

**NATURAL RESOURCES CONSERVATION SERVICE
NEW JERSEY
CONSERVATION PRACTICE STANDARD**

CRITICAL AREA PLANTING

(Acre)

CODE 342

DEFINITION

Planting vegetation, such as trees, shrubs, vines, grasses, or legumes on highly erodible or critically eroding areas.

PURPOSES

This practice may be applied for one or more of the following purposes:

1. To reduce soil erosion by wind and water;
2. To improve water quality by reducing off-site sediment movement;
3. To improve wildlife habitat and visual resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where soil stabilization requires using specialized plant species and establishment methods.

Examples of applicable areas include conservation structures, embankments, cuts, fills, mined areas, roadsides, landfills, spoilbanks, filter strips, and recreation areas.

This practice does not apply to tree planting that is primarily intended for production of timber and other forest products.

CONSIDERATIONS

Assess site conditions including surrounding land uses, soils, available moisture during the growing season, amount of shade and existing vegetation on the site and in adjacent areas, including any noxious weeds that may be present.

Consider the need for structural practices, in addition to this vegetative practice, to stabilize a critically eroding site.

Consider the time of year for installation of this practice. Avoid periods of high runoff velocities, or temporarily divert runoff from the planted area. This will allow the vegetation to become well established before it is subjected to storm flows.

Consider long-term maintenance requirements of the established vegetation.

Use native vegetation if it is adapted to the site and is commercially available.

CRITERIA

Select species based on their adaptability to the environmental conditions present and to the planned land use.

Species shall be selected based on:

1. Climatic conditions, such as annual and seasonal rainfall, growing season length, humidity, and USDA Plant Hardiness Zones ([see Figure 1](#));

2. Soil and site conditions such as drainage class, pH, available water holding capacity, slope, aspect, shade, inherent fertility, salinity or alkalinity, flooding or ponding, and levels of toxic elements such as aluminum and heavy metals;
3. Plant characteristics, such as:
 - a. Ease of establishment, persistence, and time needed for full stand establishment;
 - b. Growth habit (e.g., sod or bunch) as it relates to surface cover;
 - c. Rooting depth as it relates to slope stability;
 - d. Resistance to dislodgment by flowing water or wave action at various velocities and depths;
 - e. Season of growth (warm or cool) and life cycle (annual, perennial, or biennial);
 - f. Fertility and management requirements;
 - g. Visual appeal;
 - h. Suitability as wildlife food and/or cover.

Plant and animal pest species shall be controlled as necessary to achieve and maintain the intended purpose of the vegetative cover.

Noxious weeds shall be controlled as required by state law.

Note: Specific program requirements may dictate criteria in addition to those specified above.

Select plant species that are native, or are introduced and are non-invasive. Selection of locally native species shall be a priority when feasible.

Site preparation and planting to establish vegetative cover shall be done at a time and manner to insure survival and growth of selected species. Supplemental moisture shall be applied if and when necessary to assure early survival and establishment of selected species.

Only viable, high quality seed and planting stock shall be used. The method of planting shall include hand or machine planting techniques, suited to achieving proper depths and placement for the selected plant species.

Livestock shall be controlled or excluded as necessary to establish and maintain the vegetative cover to meet its intended purpose.

SPECIFICATIONS

Plans and specifications for establishment and maintenance of a critical area planting shall be prepared for each site or management unit according to the Considerations, Criteria, and Operation and Maintenance described in this standard. They shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

When this practice is used to specify the vegetative component of another practice (e.g., grassed waterway, filter strip, pond, etc.), plans and specifications shall meet the requirements of this standard and the other applicable standard to achieve the intended purpose of the practice. The completed work shall be checked and documented to verify that the practice was completed according to the drawings and specifications of both standards. Documentation shall be in accordance with the section "Supporting Data and Documentation" in both standards.

Grading Plan

The grading plan and practice installation shall be based upon adequate topographic surveys and investigations. The plan shall show the location, slope, cut, fill, and finish elevation of the surfaces to be graded. The plan shall also include auxiliary practices for safe disposal of runoff water, slope stabilization, erosion control, and drainage. Practices such as waterways, ditches, diversions, grade stabilization structures, retaining walls and subsurface drains shall be included where necessary.

Site Preparation

Timber, logs, brush, rocks, stumps and vegetative matter that will interfere with the grading operation or affect the planned stability of fill areas shall be removed and disposed of according to the plan.

Topsoil shall be stripped and stockpiled in amounts necessary to complete finish grading of all exposed areas requiring topsoil. A minimum 4-inch stripping depth shall be used, depending on the particular soil.

Fill material shall be free of brush, rubbish, timber, logs, stumps, and other vegetative matter in amounts that is detrimental to constructing stable fills.

All disturbed areas shall be left with a generally smooth finish and shall be protected from erosion.

Provisions shall be made to safely conduct surface water to storm drains or suitable watercourses and to prevent surface runoff from damaging cut faces and fill slopes.

In areas having a high water table, subsurface drainage shall be provided to intercept seepage that would adversely affect slope stability, building foundations, or create undesirable wetness.

Adjoining properties shall be protected from sedimentation associated with excavation and filling operations.

Fill shall not be placed adjacent to the bank of a stream or channel, unless provisions are made to protect the hydraulic, biological, aesthetic and other environmental functions of the stream.

Soil Amendments

Soil tests shall be made to determine the optimum recommendations for both lime and fertilizer. Soil analysis shall be performed by a soil testing laboratory that has been accredited by the North American Proficiency Testing Program, preferably the Rutgers University- Soil Testing Laboratory. At a minimum, soil samples taken for nutrient and pH analysis shall be from the soil layer that will be used as the surface layer (top 4 to 6 inches) for seeding.

Lime - Lime shall be applied to achieve a soil pH of 6.0 if legumes are included in a planting, and 5.5 if only grasses are used.

Lime materials shall be ground limestone (hydrated or burnt lime may be substituted) that contains at least 50% total oxides (calcium plus magnesium oxide). Pulverized limestone shall be ground to such a fineness that at least 50% will pass through a 100-mesh sieve and at least 98% will pass through a 20-mesh sieve. Pulverized limestone applied at rates greater than 50 pounds per 1,000 square feet (or greater than 1 ton per acre) shall be incorporated into the upper 4 to 6 inches of the soil.

Pulverized limestone may also be included in a hydroseeding slurry.

When a soil test is not feasible, lime shall be applied according to the rates specified as follows:

Soil Texture	Limestone Application Rate	
	Tons/Acre	Lbs./1,000 SF
Clay, clay loam, and highly organic soil	3	135
Sandy loam, loam, silt loam	2	90
Loamy sand, sand	1	45

Fertilizer - Fertilizer shall be applied to prepared seedbeds as needed, based on soil test results. Fertilizer applied without a soil test may result in an inefficient quantity of nutrients for plant establishment or could result in over application of nutrients leading to potential water quality problems

All fertilizer shall be uniform in composition, free-flowing, and suitable for application by approved equipment. Fertilizers shall be delivered to the site fully labeled according to applicable state fertilizer laws, and shall bear the name, trade name, or trademark and warranty of the producer. Slow-release forms of nitrogen shall be used when feasible to provide nitrogen over a longer period of time.

