
Chapter 3

Surface Stabilization

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Chemical Stabilization (CHS)

Description

The application of chemical products typically during temporary seeding or mulching operations to control erosion caused by water and wind. Water-soluble flocculant is often used for this.

Installation

- Prepare application site according to plans and specifications.
- Conduct site soil testing for products to verify performance with site soils before use.
- Obtain toxicity reports and OSHA Safety Data Sheets (SDSs) from the supplier before using products on site.
- All products should be mixed, applied, and equipment cleaned according to OSHA SDSs, and the manufacturer's recommendation. Rinse residue should be applied to soil areas needing stabilization.
- Runoff from the treated area should not be allowed to drain directly into storm drains or offsite prior to additional treatment options, such as directing to a sediment basin.
- Check for compliance with all manufacturer recommendations and safety requirements during application.

Maintenance

- Reapply products if treated areas are disturbed or tilled per the manufacturer recommendations.

- Maintain application equipment to ensure uniform applications.
- Remove downgradient sediment deposits as needed.
- Inspect monthly and after rain events.



Figure CHS-1 Hydraulically Applied Flocculant.

Photo courtesy of Sunshine Supplies, Inc.

Dust Control

Description

Controlling dust during land disturbing activities to minimize on-site and off-site damages and hazards.

Installation

- Sequence construction to minimize the amount of disturbed area at any one time.
- Leave undisturbed vegetative buffers between disturbed areas, if possible.
- Install planned surface stabilization measures immediately after completing grading.
 - Vegetative Cover – Apply according to plans and specifications.
 - Mulch – Apply according to plans and specifications.
- Sprinkling – Sprinkle disturbed areas with water until surface is moist. Repeat as often as needed to maintain moisture. Be careful not to overwater as to cause or contribute to stormwater runoff.
- Barriers – Install fences perpendicular to prevailing wind at intervals of 15 times the fence height.
- Calcium Chloride – Apply according to plans and specifications using a mechanical spreader.
- Spray-on Adhesives – Apply according to plans and specifications or the following table if not specified.
- Stone – Place proper gradation to the specified width and thickness.

Table DC-1 Application Rates for Spray-on Adhesives Used in Dust Control

Adhesive	Water Dilution (water : adhesive)	Type of Nozzle	Application Rate (gallons/acre)
Anionic Asphalt Emulsion	7:1	Coarse	1200
Latex Emulsion	12.5:1	Fine	235
Resin in Water	4:1	Fine	300

Source: Virginia Erosion and Sediment Control Handbook, 1993

Consult with a qualified design professional if spray-on adhesives are specified. A permit may be required.

Maintenance

- Prohibit traffic on treated surfaces until curing is complete.
- Check site during windy conditions to monitor measure effectiveness.
- Maintain dust control measures continuously throughout dry weather periods, until all disturbed areas have been stabilized.
- Ensure that any runoff water is diverted to a BMP practice to be treated before discharge.

Erosion Control Blanket (ECB)

Description

Protective cover made of straw, jute, wood or other plant fibers, plastic, nylon, paper, or cotton. Erosion control blanket is used on areas with high erosion potential such as steep slopes and channels to protect soil from raindrop impact and erosive velocities while facilitating vegetative growth.

Installation

- Grade the site to a smooth uniform surface, free of debris.
- Control any run-on water using diversion channels.
- Incorporate soil amendments and seed according to plans and specifications.
- Ensure blanket type meets plans and specifications.
- Most manufacturers can provide wildlife-friendly netting on ECB's. When not otherwise specified, these products should be preferentially used when possible.
- Blankets should be installed just beyond the top and bottom of the slope being treated.
- Install erosion control blankets according to manufacturer's recommendations; especially concerning blanket terminations, overlaps, and stapling patterns (improper installation and lack of adequate stapling are often the cause of blanket failure).

- Anchor blanket so that continuous, firm contact is maintained with the soil surface to prevent tenting.
- Check materials used for compliance with specifications and suitability for application.
- Check finished grade and dimensions for compliance with specifications.
- Check staple installation for compliance with recommendations.

Maintenance

- After storm events, check for erosion and undermining beneath blankets and confirm that run-on water is being properly managed. Rills and gullies often form from the toe of the slope and move upward. Repair as needed, by filling eroded area with soil, seeding, and replacing damaged blanket.



Figure ECB-1 Erosion Control Blanket on a Slope.
Photo courtesy of Sunshine Supplies, Inc.

