

CRITICAL AREA PLANTING SPECIFICATIONS

NATURAL RESOURCES CONSERVATION SERVICE

Plant Material Selection and Planting Method

Critical area treatment period will be the main factor considered when selecting appropriate plant material. Treatment period is categorized into three broad planting periods; January and February (Table 1), March to August (Table 2) and September to December (Table 3). Seeding mixtures and rates recommended for levees, channels and shaped spoils can be found in Table 4. Maintenance requirements, soil fertility, location within landscape, and hydrology should also be considered when selecting plants for permanent vegetation.

Temporary vegetation can be used on graded and bare areas that will be subject to erosion for up to 12 months, and where a cover of annual plants will provide temporary cover until final grade and permanent cover is established. If the period of temporary protection is 60 days or less, use mulch without seeding. In adverse growing conditions of extremely low temperatures (December – February) and extremely hot and dry periods (July and August) mulch provides superior protection. Mulch will be applied according to mulching specifications in Standard and Specifications, Mulching (484).

Grasses: All seed and planting materials will be labeled and meet state seed quality law standards. Vegetative material, such as sprigs, green hay, and roots, can be obtained on farm, if available, or from a reputable source. Seeding rates will be determined based on pure live seed (PLS) or percent germination information found on the seed tag (Table 5). Percent PLS can be computed using decimal values with the following equation.

$$\text{Percent Pure Live Seed} = [(\% \text{ germination} + \% \text{ hard seed}) \times \% \text{ purity}] / 100.$$

All seeding, sprigging and hydro-seeding operations shall be performed in such a manner that the seed or sprigs are applied uniformly in the specified rates in the designated areas. Hydro-seeding is a seeding process where seed, water, and possibly fertilizer and lime are mixed together and sprayed over the seedbed in one application using a hydraulic seeder/mulcher. Unless otherwise specified, seeding or sprigging shall be accomplished within 2 days after final grading and seedbed preparation is completed and approved.

Trees: Loblolly pine seedlings should be planted on 6 x 6 ft. spacing or 1200 trees per acre. Where it is desirable to form a living dam, spacing as close as 4 x 4 ft. may be needed. Tree planting dibbles can be used to plant tree seedlings. Holes should be deep enough so that roots can be placed straight down and slightly deeper than they grew in the nursery. The soil must be firmed around the roots so that there is no air space.

Mulch or temporary vegetation may be necessary to help keep the soil intact because trees will not effectively control erosion for 3 to 4 years. Temporary vegetation at a

reduced rate can be mixed with tree seed and broadcast planted. Permanent vegetation can be established then chemically treated in spots or strips before transplanting bare root or container trees.

Direct seeding can be used in certain situations if approved by an area or state specialist. Direct seeding is not an option on slopes steeper than 3:1 (horizontal to vertical). Use viable, mature seed. Locally collected seed or that purchased from commercial sources may be seeded by hand or mechanical methods. Seed may be planted from November through March anytime that soil and site conditions allow.

Ground cover, vines, and shrubs: Plant individual balled or bare-root stock from January to March. Plant root stock at the same depth or slightly deeper (1 inch) than it was growing in the nursery or container. Properly planted root stock should resist gentle lifting pressure. An initial cover establishment of grasses and or legumes may be needed depending on site conditions.

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. The sod shall consist of dense, well-rooted plants. It must contain a minimum of 90 percent vegetative cover of the desirable species, and shall be free of noxious weeds. Do not allow the sod to dry out, freeze or go through a heat after lifting sod and prior to placement. Cut sod at least 2 inches deep, excluding top growth, in uniform size convenient for handling and placement. Sod must be planted within 48 hours of digging.

The placement of the sod should be across the slope starting at the bottom and working up the slope. Fit the sod closely together to avoid open spaces. The joints (end of strips) shall be staggered as in laying bricks. Do not overlap sod strips. Roll or tamp the sod after placement to insure contact of the grass roots with the soil. Maintain adequate moisture for at least two weeks to insure establishment of the sod. On slopes steeper than 4:1 (horizontal to vertical), 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 or similar product for protection against water lifting and undercutting.

Site Preparation

Gullied, rilled, or rough sites will be smoothed and shaped to permit the use of tracked or wheeled equipment for establishment and maintenance of vegetation. Slopes that are being seeded with wheeled equipment for cover should not be steeper than 3:1 (horizontal to vertical). Wheel equipment can operate on 3:1 slopes however, for safety and ease of maintenance, flatter slopes should be considered. On slopes steeper than 3:1, ground cover plants should be considered. On slopes steeper than 1 ½:1 retaining walls, reinforced earth, or other structural means should be considered.

