

Chapter 5 - VEGETATIVE PRACTICE STANDARDS

PERMANENT SEEDING

Definition

Controlling runoff and erosion on disturbed areas by establishing perennial vegetative cover with seed.

Purpose

To reduce erosion and decrease sediment yield from disturbed areas, and to permanently stabilize such areas in a manner that is economical, adapts to site conditions, and allows selection of the most appropriate plant materials.

Conditions Where Practice Applies

Fine-graded areas on which permanent, long-lived vegetative cover is the most practical or most effective method of stabilizing the soil. Permanent seeding may also be used on rough-graded areas.

Areas to be stabilized with permanent vegetation must be seeded or planted within 30 days after final grade is reached, on a segment of the construction site, unless temporary stabilization is applied.

Planning Considerations

Vegetation controls erosion by protecting bare soil surfaces from raindrop impact and by reducing the velocity and volume of overland flow.

The most common and economical means of stabilizing disturbed soils is by seeding grasses and legumes. The advantages of seeding over other means of establishing plants include the smaller initial cost, lower labor input, and greater flexibility of method. The disadvantages of seeding include:

1. potential for erosion during the establishment stage,
2. the need to reseed areas that fail to establish,
3. seasonal limitations on suitable seeding dates, and
4. a need for water and appropriate temperatures during germination and early growth.

The probability of successful plant establishment can be maximized through good planning, knowledge of the soil characteristics, selection of suitable plant material for the site, good seedbed preparation, adequate liming and fertilization, and timely planting and maintenance.

Selecting Plant Materials

Plant selection is made early in the development of a site so that the seedbed can be prepared to fit requirements of the plants. A large number

of plant species and varieties can be grown in Mississippi and many have been used for soil stabilization. However, only a few have really stood the test of time. The plants emphasized in this manual were chosen for their wide adaptation and high degree of erosion control reliability. Others may be preferable for special applications.

Land use is a primary consideration in planning permanent seedings. For this purpose land use, whether residential, industrial, commercial, or recreational, can be divided into two general categories:

1. High-maintenance areas that are mowed frequently, limed and fertilized regularly, and either (1) receive intense use (e.g., athletic fields) or (2) require maintenance to an aesthetic standard (e.g., home lawns). Grasses used for these situations are long-lived perennials that form a tight sod and are fine-leaved and attractive in appearance. They must be well-adapted to the geographic area where they are planted and able to endure the stress of frequent mowing. Sites where high-maintenance vegetative cover is desirable include homes, industrial parks, schools, churches, and recreational areas.
2. Low-maintenance areas that are mowed infrequently or not at all, and do not receive lime and fertilizer on a regular basis. Plants must persist with little maintenance over long periods of time. Grass and legume mixtures are favored for these sites because legumes are a source of soil nitrogen. Mixed stands are also more resistant to adverse conditions. Sites suitable for low-maintenance vegetation include steep slopes, stream or channel banks, some commercial properties, and "utility" turf areas such as roadbanks.

Seedbed Preparation

The soil on a disturbed site 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 (acidity or alkalinity) of the soil must be such that it is not toxic and nutrients are available--preferably between 6.0 and 6.5. Sufficient nutrients--added as fertilizer--must be present.

It is as important to add lime as to add fertilizer. Lime is used primarily as a pH, or acidity, modifier, but it also supplies calcium and magnesium, which are important plant nutrients. By increasing soil pH, other nutrients are more available to plants.

After seed is in place, it must be protected with a mulch to hold moisture and modify temperature extremes, while preventing erosion during seedling establishment.

Steep Slopes

The operation of equipment is restricted on slopes steeper than 3:1, severely limiting the quality of the seedbed that can be prepared. The soil on such slopes cannot be sufficiently worked, and amendments cannot be thoroughly incorporated.

Provisions for establishment of vegetation on steep slopes can be made during final grading. In construction of fill slopes, for example, the last 4-6 inches might be left uncompacted. A loose, rough seedbed is essential. Large clods and stones provide irregularities that hold seeds and fertilizer. Cut slopes should be roughened (see Surface Roughening BMP)

Where steepness prohibits the use of farm machinery, seeding methods are limited to broadcast or hydroseeding, with hydroseeding giving the most dependable results. Vegetation chosen for these slopes must not require mowing or other intensive maintenance. Using a hydraulic seeder, seed, fertilizer, wood fiber mulch, and a tacking agent can be applied in one operation.

Good mulching practices are critical to protect against erosion on steep slopes. When using straw, anchor with netting or asphalt. On slopes steeper than 2:1, jute, excelsior, or synthetic matting may be required to protect the slope.

Plans and Specifications

Plans for installing permanent seeding shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve the intended purpose.

Specifications for applying and installing permanent seeding shall use or be in conformance with the following. Any variation from these specifications shall be approved by an engineer.

1. **Seedbed Requirements.** Establishment of vegetation should not be attempted on sites that are unsuitable due to poor drainage, concentrated overland flow, or steepness of slope until measures have been taken to correct these problems.

