

Establishment of Permanent Native Grasses and Mixtures

Establishment

Native warm season grasses are excellent choices for conservation cover on public and private lands where objectives of the landowner or manager include multiple conservation uses. In addition to controlling soil erosion and improving water quality, they offer ideal nesting habitat and food for many wildlife species including grassland birds. Keys to successful establishment of native and introduced warm season grasses and legumes for conservation cover are:

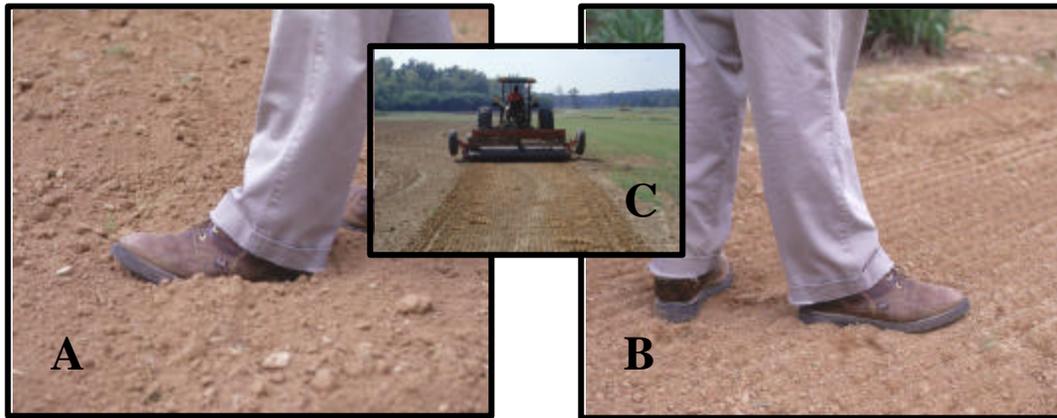
- Proper seedbed preparation
- Planting on a pure live seed basis
- Proper equipment
- Selection of adapted cultivars
- Management during and after establishment



Conservation cover planted to native warm season grass mixtures provide valuable food and cover for many grassland bird species.

Seedbed Preparation

Prepare a seedbed by disking and harrowing one year prior to planting. This may not be an option for many landowners and land managers but tillage activity in advance of planting will help get the existing weed population under control and create a desirable seedbed. Planting a wheat cover crop in the fall may be needed to protect the soil from eroding during the winter months. If a conventional seedbed is prepared, make certain the seedbed is firmed prior to spring planting. This can be achieved by using implements that firm the soil such as a cultipacker. Loose uneven seedbeds are a major cause of poor stands. Shoes or boots should not sink more than ½ inch into a properly prepared seedbed. Proper seed placement is critical; seeds sown on the surface without coverage or greater than ½ inch deep have little chance of germinating and developing into seedlings.



Poor seedbed preparation is a major cause of warm season grasses planting failures. Seedbed (A) is too loose and likely will result in poor stands. Seedbed (B) is ideal for planting warm season grasses. Shoes or boots should not sink more than ½ on a properly prepared seedbed. A cultipacker (C) is a useful implement for firming the soil before and after planting.

No-till Seedbed

Native grass seeds can be established using no-till methods with proper planting equipment. This method requires all existing vegetation be removed by burning with fire or spraying weeds in the early spring with a broad-spectrum herbicide such as Roundup. Follow the label for mixing and applying herbicides or contact your local extension agent for assistance.



Warm season grasses such eastern gamagrass can be no-till planted in to a chemically killed seedbed with a conventional row crop planter.

Establishment Method

Native and introduced grasses can be established from seed using the PLS method. Planting rates of native warm season grasses and dallisgrass are based on PLS lb/acre and **NOT** bulk lb/acre. Failing to recognize PLS when calculating seeding rates may jeopardize the planting.

A simple method for calculating PLS planting rates is to use the PLS conversion chart below. Seed quality of a given seed lot can be obtained from information on the seed tag. Be sure the seed tag accompanies the seed purchased and is sown on the bag.

