, contact a natural resources professional to verify this and assist you with developing a cogongrass eradication plan. Fact sheet 1999-01 is available from the Mississippi Department of Agriculture and Commerce to help landowners identify cogongrass. For more information about cogongrass, contact—

- Mississippi Department of Agriculture and Commerce
  Bureau of Plant Industry, Plant Pest Programs
  Mississippi State, MS 39762-5207

  (662) 325-7765
  www.mdac.state.ms.us/index.asp

Controlling Woody Brush

Due to lack of management, dense infestations of woody brush such as elm, sweetgum, eastern red cedar, and green ash degrade the value of native grassland communities. Hardwood brush shades the ground and inhibits growth of desirable grasses and forbs in grass fields and upland pine forests. Appropriate herbicidal, mechanical, or prescribed fire treatments are required to control woody brush, and in some cases a native grassland community can be effectively released from dense brush cover. Treatment prescriptions will depend on the types of brush present. Consult a wildlife biologist or other experienced professional to develop a plan to control woody brush and restore native grassland communities.



Large amounts of woody brush in native grasslands are undesirable.

Although large amounts of woody brush in native grasslands are undesirable, creating and protecting some scattered patches of shrubby cover is desirable. Scattered thickets of native shrubs like wild plums, dogwoods, winged sumac, and blackberry provide good escape and loafing cover for a number of grassland birds. Maintaining about 10 to 20 percent of grasslands in shrubby cover will provide good cover for wildlife. Protect some existing shrub thickets from fire and herbicide treatments or plant suitable shrubs to enhance protective cover in native grass stands.

Species Selection and Planting

Native grass planting rates are expressed in terms of pounds of pure live seed (PLS) per acre. The percentage PLS reflects the amount of viable seed along with stems and other inert matter mixed in with the seed. For example, to achieve 3 pounds PLS per acre, you may actually have to plant 4 pounds of bulk seed product. However, when you purchase native warm-season grass seed, it is usually in terms of "pounds PLS per acre." So usually you will just need to know how many acres and at what rate (PLS) you are going to plant when purchasing seed. Seed vendors will usually mix several grass species for you based on percentages of grasses you want to comprise a specific PLS planting rate. Try to select cultivars or varieties of native warm-season grasses that originated close to your region, if available, as these varieties may be better adapted to your climate (see Table 1 for some suggested varieties). A seed vendor representative or other experienced professional can help you choose among available, suitable varieties.

A native warm-season grass seed drill is specially designed to handle these seeds.

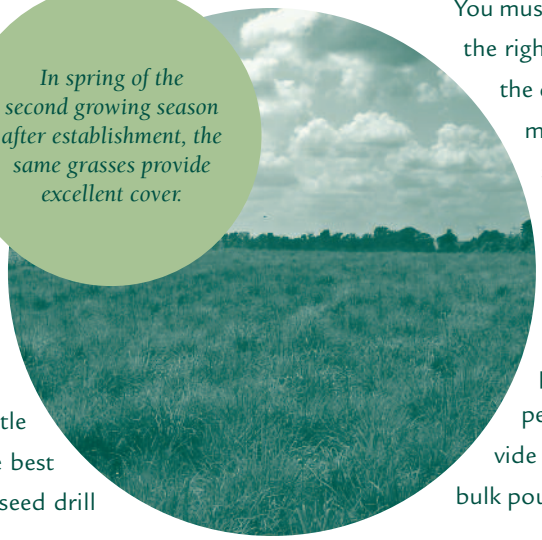
Native warm-season grasses should be planted from mid-April to early June (they also can be planted December through February during the dormant season). To reiterate, competition control is essential before planting native warm-season grasses. If substantial competing vegetation remains after initial site preparations, an application of imazapic plus glyphosate (e.g., Journey) or glyphosate (e.g., Roundup) alone may be applied just prior to or right after planting native warm-season grasses to help control competing weeds. Imazapic applied at appropriate rates prior to planting generally has few negative effects on native warm-season grasses. However, closely follow label recommendations if attempting to establish switchgrass, eastern gamagrass, or sideoats grama, as higher label rates of imazapic can have adverse effects on these species (switchgrass is especially sensitive to imazapic).

