6.66 COMPOST SOCK

C SOCK

Definition

A compost sock is a three-dimensional tubular sediment control and storm water runoff device typically used for perimeter control of sediment and soluble pollutants (such as phosphorous and petroleum hydrocarbon), on and around construction activities. Compost socks trap sediment and other pollutants in runoff water as it passes through the matrix of the sock and by allowing water to temporarily pond behind the sock, allowing deposition of suspended solids. Compost socks are also used to reduce runoff flow velocities on sloped surfaces.

Compost products acceptable for this application should meet the chemical, physical and biological properties specified for Practice 6.18, *Compost Blankets.*

Figure 6.66a – Compost Sock
Photo Credit – Filtrexx International

Conditions Where Practice Applies

Compost socks are to be installed down slope of disturbed areas requiring erosion and sediment control. Compost socks are effective when installed perpendicular to sheet flow, in areas where sediment accumulation of less than six inches is anticipated. Acceptable applications include (Fifield, 2001):

- Site perimeters
- Below disturbed areas subject to sheet runoff, with minor sheet or rill erosion. Compost socks should not be used alone below graded slopes greater than 10 feet in height.
- Above graded slopes to serve as a diversion berm.

- Check dams
- Along the toe of stream and channel banks
- Around area drains or inlets located in a storm drain system
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On paved surfaces where trenching of silt fence is impossible.

A compost sock can be applied to areas of sheet runoff, on slopes up to a 2:1 grade with a maximum height of 10 feet, around inlets, and in other disturbed areas of construction sites requiring sediment control. Compost socks may also be used in sensitive environmental areas, or where trenching may damage roots.

The weight of a filled sock (40 lbs / linear ft. for 8" diameter) effectively prevents sediment migration beneath the sock. It is possible to drive over a compost sock during construction (although not recommended); however, these areas should be immediately repaired by manually moving the sock back into place, if disturbed. Continued heavy construction traffic may destroy the fabric mesh, reduce the dimensions, and reduce the effectiveness of the compost sock. Vegetating the compost sock should be considered.

Planning Considerations

Compost socks shall either be made on site or delivered to the jobsite assembled. The sock shall be produced from a 5 mil thick continuous HDPE or polypropylene, woven into a tubular mesh netting material, with openings in the knitted mesh of ⅛" - ⅜" (3-10mm). This shall then be filled with compost meeting the specifications outlined in Practice 6.18, *Compost Blankets*, with the exception of particle size, to the diameter of the sock. Compost sock netting materials are also available in biodegradable plastics for areas where removal and disposal are not desired (i.e., when using pre-seeded socks). Compost socks contain the compost, maintaining its density and shape.

Compost socks should be installed parallel to the base of the slope or other affected area, perpendicular to sheet flow. The sock should be installed a minimum of 10 feet beyond the top of graded slopes. When runoff flows onto the disturbed area from a land above the work zone, a second sock may be constructed at the top of the slope in order to dissipate flows.

On locations where greater than a 200-foot long section of ground is to be treated with a compost sock, the sock lengths should be sleeved. After one sock section (200 feet) is filled and tied off (knotted) or zip tied, the second sock section shall be pulled over the first 1-2 feet and 'sleeved' creating an overlap. Once overlapped, the second section is filled with compost starting at the sleeved area to create a seamless appearance. The socks may be staked at the overlapped area (where the sleeve is) to keep the sections together. Sleeving at the joints is necessary because it reduces the opportunity for water to penetrate the joints when installed in the field.

Compost Sock BMP	Conventional Application	Product Description	Example
Silt Socks	Silt Fence (on smaller areas)	A 3-dimensional sediment control measure used for sediment removal	
Inlet Socks	Inlet Protection	Designed to allow stormwater to enter inlets while removing sediment and protecting inlets from clogging	
Ditch Check	Rock Check Dams	Contours to ditch shape and eliminates gullies	

Figure 6.66a Compost Sock BMPs as Replacements for Current Erosion Control Practices
Photo credits: Filtrexx International

After filling, the compost sock must be staked in place. Oak or other durable hardwood stakes 2"x 2" in cross section should be driven through the center of the compost sock, either vertically plumb or angled upslope. Stakes should be placed at a maximum interval of 4 feet, or a maximum interval of 8 feet if the sock is placed in a 4 inch trench. See Figure 6.66b. The stakes should be driven to a minimum depth of 12 inches, with a minimum of 3 inches protruding above the compost sock.

If the compost sock is to be left as part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation using the seeding specification in the erosion and sedimentation control plan. A maximum life of 2 years for photodegradable netting and 6 months for biodegradable netting should be used for planning purposes.

