NATURAL RESOURCES CONSERVATION SERVICE
SPECIFICATION GUIDE

CRITICAL AREA PLANTING
(CODE 342)

GENERAL 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 USDA, NRCS-RI Conservation Practice Standard, Critical Area Planting (342), Criteria, Considerations, and Operation and Maintenance. They shall be recorded on specification sheets and 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 both standards 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. Caution should be given to landowners on wetland alteration, referencing Rhode Island's Wetland Rules and Regulations , Section 404 of the Clean Water Act (33 U.S.C. 1344), and the Wetland Conservation Provisions (Swampbuster) of the U.S. Farm Bill.

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.

Conservation practice standards and specifications are reviewed periodically, and updated if needed.
To obtain the most current version of this standard, contact the Natural Resources Conservation

SOIL AMENDMENTS

Soil tests shall be used to determine the optimum recommendations for both lime and fertilizer. 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.

Soil analysis shall be performed by a soil testing laboratory that has been accredited by the North American Proficiency Testing Program, preferably Land Grant University soil testing laboratories from University of Massachusetts (UMASS).

Lime

Lime shall be applied to achieve a soil pH of between 5.5 and 7.0 depending on the specific requirements of the planting.

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. If the site conditions involve B-horizon soil and no topsoil, use one of the following recommendations, in lieu of a soil test:

- Cool Season Seed Mix: Apply 10-20-20 analysis fertilizer at a rate of 500 lbs./acre, with 40% of the nitrogen to be in an organic or slow release form. Incorporate into the top 2-3 inches of soil. If legumes are more than 20% of the mix, reduce nitrogen to 30 lbs./acre.
- Warm Season Seed Mix: Apply a 0-10-10 analysis fertilizer at a rate of 600 lbs./acre. Incorporate into the top 2-3 inches of soil. For sterile, droughty sites add a slow release nitrogen after emergence of grass in late spring at the rate of 30 lbs./acre. If the mix includes more than 20% legumes, use 20 lbs./acre of nitrogen. On finer textured soils with high weed pressure, delay application of nitrogen until the second year.

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 and the soil test results. 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 7.0. 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 (< 4.0), 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 not be spread when it is partly frozen or muddy, or on frozen slopes covered with ice or snow.

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 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 above. 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.

SEEDING

Seed Quality and Treatment

All seed shall be labeled and meet the requirements of the local Seed Law. Refer to Table 1 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 is 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.

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

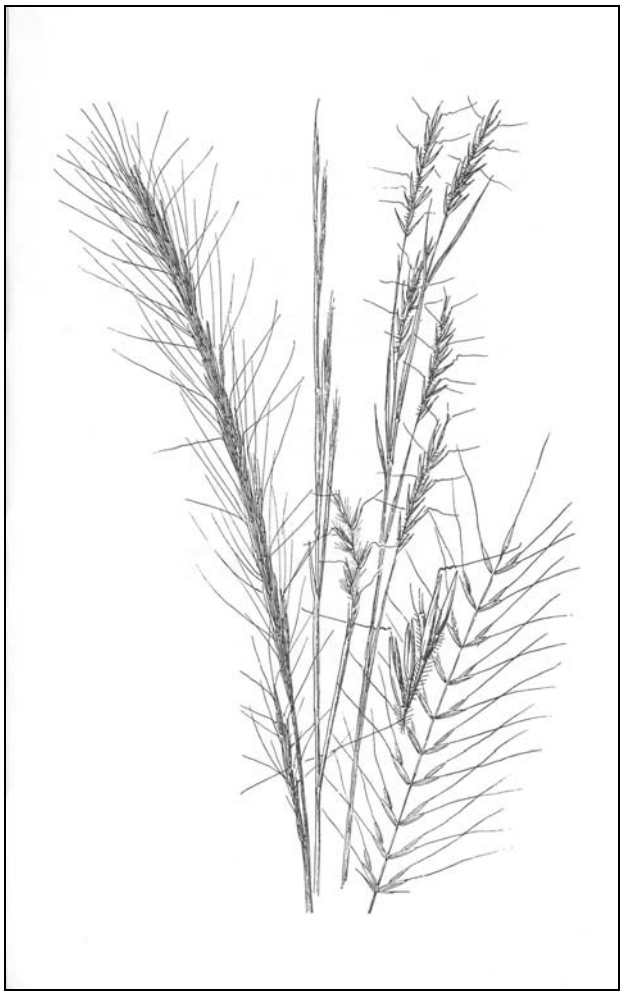
When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. See Table 2 for recommended plant species and planting rates.

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 2 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 2.

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.

Grasses and Legumes

Grasses and legumes suitable for critical area planting in Rhode Island are described in Tables 3 and 4.

Seed Mixes

To establish permanent cover, select grass and legume mixes according to the guidelines listed in Tables 5 and 6.

Planting Dates

Use Figure 1 and Table 7 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:

- Provide temporary erosion control when seeding must be delayed until the proper planting dates, or until plantings become well established;
- Conserve soil moisture to aid seed germination and plant survival;
- Reduce weed growth in planted areas;
- 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.

Mulch Netting.

Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;

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;

Liquid Mulch-Binders.

Use one of the following:

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;

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 7 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 these guidelines. 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 7 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 these guidelines 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.

When using trees and shrubs for critical area planting, refer to the NRCS-RI Tree/Shrub Establishment Conservation Practice Standard (612), Specification Guidelines and Job Sheet.

Table 8 provides a selected list of native tree and shrub species that may be used for critical areas. 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, Streambank and Shoreline Protection (580) Conservation Practice Standard and Specification Guidelines.

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.

Invasion of undesirable plants shall be controlled by pulling, mowing, or spraying 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

Competing vegetation shall be controlled until the woody plants are established.

Replanting shall be required when survival is inadequate.

Trees and shrubs shall be protected from fire, insects, disease, and animals until established.

Supplemental watering may be desirable to ensure adequate survival.

Damaging pests shall be monitored and controlled.

Periodic applications of nutrients may be needed to maintain plant vigor.

Refer to the NRCS-RI Tree/Shrub Establishment (612) Conservation Practice Standard and Specification Guidelines.

SPECIAL PROBLEM SITES – DUNE STABLIZATION

Dune stabilization is used to control surface movement of sand dunes or shifting sand by vegetative or mechanical means. The practice reduces wind erosion, sand movement by storms and tides, and facilitates dune building at ocean, bay frontal and back bay areas. It is applicable along ocean and bay shorelines where blowing sands and storm waters may cause erosion damage, but must be kept at least one hundred feet (horizontal distance) from mean high tide (MHT) water line.

Vegetation

Materials

Sand dunes naturally form on barrier islands, shorelines exposed directly to the ocean, and inland sand deposits (see Figure 2). The source of this wind born sand is the ocean or its bays. These parallel ridges of sand form perpendicular to prevailing winds and grow toward its source of sand. Periodic storm events and human activity continually alter their development and original configuration. Once developed, the sand dunes provide protection from moderate storms and tides.

The existence and maintenance of vegetation on dunes provides a network of root and foliage that holds unconsolidated sand in place. American beachgrass is the dominant naturally occurring vegetation of the frontal dunes of Rhode Island. When beachgrass is established with structural resources and other dune species, a well-anchored storm barrier is established.

The foliage of most sand dune species filters sand from the wind. The reduction of wind velocity near the dune's surface by vegetation allows sand to be deposited. The root-mass of these plant species are typically deep and extensive, anchoring the dunes to their foundation.

When establishing dune vegetation, plant certified cultivars that have been tested on similar sites when possible. Plant materials recommended for sand dune stabilization in Rhode Island are listed below.

Plant Materials for Dune Stabilization

Cultivars:*

- 'Cape' **American Beachgrass** (*Ammophila breviligulata*)
- 'Avalon' **Saltmeadow Cordgrass** (*Spartina patens*)
- 'Wildwood' **Bayberry** (*Myrica pensylvanica*)
- 'Ocean View' **Beach Plum** (*Prunus maritima*)
- 'Sandy' **Rugosa Rose** (*Rosa rugosa*)

Non-Cultivars:

- **Switchgrass** (*Panicum virgatum*)
- **Seashore Little Bluestem** (*Schizachyrium scoparium* var. *litoris*)
- **Seaside Goldenrod** (*Solidago sempervirens*)
- **Eastern Red Cedar** (*Juniperus virginiana*)

*All cultivars listed above were released by the USDA, NRCS, Cape May Plant Material Center, Swainton, NJ.

American Beachgrass is successionally classified as a pioneering type species; it is the hardiest species capable of surviving the harsh environmental conditions of the frontal dunes. For initially stabilizing a dune system, this species is the most reliable and commercially available option. Once established it rapidly spreads by a rhizomatous root system, developing a soil-binding network of inter-woven roots.

Saltmeadow Cordgrass, although typically associated with tidal salt marshes, naturally occurs in the secondary and back dune areas. Predominantly inhabiting inter-dune troughs and low blow-out areas. It is dominant in these micro-sites since most other sand dune species can not tolerate wet to saturated soil conditions. The trailing rhizomes of saltmeadow cordgrass are slender, but form dense mats near the surface. It is vegetatively established on normal sites using freshly harvested stems (culms) or containerized plants on severe locations.

Switchgrass & Bluestem

Switchgrass is a medium to tall height native perennial grass that grows in nontidal and fresh tidal marshes. It is tolerant of drought, flooding, salt, sun and wet soil. It's soil stabilization function is attributed to its rhizomotous root system. Its stiff stems resist lodging and will recover to an upright position after storms. A typical seeding rate is 10 PLS lbs./acre.