In late summer of the first growing season, these native warm-season grasses do not exhibit much above-ground vegetative growth.

The fluffy seeds of big bluestem, little bluestem, indiangrass, and purple top are best planted with a native warm-season grass seed drill specially designed to handle these seeds. It is important not to plant these seeds too deep (no deeper than one-fourth to one-half of an inch; shallower is better). When planting these seeds with a native warm-season grass seed drill, it is acceptable if some of the seed is visible on the surface. Many of these drills are capable of planting seeds via no-till planting. However, if you must plow the site before planting (e.g., there is too much litter for no-till planting), use a roller or cultipacker to firm and smooth the seedbed before planting.

A firm seedbed is essential because you do not want the seeds to be buried too deep in a loose seedbed (this is especially important if planting with drills, which may weigh over a ton). If using a native warm-season grass drill, it is not necessary to pack the seed after planting if the drill is equipped with packing wheels. If a drill is unavailable, a less effective method of planting is broadcast seeding. Prepare a firm seedbed as previously described; broadcast seed with a carrier such as cracked corn or 0-13-13 fertilizer and pack **lightly** with a roller.

Eastern gamagrass is best planted with a corn planter, whereas switchgrass, sand lovegrass, and sideoats grama can be planted with a drill or broadcast seeder (a carrier is not necessary). Eastern gamagrass should be planted about 1 inch deep, whereas switchgrass, sand lovegrass, and sideoats grama should be planted no deeper than one-fourth of an inch. Follow the instructions above if planting into a prepared seedbed is necessary.



In spring of the second growing season after establishment, the same grasses provide excellent cover.

You must calibrate planting equipment to distribute the right amount of bulk seed in order to achieve the desired PLS rate. Refer to equipment documentation or consult an experienced professional for calibration instructions. The ratio of PLS to bulk seed should be printed on a label accompanying the seed when it is purchased, or the label should at least provide purity (PP) and total germination (GP) percentages. Multiply PP by GP to find the percent PLS in 1 bulk pound of seed, then divide 1 by the percent PLS to figure how many bulk pounds of seed are equal to 1 pound PLS.

After planting, **BE PATIENT**. Do not expect a dense stand of grasses by the end of the first growing season (although it is possible under ideal conditions). Native warm-season grass seedlings spend most of the first growing season developing a root system and may not exhibit much above-ground vegetative growth. Often, a perfectly good stand of native warm-season grasses is developing although it may appear that the planting was unsuccessful. Native warm-season grasses planted at forage rates **might** develop quickly and almost completely cover a site during the first year given good growing conditions, but stands planted at lower rates for wildlife will likely contain significant bare ground areas. However, bare ground is good for wildlife habitat, and by the second growing season, these stands will likely be excellent cover.

Wildlife Habitat and Ecosystem Restoration

Generally, the total amount of all grasses planted should be in the range of 3 to 6 pounds PLS per acre for wildlife habitat. More sparse stands of grass are desirable for wildlife because dense grass growth shades out desirable forbs that produce wildlife food, and dense grass limits access for species that travel and forage along the ground. Indiangrass can become especially dense and outcompete other grasses if planted too heavily. Thus, indiangrass should comprise no more than 10 to 20 percent of native warm-season grass seed mixtures planted specifically for wildlife.

A mixture of grass species is best for wildlife because the structure and composition of mixed stands creates more diverse, usable habitats than a single species stand. See Table 2 for some suggested grass mixtures. See Table 3 for some suggested forb species.

Forb seeds can be mixed with native grass seeds for planting (drill or broadcast); alternatively, many native grass drills have separate forb boxes, but these are often hard to accurately calibrate for mixtures of large and small seeds. Forbs increase habitat diversity and provide wildlife foods in the form of seeds, nectar, and green forage. A diversity of forbs also attracts numerous insects that are important foods for other wildlife or attractive species for wildlife viewing (e.g., butterflies). Establishing or protecting scattered patches of native shrubs (e.g., wild plum, blackberry, and dogwood) and trees (e.g., oak and pine) in open landscapes (e.g., pastures) restored to native grasses will also enhance habitat value for wildlife by adding more diverse cover and food resources.