Compost socks may be used as check dams in ditches not exceeding 3 feet in depth. Normally, 8 to 12 inch diameter socks should be used. Be sure to stake the sock perpendicular to the slope of the ditch. When used as check dams, installation should be similar to that of natural fiber wattles. The ends and middle of the sock should be staked, and additional stakes placed at a 2-foot maximum interval. See Table 6.66a for spacing.

Design Criteria

The sediment and pollutant removal process characteristic to a compost sock allows deposition of settling solids. Ponding occurs when water flowing to the sock accumulates faster than the hydraulic flow through rate of the sock. Typically, initial hydraulic flow-through rates for a compost sock are 50% greater than geotextile fabric (silt fence). However, installation and maintenance is especially important for proper function and performance. Design consideration should be given to the duration of the project, total area of disturbance, rainfall/runoff potential, soil erosion potential, and sediment loading when specifying a compost sock.

Runoff Flow:

The depth of runoff ponded above the compost sock should not exceed the height of the compost sock. If overflow of the device is a possibility, a larger diameter sock should be constructed, other sediment control devices may be used, or management practices to reduce runoff should be installed. Alternatively, a second sock may be constructed or used in combination with Practice 6.17, *Rolled Erosion Control Products* or Practice 6.18, *Compost Blankets* to slow runoff and reduce erosion.

Level Contour:

The compost sock should be placed on level contours to assist in dissipating low concentrated flow into sheet flow and reducing runoff flow velocity. Do not construct compost socks to concentrate runoff or channel water. Sheet flow of water should be perpendicular to the sock at impact and un-concentrated. Placing compost socks on undisturbed soil will reduce the potential for undermining by concentrated runoff flows.

Runoff and Sediment Accumulation:

The compost sock should be placed at a 10 foot minimum distance away from the toe of the slope to allow for proper runoff accumulation for sediment deposition and to allow for maximum sediment storage capacity behind the device. On flat areas, the sock should be placed at the edge of the land-disturbance.

End Around Flow:

In order to prevent water flowing around the ends of the compost sock, the ends of the sock must be constructed pointing upslope so the ends are at a higher elevation. A minimum of 10 linear feet at each end placed at a 30 degree angle is recommended.

Vegetated Compost Sock:

For permanent areas the compost sock can be directly seeded to allow vegetation established directly on the device. Vegetation on and around the compost sock will assist in slowing runoff velocity for increased deposition of pollutants. The option of adding vegetation should be shown on the erosion and sedimentation control plan. No additional soil amendments or fertilizer are required for vegetation establishment in the vegetated compost sock.

Slope Spacing & Drainage Area:

Maximum drainage area to and spacing between the compost socks is dependent on rainfall intensity and duration used for specific design/plan, slope steepness, and width of area draining to the sock.

A compost sock across the full length of the slope is normally used to ensure that stormwater does not break through at the intersection of socks placed end-to-end. Ends are jointed together by sleeving one sock end into the other. The diameter of the compost sock used will vary depending upon the steepness and length of the slope; example slopes and slope lengths used with different diameter compost socks are presented in Table 6.66a.

Table 6.66a - Compost Sock Spacing versus Channel Slope

Channel Slope (%)	Spacing Between Socks (feet)	
	8-inch Diameter Sock	12-inch Diameter Sock
1	67	100
2	33	50
3	22	33
4	17	25
5	13	20

Source: B. Faucette – 2010

Material:

The compost media shall be derived from well-decomposed organic matter source produced by controlled aerobic (biological) decomposition that has been sanitized through the generation of heat and stabilized to the point that it is appropriate for this particular application. Compost material shall be processed through proper thermophilic composting, meeting the US Environmental Protection Agency's definition for a 'Process to Further Reduce Pathogens' (PFRP), as defined at 40 CFR Part 503. The compost portion shall meet the chemical, physical and biological properties specified in Practice 6.18, *Compost Blankets* Table 6.18a, with the exception of particle size. Slightly more coarse compost is recommended for the socks, as follows:

<u>**Particle Size Distribution**</u>

Sieve Size	**Percent Passing Selected Sieve Mesh Size, Dry Weight Basis**
2"	**99 % (3" Maximum Particle Size)**
3/8"	**30-50 %**

See Practice 6.18, *Compost Blankets* for complete information on compost parameters and tests. Installer should provide documentation to support compliance of testing required in the compost specification.

This specification covers compost produced from various organic by-products, for use as an erosion and sediment control measure on sloped areas. The product's parameters will vary based on whether vegetation will be established on the treated slope. Only compost products that meet all applicable state and federal regulations pertaining to its production and distribution may be used in this application. Approved compost products must meet related state and federal chemical contaminant (e.g., heavy metals, pesticides, etc.) and pathogen limit standards pertaining to the feedstocks (source materials) in which it are derived.

