chapter 5 - VEGETATIVE PRACTICE STANDARDS

Soils

Many soil characteristics--including texture, organic matter, fertility, acidity, moisture retention, drainage, and slope--influence the selection of plants and the steps required for their establishment. The following is a list of the general Major Land Resource Areas of the state with a general description of each (see Figure 5-4, Map of Major Land Resource Areas).

1. 131 Southern Mississippi Valley Alluvium

a. Land Use

Most of this area is in farms. About 55 percent is cropland, 35 percent woodland, and 7 percent pasture. About 3 percent is used for miscellaneous purposes. Cropland makes up about three-fourths of the acreage in the north and less than one-fourth in the south. The proportion of forest land varies inversely with that planted to crops; the proportion of pasture is a little higher in the south. This is an important cash-crop area. Soybeans, cotton, and wheat grown by highly mechanized methods are the major crops throughout the area. Controlling surface water and artificially draining the wet soils are major concerns of management.

b. Elevation and Topography

Elevation is at sea level in the south and increases gradually to about 200 m in the north. The area consists of level to gently sloping broad flood plains and low terraces. Most of the area is flat. The only noticeable slopes are sharp terrace scarps and natural levees that rise sharply to several meters above adjacent bottom lands or stream channels.

c. Soils

The dominant soils are Aquepts, Aqualfs, Aquents, Udolls, and Udalfs. They are deep, medium textured and fine textured soils that have an udic or aquic moisture regime, a thermic temperature regime, and mostly montmorillonitic or mixed mineralogy.

d. Potential Natural Vegetation

This area supports deciduous bottom land forest vegetation. Willow oak, water oak, Nuttall oak, swamp white oak, sweetgum, water tupelo, baldcypress, native pecans, and hickories are the principal species.

2. 133A - Southern Coastal Plain

a. Land Use

This area is about 69 percent woodland, 17 percent cropland, and 11 percent pastureland. About 3 percent of the area is used for

rangeland, urban development, or other purposes. Controlling soil erosion and improving drainage on low wetland areas are major concerns of management.

b. Elevation and Topography

Elevations ranges from 25 to 200 m, increasing gradually from the lower Coastal Plain northward.

C. Soils

The dominant soils are Udults. They are deep and have a thermic temperature regime, an udic moisture regime, a loamy or sandy surface layer, and a loamy or clayey subsoil.

d. Potential Natural Vegetation

This area supports mixed oak-pine forest vegetation. Loblolly, longleaf, slash, and shortleaf pines; sweetgum; yellow-poplar; and red and white oaks are major overstory species. Dogwood, gallberry, and farkleberry are major understory species.

3. 134 Southern Mississippi Valley Silty Uplands

a. Land Use

Most of this area is in farms; a small acreage is federally owned. About 35 percent of the area is cropland,-but the proportion varies greatly from county to county, depending on the soils and the topography. Cotton, corn, soybeans, and wheat are major crops.

b. Elevation and Topography

Elevation ranges from 25 to 100 m. Valley sides are hilly to steep. The intervening ridges are mostly narrow and rolling. Stream valleys are narrow in the upper reaches but broaden rapidly downstream and have wide, flat flood plains and meandering stream channels.

C. Soils

Most of the soils are Udalfs. They are deep, medium textured soils that have a thermic temperature regime, an udic moisture regime, and mixed mineralogy.

d. Potential Natural Vegetation

This area supports hardwood and pine forest vegetation. Cherrybark oak and Shumard oak are widely distributed. Yellow-poplar, white ash, cottonwood, and black walnut are

important species on the flood plains. Loblolly and shortleaf pines are on a wide variety of sites, mainly the eroded soils of the uplands and ridges.

4. 135 Alabama, Mississippi, and Arkansas Blackland Prairie

a. Land Use

This area is about 58 percent woodland, 26 percent pastureland, and 14 percent cropland. Most soil areas have been disturbed, and only small remnants of the former prairie vegetation remain. Soybeans are the major crop, but corn, small grains, and cotton are also grown. Pastures are used mainly for beef production.

b. Elevation and Topography

Elevation ranges from 25 to 100 m. Some of the more prominent valley floors are less than 25 m, and a few ridgetops exceed 100 m.

c. Soils

The dominant soils are Ochrepts and Udalfs. They are fine textured and have a thermic temperature regime, an udic moisture regime, and montmorillonitic or carbonatic mineralogy. They are mainly moderately deep to deep over soft limestone or chalk and typically shrink, swell, and crack.

d. Potential Natural Vegetation

This area supports deciduous hardwood forest vegetation. Red oak, white oak, sweetgum, and blackgum are the dominant overstory species. Eastern redcedar, dogwood, and osage orange are major midstory species. Japanese honeysuckle, greenbrier, little bluestem, native lespedezas, plumegrass, low panicums, sedges, and rushes are the dominant understory species.