Organic Amendments - Apply manure and compost at a rate based on a nutrient analysis of that material. Organic amendments to sites shall be recommended only after an evaluation of any potential water quality hazards. Organic amendments shall be incorporated to the extent practical into the upper 4 to 6 inches of the soil with a disk, springtooth harrow, or other suitable equipment.

Topsoil

Topsoil shall be added to a site when needed to improve the soil medium for plant establishment

and growth. The use of topsoil shall be limited to slopes that are 2:1 or flatter.

Exposed soils shall be topsoiled if they have one or more of the following limiting factors:

1. Very shallow to bedrock or other restrictive layer (e.g., the subsoil is less than 6 inches deep);
2. Extremely acidic (pH less than 5.0); or,
3. Extremely salty (conductivity greater than 500 parts per million, or 4.0 millisiemens per centimeter).

Topsoil shall also be used when assurance of improved vegetative growth is desired.

Topsoil Quality - Topsoil shall be friable and loamy, free of debris, stones, or other materials larger than 1.5 inches in diameter. It shall be free of any known viable seeds or plant parts of objectionable weeds such as Johnsongrass, shattercane, thistle, multiflora rose, or others as specified.

Topsoil shall contain no toxic substance that may be harmful to plant growth. Soluble salts shall not be excessive (concentration greater than 500 parts per million). A pH range of 5.5 to 7.5 is required. If pH is less than 5.5, lime shall be applied and incorporated with the topsoil to adjust the pH to between 5.5 and 7.5. A pH of 6.5 is ideal. Topsoil hauled in from off-site shall have a minimum organic matter content of 1% by weight, based on soil test results.

Topsoil Application - Before topsoiling, the exposed subsoil shall be tested for pH. Where the subsoil is highly acidic, ground limestone shall be added at the rate of 4 to 8 tons per acre (200 to 400 pounds per 1,000 square feet). Lime shall be distributed uniformly and worked into the subsoil as previously described in the section concerning Soil Amendments.

Immediately before spreading topsoil, the subsoil shall be loosened by disking or scarifying to provide a good bond for the topsoil. Where the slope of the site is flatter than 3:1, loosen the subsoil to a minimum average depth of 2 inches. On steeper slopes (up to 2:1), loosen the subsoil to a depth of 0.5 to 1 inch, or use a bulldozer to track up and

down slope to create horizontal check slots that will prevent topsoil from sliding down the slope.

Topsoil shall only be handled when it is dry enough to work (less than field capacity) without damaging soil structure.

Topsoil shall be uniformly applied in a 5 to 8 inch layer, and lightly compacted to a minimum thickness of 4 inches. Subsoil with a pH of 4.0 or less, or containing iron sulfide, shall be covered with a minimum depth of 12 inches of topsoil.

Topsoil shall not be spread when it is partly frozen or muddy, or on frozen slopes covered with ice or snow.

Topsoil placed on slopes greater than 5% shall be promptly limed and fertilized (if needed), seeded, mulched, and tracked with suitable equipment.

Seedbed Preparation

Seedbed preparation shall be done when the soil is moist, but not wet. Lime, fertilizer, and other soil amendments shall be evenly applied where needed on the site, as described in previous sections of this standard. Either dry or wet application methods may be suitable.

Slopes flatter than 3:1 - Seedbed preparation shall consist of working the soil to a depth of 3 to 5 inches with a disk or similar equipment. Continue tillage until a reasonably uniform seedbed is prepared.

Slopes 3:1 or steeper - Scarify the soil surface with a bulldozer, heavy chain, hand tools or other equipment that will loosen the soil 0.5 to 1 inch deep. After the soil is loosened, it shall not be worked completely smooth, but left in a somewhat roughened condition. The final surface preparation shall be on the general contour.

Seed Quality and Treatment

All seed shall be labeled and meet the requirements of the New Jersey Seed Law. Refer to [Table 5](#) for minimum germination and purity requirements. Seed shall have had a germination test within 12 months prior to the date of sowing. Use of certified seed shall be preferred. Seed shall be kept cool and dry until planted.

Species with seed lots greater than 50% hard seed shall be dehulled and/or scarified and planted no later than 60 days after scarification.

Endophytes: Grass seed (perennial ryegrass, fine fescues, and tall fescue) enhanced with **endophytes**, a naturally occurring fungus, shall only be used when establishing a managed turfgrass, such as a lawn, athletic field, or recreation area. The endophytes protect the grass from insect and disease damage, but are potentially harmful to wildlife if the seed or plant is eaten. **Conservation seedings should be made with low (< 5%) or endophyte-free grass cultivars.** Refer to **Appendix B.** for guidance on selecting the appropriate cultivar.

Grasses that have fluffy seeds shall be planted using specialized seed drills. Alternatively, beards or awns shall be mechanically removed from such seeds to facilitate movement through conventional seeding equipment.

Legume seeds shall be inoculated with the proper, viable *Rhizobium* bacteria before planting. Inoculant shall be kept as cool as possible until used and shall not be used later than the date indicated on the package. When hydroseeding, use four times the recommended Inoculant rate.

Seeding Methods

Apply seed uniformly by hand, cyclone seeder, drill, cultipacker-seeder, or hydroseeder. The preferred method of seeding is by drilling or cultipacker-seeder method because these methods optimize seed to soil contact. Seeding operations shall be done on the contour to the extent feasible.

Drill - A grass drill (not a grain drill) or cultipacker-type seeder shall be used to plant grass seed. Grasses shall not be planted more than 1/4 to 1/2-inch deep. If the drill does not have a packer attachment, a packer/roller shall be trailed behind the drill. Where practical, seed shall be applied in two directions perpendicular to each other. Apply one-half the seeding rate in each direction.

Broadcast - Seed may be broadcast by using a cyclone or whirlwind seeder, or by hand. If spread by hand, small or light-seeded species such as redtop or bluestem may be mixed with filler (e.g., sawdust, rice) to achieve an even distribution. Seed

shall be applied in two directions, each perpendicular to one another. One-half the seeding rate shall be applied in each direction. Seed shall be incorporated 1/8 to 1/4-inch deep by raking or dragging, cultipacking, or tracking with heavy machinery. Raked areas shall be rolled with a weighted roller to provide good seed to soil contact.

Hydroseeding - This method is best suited for steep, inaccessible areas where use of a drill or other mechanized equipment is not feasible. Hydroseeding shall be done in two separate operations with seed and fertilizer applied in the first pass, and mulch applied in the second pass. Do not use burnt or hydrated lime when hydroseeding. If legume inoculant is used, seeding shall be accomplished within 3 to 4 hours after slurry is mixed, or a fresh supply of inoculant shall be added. If possible after seeding, the area shall be tracked with heavy machinery such as a bulldozer to improve seed to soil contact.

Temporary Seeding

When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. See Table 1 for recommended plant species and planting rates.

Temporary seedings shall be planted as a nurse crop with a permanent seeding mixture when rapidly growing cover is needed. When seeding toward the end of the listed planting dates for permanent seedings, or when conditions are expected to be less than optimal, select an appropriate nurse crop from [Table 1](#) and plant with the permanent seeding mix. Companion seedings of small-seeded grasses shall not exceed 5% (by weight) of the overall permanent seeding mixture. Companion seedings of small grains such as barley, wheat, oats, or cereal rye shall be sown at one-third the rates listed in [Table 1](#).

Oats are the recommended nurse crop for warm-season grasses. Do not use cereal rye as a nurse crop for warm-season grasses because it will inhibit their germination and growth.