In regions subjected to higher rates of precipitation and/or greater rainfall intensity, larger compost socks should be used. In these particular regions, coarser compost products are preferred as the compost sock must allow for an improved water percolation rate. The designer should check the flow rate per foot of sock in order to ensure drainage rate of the compost sock being used is adequate. The required flow rates are outlined in Table 6.66b.

Table 6.66b – Compost Sock Initial Flow Rates

Compost Sock Design Diameter	8 inch (200mm)	12 inch (300mm)	18 inch (450mm)	24 inch (600mm)	32 inch (800mm)
Maximum Slope Length (<2%)	**600 ft (183m)**	**750 ft (229m)**	**1,000 ft (305m)**	**1,300 ft (396m)**	**1,650 ft (500m)**
Hydraulic Flow Through Rate	**7.5 gpm/ft (94 l/m/m)**	**11.3 gpm/ft (141 l/m/m)**	**15.0 gpm/ft (188 l/m/m)**	**22.5gpm/ft (281 l/m/m)**	**30.0 gpm/ft (374 l/m/m)**

Source: B. Faucette-2010

Construction Specifications

INSTALLATION

1. Materials used in the compost sock must meet the specifications outlined above and in Practice 6.18, Compost Blankets.

2. Compost socks should be located as shown on the erosion and sedimentation control plan.

3. Prior to installation, clear all obstructions including rocks, clods, and other debris greater than one inch that may interfere with proper function of the compost sock.

4. Compost socks should be installed parallel to the toe of a graded slope, a minimum of 10 feet beyond the toe of the slope. Socks located below flat areas should be located at the edge of the land-disturbance. The ends of the socks should be turned slightly up slope to prevent runoff from going around the end of the socks.

5. Fill sock netting uniformly with compost to the desired length such that logs do not deform.

6. Oak or other durable hardwood stakes 2" X 2" in cross section should be driven through the center of the compost sock, either vertically plumb or angled upslope. Stakes should be placed at a maximum interval of 4 feet, or a maximum interval of 8 feet if the sock is placed in a 4 inch trench. See

Figure 6.66b. The stakes should be driven to a minimum depth of 12 inches, with a minimum of 3 inches protruding above the compost sock.

7. In the event staking is not possible (i.e., when socks are used on pavement) heavy concrete blocks shall be used behind the sock to hold it in place during runoff events.

8. If the compost sock is to be left as part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation using the seeding specification in the erosion and sedimentation control plan.

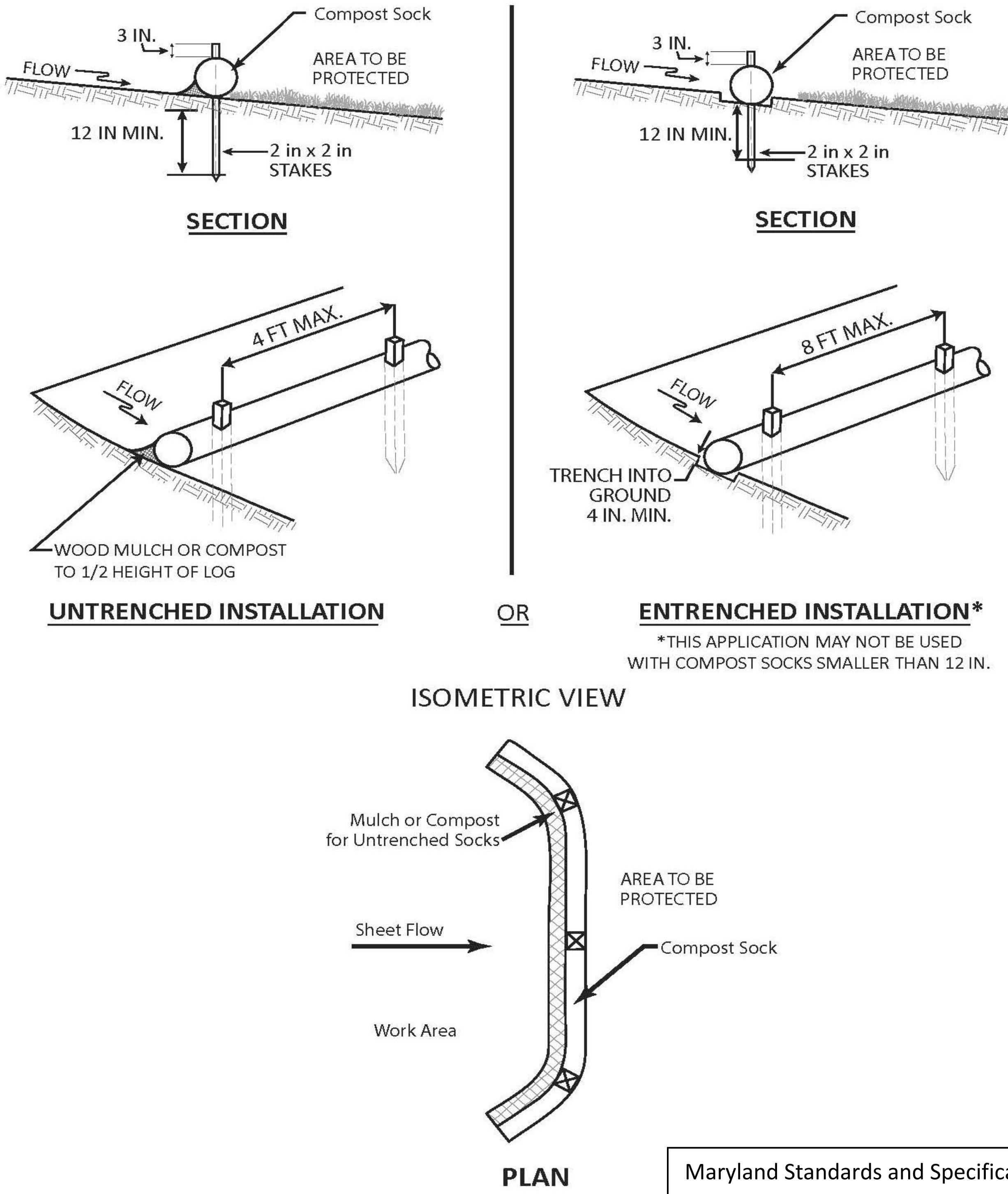
9. Compost socks are not to be used in perennial or intermittent streams.