Groundskeeping (GK)

Description

Activities, measures, and BMPs that are essential during construction for the protection of environmental quality.

Spill Prevention and Material Management

- All construction sites with temporary or permanent fuel storage must have a Spill Prevention Control and Countermeasures (SPCC) Plan developed by a Qualified Credentialed Professional (QCP) per 40 CFR Part 112 if the aggregate aboveground capacity is greater than 1,320 gallons.
- Verify if the SPCC plan requires secondary containment.
- Chemical storage areas must have a BMP plan that is specific for the stored chemical.
- Monitor all on-site vehicles for leaks.
- All petroleum products and chemicals must be stored in labeled, tightly sealed containers. Store the containers in a neat orderly manner and under roof when possible.
- Locate petroleum-based activities as far as possible from waters of the State and stormwater inlets or conveyances so that stormwater coming into contact with these activities cannot reach waters of the State.
- No fueling, servicing, maintenance, or repair of equipment should occur within 50 feet of a stream or within 100 feet of Public Water Supply, Outstanding Alabama Water,

Outstanding National Resource Water, or a sinkhole.

- All construction traffic should use the designated construction entrance/exit.
- Mud and soil tracked onto streets and roads should be removed daily using “dry” methods like sweeping or manual removal (DO NOT wash material into nearby storm drains).
- Concrete trucks should only be allowed to wash out at designated locations where the discharge is contained to be properly removed, recycled, or disposed of later and meets any applicable regulatory requirements. Storm drains are NEVER used as designated wash out locations.
- Locate portable toilets so that accidental spills will not discharge into a storm sewer or concentrated flow area. Portable toilets should not be located on streets or roadways.
- No hazardous materials of any kind can be disposed of on the site.
- All solid waste should be collected in a dumpster or other approved collection device and be disposed of in accordance with state law.
- Water used to pressure test sanitary sewers, flush water lines, etc., should be discharged only in approved locations. Discharge of chlorinated water may require permitting.

Spill Controls

- Materials to contain and clean up fuel and chemical spills should be readily available on-site.
- In the event of a spill that has the potential to impact surface or groundwater, immediately call

National Response Center at 1-800-424-8802 and the Alabama Emergency Management Agency (AEMA) at 1-800-843-0699.

- ALL SPILLS should be cleaned up immediately, properly contained, and handled according to the Safety Data Sheet (SDS). DO NOT bury spilled materials.

Management of Hazardous Products

- Keep all products in original containers whenever possible. Make sure all containers are properly marked and labeled.
- Original labels and SDSs should be on-site at all times until the product(s) is no longer used.
- Surplus product and empty containers should be disposed of only according to ADEM regulations.

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Mulching (MU)

Description

Applying straw or other suitable materials to cover the soil surface to protect against erosion. Mulching used in conjunction with seeding helps establish plant cover. Mulching can be used on unseeded areas (excluding concentrated flow areas) to protect against erosion until final grading and shaping can be accomplished.

Installation

- Remove stumps, roots, and other debris from the site before seeding and/or mulching.
- Grade area, as needed, to permit the use of equipment for seeding, mulching and maintenance.
- Shape area so that it is relatively smooth, and that run-on water is properly managed.
- If seeding, follow seeding specifications and apply mulch immediately after seeding.
- Spread straw uniformly over the area with a power blower, hydroseeder or by hand application at rates recommended for either seeded areas or without seeding. When mulching WITH seeding, about 75% of the soil surface should be covered after mulching is applied. When mulching WITHOUT seeding, 100% of the soil surface should be covered.
- Apply mulch at the rates shown in the plan or in Table MU-1 if there is not a plan.
- Hydraulic Erosion Control Products (HECPs) as defined by the Erosion Control Technology

Council (ECTC) used for mulching should be applied using the manufacturer's specified rates and methods.

Table MU-1 Mulching Materials and Application Rates

Material	Rate Per Acre (Per 1,000 ft.²)	Notes
Straw (with Seed)	1 ½ - 2 tons (70 lbs – 90 lbs)	Spread by hand or machine; anchor when subject to blowing.
Straw Alone (no seed)	2 ½ - 3 tons (115 lbs - 140 lbs)	Spread by hand or machine; anchor when subject to blowing.
Wood Chips	5 - 6 tons (225 lbs - 270 lbs)	Treat with 12 lbs. nitrogen/ton.
Bark	35 cubic yards (0.8 cubic yard)	Can apply with mulch blower.
Pine Straw	1 - 2 tons (45 lbs – 90 lbs)	Spread by hand or machine; will not blow like straw. Additional lime may be required.
Peanut Hulls	10 - 20 tons (450 lbs - 900 lbs)	Will wash off slopes. Treat with 12 lbs. nitrogen/ton.
HECPs	0.75 - 2.25 tons (35 lbs – 103 lbs)	Refer to ECTC or manufacturer's specifications.