Livestock Forage

Native warm-season grasses provide excellent warm-season forage once established. Average daily weight gains for cattle grazing native warm-season grasses can be equal to or greater than gains reported for cattle grazing bermudagrass or bahiagrass. Native warm-season grasses work best as one component of a rotational grazing system that includes both cool-season and warm-season paddocks. Generally, 67 to 75 percent of the forage base should be cool-season forage, whereas 25 to 33 percent should be warm-season forage. Cool- and warm-season grasses should be planted in separate paddocks and not in mixed stands.

Eastern gamagrass, switchgrass, big bluestem, and indiangrass are good native warm-season grass species for forage production. Many cultivars of native grass species have been developed specifically for forage production. For livestock forage, plant native warm-season grasses (singularly or in combination) at a total rate of 8 to 12 pounds PLS per acre. Mixed species stands of these grasses (or different single-species paddocks) will likely be advantageous because species mature at different times (possibly increasing summer forage availability), and some species may retain better forage quality during dry weather periods. Switchgrass and eastern gamagrass can be established and used more effectively when planted as single-species stands. A good combination of native warm-season grass species for both livestock forage and wildlife habitat is 3 pounds PLS per acre big bluestem, 3 pounds PLS per acre indiangrass, and 2 pounds PLS per acre little bluestem. Big bluestem and indiangrass flower later than most other native warm-season grasses, so these two species may be good choices if both hay and wildlife are the objective. Waiting until July to cut these grasses for hay allows grassland birds to have good nesting cover through the peak of the nesting season. However, grasses like switchgrass and eastern gamagrass will be past their best quality by July. Producers should weigh their objectives accordingly when trying to manage native warm-season grasses for both forage and wildlife habitat.

Maintenance and Use of Native Warm-Season Grass Stands

Once established, native grassland communities must be maintained through periodic disturbance such as disking, prescribed fire, or grazing. To manage for grassland wildlife and ecosystem restoration, periodic disturbance is essential to maintain grassland communities by controlling invading brush and trees (scattered shrubs and trees can be beneficial in grassland communities), minimizing litter accumulation, recycling nutrients, and by stimulating new herbaceous plant growth. Disking should not be used to manage sensitive areas such as remnant native prairie or wiregrass communities because it may destroy rare or sensitive plants in these systems. Prescribed fire is a cost-effective tool for managing wildlife habitat and native prairie, controlling woody brush, and improving forage quality. However, prescribed burning should always be supervised by a certified prescribed burn manager, who will develop a written burn plan and obtain appropriate permits before burning.

Check with the Mississippi Forestry Commission for more information about prescribed burning regulations.

Use of nitrogen (N) fertilizer during the first year of establishment is not recommended, although moderate amounts of phosphorus (P) and potassium (K) fertilizer may be beneficial during the first year. For forage production, N-P-K may be applied as needed during subsequent years to enhance production. However, native warm-season grasses do not require as much supplemental fertilization as nonnative forage grasses. In most cases, native warm-season grasses will probably not be available for substantial grazing or haying during the first growing season after planting. It is important not to graze native warm-season grasses shorter than a height of 8 inches; a rotational grazing system in which several native warm-season grass paddocks are available is the most efficient way to use native warm-season grasses for livestock forage.

The best-quality hay is produced from native warm-season grasses by harvesting when seed heads first begin to show. A professional experienced in native warm-season grass management can provide prescriptions for maintenance of native warm-season grass stands tailored specifically to your objectives.

Technical Assistance

This guide is primarily an introduction to native warm-season grass establishment and management. An excellent, more detailed reference is "Native warm-season grasses: identification, establishment, and management for wildlife and forage production in the mid-South" by Harper et al. (2007) (http://www.utextension.utk.edu/publications/wildlife/default.asp). For professional assistance with native warm-season grass establishment and management, the following agencies are available to provide technical and programmatic assistance:

- Delta Wildlife, Inc.
  http://www.deltawildlife.org/
  (662) 686-3370

- Mississippi Department of Wildlife, Fisheries, and Parks
  http://www.mdwfp.com/
  (601) 432-2400

- Mississippi Forestry Commission
  http://www.mfc.state.ms.us/
  (601) 359-1386

- Mississippi State University
  Forest and Wildlife Research Center
  http://www.cfr.msstate.edu/fwrc/fwrc.htm
  (662) 325-2952