When a temporary or permanent seeding cannot be completed because of weather conditions or time of year, mulch only (no seeding) shall be applied as a

temporary cover when soil stabilization is needed. Refer to the Mulching section of this standard for application rates and methods.

Permanent Seeding

Permanent herbaceous vegetation shall be designed to achieve a minimum stand density of 85 percent ground cover within one year.

Seed Mixes - To establish permanent cover, select grass and legume mixes according to the guidelines listed in [Tables 3](#) and [4](#).

Planting Dates - Use [Figure 1](#) and [Table 2](#) to determine the recommended planting dates for selected mixes.

Supplemental Watering - If soil moisture is deficient, supply new seedings with adequate water (a minimum of 1/4-inch twice a day) until vegetation is well established. This is especially necessary when seedings are made in abnormally dry or hot weather or on droughty soils.

Mulching

Mulch shall consist of natural and/or artificial non-toxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, plastic, or fabric of sufficient thickness and durability to achieve the intended effect for the required time period. Tackifiers, emulsions, netting, pinning, or other methods of anchoring mulch shall be sufficiently durable to maintain mulch in place until it is no longer needed.

Mulch shall be used where needed to accomplish one or more of the following purposes:

1. Provide temporary erosion control when seeding must be delayed until the proper planting dates, or until plantings become well established;
2. Conserve soil moisture to aid seed germination and plant survival;
3. Reduce weed growth in planted areas;
4. Reduce surface compaction or crusting, and improve water infiltration.

All newly planted areas that are subject to erosion shall be mulched. If dense ground cover is already present after planting (e.g., there is a previously seeded nurse crop sufficient to control soil erosion), then this mulching requirement shall be considered met.

Soil Stabilization Matting - Soil stabilization matting shall have a uniform thickness and distribution of natural or biodegradable synthetic fibers or cords that freely allow penetration by water and plant seedlings. Matting shall resist decay for a minimum of 6 months and a maximum of 12 months. Matting shall not contain any harmful chemicals or other materials that may leach into the soil, or reduce the germination and establishment of seedlings.

Matting products shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions. Soil stabilization matting is especially applicable where high water velocities are expected.

Straw or Hay Mulch - Straw or hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet) immediately following seeding. Straw and hay shall be unweathered and free of any known viable seeds of objectionable weeds such as Johnsongrass, shattercane, thistle, or others as specified.

Spread mulch uniformly by hand or by mechanical methods so that approximately 85% of the soil surface is covered. This will provide erosion protection and allow adequate light penetration for seedling germination. Straw or hay shall not be chopped or finely broken during application.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. One of the following methods shall be used, depending on the size of the area, steepness of slope, and costs:

1. Mulch Netting. Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;
2. Crimper. Use a tractor-drawn mulch anchoring coulter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch.

Crimping operations are limited to areas accessible by tractor;

3. Liquid Mulch-Binders. Use one of the following:
 - a. Organic and Vegetable-Based Binders. Mix with water and apply to mulch to form an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;
 - b. Synthetic Binders. Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

Wood Fiber or Paper Fiber Mulch - Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre, or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder, but shall not be mixed in the tank with seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring and fall. Do not use on steep slopes or in concentrated flow areas.

Pelletized Mulch - Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2-inch of water after spreading pelletized mulch to activate and expand the mulch and to provide sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable, or straw mulch and tackifiers are not practical.

Bark Mulch - Shredded hardwood bark mulch or bark chips shall be applied to a depth of 2 to 3 inches around plantings of trees, shrubs, groundcovers, and vines. Bark mulch and chips shall be well-aged, and shall be applied to provide at least 85% ground cover of the site. Shredded hardwood bark mulch, rather than bark chips,

shall be used on steeper slopes because it is less subject to movement by water.

Sod

Sod Quality and Treatment - Sod used shall be state certified sod which is at least one year old but not older than 3 years. Commonly available sod types include Kentucky Bluegrass blends, and Tall Fescue/Kentucky Bluegrass mixes.

Sod shall be machine cut to uniform thickness of 3/4-inch, plus or minus 1/4-inch, at the time of cutting. Measurement of thickness shall exclude top growth or thatch.

Standard size sections of sod shall be strong enough to support their own weight and retain their shape when suspended vertically with a firm grasp of the upper 10% of the section.

Individual pieces of sod shall be cut to the supplier's width and length. Maximum allowable deviation from standard widths and lengths shall be no more than 5%.

Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be inspected and approved prior to its installation.

Sod shall not be harvested or transplanted when the moisture content (excessively wet or dry) may adversely affect its survival.

Planting Dates - Use [Figure 1](#) and [Table 2](#) to determine the appropriate planting dates for sod.

The optimum planting period is in early fall, followed by the spring planting period. Sod may be planted during the summer if supplemental watering will be provided until the sod is well established. The fall planting season is limited by the amount of time the sod has to develop roots before the ground freezes. Newly sodded areas usually need 4 to 6 weeks before the sod is sufficiently rooted. Similarly, the spring planting season is limited by the high temperatures and drought of summer, unless supplemental water will be provided.

Installation - Prior to sodding, the soil surface shall be cleared of roots, brush, trash, debris, and other objects that would interfere with planting. Based on a soil test, lime and fertilizer shall be evenly applied as needed, and mixed into the top 3 inches of soil. The site shall then be raked smooth in preparation for laying the sod.

During periods of high temperature, the soil shall be lightly watered immediately prior to laying the sod. Sod strips shall be laid lengthwise on the contour, never up and down the slope, starting at the bottom of the slope and working up. On steep slopes, the use of ladders will facilitate the work and prevent damage to the sod.

Sod strips shall be laid in staggered rows, with joints butted tightly together to prevent voids. Sod shall be rolled or tamped immediately following placement to insure solid contact of root mat and soil surface. Sod strips shall not be overlapped.

On slopes greater than 3:1, sod shall be secured to the soil surface with wooden pegs or wire staples.

Where surface water cannot be diverted from flowing over the face of a sodded slope, a capping strip of heavy jute or plastic netting, properly secured, shall be installed along the crown of the slope and edges to provide extra protection against lifting and undercutting of sod. The same technique shall be used to anchor sod in water-carrying channels and other critical areas. Wire staples shall be used to anchor netting in channel work.

Supplemental Watering - Immediately following installation, sod shall be watered until moisture penetrates the soil layer beneath the sod to a depth of 4 inches. Maintain optimum moisture for at least 2 weeks by lightly watering the sod on a regular (usually daily) basis, unless sufficient rainfall has occurred. Do not allow the sod to dry out completely. After the sod begins to take root, reduce the frequency of watering and increase the amount of water applied per watering. This encourages the development of a deep root system and ultimately reduces the amount of water needed.

Groundcovers

On sites where grass is difficult to grow or maintain, other perennial groundcovers may be used to control erosion. Groundcovers are low-growing

herbaceous plants, vines, and creeping shrubs that spread quickly to form a dense cover. These plants should not be expected to provide erosion control or prevent soil slippage on sites that are inherently unstable due to soil texture, structure, water movement, or excessive slope.

Selection of Plant Species - Low-maintenance groundcovers are available to suit a variety of conditions, especially for small areas around homes and commercial buildings. These plants generally require more care than turf during the initial establishment period, but may require less care after establishment.

