

## **ESTABLISHING GRASSES AND LEGUMES ON CRITICAL AREAS**



### **INTRODUCTION**

Critical area planting is planting vegetation, such as grasses and/or legumes on highly eroding areas (sheet and rill erosion rates above 2T and/or gully erosion). These areas usually cannot be stabilized by ordinary conservation treatment and management, and if left untreated will cause severe erosion and sediment damage.

The critical area planting practice can be applied to highly disturbed areas such as urban conservation sites, road construction areas, conservation practice construction sites, and areas needing stabilization before and after natural disasters such as floods, hurricanes. Examples of critical areas include: dams, dikes, levees, cuts, fills, gullied areas, or excessively eroding sloping cropland fields where vegetation is difficult to establish by usual planting methods.

### **SITE PREPARATION**

Site preparation is essential to the establishment of vegetation on critical areas. First, gullied, rilled, or rough sites should be smoothed and shaped to permit the use of equipment for establishment and maintenance of vegetation. Graded slopes in the treated area should not be steeper than 2:1.

### **PLANTING**

Plants used in critical area plantings should be selected on the basis of species characteristics, site and soil conditions, planned use, maintenance of the treated area, method of planting, time of the year to be planted, and the needs and desires of the land user. Native plant species well adapted to the site, with multiple values (e.g., wildlife value, aesthetics) are recommended for critical area planting mixtures. Species that harbor pests should be avoided. In

addition, species diversity should be considered to avoid loss of function due to species-specific pests.

## GRASSES AND LEGUMES

- After smoothing and shaping, the soil should be pulverized to a minimum depth of 4 inches and harrowed to a uniformly smooth surface.
- **FERTILIZER:** Apply fertilizer and lime according to the nutrient management guidelines used in this document. In lieu of a soil test, use fertilizer recommendations provided in Tables 1 through 5 for initial establishment. For lime recommendations apply 2 tons/acre of agricultural lime to acid soils.
- **SEED:** Plant seed on a well prepared firm seedbed. For best results, cultipack freshly prepared seedbed before and after planting. If a cultipacker cannot be used, allow rain to settle a freshly prepared seedbed before planting, and then harrow before planting seed. Sow seed and cover lightly. Refer to Tables 1 through 5 for grass and legume planting recommendations.

For **concentrated flow areas** that have been seeded to grasses, it may be necessary to use checkdams constructed of “silt fences” or “hidabales”. Silt fences consist of burlap or synthetic material at least 24 inches high stretched across the concentrated flow area and held in place by steel posts spaced no more than eight feet apart. The bottom of the silt fence should be buried at least two inches. Attach the burlap to the steel post in an upright position using small gauge electric fence wire. Once vegetation is well established in the concentrated flow area, the silt fence can be removed. Hidabales can be placed across the concentrated flow area to help control erosion. Hidabales consist of square bales of hay placed length-ways with the cut side up in a trench across the concentrated flow area with four to six inches left above the trench or soil line. In either case, the ends of the checkdam must be 6” higher than the center of the checkdam (water will flow over the top of the checkdam). Multiple checkdams are used so that one check dam will pool water back to the upstream checkdam.

Where high velocities exist, Rolled Erosion Control Products (RECPs) may be needed to hold seed and vegetation in place temporarily and permanently.

- **SOLID SOD:** Solid sod may be applied on sites where immediate cover is required such as steep slopes, waterways, or other areas where large volumes of water are concentrated and where establishment of turf from seed is impractical.

Areas to be sodded should be watered to wet the soil two to three inches on the same day prior to placement of the sod.

Solid sod should be dense and well rooted. The sod should be 90 percent pure and free of weeds and weedy grasses. Do not allow sod to dry out, freeze, or go through a heat after harvesting and prior to placement. Transfer and place sod within 24 hours after harvesting. Cut the sod at least two inches thick, excluding top growth, and to uniform size for convenient handling and placement. Solid sod should be alternately placed on well prepared firm seedbeds.

The placement of sod should be across the slope starting at the bottom and working up the slope. Fit the sod closely together to avoid open spaces. Stagger sod strips. Do not overlap sod strips. Roll or tamp the sod after placement to insure contact of the grass roots with the soil. On slopes greater than 4:1, secure the sod to the soil surface with wooden pegs or staples. Cover the upper edge of the sodded area with a soil retention blanket for protection against water lifting and undercutting the sod. Use wire staples to anchor soil retention blankets. Immediately after anchoring, water the sod until moisture penetrates to the soil beneath. Maintain adequate moisture for at least two weeks to insure establishment of the sod.