Little Bluestem is a medium tall native bunch grass that is almost always incorporated into mixes used to produce low maintenance, long-living stands. It grow well in full sun, adapts to a wide variety of soil types and is drought tolerant. Little Bluestem should be seeded at a rate of 12 PLS lbs./acre alone and at 4 PLS lbs./acre in mixes. Seeding vigor is weak, therefore, control of competition is necessary. For best results, soil pH should be between 5.5 and 6.5.

Shrubs and Trees—Medium sized shrubs and small trees naturally dominate the back dune zone of barrier islands. The shrubs begin to co-inhabit the mid-secondary dunes. Once, extensive stands of bayberry, beach plum, pitch pine and other woody species covered these islands where houses now stand. The shrub species that are well adapted to the dune ecosystem are capable of either layering or root suckering. The trees and shrubs of the sand dunes have deep tap root systems for supplying adequate moisture and nutrients. Each species utilized for back dune stabilization has its own unique attributes. Beach plum has a colorful bloom in spring that yields a tasty succulent cherry like fruit. Bayberry roots have nodules which enable it to fix atmospheric nitrogen similar to legumes; it also produces aromatic fruit and leaves. The thorny stems of Rugosa Rose are useful in directing pedestrian traffic along established access trails. This rose species also blooms from late spring to early fall, then gives rise to a bright red fruit. The pines and junipers that are adapted to sand dunes provide the visual appeal of evergreens in the back dunes. The major function of tree and shrub vegetation on sand dunes is permanent solid structural stabilization. All trees and shrubs of the sand dunes produce viable seed, but intentional establishment occurs using bare-rooted or potted seedlings.

Establishment

Table 9: Establishment of Dune Vegetation specifies planting dates, units, methods, size, depth, spacing and other notes for planting cultivars.

Dune Crossing Areas

Where foot or vehicular traffic is expected over dunes, it is recommended that a curvilinear path be constructed to direct traffic. These paths can be constructed with boards or be comprised of a gravel base. The crossings should be bordered by sand fence to funnel the traffic to and from the beach.

Fertilizer

Date	May through July; No sooner than 30 days after planting.
Rate	< 50 lbs. of nitrogen (N) per acre; < 25 lbs. of phosphorus (P) per acre, and 25 lbs. potassium (K) per acre.
Frequency	Apply N for the first two years after planting, then as needed to maintain stem density and plant health. Single or split applications are acceptable if not applied before May 1 or after July 30. Split applications must be at least 30 days apart. It is only necessary to apply (P) and (K) in alternate years.
Recommended Formulations	10-10-10, 20-10-10, 15-10-10, etc. are acceptable as long as the maximum rates per nutrient are not exceeded. Time-release fertilizers that will provide the target amounts of the primary nutrients per acre are encouraged.
Notes	Fertilize dune grass planting by mechanical or broadcast application, except where woody species are planted. Only apply fertilizer within the drip line of shrubs and trees. Where woody plants are established, fertilizer may be broadcast applied. [*Not following this procedure will result in excessive herbaceous growth, which will out-compete newly established trees and shrubs.*]

Replanting

Uniform, unbroken dune lines are essential to the protection provided by a dune system. When uncontrollable events (i.e. storms, construction, etc.) damage dunes, replanting may be necessary to maintain a properly functioning system.

If such damage occurs between October and April, replant within a month. If the damage is experienced from May to September, utilize the outlined sand fencing or excavation procedures listed below, then plant during the recommended establishment period

Sand Fencing

Sand fencing provides a quick and effective way to build temporary sand dunes. Utilizing lines of fencing and wooden posts, orientated parallel to the beach, approximately 140 feet (horizontal distance) from the mean high tide (MHT) water line.

A source of sand is necessary for this technique to be effective, but it is not limited by time of establishment.

Materials

Fencing:

- Standard 4 foot slatted wood snow fencing; wood must be decay free.
- Polyvinyl fencing material with 50% porosity may be used as an alternative.
- Four wire-ties (>12 gauge) must be used to secure fencing to each post.

Posts

- Wooden posts must be > 6½ feet long, with a minimum diameter of 3 inches; typical length ranges from 7 to 8 feet.
- The posts should be made from black locust, eastern red cedar, Atlantic white cedar, or other species of similar durability and strength.
- Space posts 10 feet apart, and set them > 3 feet deep.

Technique

Position – Orientation of fence line is parallel to the water line of the beach, at least 140 feet from mean high tide (MHT).

Height – With adequate sand sources, dune elevations can be increased annually by at least four foot increments. The maximum dune height that is attainable will range from 12 to 15 feet, but is greatly influenced by the prevailing wind velocities and sand grain size.

Installation – Weave fencing in front of and behind alternating posts to attain maximum strength.

Number of Rows – When the distance to the MHT water line is 100 feet or more, 2 parallel rows spaced 30 to 40 feet apart are ideal (see Figure 3).

Single rows with 30 foot perpendicular spurs, spaced 40 feet apart are also acceptable if there is less than 100 feet from the MHT and a protective dune is desired. A zigzag pattern also may be considered. Where there is less than ___ feet from the MHT it may not be feasible to build dunes.

Replacement – sand will typically fill fencing to ¾ of its total height, at a maximum. Upon reaching maximum fence capacity, additional lines of fence can be added until maximum planned dune height is reached. Replace damaged fencing and posts within one month of storm damage to maintain a contiguous dune line.

Comments

This method is more expensive per lineal foot than building dunes with vegetation alone, but less expensive than using earth-moving machinery to construct dunes.

Dune height can be increased quickly, but it is limited by the fence height and the ability to add continually more lines of fencing.

Planting parallel rows of vegetation on either side of fence is usually more effective than either vegetation or fencing techniques alone. When complementing fencing with vegetation, do not plant closer than ten feet and no further than 15 feet from the fence lines. Vegetative strips should be about 20 feet wide (see Figure 4).

Mechanical Excavation

Temporary excavated sand dunes may be created quickly, with the use of various earth-moving machines. Since time is required for settling and cohesion to occur, such dunes are often short lived and only provide minimal protection to the resources behind them.

This method is often useful in the repair of storm damaged sand dunes during the fall and winter months. Any blow-out areas can be quickly filled.

Front-end loaders of all sizes can be used. Various grading machines are also useful. Pumped sand from off shore dredging can be shaped and positioned with machinery.

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 Job Sheet RI-342, "Critical Area Planting Specifications" (see Exhibit 1), or other approved job 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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Figure 1: USDA Plant Hardiness Zones for Rhode Island