Species recommendations may be found by consulting publications in the "[References](#)" section of this standard. Be cautious of using species that have aggressive growth habits and may spread beyond the planted area, especially if the planting is near a neighboring property or a natural area such as a shoreline or woodland. Species such as English Ivy (*Hedera helix*) and Periwinkle (*Vinca minor*) tend to grow rapidly once established, and should not be used except under well-contained conditions.

Planting Dates - Use [Figure 1](#) and [Table 2](#) to determine the appropriate planting dates for the different types of plant materials.

Installation - Soil shall be prepared by incorporating 2 inches of compost or peat moss into the upper 8 inches of soil. If needed based on a soil test, lime and fertilizer shall also be incorporated into the soil. In the absence of a soil test for very small sites (e.g., in home landscaping areas), fertilizer may be added at the rate of 3 pounds of 5-10-10 grade fertilizer (or equivalent) per 100 square feet.

Install the plants at a spacing that is based on their present size, expected rate of growth, and how quickly a complete cover is desired. In general, spacing shall be one plant for every 1 to 4 square feet, using a staggered spacing between rows.

The entire planted slope shall be covered with a mulch that will provide sufficient erosion control during the establishment period. Refer to the Mulching section of this standard for application rates and methods.

Trees and Shrubs

If trees and shrubs will be used on a critical area, the soil surface shall be stabilized with mulch or with a low-growing herbaceous planting to control erosion until the woody plants are large enough to serve that purpose.

Refer to the Conservation Practice Standard for Tree/Shrub Establishment ([Code 612](#)) for a selected list of native tree and shrub species that may be used. Other trees and shrubs that are native, or are introduced and are non-invasive, may also be suitable.

For selection and use of trees and shrubs as part of a soil bioengineering system for upland slopes, refer to Chapter 18 of the Engineering Field Handbook.

OPERATION AND MAINTENANCE

General Requirements for All Plantings

Corrective actions shall be taken as needed to replace destroyed plant material or dislodged mulching material. Reshape the soil surface and replant areas where prolonged slope instability is present. Where vegetative efforts have failed, reassess the need for structural measures to complement vegetative measures.

Invasions by undesirable plants shall be controlled by pulling, mowing, or spraying with a selective herbicide. Where wildlife habitat is a concern, do not mow during the primary nesting season (April 15 to July 15). Noxious weeds shall be controlled as required by state law.

Inspect for insects and diseases, and if an incidence threatens stand survival, take corrective action to bring the pest under control.

Grasses and Legumes

During the establishment period, plantings shall be monitored for germination success, water stress, pest problems, and damage by erosion. After one full year from planting, all areas with less than 85% plant cover shall be replanted according to the following recommendations:

1. If the stand provides less than 40% ground cover, reestablish following the original seedbed preparation, lime, fertilizer, and seeding recommendations;
2. If the stand provides 40 to 84% ground cover, overseed and fertilize using one-half the original rate. On small areas, reseeding may be accomplished by broadcasting and lightly raking the seed. For larger areas, use of a grass drill or cultipacker-seeder is preferable.

Spring seedings may require an application of fertilizer between September 1 and October 15, at least every two years, according to soil test recommendations. Mixtures dominated by legumes may only need topdressing once every three years according to soil test recommendations.

If a slow release form of nitrogen (such as ureaform or Osmocote) was used, a follow-up topdressing of nitrogen may not be necessary for several years.

Lime according to soil test recommendations at least once every five years.

Groundcovers

Use a soil test analysis to determine the need for lime and fertilizer. Spread 2 to 3 inches of organic mulch such as shredded hardwood bark or bark chips to reduce evaporation of moisture from the soil and help reduce invasion by weeds.

Use hand tools to remove weeds from between plants. Some perennial weeds, such as thistle and dandelion, are difficult to remove by hand weeding, and may require spot treatment with a nonselective broadleaf herbicide. Care must be taken to avoid herbicide contact with the desired groundcovers or vines, because they are susceptible to being killed or severely damaged by nonselective herbicides. Follow all label directions when using herbicides.

Trees and Shrubs

Follow the maintenance recommendations in the New Jersey practice standard for Tree/Shrub Establishment ([Code 612](#))

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Completed copy of the appropriate Job Sheet(s) or other specifications, and management plans. The following items shall be addressed, as appropriate:
 - a. Method of site preparation and type of seedbed preparation;
 - b. Conservation Practice Code to be seeded, or type of problem site;
 - c. Species and rates to be seeded/planted;
 - d. Seeding/planting dates;
 - e. Rate and type of soil amendments to be applied;
 - f. Rate and type of mulch and anchoring methods.
2. Field location and extent of planting in acres, and assistance notes. Also note the location of the planting on the conservation plan map.

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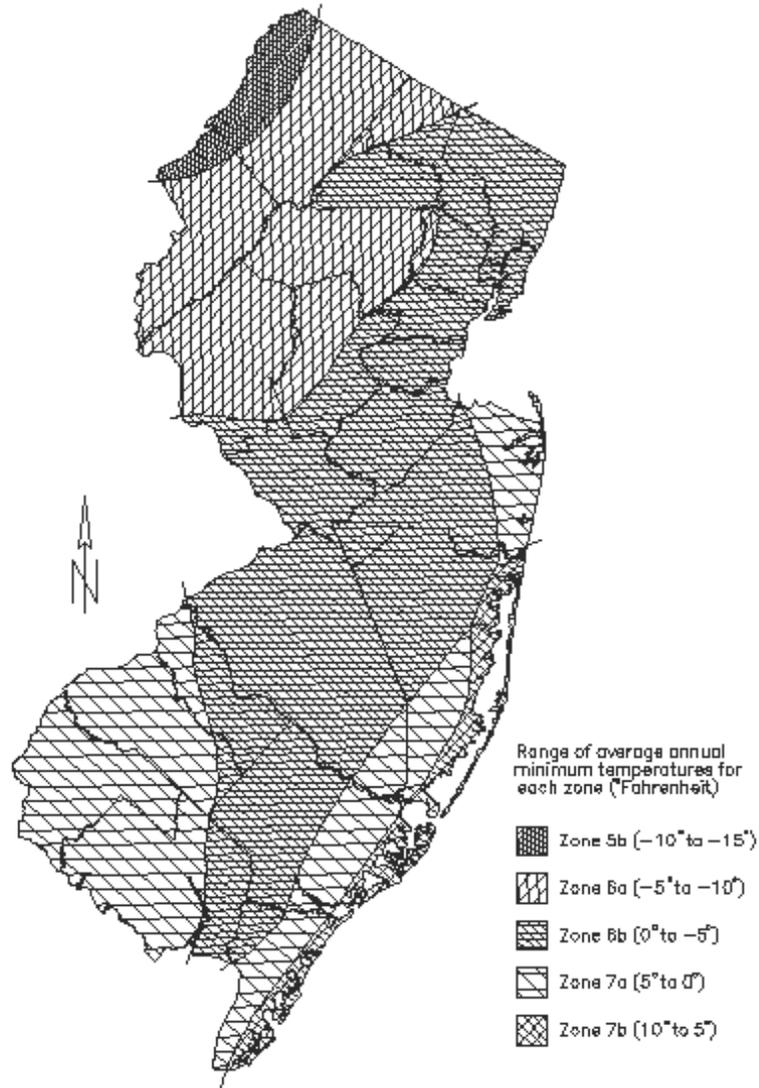
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FIGURE 1: USDA Plant Hardiness Zones for New Jersey