- **MULCHING:** All planted areas except those to be used for hay or grazing or where solid sod is applied should be mulched with acceptable mulch materials such as small grain straw or grass mulch (materials containing noxious weeds should be avoided). Mulch should be applied immediately after shaping, seeding or sprigging. A minimum of 1 ½ to 2 tons per acre of small grain straw, hay, or pine needles should be applied. Mulch should be applied evenly resulting in 65 to 75 percent groundcover.

A tractor drawn mulch anchoring tool can be used to adequately anchor mulch to the soil. This tool should be used immediately after mulch has been applied. A regular farm disk can be used if a mulch anchoring tool is unavailable, however, the disk should not be sharp enough to cut the straw. These methods are limited to slopes no steeper than 2:1, where equipment can operate safely on the contour. Liquid mulch binders and tackifiers can also be used to anchor straw, but these methods are often not cost-effective.

Cotton burs, peanut hulls, seed screening, and other materials may be used where weed seeds are acceptable in mulch. These materials should not be used on slopes steeper than 5:1, and should be evenly distributed at a rate which provides about 75 percent groundcover.

Where erosion hazards are very high, Rolled Erosion Control Products (RECPs) and Hydroseeding may be used.

- **HYDROSEEDING:** a method of planting seed that consists of mixing a slurry solution of cellulose fiber mulch, seed, fertilizer, and water, which is then mechanically sprayed as a uniform layer onto an eroding or potentially eroding area. The method is more effective at establishing seed compared to typical broadcasting of seed because seed germination and healthy root systems are enhanced. Hydroseeding is also favored over conventional straw mulch applications because weed seed is not introduced and more effective erosion control is achieved.
- **ROLLED EROSION CONTROL PRODUCTS (RECPs):** a blanket-like mat used to prevent soil erosion during vegetation establishment on highly erodible areas. Once seed and mulch have been applied to a critical area, RECP can be placed and tacked down at edges to secure placement. Vegetation will then begin to emerge through spaces between the RECP fibers.

RECP are generally divided into two distinct types: natural and synthetic. Natural RECPs are often made of biodegradable jute or coconut fiber, and synthetic RECPs are primarily made of PVC. Synthetic RECP are generally non-biodegradable and provide tough, permanent support on slopes; however, this synthetic material does not retain moisture or available nutrients as well as natural materials. In high velocity concentrated

flow areas where vegetation protection alone is not sufficient. Turf Reinforcement Material (TRM) can be used to provide permanent scour protection and to hold vegetation in place. This allows vegetation to be used over a higher range of flows before hard armoring (rip-rap) is required. TRM is also used on steep slopes (>5:1).

## **COASTAL VEGETATION**

Many native coastal plant species play a major role in the shoreline protection and sand dune formation. These plants often produce dense foliage and deep root systems that prevent erosion along coastal areas. For a list of recommended coastal plant species used for shoreline stabilization and sand dune formation refer to Technical Note. 104 “Planting Guide for Establishing Coastal Vegetation on the Mississippi Gulf Coast.” for complete information on establishing or restoring native coastal vegetation on the Mississippi Gulf Coast.

TABLE 1. Specifications for forage, hay, critical areas within wildlife habitat, recreation, and/or protection of structural measures.