After smoothing and shaping, the seedbed will be prepared to a minimum depth of 3 inches and harrowed to uniformly smooth surface. For soils with poor physical conditions, such as old cropland fields or soils, which have been compacted, use a chisel plow or similar equipment to break a minimum of 6 to 8 inches. Four inches of topsoil should be applied when excavation is made into subsoil or where growing conditions are not favorable. All loose rock, roots or other obstructions that will interfere with establishment and maintenance of vegetation must be removed from the surface.

Use a cultipacker, roller or similar implement to firm seedbed prior to planting. If rain has settled a freshly prepared seedbed, then harrow before planting seed. Native grass and forbs should be planted on an extra firm seedbed. Seedbed should be cultipacked before and after planting.

On cuts with firm undisturbed material, and soil sealed from rainfall, use a disc harrow, spring-tooth harrow, or similar implement to loosen surface and mix fertilizer into soil. Fertilizer and lime should be incorporated 2 to 3 inches deep.

Temporary vegetation can be established by broadcasting seed on the surface if seeding is done immediately after the surface is worked. No additional seedbed preparation is necessary if the soil is loose and has not been sealed by rainfall.

Concentrated flow of water from off-site areas or water draining over cut banks and fill slopes should be diverted by the use of temporary diversions, closed drains, ditches, lined waterways or other erosion control methods. For concentrated flow areas that have been seeded to grass, it may be necessary to use rolled erosion control products, silt fences or hidabales. Silt fences consist of manufactured materials at least 24 inches high stretched across the concentrated flow area and held in place by steel posts. The bottom of the silt fence should be buried at least four inches. Once the vegetation is well established in the concentrated flow area, the silt fence can be removed. Hidabales consist of square bales of hay placed length-ways with the cut side up in a trench across the concentrated flow area with 4 to 6 inches left above the trench or soil line.

Steep embankments resulting from construction activities or on slopes equal to or greater than 3:1 (horizontal to vertical), temporary rolled erosion control products may be necessary to provide protection until vegetation is established. Rolled erosion control products include but are not limited to erosion control nets, open weave geotextiles, erosion control blankets and geosynthetic mattings. These products can be manufactured from wood excelsior, straw, jute, coconut fiber, coir, polyolefin, PVC and nylon. Temporary rolled erosion control products will be installed according to mulching specifications in Standard and Specifications, Mulching (484).

Soil Fertility

A representative soil sample is required for all critical area plantings to determine lime and fertilizer needs.

Temporary Vegetation: No lime will be applied for temporary vegetation. Use temporary cover on soils with pH 4.5 or higher. Mulch will be used for temporary cover on soils to acid (pH <4.5) for temporary seeding.

In lieu of a soil test, fertilizer will be applied at a 1-1-1 ratio of N, P₂O₅, & K₂O. Apply 25 to 35 pounds of actual N, P₂O₅, & K₂O per acre or 0.60 to 0.80 lbs. per 1,000 sq. ft.

Example Fertilizer Mixes: 30 lbs of N, P₂O₅, & K₂O = 250 lbs. of 12-12-12 or 375 lbs. of 8-8-8

Permanent Vegetation: Lime is recommended for all soils with a pH below 5.0. Lime applications should follow rates recommended on soil test results. If recommendations are not available, use the following general guidelines. One-ton agricultural limestone or dolomitic limestone per acre will generally raise the pH approximately one unit. Soil pH should be maintained at 5.5 or higher. *NOTE: Broadcast lime and fertilizer on the soil surface. On areas requiring seedbed preparation, lime and fertilizer should be incorporated.*

In lieu of a soil test, fertilizer will be applied at a 1-1-1 ratio of N, P₂O₅, & K₂O. Apply 50 to 100 pounds of actual N, P₂O₅, & K₂O per acre or 1.2 to 2.3 lbs. per 1,000 sq. ft.

Example Fertilizer Mixes: 75 lbs of N, P₂O₅, & K₂O = 625 lbs. of 12-12-12 or 938 lbs. of 8-8-8

Poultry litter or cattle manure can also be applied to add organic matter, improve soil structure, water holding capacity and to provide plant nutrients.

Table 1. Seeding rates and specie mixtures recommended for January and February treatment period on critical area.

Species Mixture	Planting Rates	
	Acre PLS lbs.	1,000 sq. ft. PLS oz.
<u>Permanent Cover Mixtures</u>		
1 Common bermudagrass unhulled	15-20	6-8
Common bermudagrass Hulled	15-20	6-8
Ryegrass	15-20	6-8
2 Pensacola, Argentine or Tifton 9 bahiagrass and Ryegrass	40-50 15-25	17-20 17-20
3 Loblolly pine seed and Ryegrass	1-2 15-25	0.5-1.0 5.5-9
<u>Temporary Cover</u>		
1 Ryegrass	40-50	17-20
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<u>Bareroot / Containers</u>	<u>Spacing</u>	<u>Remarks</u>
	ft.	
1 Loblolly pine seedlings	6 x 6	May take 2-3 years to form cover
2 Brambles	3 x 3	Can be planted through March 15
3 Virginia Creeper	2 x 2	Vigorous climbing vine of loose habit

Table 2. Seeding rates and specie mixtures recommended for March to August treatment period on critical area.