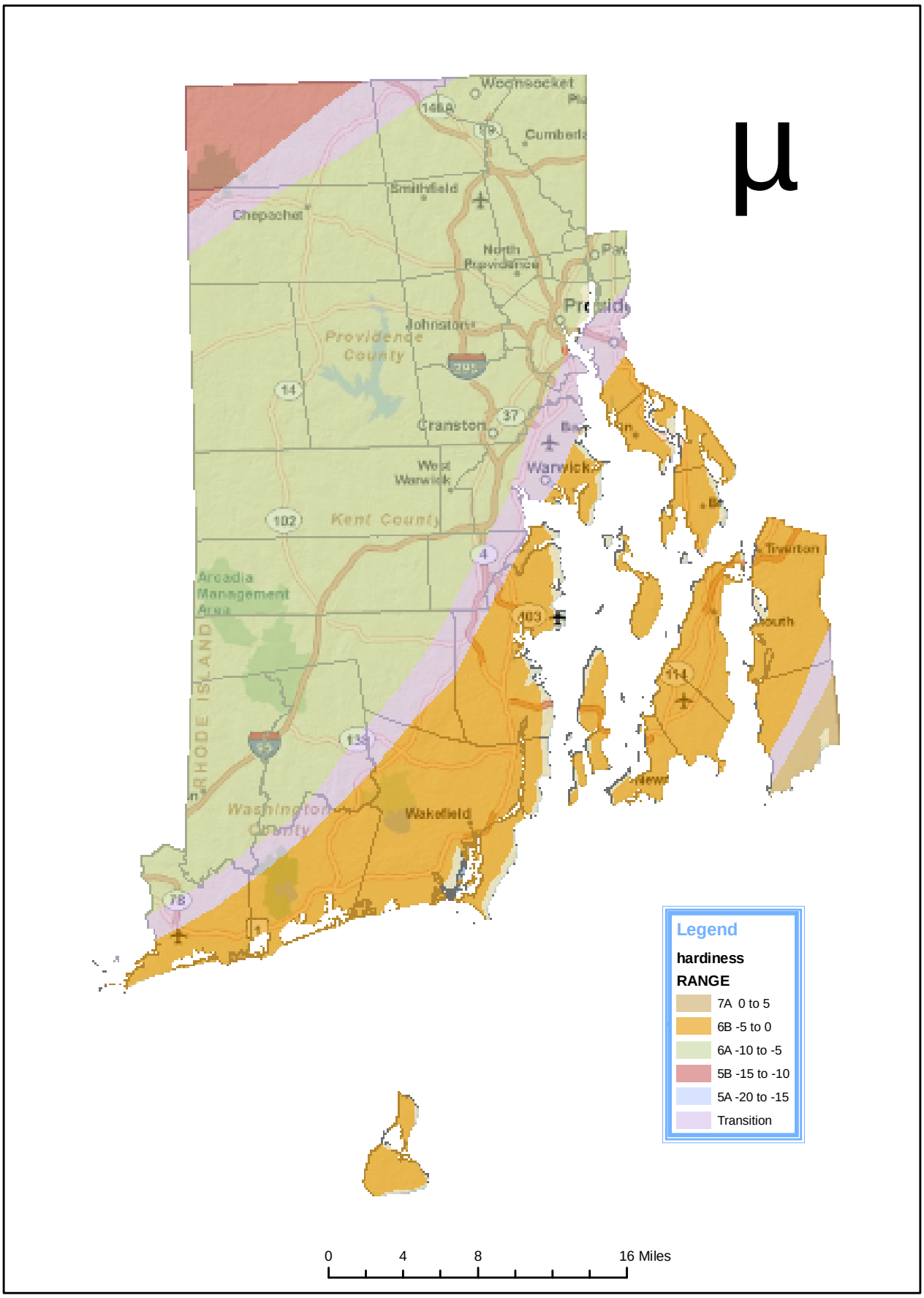


FIGURE 2: Typical Barrier Island Cross Section

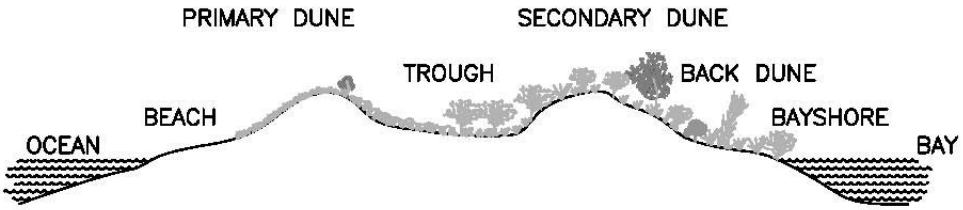
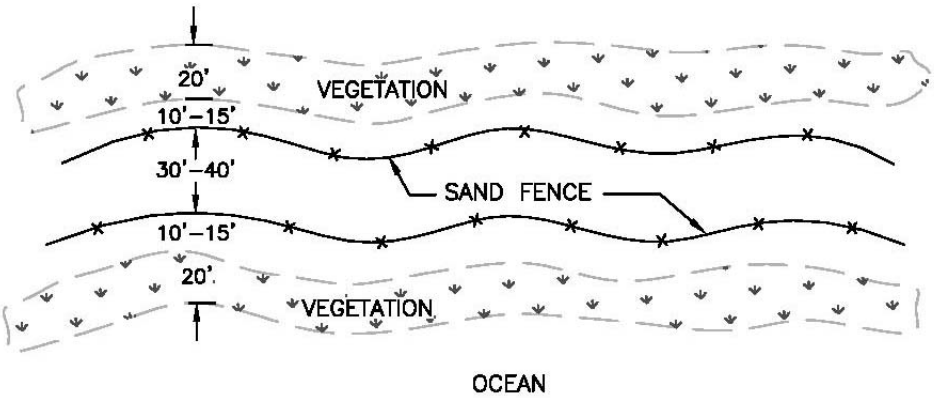


FIGURE 3: Combination Of Sand Fence And Vegetation For Dune Building



Not to Scale

FIGURE 4: Typical Cross Section Produced By A Combination Of Sand Fence And Vegetation

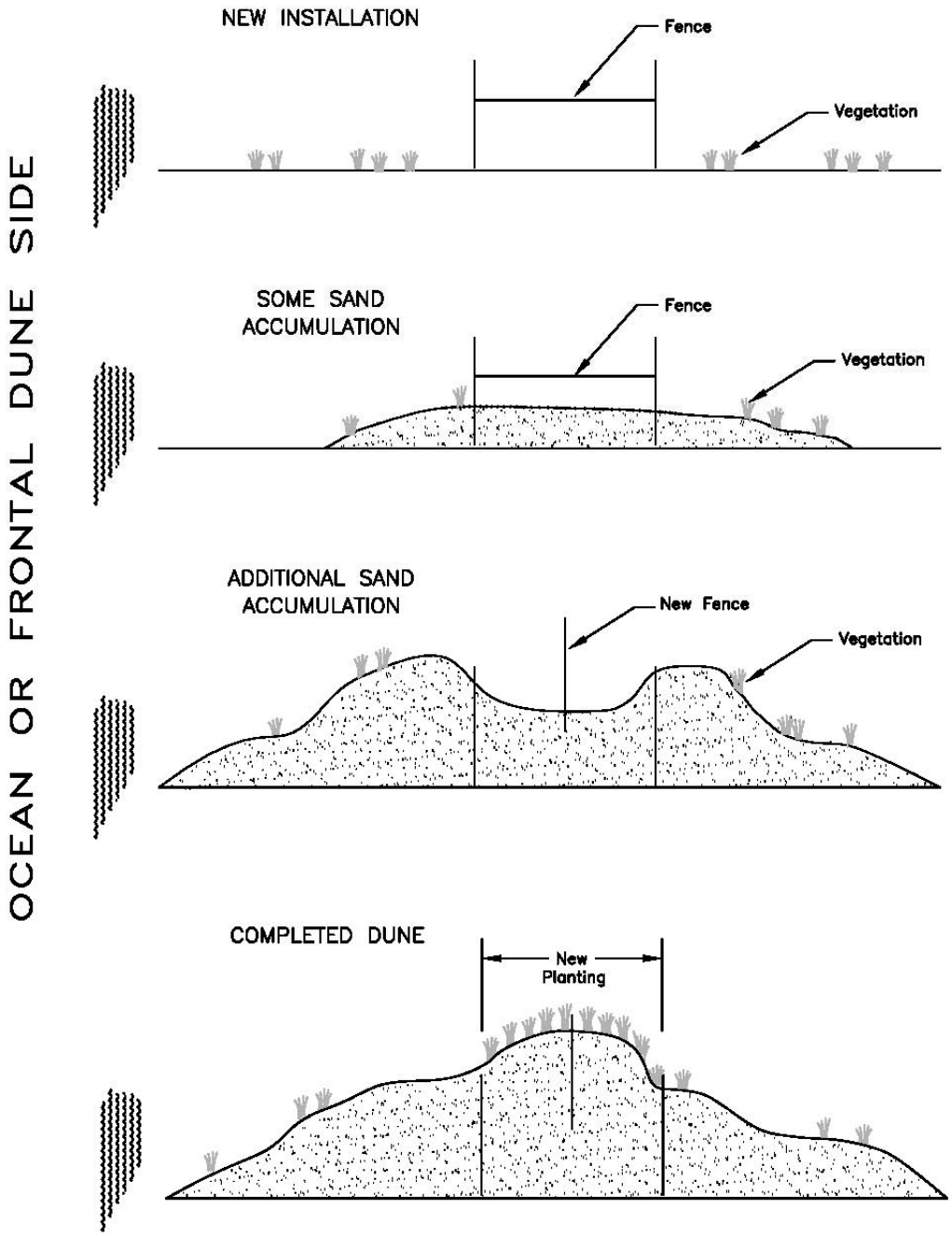


TABLE 1: Quality of Seed [1.]					
Species	**Minimum Seed Purity (%)**	**Minimum Seed Germination (%)**	**Species**	**Minimum Seed Purity (%)**	**Minimum Seed Germination (%)**
COOL-SEASON GRASSES			***WARM-SEASON GRASSES***		
Alkali saltgrass	85	80	Bluestem, Big	60	60
Barley	98	85	Little Bluestem, Broomsedge	55	60
Bentgrass, Creeping	95	85	Deertongue	95	75
Bluegrass, Canada	90	80	Indiangrass	60	60
Bluegrass, Kentucky	97	80	Lovegrass, Purple	--	--
Bluejoint, Canada	85	70	Millet, Foxtail	98	80
Bromegrass, Fringed	85	70	Switchgrass	95	75
Bromegrass, Smooth	95	85	***LEGUMES/FORBS***		
Cordgrass, Freshwater	85	70	Beach pea	--	--
Dropseed, Poverty	--	--	Bushclover	80	50
Fescue, Creeping Red, Hard, Chewings, Sheep	97	85	Clover, Alsike	99	85
Meadowgrass, Fowl	90	70	Flatpea	98	75
Oats	98	85	Groundnut	--	--
Orchardgrass	90	80	Pea, Partridge	98	70
Redtop	92	80	Tick trefoil	90	70
Rye, Cereal	98	85	Wild Indigo	--	--
Ryegrass, Annual or Perennial	97	85			
Wheat	98	85			
Wild Rye, Canada, VA, Riparian	85	70			
Wood Reedgrass	--	--			

[1] All seed shall comply with the Massachusetts, Connecticut, or Rhode Island State Seed Law.

TABLE 2: 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 sf*		**4b & 5a**	**5b**	**6a, 6b, & 7a**
Cool-Season Grasses						
Annual Ryegrass *Lolium perenne* ssp. *multiflorum*	40	1.0	0.5	Apr 1 to May 31 Aug 1 to Sept. 1	Mar 15 to May 31 Aug 1 to Sept. 15	Mar 1 to May 31 Aug 15 to Sept 30
Oats *Avena sativa*	86	2.0	1.0	Apr 1 to July 1 Aug 1 to Sep 30	Mar 15 to Jun 15 Aug 1 to Oct 15	Mar 1 to Jun 1 Aug 15 to Sept 30
Cereal Rye *Secale cereale*	112	2.8	1.0	Aug 15 to Sept 15	Aug 15 to Sept 30	Aug 15 to Oct 30
Warm-Season Grass						
Foxtail Millet *Setaria italica*	30	0.7	0.5	Jun 1 to Jul 31	May 1 to Jul 31	May 1 to Aug 15

TABLE 2 NOTES:

1. 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.