U.S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

USDA Plant Hardiness Zones

Average Annual Minimum Temperature
New Jersey



Base Map: 1:250,000 DLG USGS, 1980
 Thematic Data: Adapted from USDA-ARS Miscellaneous
 Publication 1475 (Jan 1990) Mar 1994

TABLE 1: Temporary Seeding for Site Stabilization						
Plant Species	Seeding Rate ^{1/}		Seeding Depth (inches) ^{2/}	Recommended Seeding Dates by Plant Hardiness Zone ^{3/}		
	lbs./ac.	lbs./1,000 sq.ft.		5b and 6a	6b	7a and 7b
<i>Cool-Season Grasses</i>						
Annual Ryegrass <i>Lolium perenne</i> ssp. <i>multiflorum</i>	40	1.0	0.5	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to Apr 30 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Nov 30
Barley <i>Hordeum vulgare</i>	96	2.2	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to Apr 30 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Nov 30
Oats <i>Avena sativa</i>	86	2.0	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to Apr 30 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Nov 30
Wheat <i>Triticum aestivum</i>	120	2.8	1.0	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to Apr 30 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Nov 30
Cereal Rye <i>Secale cereale</i>	112	2.8	1.0	Mar 15 to May 31 Aug 1 to Oct 15	Mar 1 to Apr 30 Aug 1 to Nov 1	Feb 1 to Apr 30 Aug 15 to Nov 1
<i>Warm-Season Grasses</i>						
Foxtail Millet <i>Setaria italica</i>	30	0.7	0.5	Jun 1 to Jul 31	May 1 to Jul 31	May 1 to Aug 14
Pearl Millet <i>Pennisetum glaucum</i>	20	0.5	0.5	Jun 1 to Jul 31	May 1 to Jul 31	May 1 to Aug 14

TABLE 1 NOTES:

- Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses.
Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 the seeding rate listed above for barley, oats, wheat, and cereal rye. For smaller-seeded grasses (annual ryegrass, pearl millet, foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix.
Oats are the recommended nurse crop for warm-season grasses. Do not use cereal rye with warm-season grasses; it has been shown to have allelopathic properties that inhibit the germination and growth of warm-season grasses.
- For sandy soils, plant seeds at twice the depth listed above.
- The planting dates listed are averages for each Zone, and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

TABLE 2: Recommended Planting Dates for Permanent Cover in New Jersey ^{1/}			
Type of Plant Material	Plant Hardiness Zones		
	5b and 6a	6b	7a and 7b
Grasses and Legumes Cool-Season Seed Mixes	Mar 15 to May 31 Aug 1 to Sep 30	Mar 1 to Apr 30 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Oct 31 Nov 1 to Nov 30 ♦
Warm-Season/ Cool-Season Seed Mixes	Mar 15 to May 31 Jun 1 to Jun 15*	Mar 1 to Apr 30 May 1 to Jun 15*	Feb 1 to Apr 30 May 1 to May 31*
Cool-Season Sod	Mar 15 to May 31 Jun 1 to Aug 31* Sep 1 to Oct 15	Mar 1 to Apr 30 May 1 to Sep 14* Sep 15 to Oct 31	Feb 1 to Apr 30 May 1 to Sep 30* Oct 1 to Dec 15
Forbs: Seeds	Mar 15 to May 31	Mar 1 to Apr 30	Feb 1 to Apr 30
Bare-Root Seedlings	Apr 1 to May 31 Jun 1 to Jun 30*	Mar 15 to May 15 May 16 to Jun 30*	Feb 15 to Apr 30 May 1 to Jun 30*
Containerized Stock	Apr 1 to May 31 Jun 1 to Jun 30* Sep 1 to Oct 1*	Mar 15 to May 15 May 16 to Jun 30* Sep 15 to Oct 15*	Mar 1 to Apr 30 May 1 to Jun 30* Oct 1 to Nov 15*
Woody Plants: Dormant Cuttings	Mar 1 to Mar 31 Nov 1 to Nov 15	Feb 15 to Mar 15 Nov 15 to Nov 30	Feb 1 to Feb 28 Nov 15 to Nov 30
Bare-Root Seedlings	Apr 1 to May 31 Jun 1 to Jun 30*	Mar 15 to May 15 May 16 to Jun 30*	Feb 15 to Apr 30 May 1 to Jun 30*
Containerized Stock	Apr 1 to May 31 Jun 1 to Jun 30* Sep 1 to Oct 1*	Mar 15 to May 15 May 16 to Jun 30* Sep 15 to Oct 15*	Mar 1 to Apr 30 May 1 to Jun 30* Oct 1 to Nov 15*

TABLE 2 NOTES:

1. The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from [Table 1](#) and plant with the permanent seeding mix. (See [Table 1](#), Note 1 for more information.)
2. ♦ Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.
3. *Additional planting dates during which supplemental watering may be needed to ensure plant establishment.

TABLE 3: Recommended Permanent Seeding Mixtures by Purpose													
Purpose of the Planting	Recommended Mix (see Table 4)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Steep Slopes, Roadsides	4	4	4	u	4	u	u			u	u		4
Sand and Gravel Pits, Sanitary Landfills	4	4	4	u	4	u				u	u		u
Mine Spoil, Dredged Material, and Spoil Banks	u		4	u	u				u				
Utility Rights-of-Way	4	4	4	4	4	4	u		u	4	4		u
Dikes and Dams	u	u	4	u		4	4		4	4	4	u	u
Berms, Low Embankments (<u>not</u> on Ponds)	4	4	4	4	4	4	u		4	4	4	4	u
Pond and Channel Banks, Streambanks	4	4	4	4	u	u	u			u	u	4	
Grassed Waterways, Diversions, Terraces, Spillways	u			u	u	4	4		4	4		u	u
Bottom of Drainage Ditches, Swales, Detention Basins				u		4	u			u		4	4
Field Borders, Filter Strips, Contour Buffer Strips	4	4	4	u	u	4	u		4	u	4	4	u
Wastewater Treatment Strips and Areas									u	u			4
Athletic Fields, Residential and Commercial Lawns							u	4	4	4			
Recreation Areas						u	4	4	4	u	u		

TABLE 3 NOTES:

4 Recommended mix for this purpose.

u Alternative mix, depending on site conditions.