Species	Planting Rates	
	Acre	1,000 sq. ft.
	PLS lbs.	PLS oz.
<u>Permanent Cover</u>		
1 Common bermudagrass (hulled)	30-40	11-15
2 Common bermudagrass (hulled)	6-8	2.2-3.0
Common, Kobe, Korea lespedeza	50-60	19-22
3 Pensacola bahiagrass	40-50	15-19
4 Pensacola bahiagrass	35-45	13-17
Common, Kobe or Korea lespedeza	50-60	19-22
5 Hybrid Bermudagrass	35-45 bu. sprigs	1-2 bu. sprigs
<i>Recommended Varities:</i> Alicia, Brazos, Coastal, Grazer, Jiggs, Russell, Sumrall, Tifton 44 / 85	3,000 lbs. green hay	70 lbs. green hay
6 Alamo Switchgrass	15-25	6-9
7 Carpetgrass	25-35	9-11
8 Centipede grass	15-25	4-8
9 Sod		
St. Augustine	N/A	110 sq. yd.
Bermudagrass	N/A	110 sq. yd.
Zoysia	N/A	110 sq. yd.
<u>Temporary Cover can be planted alone or with mixtures 1-4.</u>		
Browntop millet	35-45	13-15
Pearl millet	35-45	13-15
Sorghum-Sudan hybrids	35-45	13-15
Sudangrass	30-40	11-13

Table 3. Seeding rates and specie mixtures recommended for September to December treatment period on critical area.

Species Mixture	Planting Rates	
	Acre	1,000 sq. ft.
	PLS lbs.	PLS oz.
<u>Permanent Cover</u>		
1 Tall Fescue (Entophyte Infected)	30-40	11-13
2 Pensacola, Argentine and Tifton 9 bahiagrass <i>Choose one annual or legume</i>	40-50	17-20
3 Pensacola, Argentine or Tifton 9 bahiagrass Common, Kobe or Korea lespedeza <i>Choose one annual or legume</i>	40-50 65-75	17-20 25-28
<u>Annuals for mixtures or seeded alone</u>		
Cereal rye	60-70	22-26
Oats	100-110	37-40
Wheat	75-85	25-28
Ryegrass	30-40	11-13
<u>Legumes used with fescue or bahiagrass</u>		
Ball clover	5-7	2-3
Crimson clover	20-30	8-9
Subterranean clover	15-25	6-8
White clover	6-8	2-3
Southern winter pea	65-75	25-26
Vetch	50-60	19-22
Arrowleaf clover	8-10	3-4
Red Clover	12-15	4-6
4 Omaha Virginia Wildrye	25-40	9-15
5 Lavaca Canada Wildrye	25-40	9-15
6 Loblolly pine seed	1-2	0.5-1.0
Rye	15-25	5.5-9

Table 4. Seeding rates and specie mixtures recommended for levees, channels and shaped spoils.

Seeding Period	Species Mixture	Planting Rates	
		Acre	1,000 sq. ft.
		PLS lbs.	PLS oz.
<u>Permanent Cover</u>			
Mar 1 - Aug 31	Common bermudagrass (hulled) and Brown Top Millet	45	16
		20	7
Sep 1 - Dec 31	Tall Fescue and Hairy Vetch	30	11
		25	9
Jan 1 - Feb 28	Common bermudagrass (unhulled) and Common bermudagrass (hulled) and Ryegrass	20	7
		20	7
		20	7
<u>Temporary Cover</u>			
Mar 16 - Sep 15	Browntop Millet	25	9
Sep 16 - Mar 15	Ryegrass	25	9

Table 5. Multiplication factors used to determine bulk-seeding rate using percent germination and purity.

% Purity	% Germination																		
	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	15.4	16.7	18.2	20.0	22.3	25.0	28.6	33.4	40.0	50.0	66.7	100.0

To use this chart, simply cross reference the % germination down to the corresponding % purity. Example: The recommended rate of bermudagrass is 20 pounds of Pure Live Seed (PLS) per acre. The source of bermudagrass has 70% germination and 80% purity. Multiply the desired PLS (20) by the number from table (1.8). 36 pounds of bermudagrass would be needed to plant 20 pls pounds.