5. 151 Gulf Coast Marsh

a. Land Use

Most of this area is in marsh vegetation and is used mainly for wildlife habitat. The area is almost treeless and uninhabited. It is part of the fertile and productive estuarine complex that supports marine life of the Gulf of Mexico.

b. Elevation and Topography

Elevation ranges from sea level to about 2 m. On beach ridges, canal spoil banks, and natural levees, elevation is as much as 3 m, and on the salt dome islands, it is as much as 50 m.

c. Soils

The dominant soils are Aquolls, Saprists, Aquents, and Hemists. They have a thermic temperature regime and an aquic moisture regime. Most of the soils of the Gulf Coast Marsh are very poorly drained, and their water table is at or above the surface most of the time. These soils are susceptible to frequent flooding. They formed in alluvial and marine sediments and organic accumulations. The Aquolls are firm, but the other soils are soft and can sustain little weight.

d. Potential Natural Vegetation

This area supports freshwater and saltwater marsh vegetation of grasses, sedges, rushes, and other plants. Alligatorweed, spikerush, maidencane, cutgrass, and bulltongue characterize the freshwater vegetation. Roseau, common reed, bulltongue, and marshhay cordgrass characterize the intermediate water vegetation. Marshhay cordgrass, saltgrass, and Olney bulrush are typical of the brackish water vegetation. Saltgrass, marshhay cordgrass, smooth cordgrass, and black needlerush are included in the saline water vegetation.

6. 152A - Eastern Gulf Coast Flatwoods

a. Land Use

Very little of this area is in farms. Much of it is in large holdings owned by pulp and paper companies. Part of it is in national forests or is used as game refuges and for military training areas. Nearly nine-tenths of the area is forested; pulpwood and lumber are the principal forest products. Some of the woodland is grazed. Only about 4 percent is cropped and a like amount is in pasture.

b. Elevation and Topography

Elevation ranges from sea level to 25 m. This nearly level low coastal plain is crossed by many large streams.

c. Soils

The dominant soils are Aquults, Aquepts, and Aquods. They have a thermic temperature regime and an aquic moisture regime. They are sandy and poorly drained or very poorly drained.

d. Potential Natural Vegetation

This area supports pine forest vegetation. Chalky bluestem, indiangrass, and several panicum species make up the understory. Palmetto, gallberry, and waxmyrtle are the dominant woody shrubs. Longleaf and slash pine are the major trees.

Nature of Disturbed Soils - Throughout the state, most disturbed sites end up, after grading, with a surface consisting of acid, infertile subsoil materials that are toxic to most plants (Figure 5-5). Such soils may not be capable of supporting the dense growth necessary to prevent erosion. Construction activities further decrease soil productivity by increasing compaction, making slopes steeper, and altering drainage patterns. Topsoiling, soil amendments, and special seedbed preparation are generally required to offset these problems.