Anchoring

Anchor straw or wood cellulose mulch by one of the following methods:

- Crimp with a mulch anchoring tool (crimper), as near to the contour as practical, to punch the straw into the soil.
- Tack with a liquid tackifier designed to hold mulch in place. Use suitable spray equipment and follow manufacturer's recommendations.
- In more erosive areas, cover mulch with netting, using a degradable natural or synthetic mesh and anchor according to manufacturer's specifications (see Erosion Control Blanket practice). Prioritize the use of wildlife-friendly netting when possible.
- On steep slopes and other areas needing more protection, use heavy natural nets without additional mulch, synthetic netting with additional mulch or erosion control blanket (don't place erosion control blanket over mulch). These areas include grassed waterways, swales, and diversion channels.
- Install netting and blankets according to manufacturer's specifications making sure materials are properly anchored (see Erosion Control Blankets).

Maintenance

- Inspect all mulched areas periodically and after rainstorms for erosion and damage to the mulch.
- Make repairs promptly and restore to original condition.
- Continue inspections of seeded areas until vegetation is well established.

- Keep mower height high if plastic netting or blanket is used to prevent material from being entangled in mower blades.



Figure MU-1 Crimped Straw Mulch.

Permanent Seeding (PS)

Description

Establishing a permanent vegetative cover for soil stabilization and long-term erosion control by seeding disturbed areas.

Installation

- Make plantings during the specified planting period if possible.
- Spread topsoil if required (see Topsoiling practice).
- Apply lime and fertilizer according to the plans or soil test recommendations.
- If a design plan or soil test is not available, use 2 tons/acre of ground agricultural lime on clayey soils (about 90 lbs/1000 ft²) and 1 ton/acre on sandy soils (about 45 lbs/1000 ft²). For grass only, apply 8-24-24 or equivalent – 400 lbs/acre (about 9 lbs/1000 ft²) before planting and 30 lbs/acre of nitrogen fertilizer (about 0.8 lbs/1000 ft²) when vegetation has emerged to a stand. For grass-legume mixtures, apply 5-10-10 or equivalent - 800 – 1200 lbs/ac (about 18 – 27 lbs/1000 ft²) at planting. For legume alone apply 0-20-20 or equivalent – 400 – 600 lbs/acre (about 9 - 14 lbs/1000 ft²) at planting.
- On gentle slopes (3:1 and flatter) and immediately after spreading lime and fertilizer, prepare the seedbed by loosening soil surfaces to a depth of 6” to 8” with appropriate tillage equipment to incorporate lime and fertilizer.

- Grade and loosen the soil to a smooth firm surface except for no-till drilling and hydroseeding. Break up large clods and loosen compacted, hard or crusted soil surfaces with a disk, ripper, chisel, harrow or other tillage equipment.
- Avoid preparing the seedbed under excessively wet conditions.
- On slopes steeper than 3:1, track the slope with a dozer up and down the slope.
- Lime and fertilizer may be applied to the surface without incorporation.
- Lime and fertilizer may be applied through hydroseeding equipment (usually on steep slopes). Lime may be applied with seed, but fertilizer should not be added to the seed mixture during hydroseeding because fertilizer salts may damage the seed.
- Plant the species specified. In the absence of plans and specifications, plant species and seeding rates may be selected from Figure PS-1 and Table PS-1 by qualified persons.
- Plant grasses and legume seed $\frac{1}{4}$ " to $\frac{1}{2}$ " deep and small grains about 1" deep.
- When planting by methods other than a drill seeder or hydroseeder, cover the seed and then firm the soil lightly with a roller.
- If planting a legume, use the correct inoculant and follow recommendations on the label. For hydroseeding, increase the inoculant used to 4 times the rate recommended on the label for other seeding methods.

- Cover about 75% of the surface with the specified mulch materials. (See Mulching practice for more details).