TABLE 4: Permanent Herbaceous Seeding Mixtures							
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
WARM-SEASON/COOL-SEASON GRASS MIXES							
1. SELECT ONE WARM-SEASON GRASS:							
Switchgrass <i>Panicum virgatum</i> OR	Blackwell, Carthage, Cave-in-Rock, or Shelter	10	0.23	E - MW	4 - 7	C - D	All species except creeping red fescue are native to the Northeast. Plant this mix with a regular grass drill. Coastal Panicgrass best adapted to Zones 7a and 7b. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grass (switchgrass or coastal panicgrass) is becoming established.
Coastal Panicgrass <i>Panicum amarum</i>	Atlantic	10	0.23				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34				
AND ADD:							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09				
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
PLUS ONE OF THE FOLLOWING LEGUMES:							
2. Big Bluestem <i>Andropogon gerardii</i>							
Indiangrass <i>Sorghastrum nutans</i>	Niagara or Rountree	6	0.14	E - MW	6 - 8	C - D	All species are native to the Northeast. The indiagrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.
Little Bluestem <i>Schizachyrium scoparium</i>	Rumsey	6	0.14				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Aldous or Blaze	4	0.09				
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34				
PLUS ONE OF THE FOLLOWING LEGUMES:							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	4	0.09				
Bush Clover <i>Lespedeza capitata</i>	Common	2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>	Common	2	0.05				
Showy Tick-Trefoil <i>Desmodium canadense</i>	Common	1	0.02				

TABLE 4 (continued): Permanent Herbaceous Seeding Mixtures							
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
WARM-SEASON/COOL-SEASON GRASS MIXES							
3. SELECT <u>THREE</u> GRASSES:							
Deertongue <i>Dicanthelium clandestinum</i>	Tioga	20	0.46	E - MW	2-4	C - D	Excellent for excessively droughty, low pH (acidic) soils. Sheep fescue, Canada wild rye, and Redtop are cool-season grasses that will provide erosion protection while the warm-season grass (deertongue) is becoming established.
Sheep Fescue <i>Festuca ovina</i> OR	Attila or Aurora	20	0.46				
Canada Wild Rye <i>Elymus canadensis</i>	Common	3	0.07				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02				
PLUS <u>ONE</u> OF THE FOLLOWING LEGUMES:							
Round bushclover <i>Lespedeza capitata</i>		2	0.05				
Wild Indigo <i>Baptisia tinctoria</i>		2	0.05				
4.							
Deertongue <i>Dicanthelium clandestinum</i>	Tioga	15	0.34	W - P	2 - 3	C - D	Use Virginia wild rye on moist, shady sites. Use Canada wild rye on droughty sites.
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				
Virginia Wild Rye <i>Elymus virginicus</i> OR	Common	5	0.11				
Canada Wild Rye <i>Elymus canadensis</i>	Common	5	0.11				
5.							
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.46				
Switchgrass <i>Panicum virgatum</i>	Blackwell, Carthage, Shelter, Cave-in-Rock	10	0.23				
Perennial Ryegrass <i>Lolium perenne</i> OR	Blazer II, Pennfine	5	0.11				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02				

TABLE 4 (continued): Permanent Herbaceous Seeding Mixtures							
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
WARM-SEASON/COOL-SEASON GRASS MIXES							
White clover <i>Trifolium repens</i>	common	2	0.05				
6. SELECT TWO GRASSES:							
Creeping Red Fescue <i>Festuca rubra</i> OR var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46	E - P	2 - 3	B - D	Use either creeping red fescue or hard fescue in heavy shade, but only hard fescue in sunny conditions and/or droughty soils. Perennial ryegrass and redtop will establish more rapidly than either fescue. Use redtop on low pH soils. Flatpea will suppress woody vegetation. It should be planted in the spring, or as a dormant seeding (overseeding) in late fall or winter. It may not be winter-hardy if planted late summer - fall.
Hard Fescue <i>Festuca trachyphylla</i>	Common or Bighorn	20	0.46				
Perennial Ryegrass <i>Lolium perenne</i> OR	Blazer (II), Pennfine	10	0.23				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02				
(OPTIONAL) ADD THE FOLLOWING LEGUME:							
Flatpea <i>Lathyrus sylvestris</i>	Lathco	15	0.34				
7. Tall Fescue <i>Lolium arundinaceum</i> Or							
Smooth bromegrass <i>Bromus inermis</i>	Fawn, Johnstone, Barcel, Festorina	40	0.93	E - P	2 - 3	C - D	These recommended forage cultivars of tall fescue are endophyte free. Smooth bromegrass best adapted to Piedmont & Mountain region Birdsfoot trefoil is suitable for use only in Zones 5b and 6a. White clover is adapted statewide.
Kentucky Bluegrass <i>Poa pratensis</i>	Saratoga, Baylor	22	0.50				
	Recommended NJ turf-types ^{4/}	15	0.34				
	Viking, Norcen	5	0.15				
PLUS ONE OF THE FOLLOWING LEGUMES:							
Birdsfoot trefoil <i>Lotus corniculatus</i>							
White clover <i>Trifolium repens</i>	common	2	0.05				

TABLE 4 (continued): Permanent Herbaceous Seeding Mixtures							
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
COOL-SEASON GRASS MIXES							
8. Tall Fescue <i>Lolium arundinaceum</i> (Use only for high impact turfgrass seedings in sunny to partially shaded, well-drained sites)	Recommended NJ turf-types ^{4/} (Endophyte-enhanced)	100	2.3	E - P	2 - 3	A - D	Tall fescue produces a dense turf if frequently mowed, but tends to be bunchy if mowed only occasionally. For best results, use a blend of 3 cultivars.
9. SELECT ONE SPECIES OF FESCUE: Tall Fescue <i>Lolium arundinaceum</i> OR Hard Fescue <i>Festuca trachyphylla</i> AND ADD: Kentucky Bluegrass <i>Poa pratensis</i> Perennial Ryegrass <i>Lolium perenne</i>	Recommended NJ turf-types ^{4/} Common or Bighorn Recommended NJ turf-types ^{4/} Blazer (II), Pennfine	60	1.38	W - MW	2 - 3	A - B	Mix is good for high impact turf areas such as athletic fields and recreation areas. Tall fescue is more suitable for compacted, high use areas. Hard fescue produces finer-textured turf with more shade tolerance. For best results, recommend using a blend of 3 cultivars each of tall fescue and Kentucky bluegrass.
10. Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i> Kentucky Bluegrass <i>Poa pratensis</i> OPTIONAL ADDITION: Rough Bluegrass <i>Poa trivialis</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem Recommended NJ turf-types ^{4/} Sabre, Laser	43	1.0	E - MW	2 - 3	B - D	Suitable mix for shady turf areas. Add rough bluegrass under moist, shady conditions <u>only</u> .

TABLE 4 (continued): Permanent Herbaceous Seeding Mixtures										
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks			
		lbs./ac.	lbs./1000 sq.ft.							
COOL-SEASON GRASS MIXES										
11. Chewings Fescue <i>Festuca rubra</i> ssp. <i>commutata</i>		25	0.57				Attractive mix of fine fescues and wildflowers for low maintenance conditions. Once well-established, the grasses may tend to outcompete the wildflowers. Hydroseeding is not recommended for this mix if wildflowers are used. (They have very small seeds.)			
Hard Fescue <i>Festuca trachyphylla</i>	Bighorn	25	0.57							
Sheep Fescue <i>Festuca ovina</i>	Attila or Aurora	25	0.57							
PLUS WILDFLOWER MIX:										
Black-eyed Susan <i>Rudbeckia hirta</i>	Common	2	0.05	E - MW	2 - 3	C - D				
Lance-leaved Coreopsis <i>Coreopsis lanceolata</i>	Common	2	0.05							
Purple Coneflower <i>Echinacea purpurea</i>	Common	2	0.05							
Partridge Pea <i>Chamaecrista fasciculata</i>	Common	5	0.11							
OR ADD CLOVER MIX:										
White Clover <i>Trifolium repens</i>	Common	3	0.07							
Red Clover <i>Trifolium pratense</i>	Any	3	0.07							
12. Alkali Saltgrass <i>Puccinellia distans</i>	Fults or Salty	20	0.46				Saltgrass will persist only under saline conditions.			
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34	W - P	2 - 3	B - D	Use the 'Dawson' variety of creeping red fescue in saline conditions.			
Fowl Meadowgrass <i>Poa palustris</i>	Common	2	0.05				Fowl meadowgrass is a native wet site bluegrass.			
OPTIONAL ADDITION										
Creeping Bentgrass <i>Agrostis palustris</i>	Seaside, Southshore, Penncross	2	0.05				Add bentgrass for wet, saline conditions.			