2. For sandy soils, plant seeds at <u>twice</u> the depth listed above.

3. The planting dates listed are averages for each Zone, and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

* Winter rye planting dates differ depending on fall and spring cover

TABLE 3: Characteristics of Grasses & Legumes for Erosion Control

Common Name	Scientific Name	Native	Season	Environmental Tolerance*	Plant Type*
Beachgrass, American	*Ammophila breviligulata*	Yes	Cool	S,D	M,G
Bentgrass,Creeping	*Agrostis stolonifera var. palustris*	Yes	Cool	F,W	M,P,G,R
Bluegrass, Canada	*Poa compressa*	No	Cool	D,S,s,W	S,P,G,R
Bluegrass, Kentucky	*Poa pratensis*	No	Cool	S	S,P,G,R
Bluestem, Big	*Andropogon gerardii*	Yes	Warm	D,S	L,P,G,B
Bluestem, Little	*Schizachryrium scoparium*	Yes	Warm	D,S	M,P,G,B
Bromegrass, Smooth	*Bromus inermis*	No	Cool	D,F,S,w	M,P,G,R
Bromegrass, Fringed	*Bromus, ciliatus*	Yes	Cool	S,s,w	M,P,G,R
Broomsedge	*Andropogon virginicus*	Yes	Warm	D,S	M,P,G,B
Bushclover, Hairy	*Lespedeza hirta*	Yes	Warm	S	L.P
Bushclover, Round Head	*Lespedza capitata*	Yes	Warm	D,S	L,P
Cordgrass, Freshwater	*Spatina pectinata*	Yes	Cool	F,Na,S,W	M,P,G
Cordgrass, Saltmeadow	*Spartina patens*	Yes	Warm	F,Na,S,W	S,P,G
Cordgrass, Smooth	*Spartina alterniflora*	Yes	Warm	F,Na,S,W	L,P,G
Cut Grass, Rice	*Leersia oryzoides*	Yes	Cool	F,S,W	M,P,G
Deertongue Grass	*Dicanthelium clandestinum*	Yes	Warm	D,S,W	S,P,G,R
Dropseed, Poverty	*Sporobolus vaginiflorus*	Yes	Warm	D,S	S,A,G,B
Fescue, Red	*Festuca rubra*	Yes	Cool	F,S,w	M,P,G,R
Flatpea	*Lathyrus sylvestris*	No	Cool	D,S,W	P,HV
Groundnut	*Apios americana*	Yes	Cool	F,S,s	P,HV
Indiangrass, Yellow	*Sorghastrum nutans*	Yes	Warm	D,F,S	L,P,G,B
Lovegrass, Tumble	*Eragrostis spectabilis*	Yes	Warm	D,S	S,P,G,B
Manna Grass, Canada	*Glyceria canadensis*	Yes	Cool	W	M,G
Manna Grass, Fowl	*Glyceria striata*	Yes	Cool	W	M,G
Meadow Grass, Fowl	*Poa palustris*	Yes	Cool	S,W	M,P,G
Pea, Beach	*Lathyrus japonicus*	Yes	Cool	D,S,Na	P,HV,R
Red Top	*Agrostis alba*	No	Cool	D,S,W,F	M,P,G,R
Reed Grass, Blue Joint	*Calamagrostis canadensis*	Yes	Cool	F,S,W	L,P,G
Ryegrass, Perennial	*Lolium perenne*	No	Cool	W	M,P,G,B
Rye, Canada Wild	*Elymus canadensis*	Yes	Cool	D,S,s,Na	L,P,G,R
Rye, Riverbank Wild	*Elymus riparius*	Yes	Cool	F,s,w	M,P,G,R
Rye, Virginia Wild	*Elymus virginicus*	Yes	Cool	F,S,s	M,P,G,R
Switchgrass	*Panicum virgatum*	Yes	Warm	D,F,Na,S,W	L,P,G,R
Trefoil, Showy-Tick	*Desmodium canadense*	Yes	Cool	D,S	L,P
Wood Reed, Stout	*Cinna arundinacea*	Yes	Cool	s,W	L,P,G

Table 3 Legend

Environmental Tolerance		Plant Type	
D	Drought	**L**	Large (> 4 ft.)
F	Flood	**M**	Medium (< 4 ft.)
Na	Salt	**S**	Small (< 2 ft.)
S	Full Sun	**HV**	Herbaceous Vine
s	Shade	**A**	Annual
W	Wet Soil	**P**	Perennial

Plant Type	
G	Grass
R	Rhizomotous
B	Bunch

Prepared by USDA-NRCS - Amherst, Masschusetts.
Native Plant List from Massachusetts NHESP, B.Sori and P.Somers.
Environmental Tolerance and Plant Type adapted from
Landscape Restoration Handbook, Lewis Publishers.

TABLE 4. Characteristics, Uses and Establishment of Grasses and Legumes for Critical Area Planting In Rhode Island		
Plant Name	**Plant Characteristics**	**Uses and Establishment Notes**
American Beachgrass *(Ammophila breviligulata)*	• **Native** to Rhode Island**,** (it will grow on sandy or other course textured soils on inland sites.) • Extensively rhizomatous in sandy soils and readily grows up through new deposition layers (dunes) • 3 ft. mature height • Adapted to coastal dunes • **Cool Season**	• Tolerant of droughty sands, full sun • Intolerant of foot and vehicular traffic • Established by planting dormant stems (culms) , 2-3 per planting unit on 12”-18” centers • Useful as initial vegetative cover on dunes and other sandy sites, to be later inter-planted with native woody shrubs •
Bentgrass, Creeping/Marsh *(Agrostis stolonifera Var. palustris)*	• Introduced to Rhode Island • Rhizomotous perennial • Sod forming, • FACW • Adapted to wet meadows, shores and coastal marshes • **Cool Season**	• Tolerant of wet soils and flooding • Seed in mixes at 1lb./acre rate • (4.5 million seeds/pound) • Suitable for waterways and ditch or pond banks • 4,540,000 seeds/lb.
Bluegrass, Canada *(Poa compressa)*	• Introduced to Rhode Island • Rhizomotous perennial • Open, sod forming • 2 ft. mature height, • FACU • **Cool Season**	• Useful on dry, low fertility soils • Tolerant of drought, full sun, shade and wet soil • Slow starter • Use in mixes only • 2,500,000 seeds/lb.
Bluegrass, Kentucky *(Poa pratensis)*	• Introduced to Rhode Island • Rhizomotous perennial • Turf forming • 3’ mature height, • FACU • **Cool season**	• Grows best on well-drained fertile soil with pH 5.5-7.0 • Avoid acid soils • Useful in lawn-type mixes • Tolerant of moist or dry sites • 2,156,000 seeds/lb.
Bluestem, Big *(Andropogon gerardii)* Bluestem, Little *(Schizachryrium scoparium)*	• Both **Native** to Rhode Island • Perennial bunchgrasses, with dense root systems • Big (7 ft. height), • Little (3 ft. height) • Big (FAC); • Little (FACU) • Adapted to hot, dry, sunny sites in sandy, loamy or silt soils • Both **Warm season**	• Tolerates medium to low fertility soil with pH 5.0-7.5 • Seed at 2 to 4 lbs. per acre in a mix and 5 to 10 lbs. per acre when seeded alone • Useful for stabilizing sand and gravel pits, road sides and mine spoil • Slow to germinate the first year • Seed in early spring with a native grass drill. Roll or cultipack • BB - 165,000 seeds/lb. • LB - 240,000 seeds/lb.

TABLE 4, cont. Characteristics of Grasses and Legumes		
Plant Name	**Plant Characteristics**	**Uses and Establishment Notes**
Bromegrass, Smooth *(Bromus inermis)*	• Introduced to Rhode Island • Rhizomotous perennial • Forms coarse dense sod • Adapted to diverse types of soils, but not wet soils • 3 – 4 ft. mature height, • **Cool Season**	• Tolerant of heat, drought and periodic flooding • Prefers fertile soils with pH 5.5-8.0 • Suited for waterways,channels, pond banks where soils do not remain wet. • 140,000 seeds/lb.
Bromegrass, Fringed *(Bromus ciliatus)*	• **Native** to Rhode Island • Rhizomotous perennial • 1 – 5 ft. mature height, • FACW • **Cool Season**	• Tolerant of full sun or partial shade • Good species for moist soils • Suitable for waterways and pond banks •
Broom-Sedge *(Andropogon virginicus)*	• **Native** to Rhode Island • Perennial bunchgrass • 2 – 5 ft. mature height, • FACU • **Warm Season**	• Adapted to dry, open sites with a variety of soil types • Suited for general erosion control where an eastern prairie appearance is desired • 800,000 seeds/lb.
Bushclover, Hairy *(Lespedeza hirta)*	• **Native** to Rhode Island • Erect perennial • **Warm Season**	• Open, sandy, sterile sites • Mix with native, warm season grasses. • 113,636 seeds/lb.
Bushclover, Round Head *(Lespedeza capitata)*	• **Native** to Rhode Island • Erect perennial • **Warm Season**	• Roadsides, sandy, dry sites • Mixes with native, warm season grasses • 154,000 seeds/lb.
Cordgrass, Freshwater *(Spartina pectinata)*	• **Native** to Rhode Island • OBL • 2 – 7 ft. mature height • Adapted to upland edge of salt marshes in relatively dry soil • **Warm Season,** July – Sept.	• Tolerant of saltwater flooding • Suited to wet soil in eastern prairie • Suitable for streambank or wetland stabilization • 197,000 seeds/lb.
Cordgrass, Saltmeadow *(Spartina patens)*	• **Native** to Rhode Island • Small perennial grass • Less than 2 ½ ft. • Thin stems bend easily and form big cowlicks in the marsh • **Warm Season,** late June – Oct.	• Tolerant of daily saltwater flooding, wet soils, and full sun; • Grows on **high marsh** sites
Cordgrass, Smooth *(Spartina alterniflora)*	• **Native** to Rhode Island • Tall perennial grass • Up to 8 ft. • Spreads by rhizomes and builds strong underground network • **Warm Season**	• Tolerant of constant saltwater flooding, wet soils, and full sun; • Grows on **low marsh** sites, along outer edge of salt marsh, and along the edge of creeks and ditches; • On protected beaches and mud flats, acts as colonizer, initiating marsh formation. • Dense stands trap silt and cause elevation of soil to rise. • 175,000 seeds/lb.