To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. The existing soil should meet the following conditions:

- a. Enough fine-grained (silt and clay) material to maintain adequate moisture and nutrient supply.
- b. Sufficient pore space to permit root penetration.
- c. Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12 inches or more, except on slopes steeper than 2:1 where the addition of soil is not feasible.
- d. A favorable pH range for plant growth, usually 6.0-6.5.
- e. Freedom from large roots, branches, stones, large clods of earth, or trash of any kind. Clods and stones may be left on slopes steeper than 3:1 if the slopes are to be hydroseeded.

2. Soil Conditioners. In order to improve the structure or drainage characteristics of a soil, the following materials may be added. These amendments should only be necessary where soils have limitations that make them poor for plant growth or are needed for fine turf establishment

Peat--Appropriate types are sphagnum moss peat, hypnum moss peat, reed-sedge peat, or peat humus, all from fresh-water sources. Peat should be shredded and conditioned in storage piles for at least 6 months after excavation.

Sand--clean and free of toxic materials.

Vermiculite--horticultural grade and free of toxic substances.

Rotted manure--stable or cattle manure not containing undue amounts of straw or other bedding materials.

Thoroughly rotted sawdust--free of stones and debris. Add 6 lb of nitrogen to each cubic yard.

Sludge--Treated sewage and industrial sludges are available in various forms; these should be used only in accordance with local, State, and Federal regulations.

3. Species Selection. Use the Permanent Seeding, Table 5-2 to select the most appropriate seed.

4. Seedbed Preparation. Install necessary mechanical erosion and sedimentation control practices before seeding, add topsoil as needed, and complete grading according to the approved plan.

Lime and fertilizer needs should be determined by soil tests. Soil testing is performed by the Mississippi Cooperative Extension Service soil testing laboratory. Directions, sample cartons, and information sheets are available through county Extension Service offices. Sampling must be planned well in advance of final grading. Testing is also done by commercial laboratories.

When soil tests are not available, follow rates suggested on the individual specification sheet for the seeding mix chosen. Application rates usually fall into the following ranges:

- a. Ground agricultural limestone: 2 tons/acre
- b. Fertilizer:
 - Grasses: 600 lb/acre of 13-13-13 (or the equivalent)
 - Grass-legume mixtures: 600 lb/acre of 5-10-10 (or the equivalent)

Apply lime and fertilizer evenly and incorporate into the top 4-6 inches of soil by disking or other suitable means. Operate machinery on the contour. When using a hydroseeder, apply lime and fertilizer to a rough, loose surface.

Complete seedbed preparation by breaking up large clods and raking a smooth, uniform surface (slopes less than 3:1). Fill in or level depressions that can collect water. Broadcast seed into a freshly loosened seedbed that has not been sealed by rainfall.

5. Seeding. Seeding dates are given in Table 5-2. Seedings carried out within these dates have a high probability of success. It is possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. This should be taken into account when scheduling land-disturbing activities.

Use certified seed. All seeds must conform to Mississippi seed law regulations regarding noxious weed seed. Each bag of seed must be labeled with a bag tag showing percent pure seed, percent germination (including hard seed), and percent weed seed. The information on the bag tag shall be from a seed test made within six (6) months prior to the date of planting.

Inoculate legume seed with the Rhizobium bacteria appropriate to the species of legume.

Apply seed uniformly with a cyclone seeder, drop-type spreader, drill, cultipacker seeder, or hydroseeder on a firm, friable seedbed.

When using a drill or cultipacker seeder, plant small grains no more than 1 inch deep, grasses and legumes no more than 1/2 inch. Equipment should be calibrated in the field for the desired-seeding rate.

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass.

Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact.

Mulch all plantings immediately after seeding (see Mulching BMP).

6. Hydroseeding. Surface roughening is particularly important when hydroseeding, as a roughened slope will provide some natural coverage for lime, fertilizer, and seed. The surface should not be compacted or smooth. Fine seedbed preparation is not necessary for hydroseeding operations; large clods, stones, and irregularities provide cavities in which seeds can lodge.

Apply legume inoculants at four times the recommended rate when adding inoculant to a hydroseeder slurry.

If a machinery breakdown of 1/2 to 2 hours occurs, add 50 percent more seed to the tank, based on the proportion of the slurry remaining.

This should compensate for damage to seed. Beyond 2 hours, a full rate of new seed may be necessary.

Lime is not normally applied with a hydraulic seeder because it is abrasive. It can be blown onto steep slopes in dry form.

7. Sprigging. Some hybrid grasses cannot be grown from seed and must be planted vegetatively. Vegetative methods of establishing these include sodding, plugging and sprigging. Sprigs are fragments of horizontal stems which include at least one node (joint). They are normally sold by the bushel and can either be broadcast or planted in furrows using a tractor-drawn tobacco or vegetable transplanter.