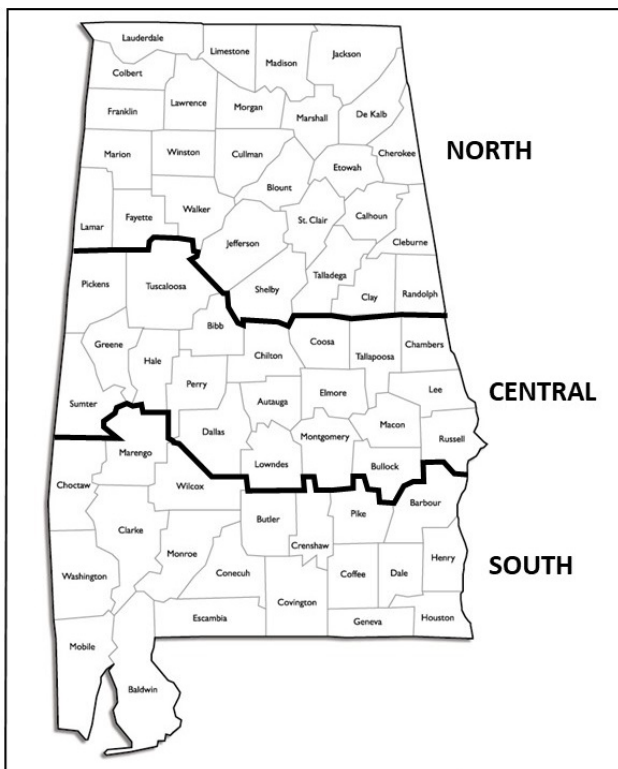


Figure PS-1 Geographical Areas for Species Adaptation

Table PS-1 Commonly used Plants for Permanent Cover with Seeding^{1/}

Species	Seeding Rates/Ac PLS ^{2/}	North AL	Central AL	South AL
		Seeding Dates ^{3/}		
Bahiagrass, Pensacola	40 lbs	--	Mar 1- July 1	Feb 1- Nov 1
Bermudagrass, Common	10 lbs	Apr 1- July 1	Mar 15- July 15	Mar 1- July 15
Bahiagrass, Pensacola Bermudagrass, Common	30 lbs 5 lbs	--	Mar 1- July 1	Mar 1- July 15
Bermudagrass, Hybrid (Lawn Types)	Solid Sod	Anytime	Anytime	Anytime
Bermudagrass, Hybrid (Lawn Types)	Sprigs 1/sq ft	Mar 1- Aug 1	Mar 1- Aug 1	Feb 15 – Sep 1
Fescue, Tall	40-50 lbs	Sep 1- Nov 1	Sep 1- Nov 1	--
Sericea	40-60 lbs	Mar 15- July 15	Mar 1- July 15	Feb 15 – July 15
Sericea & Common Bermudagrass	40 lbs 10 lbs	Mar 15- July 15	Mar 1- July 15	Feb 15- July 15
Switchgrass, Alamo	4 lbs	Apr 1- Jun 15	Mar 15- Jun 15	Mar 15- Jun 15

^{1/} DO NOT USE Seeding Rates as part of a mixture unless shown as a mixture in this table.

^{2/} PLS means Pure Live Seed and is used to adjust seeding rates. For example, to plant 10 lbs. PLS of a species with germination of 80% and purity of 90%, PLS= 0.8X 0.9 = 72%. 10 lbs. PLS = 10/0.72 = 13.9 lbs. of the species to be planted.

^{3/} Plantings made late in the listed Seeding Dates may establish slowly and fail to provide the desired cover in the year planted. Corrective actions may involve making a Temporary Seeding at the end of the first growing season and another Permanent Seeding during the following year.

Maintenance

- Generally, a stand of vegetation cannot be determined to be fully established until vegetative cover has been maintained for 1 year from planting and has reached 100% coverage and 85% density.
- Inspect seedlings weekly until a stand has germinated and, thereafter, at least monthly for stand survival and vigor.
- Bare and eroded areas should be repaired by filling and/or smoothing, and reapplication of lime, fertilizer, seed and mulch. A qualified design professional should be consulted for advice on remedial actions.
- If vegetation fails to grow, identify the cause of the failure (plant materials, lime/fertilizer quantities, poor seedbed preparation or weather) and take corrective action. Additional soil testing is recommended to determine whether pH is in the correct range or if a nutrient deficiency is the problem.
- Mow vegetation on structural practices such as embankments and grass-lined channels to prevent woody plants from invading. Avoid over-mowing which may cause damage to vegetation and increase soil instability (See the following species mowing specifications).
- Other areas should be mowed to compliment the use of the site.
- Bermudagrass and bahiagrass can be mowed often and close, if so desired, during their growing season.