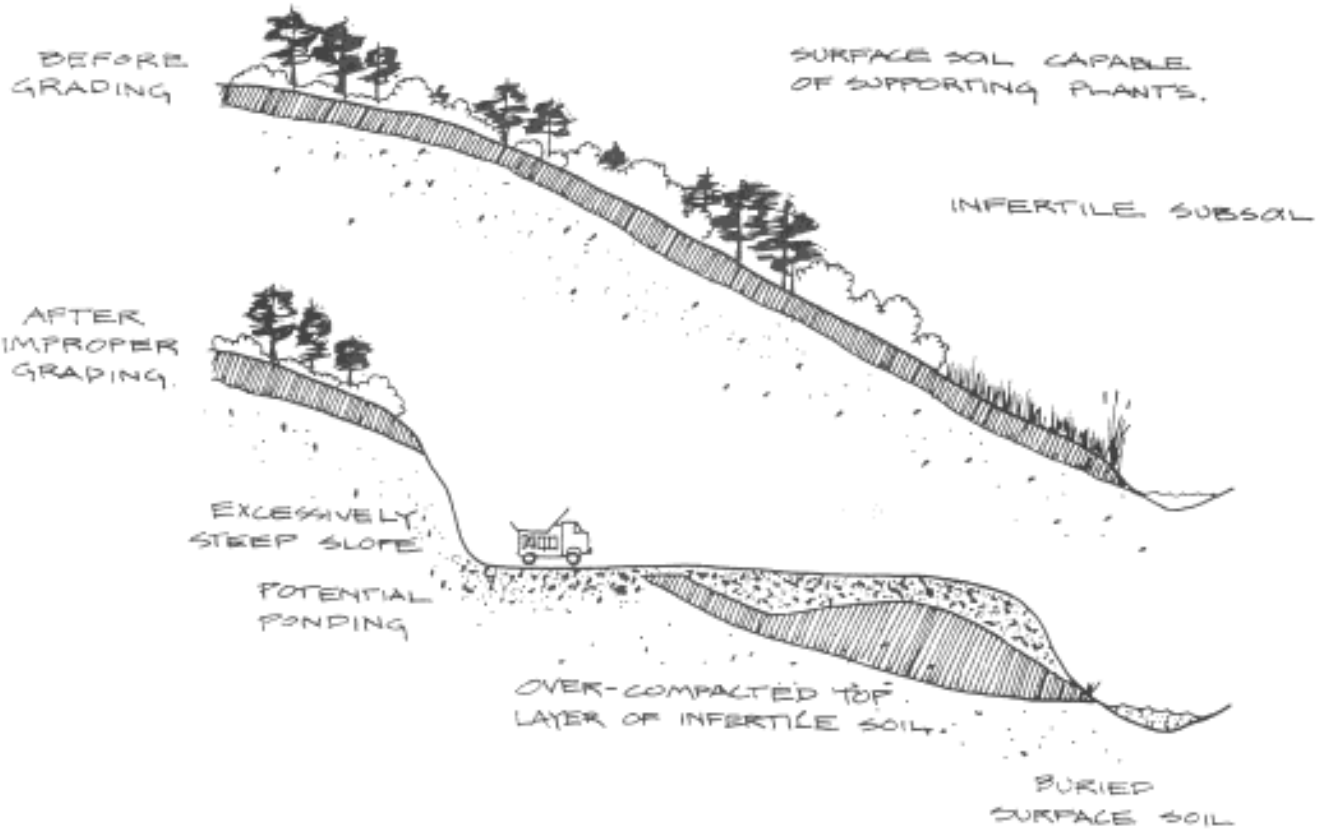

Figure 5-5 Construction decreases soil fertility.

Soil Sampling - A good sedimentation control plan should include thorough soil sampling in the area of planned construction. Different soils should be sampled separately. Containers for soil samples and instructions for sampling may be obtained from any local extension service office. Analysis of soil samples is available from the soil testing lab. Test results include lime and fertilizer recommendations. Fertilizing according to the soil test insures the most efficient expenditure of money for fertilizer and a minimum of excess fertilizer to pollute streams or groundwater. Soil sampling should begin well in advance of planting because 1 to 6 weeks are required to obtain soil test results.

Soil Limitations - Certain soil factors are difficult to modify and can impose severe limitations on plant growth. These include such things as depth, stoniness, texture, and properties related to texture such as water-and nutrient-holding capacity. Extremely coarse textures result in droughtiness and nutrient deficiencies. Fine textures, on the other hand, impede infiltration and decrease permeability, thereby increasing the volume of runoff. Toxic levels of elements such as aluminum, iron, and manganese are limiting to plant growth. However, these become less soluble as the pH is raised. Toxicity problems can usually be eliminated by liming. Toxicities from industrial waste could also make the soil Unsuitable for plant growth.

ESTABLISHING VEGETATION

Topsoiling. The surface layer of an undisturbed soil is often enriched in organic matter and has physical, chemical, and biological properties that make it a desirable planting and growth medium. These qualities are particularly beneficial to seedling establishment. Consequently, where practical, topsoil should be stripped off prior to construction and stockpiled for use in final revegetation of the site. Planning such stabilization measures from the beginning of the project may eliminate costly amendments and repair measures later. Topsoiling may not be required for the establishment of less demanding, lower maintenance plants, but it is essential-on sites having critically shallow soils or soils with other severe limitations. It is essential for establishing fine turf and ornamentals.

The need for topsoiling should be evaluated, taking into account the amount and quantity of available topsoil and weighing this against the difficulty of preparing a good seedbed on the existing subsoil. Where a limited amount of topsoil is available, it should be reserved for use on the most critical areas. In many cases, topsoil has already been eroded away or, as in wooded sites, it may be too trashy.