**Table for Using Percent Purity and Germination
to Calculate Bulk Seed Planting Rates**

| % Purity | 100 | 95 | 90 | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 |
|----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-------|
| 100 | 1.0 | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.9 | 2.0 | 2.3 | 2.5 | 2.9 | 3.4 | 4.0 | 5.0 | 6.7 | 10.0 |
| 95 | 1.1 | 1.2 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.1 | 3.6 | 4.3 | 5.3 | 7.1 | 10.6 |
| 90 | 1.2 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 | 1.8 | 1.9 | 2.1 | 2.3 | 2.5 | 2.8 | 3.2 | 3.8 | 4.5 | 5.6 | 7.5 | 11.2 |
| 85 | 1.2 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 | 1.7 | 1.9 | 2.0 | 2.2 | 2.4 | 2.7 | 3.0 | 3.4 | 4.0 | 4.8 | 5.9 | 7.9 | 11.8 |
| 80 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.1 | 2.3 | 2.5 | 2.8 | 3.2 | 3.6 | 4.2 | 5.0 | 6.3 | 8.4 | 12.5 |
| 75 | 1.4 | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.1 | 2.3 | 2.5 | 2.7 | 3.0 | 3.4 | 3.9 | 4.5 | 5.4 | 6.7 | 8.9 | 13.4 |
| 70 | 1.5 | 1.6 | 1.6 | 1.7 | 1.8 | 2.0 | 2.1 | 2.2 | 2.4 | 2.6 | 2.9 | 3.2 | 3.6 | 4.1 | 4.8 | 5.8 | 7.2 | 9.6 | 14.3 |
| 65 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.4 | 2.6 | 2.8 | 3.1 | 3.5 | 3.9 | 4.4 | 5.2 | 6.2 | 7.7 | 10.3 | 15.4 |
| 60 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.4 | 2.6 | 2.8 | 3.1 | 3.4 | 3.8 | 4.2 | 4.8 | 5.6 | 6.7 | 8.4 | 11.2 | 16.7 |
| 55 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.5 | 2.6 | 2.8 | 3.1 | 3.4 | 3.7 | 4.1 | 4.6 | 5.2 | 6.1 | 7.3 | 9.1 | 12.2 | 18.2 |
| 50 | 2.0 | 2.2 | 2.3 | 2.4 | 2.5 | 2.7 | 2.9 | 3.1 | 3.4 | 3.7 | 4.0 | 4.5 | 5.0 | 5.8 | 6.7 | 8.0 | 10.0 | 13.4 | 20.0 |
| 45 | 2.3 | 2.4 | 2.5 | 2.7 | 2.8 | 3.0 | 3.2 | 3.5 | 3.8 | 4.1 | 4.5 | 5.0 | 5.6 | 6.4 | 7.5 | 8.9 | 11.2 | 14.9 | 22.3 |
| 40 | 2.5 | 2.7 | 2.8 | 3.0 | 3.2 | 3.4 | 3.6 | 3.9 | 4.2 | 4.6 | 5.0 | 5.6 | 6.3 | 7.2 | 8.4 | 10.0 | 12.5 | 16.7 | 25.0 |
| 35 | 2.9 | 3.1 | 3.2 | 3.4 | 3.6 | 3.9 | 4.1 | 4.4 | 4.8 | 5.7 | 5.8 | 6.4 | 7.2 | 8.2 | 9.6 | 11.5 | 14.3 | 19.1 | 28.6 |
| 30 | 3.4 | 3.6 | 3.8 | 4.0 | 4.2 | 4.5 | 4.8 | 5.2 | 5.6 | 6.1 | 6.7 | 7.5 | 8.4 | 9.6 | 11.2 | 13.4 | 16.7 | 22.3 | 33.4 |
| 25 | 4.0 | 4.3 | 4.5 | 4.8 | 5.0 | 5.4 | 5.8 | 6.2 | 6.7 | 7.3 | 8.0 | 8.9 | 10.0 | 11.5 | 13.4 | 16.0 | 20.0 | 26.7 | 40.0 |
| 20 | 5.0 | 5.3 | 5.6 | 5.9 | 6.3 | 6.7 | 7.2 | 7.7 | 8.4 | 9.1 | 10.0 | 11.2 | 12.5 | 14.3 | 16.7 | 20.0 | 25.0 | 33.4 | 50.0 |
| 15 | 6.7 | 7.1 | 7.5 | 7.9 | 8.4 | 8.9 | 9.6 | 10.3 | 11.2 | 12.2 | 13.4 | 14.9 | 16.7 | 19.1 | 22.3 | 26.7 | 33.4 | 44.5 | 66.7 |
| 10 | 10.0 | 10.6 | 11.2 | 11.8 | 12.5 | 13.4 | 14.3 | 15.6 | 16.7 | 18.2 | 20.0 | 22.3 | 25.0 | 28.6 | 33.4 | 40.0 | 50.0 | 66.7 | 100.0 |

To use the PLS/conversion chart, find the percent purity and germination of the seed lot to be planted and cross-reference the numbers in the chart. Once you have located the number on the chart that corresponds to the percent purity and germination, multiply it by the recommended PLS seeding rate. For example, if a seed lot of big bluestem has 95 percent purity and 90 percent germination, it would take 1.2 bulk pounds to plant 1 PLS/acre. If the recommended seeding rate for big bluestem is 8 PLS/acre, then multiply 1.2 by 8 to determine the amount of bulk seed needed to plant one acre. In this example, it would require 9.6 or approximately 10 bulk lb/acre to plant 8 PLS/acre of big bluestem.