- Fescue should not be mowed often or closer than 4 inches during the summer. No mowing during the summer is best for erosion control.
- Sericea should not be mowed often or closer than 6 inches during the summer and should not be mowed at all during the last 6 weeks of the growing season.
- Switchgrass should not be mowed often or closer than 8 inches during the growing season.
- Control weed infestations as needed.

Sodding (SOD)

Description

Establishing vegetative cover with sod to provide immediate erosion control on bare soil.

Installation

- Begin by clearing the area of clods, rocks, etc.
- Grade and loosen the soil to a smooth firm surface.
- Loosen compacted, hard or crusted soil surfaces to 6" to 8" with appropriate tillage equipment and incorporate the lime and fertilizer.
- Where topsoiling is specified or needed, follow steps in the design plan or, if not available, apply according to the Topsoiling practice. Lime subsoil first if lime is needed.
- Apply lime and fertilizer according to the plan or by soil test recommendations. In the absence of a plan or soil test recommendations apply agricultural limestone at the rate of 2 tons per acre (90 lbs. per 1000 sq. ft.) if the pH is under 6.0 and apply 10-10-10 fertilizer at the rate of 1000 lbs. per acre (25 lbs per 1000 sq. ft.). Incorporate amendments to depth of 4" to 6".
- Rake or harrow to achieve a smooth, loose, debris-free final grade on which to lay the sod.
- Avoid preparing the seedbed when conditions are too wet.
- Use plants specified in the plan. If not specified, select a variety using Figure SOD-1 and Tables SOD-1 and SOD-2.

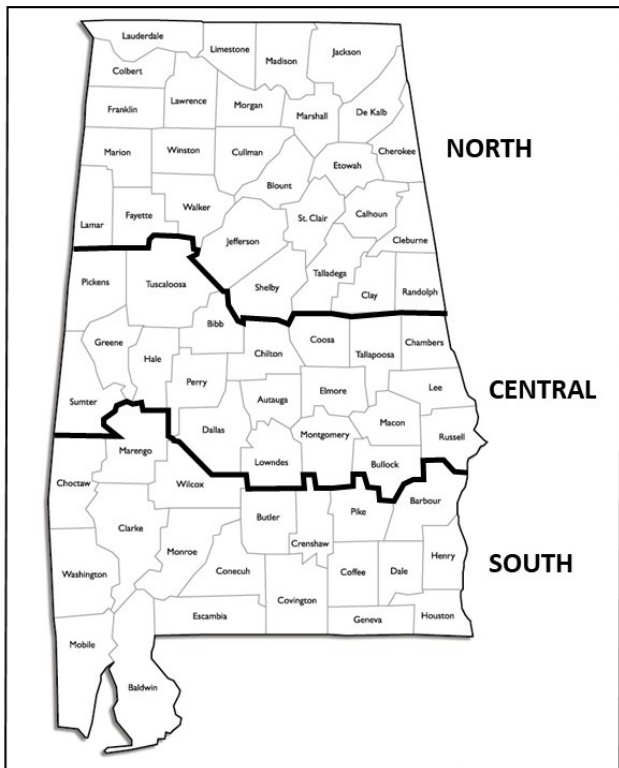


Figure SOD-1 Geographical Areas for Species Adaptation in Alabama

Table SOD-1 Grasses Adapted for Sodding in Alabama

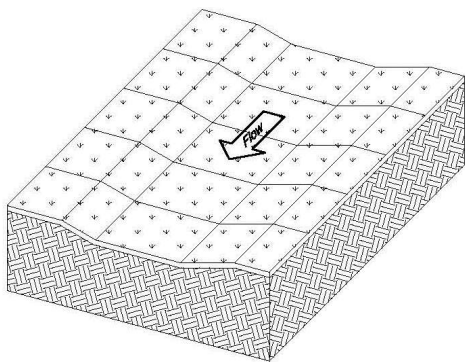
Warm Season Species	Variety	Area Adapted
Bermudagrass	Tifway, TifSport, Celebration, TifGrand, Common	North, Central, South
Bahiagrass	Pensacola	Central, South
Centipede	Common, TifBlair	Central, South
St. Augustine	Common, and commercial varieties	South
Zoysia	Any selection available in AL, Zenith is seeded.	Central, South
Cool Season Species	Variety	Area Adapted
Tall Fescue	Kentucky 31, Rebel (turf type)	North