Site Preparation. The soil on a disturbed site must be modified to provide an optimum environment for germination and growth. Addition of topsoil, soil amendments, and tillage are used to prepare a good seedbed. At planting the soil must be loose enough for water infiltration and root penetration, but firm enough to retain moisture for seedling growth. Tillage generally involves disking, harrowing, raking, or similar method. Lime and fertilizer should be incorporated during tillage.

Soil Amendments. Liming is almost always required on disturbed sites to decrease the acidity (raise pH), reduce exchangeable aluminum, and supply calcium and magnesium. Even on the best soils, some fertilizer is required. Suitable rates and types of soil amendments should be determined through soil tests. Lime and fertilizer should be applied uniformly during seedbed preparation and mixed well with the top 4 to 6 inches of soil. Organic amendments, in addition to lime and fertilizer, may improve soil tilth, structure, and water-holding capacity--all of which are highly beneficial to seedlings establishment and growth. Some amendments also

provide nutrients. Examples of useful organic amendments include well-rotted sawdust, well-rotted animal manure and bedding, crop residue, peat, and sludge from municipal sewage or industrial waste.

Organic amendments are particularly useful where topsoil is absent, where soils are excessively drained, and where soils are high in clay. The application of several inches of topsoil usually eliminates the need for organic amendments.

Sludge is an inexpensive amendment that can be very beneficial to plant growth, but proper planning and careful management are essential to its use. Sludge adds nutrients, primarily nitrogen and phosphorus, improves soil structure, and increases organic matter. Types of sludge available include municipal sewage, and waste from textile, wood processing. Nutrient content of the sludge depends on the source, but is much lower than that of commercial fertilizers. Sewage sludge may be used in reclamation of disturbed sites, but always check local or State regulations before attempting to use sewage sludge.

Surface Roughening. A rough surface is especially important to seeding sloped areas. Contour depressions and loose surface soil help retain lime, fertilizer, and seed. A rough surface also reduces runoff velocity and increases infiltration.

Because slopes steeper than 3:1 are not usually mowed, they can be left quite rough by grooving, furrowing, tracking, or stairstep grading. Stairstep grading is particularly helpful where there are large amounts of soft rock, because each step catches material in which vegetation can become established.

Slopes flatter than 3:1, which may be mowed, should be grooved by disking, harrowing, raking, or operating planting equipment on the contour. Mulch is sufficient to retain seed and soil amendments and promote infiltration on gentle slopes. Seed should be broadcast soon after surface roughening, before the surface is sealed by rainfall.

Planting Methods. Seeding is by far the fastest and most economical method that can be used with most species. However, some grasses do not produce seed and must be planted vegetatively. Seedbed preparation, liming, and fertilization are essentially the same regardless of the method chosen.

Seeding. Uniform seed distribution is essential. This is best obtained using a cyclone seeder (hand-held), drop spreader, conventional grain drill, cultipacker seeder, or hydraulic seeder. The grain drill and cultipacker seeders (also called grass seeder packer or Brillion drill) are pulled by a tractor and require a clean, even seedbed.

On steep slopes hydroseeding may be the only effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding. In contrast to other seeding methods, a rugged and even trashy seedbed gives the best results.

The "insurance" effect of extra seed has been taken into account in arriving at the rates recommended in this manual. Rates exceeding those given are not recommended because over-dense stands are more subject to drought and competitive interference.

Because uniform distribution is difficult to achieve with hand-broadcasting, it should be considered only as a last resort. When hand-broadcasting of seed is necessary, uneven distribution may be minimized by applying half the seed in one direction and the other half at right angles to the first. Small seed should be mixed with sand for better distribution.

A "sod seeder" (no-till planter) is used to restore or repair weak cover. It can be used on moderately stony soils and uneven surfaces. It is designed to penetrate the sod, open narrow silts, and deposit seed with a minimum of surface disturbance. Fertilizer is applied in the same operation.

Inoculation of Legumes. Legumes have bacteria, rhizobia, which invade the root hairs and form gall-like "nodules." The host plant supplies carbohydrates to the bacteria, which supply the plant with nitrogen compounds fixed from the atmosphere. A healthy stand of legumes, therefore, does not require nitrogen fertilizer. *Rhizobium* species are host specific--a given species will inoculate some legumes but not others. Successful establishment of legumes, therefore, requires the presence of specific strains of nodule-forming, nitrogen-fixing bacteria on their roots. In areas where a legume has been growing, sufficient bacteria may be present in the soil to inoculate seeded plants, but in other areas the natural *Rhlzobium* population may be too low.