Plant Species <u>1/</u>	Seeding Rates Per Acre		Seeding Dates	Planting Depth (Inches)	Minimum Fertilizer <u>3/</u> Lbs/acre N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O
	Alone	Mixture <u>2/</u>			
<u>Perennials:</u>					
Bahiagrass, Pensacola <u>4/</u>	30 lbs	20 lbs	Mar-May Sep-Oct <u>5/</u>	¼	400 lbs (13-13-13)
<u>Bermudagrass:</u>					
Common (Hulled)	8 lbs	3 lbs	Mar-May	¼	400 lbs (13-13-13)
Hybrid <u>6/</u>	25,000	20,000	Mar-June	2-3	400 lbs (13-13-13)
Common (Unhulled)	10 lbs	5 lbs	Sep-Oct <u>7/</u>	¼	400 lbs (13-13-13)
Tall Fescuegrass <u>8/</u>	30 lbs	20 lbs	Sep-October Feb 15-Mar 15 <u>9/</u>	¼-½	400 lbs (13-13-13)
<u>Lespedeza:</u>					
Sericea	30 lbs	20 lbs	Mar-April	¼	
Appalow Sericea	30 lbs	20 lbs	Mar-April	¼	
White Clover <u>10/</u>		3 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
<u>Annuals:</u>					
<u>Clover: 10/</u>					
‘Meechee’ Arrowleaf		10 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
Ball		3 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
Crimson		20 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
Subterranean		20 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
Red Clover <u>11/</u>		5 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
<u>Lespedeza: 10/</u>					
Common		15 lbs	Mar-May	¼	300 lbs (0-20-20)
Kobe		15 lbs	Mar-May	¼	300 lbs (0-20-20)
Korean		15 lbs	Mar-May	¼	300 lbs (0-20-20)
Peas, wild winter <u>10/</u>		20 lbs	Sep-Oct	¼	300 lbs (0-20-20)
Vetch, hairy <u>10/</u>		20 lbs	Sep-Oct	½	300 lbs (0-20-20)
Rye, Cereal <u>12/</u>	120 lbs	90 lbs	Sep-Oct	½-1	400 lbs (13-13-13)
Wheat	120 lbs	90 lbs	Sep-Oct	½-1	400 lbs (13-13-13)
Ryegrass	40 lbs	20 lbs	Sep-Nov	½-1	400 lbs (13-13-13)
Millet, browntop	30 lbs	15 lbs	May-Jun	½-1	400 lbs (13-13-13)

1/ Refer to the Technical Note No. 102 Mississippi Planting Guide for recommended varieties.

Also refer to: <http://msucare.com/pubs/infosheets/is1168.htm>

2/ Planned seed mixtures must include at least one perennial grass species.

3/ In lieu of soil test recommendations use these minimum fertilizer recommendations for establishment.

4/ Pensacola bahiagrass is not recommended north of Hwy. 82.

5/ Fall seeded bahiagrass will be seeded in combination with cool season grasses such as rye, wheat, ryegrass. Not recommended north of Hwy. 80. Use 30 lbs bahiagrass seed per acre.

6/ May include coastal, alicia, or tifton. 20,000 springs = 1 bushel. 1 bushel = 1.25 cu. Ft. Clippings not recommended.

7/ Fall seedling will be in combination with cool season grasses. Use 10 lbs unhulled seed per acre.

8/ Not recommended south of Hwy. 80.

9/ North of Hwy. 82 and any county which Hwy. 82 crosses only. For cropland practices only.

10/ Legume seed will be inoculated with proper inoculant.

11/ Should be seeded with cool season annuals such as rye, wheat, or ryegrass.

12/ Rye may be planted alone, as a temporary cover, between Nov 15 and Dec 15.

**Note:** Bermudagrass, fescue, and sericea lespedeza are not acceptable grasses for wildlife habitat since they are not desirable for wildlife.

TABLE 2. Specifications for landscape improvement (roadsides) purposes.

Plant Species	Seeding Rates Per Acre		Depth	Planting Depth Inches	Minimum Fertilizer <u>2/</u> Rate/acre N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O
	Alone	Mixture			
<u>Perennials: 1/</u>					
Bahiagrass, Pensacola	30 lbs	20 lbs	Mar-May Sep-Oct <u>3/</u>	¼	400 lbs (13-13-13)
Bermudagrass, common					
Hulled	8 lbs	3 lbs	Mar-May	¼	400 lbs (13-13-13)
Unhulled	10 lbs	5 lbs	Sep-Oct <u>3/</u>	¼	400 lbs (13-13-13)
Fescue	30 lbs	20 lbs	Sep-October	¼-½	400 lbs (13-13-13)
Lespedeza, Sericea	30 lbs	20 lbs	Mar-April	¼-½	
<u>Annuals</u>					
Clover, crimson <u>4/</u>		20 lbs	Sep-Oct 15	¼	300 lbs (0-20-20)
Rye, cereal		90 lbs	Sep-October	½	400 lbs (13-13-13)
Vetch, hairy <u>4/</u>		20 lbs	Sep-Oct	½	300 lbs (0-20-20)
Millet, browntop		15 lbs	May-Jun	½-¾	400 lbs (13-13-13)
Wheat		90 lbs	Sep-Oct	½	400 lbs (13-13-13)

1/ Seeding mixtures must include a perennial species.