Table SOD-2 Adaptation and Maintenance of Grasses Used for Sodding

Species	Tolerance Ratings					Maintenance	
	Shade	Heat	Cold	Drought	Wear	Mowing Height	Mowing Frequency
Bermuda-grass	P	G	P	E	E	1"	H
Bahiagrass	F	G	P	E	G	2-3"	H
Centipede	F	G	P	G	P	1½"	L
Tall Fescue	G	F	G	G	G	3"	H
St. Augustine	G	G	P	P	P	2-3"	M
Zoysia	F	G	F	E	G	1"	H

E=Excellent, G=Good, F=Fair, P=Poor, H=High, M=Medium, L=Low

- During high temperatures, moisten the soil immediately prior to laying sod.
- Lay the first row of sod in a straight line with subsequent rows placed parallel to and butting tightly against each other. Stagger joints to create a brick-like pattern.
- Ensure that sod is not stretched or overlapped and that all joints are butted tight.
- Wherever concentrated flow may be a problem, install sod with the length perpendicular to the water flow (see Figure SOD-2) and secure by stapling firmly at the corners and middle of each strip. Jute or synthetic netting may be pegged over the sod for further protection during establishment. If netting is used, consider wildlife friendly netting.
- Immediately after laying the sod, roll or tamp it to provide firm contact between roots and soil.
- Irrigate sod deeply so that the underside of the sod pad and the soil 6" below the sod is wet.
- Until a good root system develops, water sod during dry periods as often as necessary to maintain moist soil to a depth of at least 4".



Lay sod across the direction of flow.
Use pegs or staples to fasten sod firmly
at the corners and in the center.

Figure SOD-2 Installation of Sod in Waterways

Maintenance

- Mow to a height of 2" to 3" after sod is rooted. Do not remove more than $\frac{1}{3}$ of the leaf blade in any mowing.
- Permanent, fine turf areas require yearly fertilization. Fertilize warm-season grass in late spring to early summer; cool-season grass in early fall and late winter.

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Temporary Seeding (TS)

Description

Establishing a temporary fast-growing annual grass or legume on disturbed areas where vegetation can be established before final grading or in a season not suitable for planting the desired permanent species. Temporary seeding reduces erosion and the amount of sediment moving off the site. Apply to any portion of the site where work has temporarily ceased and will not resume for a period exceeding 13 calendar days.

Installation

- Make plantings during the specified planting period if possible.
- Loosen compacted, hard or crusted soil surfaces to a depth of 6" with appropriate tillage equipment for all methods of seeding except hydroseeding on slopes steeper than 3:1.
- Leave a smooth firm seedbed except for no-till drilling and hydroseeding.
- Avoid preparing the seedbed under excessively wet conditions.
- Incorporate lime during seedbed preparation. If a design plan or soil test is not available, use:
 - 2 tons/acre of ground agricultural lime on clayey soils (approximately 90 lbs/1000 ft²),
 - or
 - 1 ton/acre on sandy soils (approximately 45 lbs/1000 ft²).
- Apply fertilizer during seedbed preparation. If a design plan or soil test is not available, apply

8-24-24 or equivalent – 400 lbs/acre (approximately 9 lbs/1000 ft²) at planting.

- Apply topdressing of 30 to 40 lbs/acre of nitrogen fertilizer (approx. 0.8 lbs/1000 ft²) when vegetation has emerged to a stand.
- Incorporate lime and fertilizer to a depth of 6” with a disk or rotary tiller on slopes of up to 3:1.
- On steeper slopes, track up and down the slope with a dozer. Lime and fertilizer may be applied to the surface without incorporation.
- Lime and fertilizer may be applied through hydroseeding equipment. Lime may be applied with the seed mixture, but fertilizer should not be added to the seed mixture during hydroseeding because fertilizer salts may damage the seed.
- Plant the species specified. In the absence of plans and specifications, plant species and seeding rates may be selected by qualified persons using the information in Table TS-1 and Figure TS-1.
- Ryegrass is highly competitive and should not be used when a temporary cover is added to the permanent seeding mixture.
- Plant small grains about 1” deep and grasses and legume seed ¼” to ½” deep.
- When planting by methods other than a drill seeder or hydroseeder, cover the seed and then firm the soil lightly with a roller.
- If planting a legume, use the correct inoculant and follow use recommendations on the label. For hydroseeding, increase the inoculant used to 4 times the recommended rate for other seeding methods.