Equipment

Cultipacker seeders, spreaders (PTO, hand or electric driven) or grass drills are ideal plant equipment for achieving proper seed placement. Drills equipped with double disk openers, depth bands and press-wheels will insure proper seed placement of native warm season grasses. Fluffy grass seed such as Indiangrass and little bluestem will not flow easily through a conventional drill like smooth-seeded grasses such as switchgrass, bahiagrass or dallisgrass, because appendages surrounding the seed cause it to pack together inside the planting tubes. Grass drills equipped with a fluffy seed box are necessary to achieve proper planting rate and placement of fluffy grass seed (e.g. Indiangrass, little bluestem and big bluestem). However, mixing fluffy seed with a carrier such as sand or rice hulls will help facilitate broadcast seeding. Even with a carrier, planting fluffy seed by broadcast method is difficult. Frequent checks should be made during the

planting operation to insure that the seed is being distributed uniformly across the seedbed. Special hand-operated broadcast seeders have been designed and engineered for planting fluffy grass. Small areas can be seeded with hand-operated seed spreaders or broadcast seeders mounted on a tractor or ATV. Cultipacking the seedbed before and after broadcast planting is recommended on all soils except the Blackland Prairie soils where cultipacking after planting is recommended.



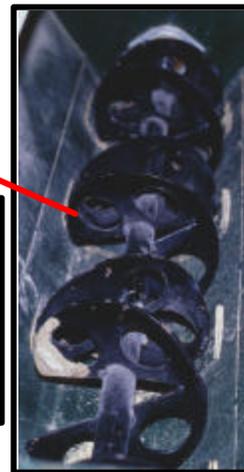
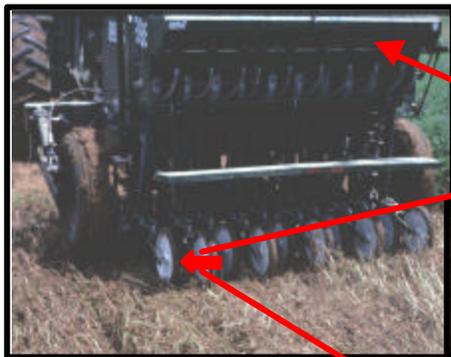
Cultipacker seeder



Hand operated seeder



Electric spreader mounted on an ATV



Grass seed drill with multiple seed boxes handles smooth and fluffy seed.

Grass seed drill equipped with double-disked openers, depth bands, and press wheels with multiple smooth and fluffy seed boxes can be used to plant both seed types simultaneously in one operation. Fluffy grass seed box have an auger style agitator to help move seed to specialized wheels in the seed box called “picker wheels”. These wheels enable fluffy seed to move freely through the planting tubes and prevent them from clogging-up inside the tubes.

Fertilization

Native warm season grasses do not require fertilization for production or persistence when planted for conservation cover. These grasses will also grow on the wide range of soil pH indigenous to Mississippi. If the soil pH is unknown, take a soil sample and have it tested to determine the pH. If the soil pH is found to be below 5.0, use soil test recommendations to bring the pH to a minimum of 5.0.

Use soil test recommendations when fertilizing and liming introduced grasses such as dallisgrass or bahiagrass. Request fertilizer and lime requirements for maintenance of introduced grasses.

Weed Control

Herbicides such as Plateau[®] and 2, 4-D can be used to control annual grassy and broadleaf weeds on many native warm season grasses. Herbicide selection will depend on whether native grasses were seeded alone or in combination with legumes and forbs, and the target weed species. If a mixture of native grasses were seeded without legumes or forbs, apply 2, 4-D when the grass seedlings reach the four-leaf stage. However, if the native grass mixture includes legumes or forbs do not spray with 2, 4-D. Plateau[®] may be used where native grasses were seeded in a mix with certain legumes and forbs. Do not spray Plateau[®] where switchgrass and eastern gamagrass were planted alone or in a mixture. As with all herbicides, follow the label for mixing and applying. Failure to follow the label directions may result in damage to the planting. Consult the extension service for weed control in dallisgrass and bahiagrass.