2/ In lieu of soil test recommendations use these minimum fertilizer recommendations for establishment.

3/ Fall seeding will be in combination with cool season annuals such as rye, wheat, or ryegrass.

4/ Legume seed will be inoculated with recommended inoculant.

TABLE 3. Specifications for landscape improvement or recreation (turf) purposes.

<b>Plant Species</b>	<b>Planting Method <u>1/</u></b>	<b>Planting Rate/1000 Ft<sup>2</sup></b>	<b>Seeding Depth (Inches)</b>	<b>Planting Dates</b>	<b>Minimum <u>2/</u> Fertilizer Rate/1000 Ft<sup>2</sup> (13-13-13)</b>	
<u>Perennial Grass Cover</u>						
Bermudagrass	Common	Seed	1 lb	¼	Mar-May	20 lbs
		Sprig	1,000	1-2	Mar-Aug	20 lbs
	Hybrids	Plug	1,000	-	Mar-Aug	20 lbs
		Sprig	1,000	1-2	Mar-Aug	20 lbs
		Plug	1,000	-	Mar-Aug	20 lbs
Carpetgrass	Seed	½ lb	¼	Apr-May	20 lbs	
	Plug	1,000	-	Apr-Aug	20 lbs	
Centipede	Seed	¼ lb	¼	Apr-May	15 lbs	
	Sprig	1,000	1-2	Apr-Aug	15 lbs	
Fescue, Ky-31	Seed	3 lb	¼-½	Sep-Nov 15	20 lbs	
St. Augustine	Sprig	1,000	1-2	Apr-Aug	20 lbs	
	Plug	1,000	-	Apr-Aug	20 lbs	
Zoysia	Sprig	4,000	1-2	Apr-Aug	20 lbs	
	Plug	4,000	-	Apr-Aug	20 lbs	
<u>Temporary Cover <u>3/</u></u>						
Millet, browntop	Seed	1 lb	½- ¾	May-Jun	20 lbs	
Rye, cereal	Seed	3 lbs	½ -1	Sep-Oct	20 lbs	
Ryegrass, annual	Seed	1 lb	½-1	Sep-Nov	20 lbs	
Wheat	Seed	3 lbs	½-1	Sep-Oct	20 lbs	

1/ One square yard of solid sod yields: 1,500 bermuda or zoysia sprigs or 500-700 carpetgrass, centipede or St. Augustine sprigs or 324 2-inch plugs. 1,000 square feet requires 1,000 sprigs at 1-foot centers, 4,000 sprigs at 6-inch centers.

2/ Any fertilizer source may be substituted to provide minimum requirements of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O. Use 800 pounds per acre of 13-13-13 or equivalent on large areas. Apply lime at rate of 90 pounds per 1,000 square feet or 2 tons per acre.

3/ For temporary seedings only. Annual ryegrass may be overseeded on established sod at a rate of 10 pounds per 1,000 square feet.

TABLE 4. Specifications for stabilizing structural practices with mulch/plants by month.

Month	Mulch <u>1/</u>	Plant Species	Seeding Rate/Acre	Seeding Depth	Minimum Rates N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O
Dec-Feb	2 tn/ac	Lespedeza, Sericea	30 lbs	¼	18-72-72
Dec-Feb	2 tn/ac	Unhulled Bermuda	10 lbs	¼	72-72-72 <u>2/</u>
Dec-Feb	2 tn/ac	Bahiagrass <u>3/</u>	30 lbs	¼	72-72-72 <u>2/</u>
Mar-May	2 tn/ac <u>4/</u>	Lespedeza, Sericea	30 lbs	¼	18-72-72
Mar-May	2tn/ac <u>4/</u>	Hulled Bermuda	8 lbs	¼	72-72-72
Mar-May	2tn/ac <u>4/</u>	Bahiagrass <u>3/</u>	30 lbs	¼	72-72-72
June	Optional	Hulled Bermuda	8 lbs	¼	72-72-72
June	Optional	Bahiagrass <u>3/</u>	30 lbs	¼	72-72-72
July-Aug	2/tn/ac	Lespedeza, Sericea plus Browntop Millet	30 lbs 25 lbs	¼ ½	72-72-72
Sept-Oct	Optional	Tall Fescue <u>5/</u>	30 lbs	½	72-72-72
Sept-Oct	Optional	Bahiagrass <u>6/</u> plus Ryegrass	30 lbs 40 lbs	¼ ½	72-72-72
Nov	2/tn/ac	Lespedeza, Sericea plus Vetch or W.W. Peas <u>7/</u>	30 lbs 30 lbs	¼ ½	18-72-72
Nov	2tn/ac	Unhulled Bermuda plus Vetch or W.W. Peas <u>7/</u>	10 lbs 30 lbs	¼ ½	18-72-72