TABLE 4, cont. Characteristics of Grasses and Legumes		
Plant Name	**Plant Characteristics**	**Uses and Establishment Notes**
Cut Grass, Rice *(Leersia oryzoides)*	• **Native** to Rhode Island • OBL • 2 - 5 ft. mature height • **Cool Season**	• Tolerant of saturated soils, full sun and flooding • Suited for waterways, pond/ditch/ stream banks stabilization
Deertongue Grass *(Dicanthelium clandestinum)*	• **Native** to Rhode Island • Perennial, spreads slowly by seed and rhizomes • Up to 3 ft. mature height • FAC+ • Adaptation: dry to moist sites with full sun to partial shade • **Warm Season**	• Best grass for acid soil sites • Tolerant of low fertility sites • Use for cover of erodible sandy areas such as road/ditch banks and sand and gravel borrow areas. • Seed in mixes at rate of 5-10 lbs./ac. • Seed with other native warm season species or with perennial ryegrass • 400,000 seeds/lb.
Dropseed, Poverty *(Sporobolus vaginiflorus)*	• **Native** to Rhode Island • Annual bunchgrass • 1 – 2 ft. mature height • UPL • Shallow root system • **Warm Season**	• Tolerant of dry sites with full sun and low fertility • Suitable as a native nurse crop for warm season mixes • Adapted to dry roadside sites
Fescue, Red Creeping Red Fescue *(Festuca rubra var rubra)* Chewings Red Fescue *(Festuca rubra commutata)*	• *Festuca rubra* is a species native to Rhode Island • Short perennial with round, wiry basal leaves • Creeping Red Fescue tends to grow in tufts on low fertility sites, but spreads by rhizomes in more fertile soils. • Chewings is a true bunch type • FACU • **Cool Season**	• Valuable for its shade tolerance • Suited for close growing cover in mixes; seed at rate of 10-40 lbs.per acre depending on use • Adapted to variety of soil types; tolerant of dry and very moist sites • Suited for low maintenance areas, general purpose turf or in mixes for wood roads, landings, roadbanks… • Adapted to full or partial shade • 615,000 seeds/lb.
Flatpea (Lathyrus *sylvestris*)	• Introduced to Rhode Island • Deep-rooted perennial • Long, climbing, vine-like stems • Established stand resist encroachment by other plants	• Adapted to a variety of sites from dry to moist. • Slow to germinate • Seed alone (with perennial ryegrass) for utility rights-of-way • 8,000 seeds/lb.
Groundnut *(Apios americana)*	• **Native** to Rhode Island • Climbing vine, from rhizome • 3-10 ft. in length	• Moist soils • Use in mixes for pond and streambanks
Indiangrass *(Sorghastrum nutans)*	• **Native** to Rhode Island • Perennial, Bunchgrass • 3 – 5 ft. mature height • **Warm Season**	• Grows best in fertile loam • Light and fluffy seed. Use native grass drill designed for chaffy seed. • Seed at 2-4 lbs./acre in mix or 5-10 lbs./acre alone • 175,000 seeds/lb.

TABLE 4, cont. Characteristics of Grasses and Legumes

Plant Name	Plant Characteristics	Uses and Establishment Notes
Lovegrass, Tumble *(Eragrostis spectabilis)*	• **Native** to Rhode Island • Perennial, bunchgrass. • 12 – 18 inches in height • UPL • **Warm Season**	• Suited to Dry sites with Full Sun • Purplish-pink appearance in flower (late summer) • Low maintenance • 1,500,00 seeds/lb.
Manna Grass, Canada *(Glyceria canadensis)*	• **Native** to Rhode Island • Perennial • 2 – 3 ft. height • OBL • **Cool Season**	• Suited to very wet sites • Good for initial wetland cover
Manna Grass, Fowl *(Glyceria striata)*	• **Native** to Rhode Islands • Perennial • 2 – 3 ft. height • OBL • **Cool Season**	• Suited to very wet sites • Low maintenance • 1,000,000 seeds/lb.
Pea, Beach *(Lathyrus japonicus)*	• **Native** to Rhode Island • Perennial with rhizomes	• Adapted to beach/dune sites • Seeded in moist, inter-dune areas
Red Top *(Agrostis alba)*	• Introduced to Rhode Island • Spreading, perennial grass • FACW • **Cool Season**	• Suited to full sun, wet or dry sites • Seed at 1 lb/ac. or less in mixes • Suited to pH 4.0-7.5 • Suited in mixes for waterways, road banks, diversions or critical areas • 4,900,000 seeds/lb.
Reed Grass, Blue Joint (Calamagrostis canadensis)	• **Native** to Rhode Island • Perennial • 4-5' height • Spreads by rhizomes • FACW+ • **Cool Season**,	• Adapted to wet sites with full sun • Tolerates flooded conditions • Suited for waterways, ditches, pond/stream banks • 4,000,000 seeds/lb.
Rush, Path (Juncus tenuis)	• **Native** to Rhode Island • perennial • 12" height • FAC-	• Adapted to full or partial sun • Tolerant of flooding , wet soils and compacted soils • Suited for cover of access road surfaces • 45,000,000 seeds/lb.
Switchgrass (Panicum virgatum)	• **Native** to Rhode Island • **Warm Season**, Bunchgrass • 3 -5' height, FAC • Provides excellent nesting and fall and winter wildlife cover • Expect 1-2 years for establishment	• Adapted to a wide range of sites: • Dry, Moist, Wet, Full Sun or Partial Sun • Tolerant of salt • Seed at 5 - 10 lbs. PLS per acre in mix or 15 lbs. PLS per acre alone • Suited to pH of 4.5-7.5 • 389,000 seeds/lb.

TABLE 4, cont. Characteristics of Grasses and Legumes		
Plant Name	**Plant Characteristics**	**Uses and Establishment Notes**
Ryegrass, Perennial (Lolium perenne)	• Introduced to Rhode Island • Fast Growing • Short lived perennial • 2 ft. mature height • FACU • **Cool Season**	• Best in moist soils and has fair drought tolerance • Seed in mixes at rate of 10 lbs./acre • 230,000 seeds/lb.
Trefoil, Showy-Tick (Desmodium canadense)	• **Native** to Rhode Island • Taproot • 2 – 5 ft. height	• Adapted to moist - dry open sites and all soil textures
Wild Rye, Canada (Elymus candensis)	• **Native** to Rhode Island • Perennial bunchgrass • 2 ½ - 6 ft. height • Good wildlife food and cover • FACU+ • **Cool Season**	• Suited to dry-moist sites with full sun or partial shade • Seed in mixes at 5 lbs./acre • 121,000 seeds/lb.
Wild Rye, Riverbank (Elymus riparius)	• **Native** to Rhode Island • Perennial bunchgrass • 3 - 5 ft. height • FACW • **Cool Season**	• Suited to moist to wet sites with partial shade • Tolerates flooding • 96,000 seeds/lb.
Wild Rye, Virginia (Elymus virginicus)	• **Native** to Rhode Island • Perennial bunchgrass • 4 – 5 ft. height • Good wildlife food and cover • FACW- • **Cool Season**	• Suited to wet sites but can tolerate drought. Can tolerate shade. • Good initial grass for seeding newly established wetlands • 73,000 seeds/lb.
Wood Reed, Stout (Cinna arundinacea)	• **Native** to Rhode Island • Perennial • 5 ft. height • FACW • **Cool Season**	• Adapted to interior woodland and woodland borders • Tolerant of shade • 2,100,000 seeds/lb.

TABLE 4 NOTES:

Wetland Plant Indicator Categories:

Abreviation	Indicator Category	Description	Probability of Occurance
OBL	Obligate Wetland	Occur almost always under natural conditions in wetlands	> 99%
FACW	Facultative Wetland	Usually occur in wetlands, but occasionally found in nonwetlands	67% - 99%
FAC	Facultative	Equally likely to occur in wetlands or nonwetlands.	34% - 66%
FACU	Facultative Upland	Usually occur in nonwetlands, but occasionally found in wetlands	1% - 33%
UPL	Obligate Upland	Occur in wetlands in another region, but occur almost always under natural conditions in nonwetlands here.	> 99%

(A positive (+) or negative (-) sign is used to indicate more or less regional frequency of occurrence in wetlands.)

TABLE 5: Recommended Permanent Seeding Mixtures by Purpose													
Purpose of the Planting	**Rhode Island Seeding Mix No.**												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Berms, Low Embankments (not on Ponds)	u	u	4	4	4	u			u	4	u		
Bottom of Drainage Ditches, Swales, Detention Basins				u	u		u	4	u		4		
Dikes and Dams				4	4	4			u	u			
Dune Stabilization												4	
Field Borders, Filter Strips, Contour Buffer Strips	u	u	u	u	4	u	u	u	u		u		
Grassed Waterways, Diversions, Terrace, Spillways				4	4		u	u	u		u		
Mine Spoil, Dredged Material, and Spoil Banks	u	u	4	u	u	u			u		u		
Pond and Channel Banks, Streambanks				4	u		4	u	u		u		
Sand and Gravel Pits, Sanitary Landfills	4	4	4	u	u	u			u	u			
Steep Slopes, Roadsides	4	4	4	u	u	4				4	u		
Tidal Shores													4
Utility Rights-of-Way			u	u	u	4	u		u	u			

TABLE 5 NOTES: for use with table 6

4 Recommended best mix for this purpose.

u Alternative mix, depending on site conditions.