TABLE 4 (continued): Permanent Herbaceous Seeding Mixtures							
Mix	Recommended Cultivars (Endophyte free)	Seeding Rate ^{1/}		Soil Drainage Class ^{2/}	Max. Height (feet)	Maint. Level ^{3/}	Remarks
		lbs./ac.	lbs./1000 sq .ft.				
COOL-SEASON GRASS MIXES							
13. Orchardgrass <i>Dactylis glomerata</i>	Any	25	0.57	W - SP	2 - 3	C - D	Low maintenance mix that is easy to establish. Omit the clovers if using this mix for wastewater treatment strips and areas.
Creeping Red Fescue <i>Festuca rubra</i> var. <i>rubra</i>	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	10	0.23				
Redtop <i>Agrostis gigantea</i>	Streaker	1	0.02				
Alsike Clover <i>Trifolium hybridum</i>	Common	3	0.07				
White Clover <i>Trifolium repens</i>	Common	3	0.07				

TABLE 4 NOTES:

- Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses, legumes, or wildflowers. All legume seeds shall be inoculated before planting with the appropriate *Rhizobium* bacteria.
- Soil Drainage Class (refer to the county soil survey for further information):
 - E - Excessively Drained
 - W - Well Drained
 - MW - Moderately Well Drained
 - SP - Somewhat Poorly Drained
 - P - Poorly Drained
- Maintenance Level:
 - A - Intensive mowing (every 2 - 4 days), fertilization, lime, insect and weed control, and watering (examples: high maintenance lawns and athletic fields).
 - B - Frequent mowing (every 4 - 7 days), occasional fertilization, lime, pest control, and watering (examples: residential, school, and commercial lawns).
 - C - Periodic mowing (every 7 - 14 days), occasional fertilization and lime (examples: residential lawns, parks).
 - D - Infrequent or no mowing, fertilization, or lime after the first year of establishment (examples: wildlife areas, roadsides, steep banks)
- Recommended cultivars for New Jersey. Refer to Rutgers Cooperative Extension Service Turfgrass Fact Sheets

TABLE 5: Quality of Seed/1.					
Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)	Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)
<i>COOL-SEASON GRASSES</i>			<i>WARM-SEASON GRASSES</i>		
Barley	98	85	Bluestem, Big	60	60
Bentgrass, Creeping	95	85	Bluestem, Little	55	60
Bluegrass, Canada	90	80	Deertongue	95	75
Bluegrass, Kentucky	97	80	Millet, Foxtail	98	80
Bluegrass, Rough	96	80	Millet, Pearl	98	80
Fescue, Creeping Red	97	85	Panicgrass, Coastal	95	70
Fescue, Hard	97	85	Switchgrass	95	75
Fescue, Sheep	97	85	<i>LEGUMES/FORBS</i>		
Fescue, Tall	97	85	Bushclover, Round-headed		
Meadowgrass, Fowl	--	--	Clover, Alsike	99	85
Oats	98	85	Clover, Red	99	85
Orchardgrass	90	80	Clover, White	98	90
Redtop	92	80	Flatpea	98	75
Rye, Cereal	98	85	Pea, Partridge	98	70
Ryegrass, Annual or Perennial	97	85	Showy Tick trefoil		
Wheat	98	85	Wild Indigo	--	--
Wild Rye, Canada	85	70			
Wild Rye, Virginia	--	--			

TABLE 5 NOTE:

1. All seed shall comply with the New Jersey State Seed Law, Department of Agriculture, Plant Industry Section.

APPENDIX A.

Plant Characteristics

COMMON NAME	SCIENTIFIC NAME	ORIGIN 1/.	GROWTH HABIT 2/.	GROWTH SEASON 3/.	SOIL DRAINAGE TOLERANCE 4/.	pH RANGE	FLOOD TOL.	SHADE TOL.	SALT TOL.	DROUGHT TOLERANCE 5/.
<u>GRASSES</u>										
Barley	<i>Hordeum vulgare</i>	Introduced	Annual	cool	WD-MWD	5.5-7.8	No	No	Low	Moderate
Bentgrass, Creeping	<i>Agrostis stolonifera</i>	Native	PsR	cool	MWD-PD	5.5-7.0	Yes	No	Low	Low
Bluegrass, Canada	<i>Poa compressa</i>	Introduced	PIR	cool	EXDR-SWPD	4.5-9.5	No	Yes	Low	Moderate
Bluegrass, Kentucky	<i>Poa pratensis</i>	Introduced	PIR	cool	WD-SWPD	5.5-7.0	Yes	No	Mod.	Low
Bluegrass, Rough	<i>Poa trivialis</i>	Introduced	PsS	cool	MWD-SWPD	5.5-7.0	Yes	Yes	Low	Low
Bluestem, Big	<i>Andropogon gerardii</i>	Native	PIB	warm	EXDR-MWD	5.0-7.5	No	No	Low	High
Bluestem, Little	<i>Schizachyrium scoparium</i>	Native	PIB	warm	EXDR-MWD	5.5-7.5	No	No	Low	High
Coastal Panicgrass	<i>Panicum amarulum</i>	Native	PIB	warm	EXDR-PD	4.5-7.5	Yes	No	Mod.	High

COMMON NAME	SCIENTIFIC NAME	ORIGIN 1/.	GROWTH HABIT 2/.	GROWTH SEASON 3/.	SOIL DRAINAGE TOLERANCE 4/.	pH RANGE	FLOOD TOL.	SHADE TOL.	SALT TOL.	DROUGHT TOLERANCE 5/.
Deertongue	<i>Dichanthelium clandestinum</i>	Native	PIR	warm	EXDR-SWPD	3.8-5.0	Yes	No	Low	High
Fescue, Creeping Red	<i>Festuca rubra</i>	Introduced	PIR	cool	WD-SWPD	4.5-7.5	Yes	Yes	Low	Moderately High
Fescue, Hard	<i>Festuca longifolia</i>	Introduced	PIB	cool	EXDR-WD	4.5-7.5	No	Yes	Low	High
Fescue, Sheep	<i>Festuca ovina</i>	Introduced	PIB	Cool	EXDR-MWD	5.0-6.0	No	High	Low	High
Fescue, Tall	<i>Lolium arundinaceum</i>	Introduced	PIB	cool	WD-SWPD	5.0-8.0	Yes	Yes	Mod.	Moderately High
Indiangrass	<i>Sorghastrum nutans</i>	Native	PIB	warm	EXDR-WD	5.0-8.0	No	No	Low	High
Meadowgrass, Fowl	<i>Poa palustris</i>	Native	PIB	Cool	MDW-PD	5.0-7.5	Mod	Mod	No	Low
Millet, Pearl	<i>Pennisetum americanum</i>	Introduced	Annual	warm	WD-SWPD	4.5-7.5	No	No	Low	High
Millet, Foxtail	<i>Setaria italica</i>	Introduced	Annual	warm	WD-SWPD	4.5-7.5	No	No	Low	High
Oats	<i>Avena sativa</i>	Introduced	Annual	cool	WD-SWPD	4.5-7.0	No	No	Low	Low
Orchardgrass	<i>Dactylis glomerata</i>	Introduced	PIB	Cool	WD-MWD	4.5-7.5	Low	Low	Low	Moderately High
Redtop	<i>Agrostis gigantea</i>	Introduced	PsR	cool	WD-PD	4.5-7.5	Yes	No	Low	Moderate