- Cover 75% of the surface with the specified mulch materials. (See Mulching practice for more details).

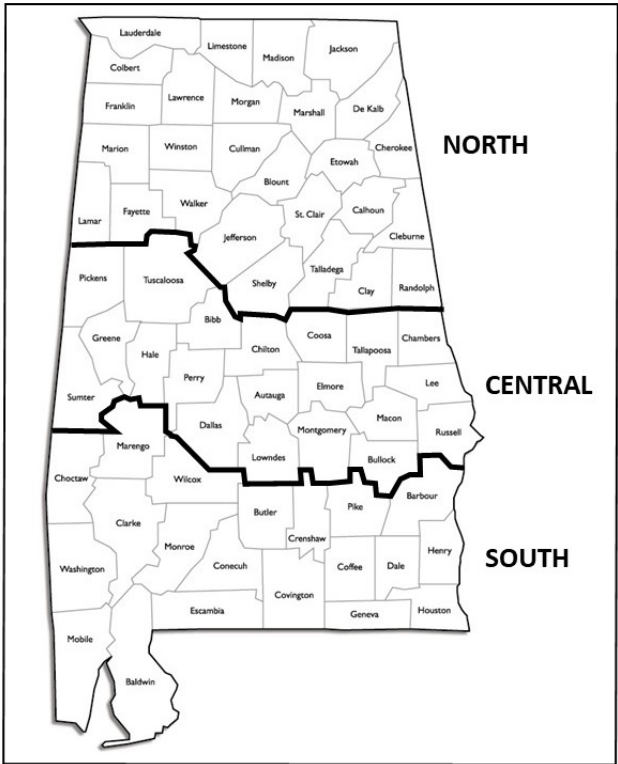


Figure TS-1 Geographical Areas for Species Adaptation in Alabama

Table TS-1 Plants for Temporary Cover^{1/}

Species	Seeding Rate/Ac PLS ^{2/}	North AL	Central AL	South AL
		Seeding Dates		
Millet, Browntop or German	40 lbs	Apr 1- Aug 1	Apr 1- Aug 15	Apr 1- Aug 15
Rye	3 bu	Sept 1- Nov 15	Sept 15- Nov 15	Sept 15- Nov 15
Ryegrass	30 lbs	Aug 1- Sept 15	Sept 1- Oct 15	Sept 1 - Oct 15
Sorghum-Sudan Hybrids	40 lbs	May 1- Aug 1	Apr 15- Aug 1	Apr 1- Aug 15
Sudangrass	40 lbs	May 1- Aug 1	Apr 15- Aug 1	Apr 1- Aug 15
Wheat	3 bu	Sept 1- Nov 1	Sept 15- Nov 15	Sept 15- Nov 15
Common Bermudagrass	10 lbs	Apr 1- July 1	Mar 15- July 15	Mar 1- July 15
Crimson Clover	10 lbs	Sept 1- Nov 1	Sept 1- Nov 1	Sept 1- Nov 1

^{1/} DO NOT USE Seeding Rates as part of a mixture

^{2/} PLS means pure live seed. For example, to plant 10 lbs PLS with germination of 80% and purity of 90%, $PLS = 0.8 \times 0.9 = 72\%$. 10 lbs. PLS = $10/0.72 = 13.9$ lbs. of seed.

Maintenance

- Inspect seedings weekly until a stand is established and thereafter at least monthly for stand survival and vigor.
- Bare and eroded areas should be addressed appropriately by filling and/or smoothing, and reapplication of lime, fertilizer, seed and mulch. A qualified design professional should be consulted for advice on remedial actions.

- If vegetation fails to grow, identify the cause of the failure (plant materials, lime/fertilizer quantities, poor seedbed preparation or weather) and take corrective action including having the soil tested to determine whether pH is in the correct range or a nutrient deficiency is the problem.
- Millet, sorghum-sudan hybrids, sudangrass, rye and wheat may be mowed, but no lower than 6" (closer mowing may damage the stand).
- Ryegrass is tolerant of most mowing regimes and may be mowed often and as close as 4" to 6" if this regime is started before it attains tall growth (over 8").

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Tree Planting On Disturbed Areas (TP)

Description

Planting desirable trees on construction sites or other disturbed areas to stabilize the soil.