TABLE 6: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivars	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. Switchgrass *Panicum virgatum*	Blackwell, Carthage, Cave-in-Rock, or Shelter	10	0.23	E - MW	3-4	C - D	**Good sand stabilizing mixture using all native species.** If little bluestem is used, mix needs to be seeded with a specialized native grass drill.
Little (seacoast) bluestem *Schizachyrium scoparium (var. littoralis)*	Aldous, Blaze, or coastal ecotype	3	0.07				
Canada Wildrye *Elymus canadensis*	Common	5	0.11				Canada wildrye is a quick establishing, short-lived companion grass.
OPTIONAL:							
Purple lovegrass *Eragrostis spectablis*	Common	2	0.05				Purple lovegrass seed may be difficult to obtain commercially.
PLUS TWO OF THE FOLLOWING LEGUMES:							
Partridge Pea *Chamaecrista fasciculata*	Common	4	0.09				Partridge pea is a reseeding annual with good wildlife value. All the legumes are adapted to coastal conditions. Beach pea seed may be difficult to obtain.
Beach pea *Lathyrus japonicus*	Common	2	0.05				
Wild Indigo *Baptisia tinctoria*	Common	2	0.05				
2. Big Bluestem *Andropogon gerardii*	Niagara	3	0.07	E - MW	5 - 8	C - D	**Eastern prairie mixture using all species native to Rhode Island.** The indiangrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. On highly erodible sites, include a temporary (annual) grass at 1/3 the rate specified in the table, for quick cover. All the legumes are perennials except partridge pea, which is a reseeding annual. All are adapted to droughty soils. Tick trefoil is also adapted to finer textured soils.
Indiangrass *Sorghastrum nutans*	Rumsey	3	0.07				
Little Bluestem *Schizachyrium scoparium*	Aldous or Blaze	4	0.09				
Switchgrass Panicum virgatum	Blackwell, Carthage, Cave-in-Rock, or Shelter	5	0.11				
PLUS ONE OR MORE LEGUMES:							
Partridge Pea *Chamaecrista fasciculata*	Common	4	0.09				
Bushclover *Lespedeza capitata/hirta*	Common	2	0.05				
Wild Indigo *Baptisia tinctoria*	Common	2	0.05				
Showy Tick-Trefoil *Desmodium canadense*	Common	1	0.02				

TABLE 6, cont. Permanent Herbaceous Seeding Mixtures							
Mix	**Recommended Cultivars**	**Seeding Rate 1/**		**Soil Drainage Class 2/**	**Max. Height (feet)**	**Maint. Level 3/**	**Remarks**
		lbs./ac.	*lbs./ 1000 sq .ft.*				
3. SELECT THREE GRASSES:							**Dredge disposal mix. Excellent for excessively droughty and low pH (4.0) soils**
Deertongue *Dicanthelium clandestinum*	Tioga	10	0.23				
Broomsedge *Andropogon virginicus*	Common	3	0.07				If broomsedge is used, a specializd seed drill is needed for fluffy seed.
Redtop *Agrostis gigantea*	Streaker, Fireball	1	0.02				
PLUS: Sheep Fescue *Festuca ovina* **OR**	Azay, Covar	15	0.34	E - MW	2-4	C - D	Sheep fescue, Canada wild rye, and Redtop are cool-season companion grasses that will provide immediate cover for erosion protection.
Canada Wild Rye *Elymus canadensis*	Common	5	0.11				
PLUS: Flatpea *Lathyrus sylvestris* **And/Or**	Lathco	10	0.23				Flatpea is tolerant of low pH (4.0)
Partridge pea *Chamaecrista fasciculata*	Common	4	0.09				Partridge pea is tolerant to pH 5.0
4. Deertongue *Dicanthelium clandestinum* **OR**	Tioga	10	0.23				**Grassed waterway/Streambank mix**
Switchgrass *Panicum virgatum*	Blackwell, Carthage, Shelter, Cave-in-Rock	10	0.23				(Good mix for variable soil moisture conditions.)
And: Creeping Red Fescue *Festuca rubra* var. *rubra*	Ensylva, Longfellow, Pennlawn	20	0.46				Use switchgrass in grassed waterways.
				W - P	2 - 3	C - D	Creeping red fescue provides a quick, low growing cover.
Select One of the Following:							
Virginia Wild Rye *Elymus virginicus*	Common	5	0.11				Use Virginia or Riparian wild rye on moist, shady sites; Canada wild rye on droughty sites.
Riparian Wild Rye *Elymus riparus*	Common	5	0.11				
Canada Wild Rye *Elymus canadensis*	Common	5	0.11				
COOL-SEASON GRASS MIXES							
5. Creeping Red Fescue *Festuca rubra* var. *rubra*	Ensylva, Longfellow, Pennlawn	15	0.34				**Traditional grassed waterway mix.**
Perennial Ryegrass *Lolium perenne* **OR**	Blazer II, Pennfine	10	0.23				Use redtop on acid soils (<5.5)
Redtop *Agrostis gigantea*	Streaker, Fireball	1	0.02	W-P	2-3	C-D	
And: Alsike clover *Trifolium hybridum*	Common	2	0.05				Alsike clover is adapted to wet soils.

TABLE 6, cont. Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivars	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	*lbs./ 1000 sq .ft.*				
6. Orchardgrass Dactylis glomerata **OR**	Any forage variety	10	0.23	MW-SWP	1-2	C-D	**Good mix for utility rights of way.**
Hard Fescue *Festuca trachyphylla*	Biljart, Scaldis, Spartan,	20	0.46				Use orchardgrass if wildlife forage is desired.
And:	Tornament						Use redtop for wetter and lower pH soils.
Perennial Ryegrass *Lolium perenne* **OR**	Blazer (II), Pennfine	10	0.23				
Redtop *Agrostis gigantea*	Streaker, Fireball	1	0.02				Flatpea suppresses woody vegetation
Plus: Flatpea *Lathyrus sylvestris*	Lathco	15	0.34				
7. Virginia/Riparian Wild Rye *Elymus virginicus/riparius*	Common	5	0.11	SWP-P	2-3	D	**Riparian area mix**
Bottlebrush grass *Elymus hystrix*	Common	2	0.05				Good native species mix for shady, moist conditions (forested floodplain)
(Optional):							
Wood reedgrass *Cinna arundinacea*	Common	1	0.02				Wood reedgrass, Fringed bromegrass and Groundnut seed may be difficult to obtain.
Fringed bromegrass *Bromus ciliatus*	Common	1	0.02				
Groundnut *Apios americana*	Common						
8. Canada bluejoint *Calamagrostis canadensis*	Common	2	0.05	SWP-P	3-4	D	**All native grass mix for waterways, ditches, and pond banks.**
Fowl Meadowgrass *Poa palustris*	Common	2	0.05				Seed may be difficult to obtain.
Creeping bentgrass *Agrostis stolonifera*	Common	1	0.02				
9. Canada wildrye *Elymus canadensis* **OR**	Common	3	0.07	W - SP	2 - 3	C - D	**Successional mix.** Use to provide quick, non-aggressive cover that allows indigenous vegetation to volunteer.
Virginia wildrye *Elymus virginicus*	Common	3	0.07				
Perennial ryegrass **Or**	Common	5	0.11				
Redtop *Agrostis gigantea*	Streaker, Fireball	1	0.02				Use Canada wildrye and redtop in droughty soils.
Plus: (optional)							
Partridge pea *Chamaecrista fasciculata* **OR**	Common	2	0.05				Use partridge pea on dry sites and tick trefoil on moist sites.
Tick trefoil *Desmodium canadense*	Common	1	0.02				

TABLE 6, cont. Permanent Herbaceous Seeding Mixtures							
Mix	**Recommended Cultivars**	**Seeding Rate 1/**		**Soil Drainage Class 2/**	**Max. Height (feet)**	**Maint. Level 3/**	**Remarks**
		lbs./ac.	*lbs./ 1000 sq .ft.*				
10. Chewings Fescue *Festuca rubra* ssp.*commutata*	NE turf-types 4/	15	0.34	E - MW	2 - 3	C - D	**Erosion Control/Wildflower mix** Attractive mix of fine fescues and wildflowers for low maintenance conditions. Once well-established, the grasses may tend to outcompete the wildflowers.
Hard Fescue *Festuca trachyphylla*	NE turf-types 4/	15	0.34				
Sheep Fescue *Festuca ovina*	NE turf-types 4/	15	0.34				
PLUS WILDFLOWER MIX:							
Black-eyed Susan *Rudbeckia hirta*	Common	2	0.05				Hydroseeding is not recommended for this mix if wildflowers are used. (They have very small seeds.)
Lance-leaved Coreopsis *Coreopsis lanceolata*	Common	2	0.05				
Purple Coneflower *Echinacea purpurea*	Common	2	0.05				
Partridge Pea *Chamaecrista fasciculata*	Common	5	0.11				
11. Alkali Saltgrass *Puccinellia distans*	Fults or Salty	20	0.46	W - P	2 - 3	B - D	**Saline (salt) adapted mix** Alkaligrass will persist only under saline conditions.
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Ensylva, Longfellow, Pennlawn,	15	0.34				
Perennial ryegrass Lolium perenne	Pennfine	5	0.11				Use the 'Dawson' variety of creeping red fescue in saline conditions.
OPTIONAL ADDITION							
Creeping Bentgrass *Agrostis stolonifera*	Seaside, Southshore	2	0.05				Add bentgrass for wet, saline conditions.
12. American Beachgrass (*Ammophila breviligulata)*	'Cape'	18" centers	18" centers	E - MW	3	D	**Dune stabilization** Vegetative planting with dormant culms, 3-5 culms per planting.
13. Smooth Cordgrass *(Spartina alterniflora)* Saltmeadow Cordgrass *(Spartina patens)*	'Avalon'	12-18" centers	12-18" centers		1 - 8	D	**Tidal Shores** Vegetative planting with transplants.

TABLE 6 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.

1. **Soil Drainage Class** (see county soil survey):

   E - Excessively Drained
   W - Well Drained
   MW - Moderately Well Drained
   SP - Somewhat Poorly Drained
   P - Poorly Drained

2. **Maintenance Level**:

   A - Intensive mowing (every 2 - 4 days), fertilization, lime, insect and weed control, and watering (examples: high maintenance 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, dunes and tidal shores)

4. **Recommended Cultivars**. See University of Massachusetts, Connecticut, or Rhode Island's Cooperative Extension Service Turfgrass Fact Sheets.