Maintenance

Inspect compost socks weekly and after each significant rainfall event (1/2 inch or greater). Remove accumulated sediment and any debris. The compost sock must be replaced if clogged or torn. If ponding becomes excessive, the sock may need to be replaced with a larger diameter or a different measure. The sock needs to be reinstalled if undermined or dislodged. The compost sock shall be inspected until land disturbance is complete and the area above the measure has been permanently stabilized.

DISPOSAL/RECYCLING

Compost media is a composted organic product recycled and manufactured from locally generated organic, natural, and biologically based materials. Once all soil has been stabilized and construction activity has been completed, the compost media may be dispersed with a loader, rake, bulldozer or similar device and may be incorporated into the soil as an amendment or left on the soil surface to aid in permanent seeding or landscaping. Leaving the compost media on site reduces removal and disposal costs compared to other sediment control devices. The mesh netting material will be extracted from the media and disposed of properly. The photodegradable mesh netting material will degrade in 2 to 5 years if left on site. Biodegradable mesh netting material is available and does not need to be extracted and disposed of, as it will completely decompose in approximately 6 to 12 months. Using biodegradable compost socks completely eliminates the need and cost of removal and disposal.



Maryland Standards and Specifications for Soil Erosion and Sediment Control, 2011, Maryland Department of Environment, Water Management Administration

Figure 6.66b, Compost Sock Installation

References

Chapter 3 Vegetative Considerations
Chapter 6 Practice Standard and Site Specifications

- 6.10 Temporary Seeding
- 6.11 Permanent Seeding
- 6.17 Rolled Erosion Control Products
- 6.18 Compost Blankets

Tyler, R., A. Marks, B. Faucette. 2010. The Sustainable Site: Design Manual for Green Infrastructure and Low Impact Development Forester Press, Santa Barbara, CA.

Fifield, J. 2001. Designing for Effective Sediment and Erosion Control on Construction Sites. Forester Press, Santa Barbara, CA.

Maryland Department of Environment, Water Management Administration, 2011, *Maryland Standards and Specifications for Soil Erosion and Sediment Control*, Filter Log

6.24 RIPARIAN AREA SEEDING

Definition

Controlling runoff and erosion in riparian areas by establishing temporary annual and perennial native vegetative cover.

Purpose

To protect riparian areas from erosion and decrease sediment yield in adjacent streams using temporary annual vegetation as an immediate cover and establish perennial native herbaceous vegetation.

Conditions Where Practice Applies

Disturbed riparian areas between streams and uplands where permanent herbaceous vegetation is needed to stabilize the soil and provide long-term protection.