Installation

- Planting should be done in accordance with the design plan. If a detailed plan is not available, obtain the assistance of a qualified professional to select long-lived and non-invasive trees that are suitable for growing on the disturbed site.
- Prepare the site for seedling type to permit adequate root development and proper tree growth.
- Bare-root seedlings should be planted between December 1 and March 15 when the soil is neither too dry nor too wet. Freezing weather should be avoided.
- Seedlings from a nursery should be kept moist and cool at all times. Do not expose seedlings to sun, wind, artificial heat, drying or freezing before they are planted.
- Balled seedlings may be kept up to 3 weeks if they are properly stacked, watered, and kept in a cool place.
- When planting is delayed longer than 3 weeks, roots should be covered with moist soil (heeled-in) or the seedlings should be put in cold storage.
- During planting, keep roots of seedlings moist.

- At the end of each day, loose seedlings should be either repacked in wet moss or heeled-in.
- If planting is being done on sloping land by equipment, the planting should be made on the contour.
- Most bare-root seedlings should be planted deeper than they grew in the nursery: small stock 1" deeper and medium to large stock ½" deeper.
- Bare root longleaf pine seedlings should be planted ¼" deeper than they grew in the nursery (never any deeper!). Containerized longleaf should be planted slightly higher than the depth grown in the nursery.
- Plant roots straight down and not twisted, balled, or U-shaped.
- Soil should be packed firmly around the planted seedlings.
- Mulching may be necessary on sloping land to reduce erosion. Mulch with wood chips, bark, pine needles, peanut hulls etc., to a depth of no more than 3". Mulch should not be placed against the trunk of the tree.
- Seedlings that are balled and burlapped or container-grown may be planted any time of the year, if watering is available during dry periods.
- Prepare hole to allow proper placement of the root ball. (See Figure TP-1).
- Depth of planting must be close to the original depth. Do not set the tree lower than it grew before.

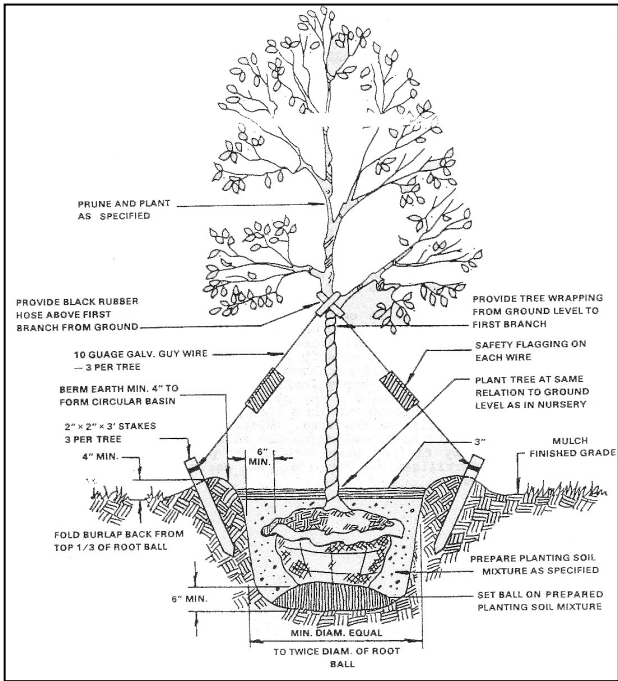


Figure TP-1 Tree Planting Diagram

- Set the tree in the hole and, if the tree is balled and burlapped, loosen the burlap and remove completely (if practical) without breaking the soil of the root ball.
- Fill the hole with soil halfway and add water to settle the soil and eliminate air pockets.
- When the water has drained off, fill the hole the remainder of the way.
- Use extra soil to form a shallow basin around the tree to help retain water.

- If needed, provide support with stakes and guy wires (see Figure TP-1). Guy wires should be loose enough to allow some movement of the tree. Webbing straps can be less damaging than wire to the new tree.
- Mulch with wood chips, bark, pine needles, peanut hulls etc. to a depth of no more than 3". Mulch should not be placed against the trunk of the tree.

Maintenance

- Periodic fertilization may be beneficial on poor sites to maintain good tree growth.
- Transplanted trees should be fertilized 1 year or more after planting in the late fall or early spring before leaves emerge.
- Determine what nutrients are needed with a soil test or use 10-8-6 or 10-6-4 fertilizer in the absence of a soil test.
- About 2 lbs. of fertilizer should be used for each inch of tree diameter measured at 4.5 feet above the ground – simply broadcast it within the drip line of the tree.
- Replant dead trees where needed to maintain adequate cover for erosion control.
- Remove guy wires or straps from a tree after the tree has developed a root system that will support the tree.