In acid subsoil material, if the specific *Rhlzobium* is not already present, it must be supplied by mixing it with the seed at planting. Cultures for this purpose are available through seed dealers.

Sprigging and Plugging Sprigging refers to planting stem fragments consisting of runners (Stolons) or lateral, below-ground stems (rhizomes), which are sold by the bushel. This method can be used with most warm-season grasses and with some ground covers, such as periwinkle. Certain dune and marsh grasses are transplanted using vertical shoots with attached roots or rhizomes. Sprigs can be broadcast or planted in furrows using a tobacco transplanter. Under favorable conditions, the hay-type, hybrid Bermudagrasses will cover-over in one growing season from sprigs spaced on 6-ft centers. Lawn-type plants are usually sprigged much more thickly.

Broadcasting is easier but requires more planting material--3 to 10 bu/1000 ft2 for Bermudagrass. Broadcast sprigs must be pressed into the top 1/2 to 1 inch of soil by hand or with a smooth disk set straight, special planter, cultipacker, or roller.

Plugging differs from sprigging only in the use of plugs cut from established sod, in place of sprigs. It is usually used to introduce a superior grass into an old lawn. It requires more planting stock, but usually produces a complete cover more quickly than sprigging.

Sodding. In sodding, the soil surface is completely covered by laying cut sections of turf. It is practiced in this region with turf-type Bermudas, Kentucky bluegrass, tall fescue, and bluegrass-tall fescue mixtures, and is limited primarily to lawns, steep slopes, and sod waterways. A commercial source of high-quality turf it required and water must be available. Plantings must be wet down immediately after planting, and kept well watered for a week or two thereafter.

Sodding, though quite expensive, is warranted where immediate establishment is required, as in stabilizing drainageways and steep slopes, or in the establishment of high-quality turf. If properly done, it is the most dependable method and the most flexible in seasonal requirements. Sodding is feasible almost any time the soil is not frozen.

Irrigation. Irrigation, though not generally required, can extend seeding dates into the summer and insure seedling establishment. Damage can be caused by both under- and over-irrigating. If the amount of water applied penetrates only the first few inches of soil, plants may develop shallow root systems that are prone to desiccation. If supplementary water is used to get seedlings up, it must be continued until plants become firmly established.

Irrigation requirements depend upon current weather conditions--rainfall, temperature, humidity, etc.

Mulching. Mulch is essential to the revegetation of most disturbed sites, especially on difficult sites such as southern exposures, channels, and excessively dry soils. The steeper the slope and the poorer the soil, the more valuable it becomes. In addition, mulch fosters seed germination and seedling growth by reducing evaporation, preventing soil crusting, and insulating the soil against rapid temperature changes.

Mulch may also protect surfaces that cannot be seeded. Mulch prevents erosion in the same manner as vegetation, by protecting the surface from raindrop impact and by reducing the velocity of overland flow. There are a number of organic, stone, and a few chemical mulches that may be useful, as well as nets and tacking materials.

Grain straw (wheat, oats, ryegrass) is the most widely used and one of the best mulches. However, there are other materials that work well but may be only locally available. Mulching materials covered in this manual have their respective advantages and appropriate applications, and a material should not be selected on the basis of cost alone.

Maintenance. Satisfactory stabilization and erosion control requires a complete vegetative cover. Even small breaches in vegetative cover can expand rapidly and, if left unattended, can allow serious soil loss from an otherwise stable surface. A single heavy rain is often sufficient to greatly enlarge bare spots, and the longer repairs are delayed, the more costly they become. Prompt action will keep sediment loss and repair cost down. New seedlings should be inspected frequently and maintenance performed as needed. If rills and gullies develop, they must be filled in, reseeded, and mulched as soon as possible. Diversions may be needed until new plants take hold.

Maintenance requirements extend beyond the seeding phase. Damage to vegetation from disease, insects, traffic, etc., can occur at any time. Herbicides and regular mowing may be needed to control weeds--dusts and sprays may be needed to control insects. Herbicides should be used with care where desirable plants may be killed. Weak or damaged spots must be relimed, fertilized, mulched, and reseeded as promptly as possible. Refertilization may be needed periodically to maintain productive stands.

Vegetation established on disturbed soils often requires additional fertilization. Frequency and amount of fertilization can best be determined through periodic soil testing. A fertilization program is required for the maintenance of fine turf and sod that is mowed frequently. Maintenance requirements should always be considered when selecting plant species for revegetation.