- Mississippi State University
  Wildlife and Fisheries Extension
  http://msucares.com/
  (662) 325-3174

- USDA-Farm Service Agency
  http://www.fsa.usda.gov/
  (601) 965-4300

- USDA-Natural Resources Conservation Service (NRCS)
  http://www.ms.nrcs.usda.gov/
  (601) 965-4339

- Wildlife Mississippi
  http://www.wildlifemiss.org/
  (662) 686-3375

Seed Sources

It is recommended that you first contact an experienced professional from one of the agencies listed above to facilitate selection of grasses and forbs that are appropriate for your property. In many cases, one or more of these organizations may be able to handle procurement of seed for you. However, if you prefer to purchase seed on your own, following are some seed companies (this list is not exhaustive) that can help you with selecting and purchasing native warm-season grass and/or forb seeds.

Specializing in Native Grasses and Forbs

- Bamert Seed Company
  http://www.bamertseed.com/
  (800) 262-9892
  1897 CR 1018
  Muleshoe, TX 79347

- Bohmont Ranch Warm-Season Grass Seed
  http://www.bohmontranch.com/
  (417) 278-3887
  939 Bohmont Road
  Sparta, MO 65753

- Ernst Conservation Seeds
  http://www.ernstseed.com
  (800) 873-3321
  9006 Mercer Pike
  Meadville, PA 16335-9299

- Roundstone Native Seed
  http://www.roundstoneseed.com
  (270) 531-2353
  9764 Raider Hollow Road
  Upton, KY 42784

- Sharp Brothers Seed Company
  http://www.sharpbro.com
  (800) 462-8483
  396 SW David Street
  Clinton, MO 64735

- Star Seed Company
  http://www.gostarseed.com
  (800) 782-7311
  101 Industrial Avenue
  Osborne, KS 67473

- Turner Seed Company
  http://www.turnerseed.com/
  (800) 722-8616
  211 County Road 151
  Breckenridge, TX 76424-8165

- Warner Brothers Seed Company
  http://www.wbseedco.com/
  (800) 467-7250
  P.O. Box 101
  Lawton, OK 73502

Selected Native Legumes for Wildlife Plantings

- Seeds, Inc
  (800) 238-6440
  761 Walnut Knoll Lane
  Memphis, TN 38018

- Wax Company, Inc
  (662) 256-3511
  212 North Front Street
  Amory, MS 38821

Financial Assistance

A number of conservation programs are available that may provide cost-shares or incentives for native warm-season grass establishment. The Conservation Reserve Program (CRP) is available only for land that satisfies an agricultural cropping history requirement or is marginal pastureland. Several CRP buffer practices (such as CP21 - Filter Strips and CP33 - Habitat Buffers for Upland Birds) can be established in native warm-season grasses to develop wildlife habitat and conserve soil and water quality. CRP grass stands that are established in nonnative grasses such as tall fescue or bermudagrass (such as CP10 - Existing Grasses) can be enhanced by converting to native warm-season grasses. CRP also provides cost-shares to manage (such as prescribed fire) CRP conservation covers. The Wildlife Habitat Incentives Program is available to any nonindustrial private landowners (dependent on funding) and provides cost-shares for native warm-season grass establishment and management. The Environmental Quality Incentives Program (EQIP) and Conservation Security Program (CSP) may also have practices that can be used to establish and manage native warm-season grasses for wildlife habitat, sensitive areas protection, or grazing. The Landowner Incentive Program (LIP) is practical for restoration of native warm-season grasses in order to enhance, restore, and protect imperiled habitats and benefit at-risk wildlife species on private lands.

The Farm Service Agency (FSA) administers CRP. The Natural Resources Conservation Service (NRCS) administers CSP, EQIP, and WHIP. Contact the NRCS or FSA office at your USDA Service Center, or a wildlife biologist with one of the agencies listed in the Technical Assistance section, about availability of federal assistance programs. If native warm-season grass plantings are established with financial assistance from USDA conservation programs, planting rates and practices must be consistent with NRCS practice standards. The Mississippi Department of Wildlife, Fisheries, and Parks, in cooperation with Wildlife Mississippi, administers LIP. Delta Wildlife (in the Delta region) and Wildlife Mississippi (in the prairie and longleaf pine regions) are active in native warm-season grass restoration. Contact these agencies about native grassland restoration programs they might have available.