Management

Mowing, which can be achieved with a bush hog, is an optional weed control measure during the establishment year and in subsequent years for residue management. Mowing in mid-summer to a height just above the grass seedlings will help reduce weed competition and encourage seedling growth. Mowing should not coincide with grassland bird nesting period. Therefore, mowing should only be performed before April 1 and after August 15.



Native warm season grasses respond to early spring burning. Burning promotes rapid regrowth in the spring and controls winter weeds. Mowing can also be a valuable management tool for removing weed competition in the establishment year or for managing residue. Mowing should be conducted after nesting season of grasslands birds, avoid mowing between April 1 and August 15.

Spring burning with fire can be used to control winter weeds and promote rapid regrowth of native warm season grasses. Burning will need to be performed before the grass begins to recover from winter dormancy. Burning can be done in late January in counties South of I-20 and late February in counties North of I-20. Contact appropriate state or federal agencies for assistance with preparing burn plans or burning.

Warm Season Grass Mixtures

A recommended mixture of native warm season grasses and legumes is provided in the table below for each adaptation zone in Mississippi (refer to planting guide section for zone identification). Planting these mixtures will require multiple seeding operations unless a grass drill equipped with multiple seed boxes is used. Mixing switchgrass, partridge pea and fluffy grass seeds in one hopper or trying to plant them in one operation with a broadcast seeder is not recommended because the switchgrass and partridge pea, which is heavier than the fluffy seed, will come out of the hopper first, leading to uneven stands. Use planting guides for selecting adapted cultivars and appropriate adaptation zones in Mississippi.

Recommended mixtures of warm season grasses and legumes in Mississippi.

| Mixture | Zone | Species | Cultivar | Planting Rate (PLS/acre) |
|---------|------|-------------------|------------------|-----------------------------|
| 1 | 1, 2 | Switchgrass | Alamo | 2.5 |
| | | Indiangrass | Lometa, Americus | 2.0 |
| | | Little bluestem | Aldous | 2.0 |
| | | Partridge pea | Lark Selection | 2.0 ^{1/} |
| 2 | 1, 2 | Indiangrass | Lometa, Americus | 2.0 |
| | | Little bluestem | Aldous | 2.0 |
| | | Big bluestem | Kaw, Earl | 2.0 |
| | | Partridge pea | Lark Selection | 2.0 ^{1/} |
| 3 | 1, 2 | Switchgrass | Alamo | 2.5 |
| | | Indiangrass | Lometa, Americus | 2.0 |
| | | Big bluestem | Kaw, Earl | 2.0 |
| | | Little bluestem | Aldous | 2.0 |
| | | Eastern gamagrass | Pete, Highlander | see footnote ^{2/} |
| | | Partridge pea | Lark Selection | 2.0 ^{1/} |
| 4 | 3 | Switchgrass | Alamo | 2.5 |
| | | Indiangrass | Lometa, Americus | 2.0 |
| | | Big bluestem | Earl | 2.0 |
| | | Partridge pea | Lark Selection | 2.0 ^{1/} |
| 5 | 3 | Switchgrass | Alamo | 2.5 |
| | | Indiangrass | Lometa, Americus | 2.0 |
| | | Eastern gamagrass | Pete, Highlander | see footnote ^{2/} |
| | | Partridge pea | Lark Selection | 2.0 ^{1/} |

1/ - rate is bulk lb/acre.

2/ - Plant ‘Pete’ at 2.0 bulk lb/acre and ‘Highlander’ at 5 bulk lb/acre using non stratified seed. Non stratified seed is seed that has not been prechilled.

Planting Guide of Warm Season Grasses and Legumes

BIG BLUESTEM (*Andropogon gerardii*)

Description: A native, warm-season perennial tall grass reaching heights of 8 feet. Big bluestem grows in large clump and can be planted in a mixture with other warm season native grasses and legumes.



Soil adaptation: Well-drained, fertile soils. It performs well on most soils except those that are very droughty or poorly drained.

Zone of adaptation: 1, 2

Cultivar: Kaw, Earl

Planting time : March – May 15

Planting rate: 8 PLS/acre when planted alone or 2.5 PLS/acre in a mixture.