COMMON NAME	SCIENTIFIC NAME	ORIGIN 1/.	GROWTH HABIT 2/.	GROWTH SEASON 3/.	SOIL DRAINAGE TOLERANCE 4/.	pH RANGE	FLOOD TOL.	SHADE TOL.	SALT TOL.	DROUGHT TOLERANCE 5/.
Rye, Cereal	<i>Secale cereale</i>	Introduced	Annual	cool	WD-MWD	4.5-7.0	No	No	Low	Low
Ryegrass, Perennial	<i>Lolium perenne</i>	Introduced	PsB	cool	WD-SWPD	5.5-7.5	No	No	Mod	Moderate
Ryegrass, Annual (Italian)	<i>Lolium multiflorum</i>	Introduced	Annual	Cool	WD-SWPD	4.5-7.5	Low	No	Low	Moderate
Saltgrass, Alkali	<i>Puccinella distans</i>	Native	PsB	cool	WD-SWPD	5.5-8.0	No	No	High	Low
Switchgrass	<i>Panicum virgatuin</i>	Native	PIB	warm	EXDR-PD	4.5-7.5	Yes	No	High	High
Wheat	<i>Triticum aestivum</i>	Introduced	Annual	Cool	WD-MWD	4.5-6.5	No	No	No	Moderate
Wildrye, Virginia	<i>Elymus virginicus</i>	Native	PIB	cool	MWD-PD	5.0-7.0	Yes	Yes	Mod	Low
Wildrye, Canada	<i>Elymus canadensis</i>	Native	PsB	cool	WD-MWD	5.0-8.0	Low	High	Mod	Mod
<u>LEGUMES</u>										
Birdsfoot trefoil	<i>Lotus corniculatus</i>	Introduced	PIR	cool	EXDR-SWPD	5.0-7.5	Yes	No	Low	Low
Bushclover, Roundheaded	<i>Lespedeza capitata</i>	Native	PIB	Warm	EXDR-WD	5.0-8.2	No	No	No	High

COMMON NAME	SCIENTIFIC NAME	ORIGIN 1/.	GROWTH HABIT 2/.	GROWTH SEASON 3/.	SOIL DRAINAGE TOLERANCE 4/.	pH RANGE	FLOOD TOL.	SHADE TOL.	SALT TOL.	DROUGHT TOLERANCE 5/.
Clover, Alsike	<i>Trifolium hybridum</i>	Introduced	PsS	Cool	SWPD-PD	5.0-7.0	High	Low	No	Low
Clover, Red	<i>Trifolium pratense</i>	Introduced	PsS	cool	WD-MWD	5.0-7.0	Low	Low	No	Low
Clover, White	<i>Trifolium repens</i>	Introduced	PIR	cool	WD-SWPD	5.5-7.5	No	No	Low	Low
Flatpea	<i>Lathyrus sylvestris</i>	Introduced	PIR	cool	EXDR-MWD	4.0-7.0	No	No	Mod	High
Pea, Partridge	<i>Chamaecrista fasciculata</i>	Native	Annual	warm	EXDR-MWD	5.0-7.0	No	No	Mod	High
Showy Tick Trefoil	<i>Desmodium canadense</i>	Native	PIS	warm	EXDR-MWD	6.0-7.0	No	Mod	No	High
Wild Indigo	<i>Baptisia tinctoria</i>	Native	PIB	warm	EXDR	5.8-7.0	No	No	Low	High

FOOTNOTES

1/. Origin: Native-occurred in the NJ prior to European colonization. However, specific cultivars may not be local ecotypes.

Introduced – European or Asian in origin

2/. Growth Habit: P-perennial; l-long-lived; s-short-lived; R-rhizomatous

S-stoloniferous; B- bunch

3/. Growth Season: Cool - major portion of growth during early spring and early fall

Warm - major portion of growth during summer months

4/. Soil Drainage Tolerance: EXDR - Excessively drained

WD - Well-drained

MWD - Moderately well-drained

SWPD - Somewhat poorly drained

PD - poorly drained

5/.Drought Tolerance: Relative tolerance to excessive periods without rainfall once the plants are fully established. Cool season grasses are considered fully established after one full growing season. Warm season grasses are not fully established for two-three growing seasons, however in the seedling stage, are generally more tolerant of drought than cool season grasses.

APPENDIX B.

Endophyte Levels of Turfgrass Cultivars

*This listing represents the % Endophyte Content in Seed**

Perennial Ryegrass

Variety	Hi	Mod.Hi	Mod.Lo	Lo
Yorktown III	97			
Palmer II	97			
Gen-90	97			
Express	97			
Advent	97			
Seville	06			
Dandy	96			
Duet	93			
ManhattanII	93			
Preludell	93			
RepellIII	92			
Assure	92			
Pleasure	92			
Target	92			
Riviera	91			
Gettysburg	91			
Pennant	91			
Legacy	90			
4 Del. Dwarf	90			
Pinnacle	90			
Repell	89			
SR 4200	89			
Commander	88			
Regal	88			
Saturn	85			
Competitor		71		
Accolade		70		
Equal		68		
Calypso		66		
Citation II			59	
Stallion			58	
Caliente			54	
Premier			50	
Entrar			47	
Prestige			43	
Derby Supreme			38	
Lindsay			37	
Charger			34	
Envy			30	
Rodeo II			27	
Essence				20
Fiesta II				15
Cowboy II				12
Danilo				06
Ovation				05
Loretta				04
Allegro				01
Gator				01
Danaro				01
Pennfine				01

For varieties not listed here contact Rutgers Cooperative Extension or the seed suppliers to obtain percent endophyte content.

Percent endophyte content can vary with seed viability.

Fine Fescue

*This listing represents the % Endophyte Content in Seed**

Variety	Hi	Mod.Hi	Mod.Lo	Lo
Jamestown II	100			
Reliant	100			
Warwick	96			
Southport		94		
SR-5000		92		
SR-3000		64		
Rainbow		63		
Valda		47		
Bridgeport		26		

Tall Fescue

*This listing represents the % Endophyte Content in Seed**

Variety	Hi	Mod.Hi	Mod.Lo	Lo
Titan	98			
Shenandoah	86			
Mesa		70		
Tribute		58		
Aguara		50		
Arid			48	
Normark 99			42	
Rebel Jr.				37
Trident				28
Rebel II				28
Winchester				24
Taurus				18
Apache				18
Finelawn I				16
Sundance				14
Thoroughbred				14
Murietta				14
Bonanza				12
Chieftain				06
Hubbard 87				04
Finelawn 5GL				02

***NOTE: The data are from Rutgers University and were obtained from seed lots submitted to the National Turfgrass Evaluation Program. Seed lots may contain lower percentages of seeds with viable endophytes because of loss of viability during seed storage. (Source: Dr. Richard Hurley.)**