Additional References

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Summary

Native warm-season grasses are a vital part of natural grassland and woodland ecosystems in Mississippi. By managing competition from undesirable vegetation and following proper planting procedures, native warm-season grass stands can be successfully established. With proper management, native warm-season grasses are compatible with both wildlife habitat and livestock forage goals. Consult a natural resources professional to develop a plan for native warm-season grass management that will best fit your objectives.

Recommended Plantings for Restoring Native Plant Communities

Following are brief lists of native grasses and forbs that are generally available for purchase. In some instances, introduced forb species may be acceptable (e.g., kobe lespedeza). Always consult a natural resources professional before planting introduced species. Consult a natural resources professional or seed company representative to decide which species and cultivars or varieties of available native warm-season grass seed and forbs will best fit your objectives.

Table 1. Recommended native warm-season grasses for Mississippi.

Common Name	Scientific Name	Varieties or Cultivars	Planting Depth	Planting Method
big bluestem	*Andropogon gerardii*	**Kaw**, **Earl**, Pawnee, Rountree	0.25 inch	**drill**; broadcast
little bluestem	*Schizachyrium scoparium*	**Aldous**, Cimmaron, Camper, Blaze	0.25 inch	**drill**; broadcast
broomsedge	*Andropogon virginicus*	Limited seed availability; readily colonizes most sites in Mississippi naturally	0.25 inch	**drill**; broadcast
indiangrass	*Sorgastrum nutans*	**Lometa**, **Osage**, Americus, Cheyenne, Rumsey	0.25 inch	**drill**; broadcast
switchgrass	*Panicum virgatum*	**Alamo**, **Kanlow**, Blackwell, Pathfinder	0.25 - 0.5 inch	**drill**; **broadcast**
eastern gamagrass	*Tripsacum dactyloides*	**Highlander**, **Jackson**, Iuka, Pete	1 inch	grain planter
sideoats grama	*Bouteloua curtipendula*	Haskell, Trailway, Butte	0.25 - 0.5 inch	**drill**; **broadcast**
sand lovegrass	*Eragrostis trichodes*		0.25 inch	**drill**; **broadcast**
purple top	*Tridens flavus*		0.25 inch	**drill**; broadcast

Bold Varieties - indicate proven performance at sites in Mississippi.
Bold Planting Methods - indicate planting methods that yield the best results.

Table 2. Example native warm-season grass mixtures for different uses.

	Grass Mixtures (pounds PLS/acre)
tallgrass prairie or Delta mixture	little bluestem (1.5 lbs), big bluestem (1.5 lbs), indiangrass (0.5 lb), switchgrass (0.5 lb)
shortgrass prairie or Delta mixture	little bluestem (2 lbs), sideoats grama (1 lb), big bluestem (0.5 lb), indiangrass (0.5 lb)
average soils mixture (e.g., red clay soils)	little bluestem (2 lbs), purple top (1 lb), indiangrass (0.5 lb), switchgrass (0.5 lb)
sandy/degraded soil mixture	little bluestem (2 lbs), sand lovegrass (0.5 lb), purple top (1 lb), switchgrass (0.5 lb)
grazing mixture, heavy soils	big bluestem (4 lbs), indiangrass (4 lbs), little bluestem (2 lbs), or eastern gamagrass or switchgrass in single-species stands
grazing mixture, average soils	little bluestem (2 lbs), indiangrass (8 lbs), or eastern gamagrass in single-species stands
grazing mixture, dry soils	little bluestem (2 lbs), indiangrass (6 lbs), sand lovegrass (2 lbs), or eastern gamagrass in single-species stands

Rates may be adjusted based on desired seeding rate. If approximate bulk seed volume output rates can be obtained for the drill being used, this will help determine amount of seed to purchase. Remember that pure live seed will have to be estimated from bulk seed volume, and pure live seed rates will have to be approximated as close to the desired rate as possible based on bulk seed output by specific drill settings.