Planting depth: ½ inch

LITTLE BLUESTEM (*Schizachyrium scoparium*)

Description: Warm-season perennial bunch grass that grows to heights of 2 to 4 feet. In the southeastern states, little bluestem is often mistaken for broomsedge bluestem because of similarities in height, color and growth form. It can be planted in a mixture with other warm season native grasses.



Soil adaptation: Prefers deep, well-drained, fertile soils, but will perform satisfactory on droughty soils.

Zone of adaptation: 1, 2

Cultivar: Aldous, OK Select.

Planting time: March – May 15

Planting rate: 8 PLS/acre when planted alone or 2.5 PLS/acre in a mixture.

Planting depth: ½ inch

EASTERN GAMAGRASS (*Tripsacum dactyloides*)

Description: Warm-season perennial bunchgrass capable of reaching heights of 5 to 9 feet tall on fertile soils.



Soil adaptation: Moist, well-drained soils.

Zone of adaptation: 1, 2 and 3.

Cultivar: Pete (Zone 1, 2, 3); Highlander (Zone 1, 2 3)

Planting time: March – May 15

Planting rate: Seeding rate varies between cultivars. Planting rate for Pete and Highlander is 8 and 15 PLS/acre when planted alone. In a mixture, plant Pete and Highlander at 2.0, and 5 bulk lb/acre. Use non-stratified or dry seed when planted in a mixture.

Special Considerations: Stratified seed is seed that has been soaked in water for 24 hours and stored wet in a refrigerated environment. Stratified seed germinates with greater uniformity and in higher percentages than dry seed. Stratified seed will need to be planted immediately upon arrival or stored in a refrigerated environment until planting. GERMTECH^{II} treated seed is easier to handle and does not require special storage facilities. Stratified seed or seed treated with GERMTECH^{II} can be drilled or planted with a corn planter. Many eastern gamagrass seed dealers offer stratified and non-stratified seed; request stratified seed when planted alone.

Planting depth: 1.5 inch for stratified seed and ½ for non-stratified. Non-stratified seed is only recommended when planted in a mixture with other warm season grasses and legumes.

INDIANGRASS (*Sorghastrum nutans*)

Description: A native, warm-season perennial grass. It occurs through much of the Southeast. It usually grows 3 to 4 feet high. Leaves are long, narrow, bluish-green, and waxy. It can be planted in mixtures with other warm season grasses.



Soil adaptation: Well-drained, fertile soils. It performs well on most soils except those that are very droughty or poorly drained.

Zone of adaptation: 1, 2, 3

Cultivars: Lometa (Zone 1 and 2) and Americus (Zone 3)

Planting time: March – May 15

Planting rate: 7 PLS/acre when planted alone or 2.5 PLS/acre in a mixture.

Planting depth: ½ inch.

SWITCHGRASS (*Panicum virgatum*)

Description: Warm-season perennial grass. It occurs through much of the Southeast. It usually grows 3 to 5 feet high. Leaves are green to bluish-green in color. It has heavy vigorous roots and underground stems. Stalks are relatively stiff causing it to stand up well even after maturity.



Soil Adaptation: Prefers deep, well-drained, moist, fertile soils. Performs well on most soils except those that are very droughty or very poorly drained. It will produce better growth and cover on droughty, infertile, soils than most of the introduced grasses because of its drought tolerance and low to medium fertility requirements.

Zone of adaptation: 1, 2, 3

Cultivars: Alamo (Zone 1, 2, 3); Kanlow (Zone 1)

Planting time: March – May 15

Planting rate: 6 PLS/acre when planted alone or 2.5 PLS/acre in a mixture.

Planting depth: ½ inch

PARTRIDGE PEA (*Chamaecrista fasciculata*)

Description: A native, warm-season annual legume with fern-like leaves and yellow flowers. Flat, black seeds are produced in pods, which pop open as they mature, scattering seeds widely. This plant is common along roadsides, idle land, ditch banks, and semi-open woodland. It averages 2 feet tall but may exceed 4 feet on better soil.



Soil adaptation: Grows naturally on practically all soils throughout Mississippi.

Zone of adaptation: 1, 2, and 3.

Cultivars: Lark selection.

Planting rate: 6 lbs/acre alone or 4 lb/acre in a mixture

Inoculant: EL

Planting time: March - May

Planting depth: ½ inch

Miscellaneous

Refer to the following documents for additional information and assistance:

- Mississippi Planting Guide
- Plant Materials Resource Handbook
- Seed and Plant Vendors Guide of Conservation Plants (November 2002) for vendors of plants
- Contact the USDA-NRCS Jamie L. Whitten Plant Materials Center

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