TABLE 7: Recommended Planting Dates for Permanent Cover [1/]				
Type of Plant Material		**Plant Hardiness Zones**		
		Ma - 4b & 5a	**RI - 5b**	**RI - 6a, 6b, & 7a**
Grasses & Legumes	Cool-Season Seed Mixes	Apr. 1 to May 31 Aug 1 to Sep 10	Apr.1 to May 15 Aug 1 to Oct 15	Mar. 15 to May 15 Aug 15 to Oct 31
	Warm-Season/ Cool-Season Seed Mixes	Apr. 1 to May 15 (Jun 1 to Jun 15)*	Apr. 1 to May 31 (May 1 to Jun 15)*	Mar.15 to Jun.15 (May 1 to May 31)* Nov 1 to Dec. 31♦
	Cool-Season Sod	Apr. 1 to May 31 (Jun 1 to Aug 15)* Aug. 15 to Oct 1	Apr.1 to May 15 (May 1 to Sep 1)* Sept.1 to Oct 15	Mar. 15 to May 15 (May 1 to Sep 15)* Sept 15 to Oct.30
Forbs	Seeds	Apr.1 to May 31 Aug.15 to Sept.15	Apr. 1 to May 15 Sept.1 to Oct.15	Mar.15 to May 15 Sept.15 to Oct.30
	Bare-Root Seedlings	Apr 1 to May 31 Jun 1 to Jun 30*	Mar 15 to May 30 May 15 to Jun 30*	Feb 15 to May 30 May 1 to Jun 30*
	Containerized Stock	Same as bare-root except: Sept.1 to Oct.15*	Same as bare-root except: Sept.15 to Nov.1*	Same as bare-root except: Sept.15 to Nov.1*

TABLE 7 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 Cape and Islands, 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 8: Species for Tree and Shrub Plantings

Trees For Dry-Open Sites

Scientific Name	Common Name	Mature Height
Betula populifolia	Gray Birch	30’
Juniperis virginiana	Eastern Red Ceder	10-75’
Pinus resinosa	Red Pine	70’
Pinus rigida	Pitch Pine	50’
Pinus strobus	White Pine	80’
Quercus rubra	Red Oak	70’
Quercus coccinea	Scarlet Oak	70’
Quercus velutina	Black Oak	70’

Shrubs For Dry-Open Sites

Scientific Name	Common Name	Mature Height
Amelanchier canadensis	Shadbush	15’
Ceanothus americanus	New Jersey Tea	4’
Comptonia peregrina	Sweetfern	4’
Cornus racemosa	Gray Dogwood	6-10’
Gaylussacia baccata	Black Huckleberry	1’
Hypericum prolificum	Shrubby St. Johnswort	4’
Juniperus communis	Pasture Juniper	2’
Myrica pensylvanica	Bayberry	6’
Prunus maritima	Beachplum	6’
Rhus aromatica	Fragrant Sumac	3’
Rhus copallina	Shining Sumac	4-10’
Rhus glabra	Smooth Suma	9-15’
Rosa carolina	Pasture Rose	3’
Rosa virginiana	Virginia Rose	3’
Spirea tomentosa	Steeplebush	3-4’
Viburnum dentatum/recognitum	Arrowood	5-8’
Viburnum lentago	Nannyberry	15’

Shrubs For Dry-Shady Sites

Scientific Name	Common Name	Mature Height
Hamamelis virginiana	Witch Hazel	15’
Kalmia latifolia	Mountain Laurel	3-8’
Rhododendron nudiflorum	Pinxterbloom Azalea	4-6’
Vaccinium angustifolium	Lowbush Blueberry	2’
Viburnum dentatum	Arrowood	5-8’

Trees For Moist Sites

Scientific Name	Common Name	Mature Height
Acer rubrum	Red Maple	60’
Betula nigra	River Birch	
Chamaecyparis thyoides	Atlantic White Ceder	
Fraxinus pennsylvanica	Green Ash	60’
Picea mariana	Black Spruce	40’
Picea glauca	White Spruce	
Picea rubens	Red Spruce	70’

Trees For Moist Sites, cont.

Scientific Name	Common Name	Mature Height
Populus deltoides	Eastern Cottonwood	80-100’
Populus tremuloides	Quaking Aspen	30-60’
Salix nigra	Black Willow	40’
Tilia americana	Basswood	60-80’

Shrubs For Moist-Open Sites

Scientific Name	Common Name	Mature Height
Amelanchier canadensis	Shadbush	15’
Aronia arbutifolia/melanocarpa	Chokeberry	8-12’
Clethra alnifolia	Sweet Pepper Bush	3-10’
Cornus amomum	Silky Dogwood	15’
Cornus sericea	Red Osier Dogwood	7-10’
Cornus racemosa	Gray Dogwood	6-10’
Corylus americana	American Hazelnut	10’
Corylus cornuta	Beaked Hazelnut	10’
Ilex glabra	Inkberry	2-6’
Ilex verticillata	Winterberry	10’
Kalmia angustifolia	Sheep laurel	3’
Leucothoe fontanesiana	Drooping Leucothoe	3-7’
Lindera benzoin	Spicebush	10’
Sambucus canadensis	Elderberry	6’
Spirea latifolia	Meadowsweet	5’
Salix discolor	Pussy Willow	10’
Rhododenron maximum	Rosebay	12-15’
Rhododendron viscosum	Swamp Azalea	8’
Rubus odoratus	Pink Flowering Raspberry	5’
Viburnum cassinoides	Wild Raisin	6’
Vaccinium corymbosum	Highbush Blueberry	10’
Viburnum dentatum	Arrowood	5-8’
Viburnum trilobum	Highbush Cranberry	7’

Shrubs For Moist-Shady Sites

Scientific Name	Common Name	Mature Height
Corylius americana	Americn Hazelnut	6’
Cornus amomum	Silky Dogwood	15’
Hamamelis virginiana	Witch-hazel	15’
Kalmia latifolia	Mountain laurel	3-8’
Leucothoe fontanesiana	Drooping leucothoe	6’
Leucothoe racemosa	Swamp doghobble	8’
Lindera benzoin	Spicebush	10’
Lonicera villosa	Mt. Fly Honeysuckle	4’
Rhododendron arborescens	Sweet Azalea	9’
Rhododendron carolinianum	Carolina Rhododenron	6’
Rhododendron maximum	Rosebay Rhododendron	12-15’
Rubus odoratus	Pink Flowering Raspberry	5’
Vaccinium corymbosum	Highbush Blueberry	6-8’
Viburnum acerifolium	Maple-leaved Viburnum	6-8’
Viburnum dentatum	Arrowwood	5-8’
Viburnum trilobum	Highbush Cranberry	6-10’

Trees For Wet Sites

Scientific Name	Common Name	Mature Height
Acer negundo	Box Elder	60’
Acer Rubrum	Red Maple	60’
Acer saccharinum	Silver Maple	70’
Chamaecyperis thyoides	Atlantic White Ceder	
Fraxinus pennsylvanica	Green Ash	40’
Fraxinus nigra	Black Ash	45’
Nyssa sylvatica	Black Tupelo	40-60’
Platanus occidentalis	Sycamore	100’
Thuja occidentalis	White Ceder	60’
Larix laricina	American Larch	80’
Quercus palustris	Swamp White oak	50-70’

Shrubs For Wet Sites

Scientific Name	Common Name	Mature Height
Alnus rugoas/serulata	Speckeld/Smooth Alder	10-15’
Cephalanthus occidentalis	Buttonbush	7’
Clethra alnifolia	Sweet Pepperbush	3-10’
Cornus amomum	Silky Dogwood	7’
Decodon verticillatus	Water Willow	3-5’
Ilex glabra	Inkberry	2-6’
Ilex verticillata	Winterberry	10’
Kalmia angustifolia	Sheep Laurel	3’
Lindera benzoin	Spicebush	10’
Lyonia ligustrina	Maleberry	2’
Salix discolor	Pussy Wllow	10’
Sambucus canadensis	Elderberry	6’

Trees For Sand Dunes

Scientific Name	Common Name	Mature Height
Juniperus virginiana	Eastern Red Cedar	

Shrubs For Sand Dunes

Scientific Name	Common Name	Mature Height
Myrica pensylvanica	'Wildwood' Bayberry	
Prunus maritima	'Ocean View' Beach Plum	
Rosa rugosa	'Sandy' Rugosa Rose	

Table 8. Establishment Note:
Wetland restoration/creation and establishment of riparian buffers call for planting stock adapted to moist or wet sites that also may be subject to flooding. The species listed above all occur naturally in the identified site moisture conditions, however attention needs to be given to the origin and source of the seedling stock to be planted. Origin is the geographic location where the seed or plants were first collected. Source is the supplier of the plants. Seedlings are oftentimes shipped long distances from production nurseries to wholesale nurseries from one region of the country to another. In situations like this, the species may not perform well in the habitats they will be introduced to and the plantings may fail. It is best to assure the origin and source of the material is adapted to the habitat of the planting site.