Planning Considerations

Native vegetation species are defined as plant species that naturally occur in the region in which they evolved. These plants are adapted to local soil types and climatic variations and generally require little to no maintenance. Many of the species have evolved deep, extensive root structures that help stabilize soils and reduce erosive forces of rainfall and overland stream flow. Native species possess certain characteristics that allow them not only to survive, but also to thrive under local conditions. Further, naturally occurring plant communities provide optimal habitat for terrestrial and aquatic fauna. Other agency permits (i.e. ACOE 404 and DWQ 401) may specify further conditions for establishment of native woody vegetation and limits on use of mechanical equipment.

Seeding a mixture of perennial native grasses, rushes, and sedges is a common way to establish permanent ground cover within riparian areas. Both labor and material costs are lower than installation of propagated plants, though some sites may require installation of established vegetation due to site limitations. Selecting a seed mixture with different species having complementary characteristics will allow vegetation to fill select niches within the varying riparian area and respond to different environmental conditions.

Despite the advantages, several disadvantages of seeding riparian areas with native seed may include:

- Potential for erosion or washout during the establishment stage;
- Longer time for germination and establishment;
- Seasonal limitation on suitable seeding dates;
- Specificity of species at each site;
- Need for water and appropriate temperatures during germination and early growth; and
- Need for invasive plant/competition control.

A temporary, non-invasive, and non-competitive annual grass species should be incorporated with the native seeding. This will provide an immediate cover over the site that serves to:

- Prevent bare soil exposure and hold soil in place; and
- Provide a nurse crop for native seeds while they become established.

Temporary annual species should be planted at a low density so they do not suppress growth of permanent species.

Successful plant establishment can be maximized through good planning, knowledge of soil characteristics, selections of suitable plant species for each site, proper seedbedpreparation, and timely planting and maintenance.

Selecting Plant Materials

Permanent seed species within the seed mixture should be selected based on natural occurrence of each species in the project site area. Climate, soils, and topography are major factors affecting the suitability of plants for a particular site and these factors vary widely across North Carolina, with the most significant contrasts occurring among the three major physiographic regions of the state – Mountains, Piedmont, and Coastal Plain. Even within the riparian area, there may be need for different species depending on site conditions (i.e. dry sandy alluvial floodplains with wet pockets). Therefore, thoughtful planning is required when selecting species for individual sites in order to maximize successful vegetation establishment.

Seeds adapted to North Carolina should be purchased from a reputable seed grower and should be certified. Do not accept seed containing “prohibited” noxious weed seed. For successful broadcast seeding, seeds should be cleaned. If warm season grasses with “fluffy” seeds are used, a specialized warm season grass drill should be employed. Cultivars should be selected based on adaptation to site region. Stratification, either naturally or artificially, is required for most native seed species to ensure proper germination.

Table 6.24a provides suitable temporary seed species with recommended application rates and optimal planting dates. Temporary annual seed selection should be based on season of project installation. A single species selection for temporary cover is acceptable. In some cases where seasons overlap, a mixture of two or more temporary species may be necessary; however, application rates should not exceed the total recommended rate per acre. Temporary seed should be mixed and applied simultaneously with the permanent seed mix if optimal planting dates allow.

Table 6.24a Temporary Seeding Recommendations

Common Name	Scientific Name	Rate per Acre	Optimal Planting Dates		
			Mountains	*Piedmont*	*Coastal Plain*
Rye grain	Secale cereale	30 lbs	Aug. 15 - May 15	Aug. 15 - May 1	Aug. 15 - Apr. 15
Wheat	Triticum aestivum	30 lbs	Aug. 15 - May 15	Aug. 15 - May 1	Aug. 15 - Apr. 15
German millet	Setaria italica	10 lbs	May 15 - Aug. 15	May 1 - Aug. 15	Apr. 15 - Aug. 15
Browntop millet	Urochloa ramosa	10 lbs	May 15 - Aug. 15	May 1 - Aug. 15	Apr. 15 - Aug. 15

Tables 6.24b-6.24d provide selections of native permanent seeds based on physiographic regions. Included in these tables are species, cultivars, appropriate percentage rates of mixture, and optimal planting times. **No specific seeding rate is given in order to allow for custom seed mixes based on site characteristics and season. However, permanent seed inclusion in the**

mixture should total 15 pounds of pure live seed (PLS) per acre drilled or 15 to 20 pounds PLS per acre broadcast applied. At least four species should be selected for the mixture, including one species from each type (warm season, cold season, wetland); selection of more than four species is recommended for increasing chances of successful vegetation establishment. If other species such as wildflowers are added to the mix, they should not be counted in the minimum seeding rate for grasses.