1/ Refer to Mulching Practice Code 484.

2/ Apply fertilizer when grass begins to green up.

3/ Not recommended north of Hwy. 82.

4/ Apply mulch only in March. Mulch for April or May is optional.

5/ Not recommended south of Hwy. 80.

6/ Not recommended north of Hwy. 80.

7/ Vetch or wild winter peas will be inoculated with the proper inoculant.

NOTE: Table 7 may be used in lieu of a soil test or nutrient budget on gullied and eroded areas that require land shaping and grading.

NOTE: Lime should be applied at the rate of 2 tons/acre before planting and mixed with the soil.

NOTE: To improve wildlife benefits, legumes can be added to the seedings using seeding rates in Table 1.

TABLE 5. Specifications for native herbaceous and woody plant species used as forage, hay, wildlife habitat, recreation, and/or protection of structural measures.

Plant Species <u>1/</u>	Seeding Rates Lbs Per Acre		Seeding Dates	MS Adaptation Zone <u>3/</u>	Planting Depth (In.)	Minimum Fertilizer <u>4/</u> Lbs/acre N-P <sub>2</sub> O <sub>5</sub> -K <sub>2</sub> O
	Alone	Mixture <u>2/</u>				
<b>Native Warm Season Perennial Grasses <u>5/</u></b>						
Big bluestem ( <i>Andropogon gerardii</i> )	10 lbs drilled 12 lbs broadcast	1-2 lbs <u>7/</u>	Mid-April to Early June	1	1/2	300 lbs (0-20-20) <u>8/</u>
Little bluestem <u>6/</u> ( <i>Schizachyrium scoparium</i> )	10 lbs drilled 12 lbs broadcast	3-4 lbs	Mid-April to Early June	1	1/2	300 lbs (0-20-20)
'Highlander' Eastern gamagrass ( <i>Tripsacum dactyloides</i> )	15 lbs drilled	n/a	Mid-April to Early June	1, 2, 3	1 to 1 1/2	300 lbs (0-20-20)
Indiangrass ( <i>Sorghastrum nutans</i> )	9 lbs drilled 11 lbs broadcast	1-2 lbs	Mid-April to Early June	1, 2	1/2	300 lbs (0-20-20)
Switchgrass ( <i>Panicum virgatum</i> )	8 lbs drilled 10 lbs broadcast	2 lbs	Mid-April to Early June	1, 2, 3	1/4	300 lbs (0-20-20)
<b>Legumes:</b>						
'Lark Selection' Partridge Pea ( <i>Chamaecrista fasciculata</i> )	n/a	4 lbs	Feb. to Mid-May	1, 2, 3	Broadcast or shallowly drill	200-300 lbs (0-20-20)
<b>Wildflowers:</b>						
<b>Annuals:</b>						
Bur marigold ( <i>Bidens aristosa</i> )	n/a	0.5 lbs	Aug.-Oct.	1, 2, 3	Soil surface to ¼"	100-150 lbs (13-13-13)
Plains coreopsis ( <i>Coreopsis tinctoria</i> )	n/a	0.5 lbs	Aug.-Sept.	1, 2, 3	Soil surface to 1/8"	100-150 lbs (13-13-13)
Clasping coneflower ( <i>Dracopis amplexicaulis</i> )	n/a	0.5 lbs	Aug.-Sept.	1, 2, 3	Soil surface to 1/8"	100-150 lbs (13-13-13)
Sunflower ( <i>Helianthus annuus</i> )	n/a	0.5 lbs	April-May	1, 2, 3	1"	400 lbs (13-13-13)
<b>Perennials:</b>						
Black-eyed susan ( <i>Rudbeckia hirta</i> )	n/a	0.5 lb	Aug. - Sept.	1, 2, 3	Soil surface to 1/8"	100-150 lb (13-13-13)
Lance-leaf coreopsis ( <i>Coreopsis lanceolata</i> )	n/a	0.5 lb	July-Sept.	1, 2, 3	Soil surface to 1/8"	100-150 lbs (13-13-13)
Lyre-leaf sage ( <i>Salvia lyrata</i> )	n/a	0.5 lb			Soil surface to 1/8"	100-150 lbs (13-13-13)
Meadow beauty ( <i>Rhexia mariana</i> )	n/a	0.5 lb	Aug.-Oct.	1, 2, 3	Soil surface	100-150 lbs (13-13-13)
Mistflower ( <i>Eupatorium coelestinum</i> )	n/a	0.5 lb	Sept.-Oct.	1, 2, 3	Soil surface	100-150 lbs (13-13-13)