Furrows should be 4-6 inches deep and 2 ft apart. Place sprigs about 2 ft apart in the row with one end at or above ground level.

Broadcast sprigs at the specified rate. Press into the top 1/2-2 inches of soil with a cultipacker or with a disk set nearly straight so that the sprigs are not brought back to the surface.

8. Irrigation. Moisture is essential for seed germination and seedling establishment. Supplemental irrigation can be very helpful in assuring adequate stands in dry seasons or to speed development of full cover. It is a requirement for the fine turf establishment and should be used elsewhere when feasible. However, irrigation is rarely critical for low-maintenance vegetation planted at the appropriate time of the year .

Water application rates must be carefully controlled to prevent runoff. Inadequate or excessive amounts of water can be more harmful than no supplemental water.

9. Maintenance. Generally, a stand of vegetation cannot be determined to be fully established until soil cover has been maintained for one full year from planting. Inspect seeded areas for failure and make necessary repairs and reseedings within the same season, if possible.

Reseeding--If a stand has inadequate cover, re-evaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand after seedbed preparation or over-seed the stand. Consider seeding temporary, annual species if the time of year is not appropriate for permanent seeding.

If vegetation fails to grow, soil must be tested to determine if acidity or nutrient imbalance is responsible.

Fertilization--On the typical disturbed site, full establishment usually requires refertilization in the second growing season. Fine turf requires annual maintenance fertilization. Use soil tests if possible or apply 200-300 pounds of 13-13-13 fertilizer per acre when growth begins. Apply additional nitrogen, if needed, during the growing season.

Table 5.2

KEY TO
PERMANENT SEEDING

(PS)

SPECIES	SEEDING RATE/AC.	PLANTING TIME	DESIRED PH RANGE	FERTILIZATION RATE/AC.	METHOD OF ESTABLISHMENT	ZONE OF ADAPTABILITY
Common Bermuda	15 lbs alone 10 lbs mixture	Mar 1 -Jul 15 Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed or sod	1, 2, 3
Bahia	40 lbs alone 30 lbs mixture	Mar 1 -Jul 15 Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed	2,3
Fescue	40 lbs alone 30 lbs mixture	Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2
Saint Augustine	--	Mar 1 -Jul 15	6.0 - 7.0	600 lbs 13-13-13	sod only	2, 3
Centepede	4 lbs alone 2.5 lbs mixture	Mar 1 -Jul 15	6.0 - 7.0	600 lbs 13-13-13	seed or sod	1, 2, 3
Carpet Grass	15 lbs alone 10 lbs mixture	Mar 1-Jul 15	6.0 - 7.0	600 lbs 13-13-13	seed or sod	1, 2, 3
Zoysia Grass	--	Mar 1-Jul 15	6.0 - 7.0	600 lbs 13-13-13	sod only	1, 2, 3
Creeping Red Fescue	30 lbs alone 22.5 lbs mix	Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2, 3
Weeping Lovegrass	10 lbs alone 5 lbs mixture	Mar 1-Jul 15	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2, 3
*Wheat	90 lbs alone	Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2, 3
*Ryegrass	30 lbs	Sept 1-Nov 30	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2, 3
*White Clover	5 lbs	Sept 1-Nov 30	6.0 - 7.0	400 lbs 6-24-24	seed	1, 2, 3
*Crimson Clover	15 lbs	Sept 1-Nov 30	6.0 - 7.0	400 lbs 6-24-24	seed	1, 2, 3
Sericea Lespedeza	40 lbs	Mar 1 -Jul 15 Sept 1-Nov 30	6.0 - 7.0	400 lbs 6-24-24	seed	1, 2, 3
*Hairy Vetch	30 lbs	Sept 1-Nov 30	6.0 - 7.0	400 lbs 6-24-24	seed	1, 2, 3
*Browntop Millet	40 lbs alone 15 lbs mixture	Apr 1- Aug 30	6.0 - 7.0	600 lbs 13-13-13	seed	1, 2, 3

*Annual

Note: For permanent seeding, annuals can only be used in a mixture with perennials.

CALENDAR FOR
VEGETATIVE ESTABLISHMENT

MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB
1											
				2							
						3					
									4		

- 1) Warm Season Cover:
- * Bermuda - seed or sod
 - * Bahia
 - * Centipede - seed or sod
 - * Carpet Grass
 - * Zoysia - sod only
 - * Lespedeza
 - * Millet
 - * Weeping Love Grass
 - * St. Augustine - sod only
central & south zones only

- 2) Temporary Summer Cover:
- * Browntop Millet

- 3) Cool Season Cover:
- * Fescue/Creeping Red Fescue - north and central zones only
 - * Wheat - only in mixture
 - * Ryegrass - only in mixture
 - * Clover
 - * Vetch
 - * Bermuda - unhulled in mixture
 - * Bahia - central & south zones only
 - * Sericea Lespedeza - in mixture

- 4) Mulch Cover Only

Figure 5-7