Seedbed Preparation

Disturbed soils within riparian areas must be amended to provide an optimum environment for seed germination and seedling growth. The surface soil must be loose enough for water infiltration and root penetration. The pH of the soil must be such that it is not toxic and nutrients are available. Riparian areas are generally considered rich in nutrients due to flooding and deposition, however, these areas can be highly variable (i.e. narrow steep corridors in the mountains, artificial fill material on top of alluvial floodplains in the Piedmont). Soil analysis should be performed to determine nutrient and lime needs of each site. Appropriate levels of phosphorus and potassium are critical for permanent seed establishment. Appropriate pH levels are between 5.5 and 7. Riparian buffers regulated for nutrient management may be limited to a single application of fertilizer.

Construction activities within the riparian area can greatly compact soils. Suitable mechanical means such as disking, raking, or harrowing must be employed to loosen the compacted soil prior to seeding.

Planting

Seeding rates of native herbaceous species are given in pounds of pure live seed due to the variability in the germination and purity of native seed. Reputable seed growers and dealers will buy and sell native seed by the pure live seed pound. When the seed is sown, the amount of pure live seed must be converted to pounds of bulk (actual) seed to sow the proper amount of seed. The amount of bulk (actual) seed is calculated by dividing the amount of pure live seed by the germination and purity as decimals. For example, a ten pound pure live seed per acre seeding rate with seed with 50 percent germination and 50 percent purity will require 40 pounds of bulk (actual) seed (40-10/0.5*0.5).

Planting dates given in the seeding mixture specifications (Tables 6.24b – 6.24d) are designated as "optimal". Seeds properly sown within the "optimal" dates have a high probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. Always take this into account when scheduling land-disturbing activities. Many perennial native species require a cold, wet treatment (stratification) before they will germinate at the rate noted on the seed tag. Seeding before the local date of last frost usually provides enough exposure to cold moist conditions to meet these requirements. Seeding before that date also insures early germination that will decrease the chance that seedlings will be affected by summer droughts. Seed sown late may not germinate until the next year after it has laid in the ground through a winter.

Apply seed uniformly with a cyclone seeder, drop-type spreader, drill, or hydroseeder on a firm, friable seedbed. When using a drill, equipment should be calibrated in the field for the desired seeding rate. In fine soils, seeds should be drilled ¼ to ½ inch. In coarse sandy soils, seeds should be planted no deeper than ¾ inch. Cover broadcast seed by lightly raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact.

Mulch all plantings immediately after seeding (Practice 6.14, Mulching). If planting on stream banks steeper than 10 percent or areas subject to flooding, a biodegradable RECP (Practice 6.17, Rolled Erosion Control Products) is recommended to hold seed and soil in place.

Table 6.24b Permanent Seeding Recommendations -- Mountain Region

Common Name	Scientific Name	Cultivars	Type*	Percentage of Mix	Optimal Planting Dates	Soil Drainage Adaptation	Shade Tolerance	Height
Switchgrass	Panicum virgatum	**Cave-in-rock --** well drained **Blackwell --** well drained **Shelter --** well drained **Kanlow --** poorly drained **Carthage --** well drained	Warm Season	10-15%	Dec. 1 - Apr. 15	Cultivar Dependent	Poor	6
Indiangrass	Sorghastrum nutans	**Rumsey, Osage, Cheyenne**	Warm Season	10-30%	Dec. 1 - Apr. 15	Well-drained to Droughty	Poor	6
Deertongue	Dichanthelium clandestinum	**Tioga**	Warm Season	5-25%	Dec. 1 - Apr. 15	Poorly-drained to Droughty	Moderate	6
Big Bluestem	Andropogon gerardii	**Roundtree, Kaw, Earl**	Warm Season	10-30%	Dec. 1 - Apr. 15	Well-drained to Droughty	Poor	6
Little Bluestem	Schizachyrium scoparium	**Aldous, Cimarron**	Warm Season	10-30%	Dec. 1 - Apr. 15	Well-drained to Droughty	Poor	4
Sweet Woodreed	Cinna arundinacea		Warm Season	1-10%	Dec. 1 - Apr. 15	Poorly-drained to Well-drained	Moderate	5
Rice Cutgrass	Leersia oryzoides		Warm Season	5-25%	Dec. 1 - Apr. 15	Poorly-drained	Poor	5
Redtop Panicgrass	Panicum rigidulum		Warm Season	10-20%	Dec. 1 - Apr. 15	Well-drained	Poor	3.5
Eastern Gammagrass	Tripsacum dactyloides		Warm Season	10-20%	Dec. 1 - Apr. 15	Well-drained to Poorly-drained	Poor	4.5
Purple top	Tridens flavus		Warm Season	5-10%	Dec. 1 - Apr. 15	Well-drained to Droughty	Poor	2.5
Indian Woodoats	Chasmanthium latifolium		Cold Season	1-10%	Mar. 1 - May 15, July 15 - Aug. 15	Well-drained to Droughty	Moderate	4
Virginia Wildrye	Elymus virginicus		Cold Season	5-25%	Mar. 1 - May 15, July 15 - Aug. 15	Well-drained to Droughty	Moderate	3
Eastern Bottle-brush Grass	Elymus hystrix		Cold Season	5-10%	Mar. 1 - May 15, July 15 - Aug. 15	Well-drained to Droughty	Moderate	3
Winter Bentgrass	Agrostis hyemalis		Cold Season	10-20%	Mar. 1 - May 15, July 15 - Aug. 15	Well-drained	Moderate	3.5
Rough Bentgrass	Agostis scabra		Cold Season	10-20%	Mar. 1 - May 15, July 15 - Aug. 15	Poorly-drained	Poor	2.5
Soft Rush	Juncus effusus		Wetland	1-10%	Dec. 1 - May 15, Aug. 15 - Oct.. 15	Poorly-drained	Poor	4
Shallow Sedge	Carex lurida		Wetland	1-10%	Dec. 1 - May 15, Aug. 15 - Oct.. 15	Poorly-drained	Poor	3
Fox Sedge	Carex vulpinoidea		Wetland	1-10%	Dec. 1 - May 15, Aug. 15 - Oct.. 15	Poorly-drained	Poor	3
Leathery Rush	Juncus coriaceus		Wetland	2-5%	Dec. 1 - May 15, Aug. 15 - Oct.. 15	Poorly-drained	Poor	2