Calculating Bulk Pounds of Seed for Planting

Multiply pure seed percentage by total germination percentage. If pure seed is 70 percent and total germination is 85 percent, then 0.70 multiplied by 0.85 equals 0.595 or 59.5 percent pure live seed in 1 bulk pound of seed. Divide 1 by the percentage of pure live seed in 1 bulk pound to determine bulk pounds of seed that equal 1 pound of pure live seed.

In this example, 1 divided by 0.595 equals 1.68 bulk pounds. Thus, there is 1 pound of pure live seed in 1.68 bulk pounds. To plant at a rate of 4 pounds pure live seed per acre, plant approximately 7 bulk pounds of seed per acre (1.68 multiplied by 4). The actual rate that can be planted will depend on equipment used. For example, the lowest output setting on a native grass drill may be 5 bulk pounds, while the next output setting may be 8 bulk pounds. In this example, 5 bulk pounds would equal approximately 3 pounds of pure live seed (5 multiplied by 0.595), and 8 bulk pounds would equal approximately 5 pounds of pure live seed (8 multiplied by 0.595).

Table 3. Some native forbs recommended for wildlife habitat enhancement or ecosystem restoration in Mississippi.

Common Name	Scientific Name	Form (Varieties)	Soil Adaptation*
wild bergamont	*Monarda fistulosa*	mint, broadleaf forb	L, M, H
oxeye	*Heliopsis helianthoides*	aster, broadleaf forb	M, H
ragweed	*Ambrosia artemisiifolia*	aster, broadleaf forb	L, M, H
blazing star	*Liatris spp.*	aster, broadleaf forb	M, H
purple coneflower	*Echinacea purpurea*	aster, broadleaf forb	M, H
coneflower	*Radtibida spp.*	aster, broadleaf forb	M, H
coreopsis	*Coreopsis spp.*	aster, broadleaf forb	M, H
compass plant	*Silphium laciniatum* and other *Silphium spp.*	aster, broadleaf forb	H
maximilian sunflower**	*Helianthus maximiliani*	aster, broadleaf forb	M, H
common sunflower	*Helianthus annuus*	aster, broadleaf forb	M, H
narrow leaved sunflower	*Helianthus angustifolius*	aster, broadleaf forb	L, M
butterfly milkweed	*Asclepias tuberosa*	aster, broadleaf forb	M, H
blackeyed Susan	*Rudbekia hirta*	aster, broadleaf forb	L, M, H
Illinois bundleflower	*Desmanthus illinoensis*	legume	H
Florida beggarweed	*Desmodium tortuosum*	legume	L, M, H
smooth ticktrefoil	*Desmodium laevigatum*	legume	L, M, H
stiff ticktrefoil	*Desmodium obtusum*	legume	L, M, H
partridge pea	*Chamaecrista fasciculata*	legume (Lark)	L, M, H
roundhead lespedeza	*Lespedeza capitata*	legume	L, M, H
slender lespedeza	*Lespedeza virginica*	legume	L, M, H
white prairie clover	*Dalea candida*	legume	H
purple prairie clover	*Dalea purpurea*	legume	H
white indigo	*Baptisia alba*	legume	L, M

* **L** = light soils (drier, sandy, and silty soils; may not be suitable for extremely droughty soils);
M = medium soils (well-drained loam and clay soils);
H = heavy soils (moderately drained, heavier clay soils such as prairie or Delta soils)

** Not native to Mississippi, but native to western United States; not known to be invasive in Mississippi.

Consult a natural resources professional for more information about appropriate plant materials for your site.

All species may not be commercially available.

Photos

Bobby Watkins
Rick Hamrick
Wes Burger
Bryan Watkins
Sam Riffell

Illustrations

Jeanne Jones

www.naturalresources.msstate.edu

This project was funded in part by the Mississippi Department of Wildlife, Fisheries, and Parks, and the Natural Resource Enterprises program.

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By **Rick Hamrick**, Research Associate II, Forest and Wildlife Research Center; **L. Wes Burger**, Professor, Forest and Wildlife Research Center; **Jeanne Jones**, Associate Professor, Forest and Wildlife Research Center; and **Bronson Strickland**, Assistant Extension Professor, Forest and Wildlife Research Center

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Publication 2435

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. VANCE H. WATSON, Interim Director (2500-08-07)