1/ Refer to Tech. Note 102 Mississippi Planting Guide for recommended varieties.

2/ Planned seed mixtures must include at least one perennial grass species.

3/ See Figure 1 for Mississippi Plant Adaptation Zones.

4/ In lieu of soil test recommendations use these minimum fertilizer recommendations for initial establishment.

5/ Plant native warm season grasses using the pure live seed method (pp. 10-11)

6/ Little bluestem is not recommended south of I-20.

7/ Mixes should be based on percentage of the mix and the seeding rate.  
(ex. Species 1 @ 2 lbs/acre \* 0.4 of mix = 0.8 lbs/acre)

8/ After establishment of native warm season grasses, apply 50 lbs N/acre.

**Planting Native Grasses Using the Pure Live Seed Method:**

Native grass seed lots vary widely in quality and price with lots containing various amounts of inert material, weed seeds and grass seeds that will not grow. To account for the variability in seed lots, the pure live seed (PLS) method of planting was developed to insure correct seeding rates. Since only live seeds of the desired crop are of value, the amount of other material in a seed lot must be accounted for in the seeding rate. Seed sold by bulk pounds (lbs/acre) may not consider the quality of the seed being sold.

To calculate the pure live seed in a lot of seed simply use the following formula.

$$\frac{\%Purity \times \%Germination}{100} = \text{Pure Live Seed (PLS)}$$

It is important to plant seed with the highest purity percentage. This reduces the amount of detrimental materials, i.e., other crop or weed seed which will compete with grass seedlings during establishment. The other factor to consider when calculating PLS is germination percentage. Germination percentage is calculated by the number of seed which will produce a viable seedling in germination tests divided by the total number of seed tested. All of this information can be found on a seed tag (see example) that is attached to the bag of seed.

**Sample Seed Tag from XYZ Seed Company**

Kind: Switchgrass	<b>Purity: 99.98%</b>	Weed Seed: 0.00%
Lot: SSG 1-98	Other Crop: 0.01%	Bulk Wt: 50 lbs
Test Date: 12/98	Inert: 0.01%	<b>Germination: 88.00%</b>
Origin: Native grass USA	Noxious Weed Seed: 0	Hard Seed: 5.00%
Net Wet. 44 (lbs PLS)	Dormant Seed: 0.00%	

To plant 10 pls pounds of switchgrass from the XYZ Seed Company, first calculate the %PLS:

$$\frac{99.98\% (Purity) \times 88.00\% (Germination)}{100} = 87.98\% \text{ PLS}$$

Then:

$$\frac{10 \text{ pls (Desired Rate)}}{87.98\% (PLS)} \times 100 = 11.36 \text{ lbs of bulk seed to plant 10 pls/acre.}$$

A helpful reference chart for determining the number of bulk pounds needed to plant a lot of seed with a specified %purity and %germination is included on the next page.

To use this chart, simply cross reference the % Germination down to the corresponding % Purity. Using the *XYZ Seed Company* example from the previous page, 88% would round to 90% Germination and 92.30% would round to 90% Purity. Multiply the desired PLS (10 lbs) by the number from table (1.3). 13 lbs of seed from the *XYZ Seed Company* would be needed to plant 10 pls per acre.

		% Germination																	
% Purity	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	
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

Figure 1: Plant Adaptation Zones in Mississippi.



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