*Pick at least four species, including one from each type.

Table 6.24c Permanent Seeding Recommendations -- Piedmont Region

Common Name	Scientific Name	Cultivars	Type*	Percentage of Mix	Optimal Planting Dates	Soil Drainage Adaptation	Shade Tolerance	Height
Switchgrass	Panicum virgatum	**Blackwell --** well drained **Shelter --** well drained **Kanlow --** poorly drained **Carthage --** well drained	Warm Season	10-15%	Dec. 1 - Apr. 1	Cultivar Dependent	Poor	6
Switchgrass	Panicum virgatum	**Alamo --** poorly-drained	Warm Season	10-15%	Dec. 1 - May 1	Cultivar Dependent	Poor	6
Indiangrass	Sorghastrum nutans	**Rumsey, Osage, Cheyenne**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	6
Indiangrass	Sorghastrum nutans	**Lometa**	Warm Season	10-30%	Dec. 1 - May 1	Well-drained to Droughty	Poor	6
Deertongue	Dichanthelium clandestinum	**Tioga**	Warm Season	5-25%	Dec. 1 - Apr. 1	Poorly-drained to Droughty	Moderate	2
Big Bluestem	Andropogon gerardii	**Roundtree, Kaw, Earl**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	6
Little Bluestem	Schizachyrium scoparium	**Cimarron**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	4
Sweet Woodreed	Cinna arundinacea		Warm Season	1-10%	Dec. 1 - Apr. 1	Poorly-drained to Well-drained	Moderate	5
Rice Cutgrass	Leersia oryzoides		Warm Season	5-25%	Dec. 1 - Apr. 1	Poorly-drained	Poor	5
Redtop Panicgrass	Panicum rigidulum		Warm Season	10-20%	Dec. 1 - Apr. 1	Well-drained	Poor	3.5
Beaked Panicgrass	Panicum anceps		Warm Season	10-20%	Dec. 1 - Apr. 1	Poorly-drained	Moderate	3.5
Purple top	Tridens flavus		Warm Season	5-10%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	2.5
Eastern Gammagrass	Tripsacum dactyloides		Warm Season	5-10%	Dec. 1 - Apr. 1	Well-drained to Poorly-drained	Poor	4.5
Indian Woodoats	Chasmanthium latifolium		Cold Season	1-10%	Feb. 15 - Apr. 1, Aug. 15 - Oct. 15	Well-drained to Droughty	Moderate	4
Virginia Wildrye	Elymus virginicus		Cold Season	5-25%	Feb. 15 - Apr. 1, Aug. 15 - Oct. 15	Well-drained to Droughty	Moderate	3
Eastern Bottle-brush Grass	Elymus hystrix		Cold Season	5-10%	Feb. 15 - Apr. 1, Aug. 15 - Oct. 15	Well-drained to Droughty	Moderate	3
Rough Bentgrass	Agrostis scabra		Cold Season	10-20%	Feb. 15 - Apr. 1, Aug. 15 - Oct. 15	Poorly-drained	Poor	2.5
Winter Bentgrass	Agrostis hyemalis		Cold Season	2-5%	Feb. 15 - Apr. 1, Aug. 15 - Oct. 15	Well-drained	Moderate	3.5
Soft Rush	Juncus effusus		Wetland	1-10%	Dec. 1 - May 1, Sep. 1 - Nov. 1	Poorly-drained	Poor	4
Shallow Sedge	Carex lurida		Wetland	1-10%	Dec. 1 - May 1, Sep. 1 - Nov. 1	Poorly-drained	Poor	3
Fox Sedge	Carex vulpinoidea		Wetland	1-10%	Dec. 1 - May 1, Sep. 1 - Nov. 1	Poorly-drained	Poor	3
Leathery Rush	Juncus coriaceus		Wetland	2-5%	Dec. 1 - May 1, Sep. 1 - Nov. 1	Poorly-drained	Poor	2

Table 6.24d Permanent Seeding Recommendations -- Coastal Plain Region

Common Name	Scientific Name	Cultivars	Type*	Percentage of Mix	Optimal Planting Dates	Soil Drainage Adaptation	Shade Tolerance	Height
Switchgrass	Panicum virgatum	**Blackwell --** well drained **Shelter --** well drained **Kanlow --** poorly drained **Carthage --** well drained	Warm Season	10-15%	Dec. 1 - Apr. 1	Cultivar Dependent	Poor	6
Switchgrass	Panicum virgatum	**Alamo --** poorly-drained	Warm Season	10-15%	Dec. 1 - May 1	Cultivar Dependent	Poor	6
Indiangrass*	Sorghastrum nutans*	**Rumsey, Osage, Cheyenne**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	6
Indiangrass*	Sorghastrum nutans*	**Lometa**	Warm Season	10-30%	Dec. 1 - May 1	Well-drained to Droughty	Poor	6
Big Bluestem	Andropogon gerardii	**Earl**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	6
Little Bluestem	Schizachyrium scoparium	**Cimarron**	Warm Season	10-30%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	4
Sweet Woodreed	Cinna arundinacea		Warm Season	1-10%	Dec. 1 - Apr. 1	Poorly-drained to Well-drained	Moderate	5
Rice Cutgrass	Leersia oryzoides		Warm Season	5-25%	Dec. 1 - Apr. 1	Poorly-drained	Poor	5
Redtop Panicgrass	Panicum rigidulum		Warm Season	10-20%	Dec. 1 - Apr. 1	Well-drained	Poor	3.5
Beaked Panicgrass	Panicum anceps		Warm Season	10-20%	Dec. 1 - Apr. 1	Poorly--drained	Moderate	3.5
Eastern Gammagrass	Tripsacum datyoides		Warm Season	5-10%	Dec. 1 - Apr. 1	Well-drained to Poorly-drained	Poor	4.5
Purple top	Tridens flavus		Warm Season	5-10%	Dec. 1 - Apr. 1	Well-drained to Droughty	Poor	2.5
Indian Woodoats	Chasmanthium latifolium		Cold Season	1-10%	Feb. 15 - Mar. 20, Sep. 1 - Nov. 1	Well-drained to Droughty	Moderate	4
Virginia Wildrye	Elymus virginicus		Cold Season	5-25%	Feb. 15 - Mar. 20, Sep. 1 - Nov. 1	Well-drained to Droughty	Moderate	3
Rough Bentgrass	Agrostis scabra		Cold Season	10-20%	Feb. 15 - Mar. 20, Sep. 1 - Nov. 1	Poorly-drained	Poor	2.5
Soft Rush	Juncus effusus		Wetland	1-10%	Dec. 1 - Apr. 15	Poorly-drained	Poor	4
Shallow Sedge	Carex lurida		Wetland	1-10%	Dec. 1 - Apr. 15	Poorly-drained	Poor	3
Fox Sedge	Carex vulpinoidea		Wetland	1-10%	Dec. 1 - Apr. 15	Poorly-drained	Poor	3
Leathery Rush	Juncus coriaceus		Wetland	2-5%	Dec. 1 - Apr. 15	Poorly-drained	Poor	2

* Only Lometa in eastern coastal plain (Plant Hardiness Zone 8).

Maintenance

Many of the recommended permanent grass species may require two years for establishment, depending on site conditions. Inspect seeded areas for failure and make necessary repairs, soil amendments, and reseedings. If weedy exotic species have overtaken the area after the first growing season, the invading species must be eradicated to allow native species to grow. Native vegetations are difficult to manage and take longer to establish. Monitor the site until long term stability has been established.