TABLE 9: Establishment of Dune Vegetation							
Cultivar	**Planting Dates**	**Planting Unit**	**Method**	**Size**	**Depth**	**Spacing**	**Notes**
American Beachgrass	October 15 to April 1; non-frozen soil condition	Minimum two stems (culms) per hole	Hand placed, vegetable or tree planter	16 to 18 inch stems; > ¼ inch diameter	Approx. 8" deep (≥7" ≤9")	Severe sites = 12"X12" Normal sites = 18"X18" Stable sites = 24"X24"	Plant > 100 feet of horizontal distance from the mean high tide (MHT) water line. Plant a minimum of 10 parallel rows; stagger rows to maximize protection. Firm soil around plants to eliminate air pockets. If using dredged fill, allow salts to leach out before planting and allow rains to compact sands.
Saltmeadow Cordgrass	May 1 to June 15	3 to 5 live stems placed bare-root or container stock	Hand placed, or vegetable planter	> 12 inches	2 inches below the nursery grown depth	18 to 36 inches depending on the severity of the planting site	Utilize this species in low elevation sites of sand dunes that are frequently inundated.
Shrubs & Trees	March 15 to April 15, unless soil is frozen	1/1 or 2/1 or greater bare-root seedlings or container transplants	Hand placed, or tree planter	> 12 inches tall	2 inches below the nursery grown depth	4 to 6 feet apart; stagger rows for maximum protection	To ensure establishment (first 2 years) all competing vegetation must be removed from within 2 feet of each plant. It is important not to fertilize the surrounding vegetation which will potentially out-compete the tree or shrub.

APPENDIX A.

DESIGNING CUSTOM SEED MIXTURES

SECTION I

READING & UNDERSTANDING SEED LABELS

INTRODUCTION

Certified seed is the progeny of seed that has been handled to maintain genetic identity and purity and has been approved by a certifying agency. Certified seed should be your first choice for any seeding project. If Certified seed is not available, then try to obtain non-certified seed that may meet certification standards for purity, germination, weed seed, and noxious weed seed. Be extremely careful in choosing a particular seed lot to ensure that it meets quality standards.

Seed lots vary widely in quality. The key to getting the best quality is to look at the information on the seed tag.

Law requires that each lot offered for sale must be truthfully labeled. This applies to a single species or a mixture, certified or non-certified.

The Federal Seed Act and State Seed laws dictate the information found on the seed tag (Figure 1). All state certification agencies comply with the minimum requirements and standards of the Association of Official Seed Certification Agencies (AOSCA). Additional information can vary slightly from state to state. If the seed is Certified, it will also have a certification tag (Figure 4) which establishes that the seed meets standards for each class of seed.

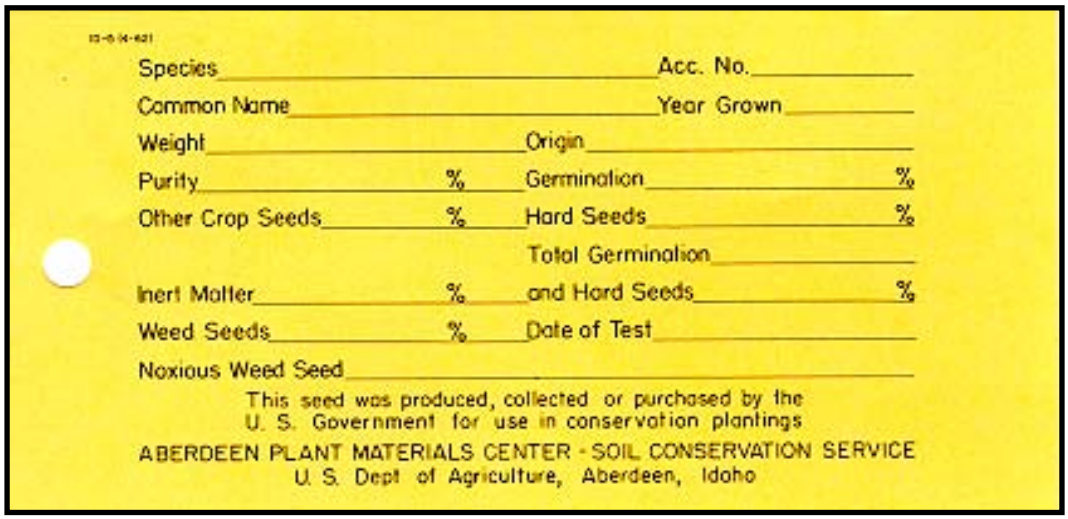

Species _____ Acc. No. _____
Common Name _____ Year Grown _____
Weight _____ Origin _____
Purity _____ % Germination _____ %
Other Crop Seeds _____ % Hard Seeds _____ %
Total Germination
Inert Matter _____ % and Hard Seeds _____ %
Weed Seeds _____ % Date of Test _____
Noxious Weed Seed _____
This seed was produced, collected or purchased by the U. S. Government for use in conservation plantings
ABERDEEN PLANT MATERIALS CENTER - SOIL CONSERVATION SERVICE
U. S. Dept of Agriculture, Aberdeen, Idaho

Figure 1: Example of a seed tag used at the USDA, Natural Resources Conservation Service, Plant Materials Centers

Information On A Seed Tag:

1) Variety and kind (Species and Common name)
2) Lot number
3) Origin
4) Net weight
5) Percent pure seed
6) Percent germination (w/date of test)
7) Percent inert matter
8) Percent other crop seed
9) Percent weed seeds
10) Name of restricted noxious seed (number per pound of seed)
11) Prohibited noxious seeds are not allowed.
12) Name and address of company responsible for analysis (seller)

Variety and kind (species and common name), lot number, origin, and net weight are all obtained from the grower, seed conditioner (seed cleaner), or seed dealer. The remaining information is obtained from the Seed Analysis Report (Figures 2 and 3), which is completed by an official seed laboratory (government or commercially run) authorized by the state Department of Agriculture.

The seed lab performs a number of tests on a representative sample from each lot submitted by state or certification officials, growers, seed conditioners, or seed dealers. The tests are conducted under controlled conditions based on the "Rules for Testing Seed adopted by the Association of Official Seed Analysts."

It is your right to receive a copy of the Seed Analysis Report, which will list all seeds found in the test sample. With the report in hand, you will be able to make a more informed decision on using a particular seed lot or which lot you want to seed.

PURITY TEST

A purity test separates pure seed, inert matter, other crop seed, and weed seed.

- **Purity:** Expresses the composition of the seed lot and its degree of contamination by unwanted components. Purity + inert matter + weed seed + other crop seed must add up to 100%.
- **Inert Matter:** Includes dirt, plant parts, and certain types of damaged seeds. Most grass seed should contain no more than 15% inert matter. Even low percentages of inert matter containing pieces of stem or unthreshed seed clusters can block passage through a drill.

Note: Purity and inert matter of grass, forb and shrub seed will vary by species.

- **Other Crop Seeds:** Seeds of species normally grown for crops that occur in amounts of 5% or less. If the types of other crop seed are a concern, you may request a complete seed analysis report for the lot, which lists other crop species and the number of seeds per pound of each crop.
- **Weed Seeds:** Total amount of common and restricted weed seed found in the lot.

Note: The number of noxious weed seeds per pound is listed separately.

PROHIBITED AND RESTRICTED WEEDS

During the purity test, the seed lot sample is examined for the presence of Restricted and Prohibited Noxious Weed seed. Each state has its own list of Prohibited and Restricted Noxious Weeds. Prohibited noxious weeds are not allowed in any lot of seed. Restricted noxious weeds are allowed in seed but the amount of weed seed is restricted. Prohibited and Restricted

noxious weeds vary from state to state, but any seed lot must meet the regulations of the state where it is sold. These lists are assembled from input provided by seed growers, crop improvement associations, seed dealers, and others. They are part of each states' seed laws. They do not necessarily include weeds that every group considers noxious.

By the Federal Seed Act and state laws, seed lots can not be sold when they contain any prohibited noxious weed seeds. The analysis must indicate that no prohibited noxious weed seeds are present. Seed lots may contain only a small percentage of Restricted Noxious Weed seeds.

The name and number of seeds per pound of any restricted noxious weeds must be listed on the label. This means that any one of the weed seeds on the Restricted List can be included in a Certified seed lot up to the maximum number of seeds allowed by law. Each state requires similar information. The main differences are in the Prohibited and Restricted Weed lists from state to state.

You should identify your particular state's requirements so you know what you are legally entitled to or legally obligated to do. By law, seed that comes from a state that has less restrictive weed lists must meet the more restrictive requirements of the receiving state. Contact the State Department of Agriculture or the crop improvement association in your state for specific information.

COMMON WEEDS

"Common" weed seeds are those weeds that are not on the Prohibited or Restricted Noxious Weed lists. Common weed seed should not total more than 0.5% by weight. This will vary according to state seed laws.

The major problem with common weeds is that you don't know what they are because they are not listed on the tag. The only way you'll know what they are is from the Seed Analysis Report. In general, the fewer weed seeds the better. Some weeds are worse than others in pasture and rangeland plantings so use caution when purchasing seed with weed seed present. Even with only a few seeds per pound, you can have more than enough weed seed to infest thousands of acres.

GERMINATION TEST

A germination test samples for total viability, including the sum of all seeds (of a "kind" listed on the label) actually germinating using standard laboratory methods + hard seed and/or dormant seed.

- **% Germination:** A germination test determines the capability of a seed lot to produce normal seedlings under favorable controlled conditions. Total germination is the percent germination added to the percent hard and/or dormant seed. Anything under 100% total germination represents the presence of dead seed and/or seed that doesn't produce a shoot or root.
- Germination may also be estimated by the use of a tetrazloium chloride test (TZ test) in which seeds are stained with a dye to determine viability. Viable seed with live (respirating) tissues will stain a red color. However, not all states

recognize the use of a TZ test for all species.

- **Dormant Seed:** Includes hard seed, refers to the portion of the seed sample that doesn't germinate during the seed test. Reasons for dormant seed are: 1) the seed coat is impervious to water, and/or 2) internal structures within the seed prohibit oxygen exchange. Hard seed may germinate at a later date and produce a viable plant, or it may germinate and succumb to competition, or it may never germinate at all.

The higher the germination percentage, the better. Germination of most grass species is normally above 80% and should not be lower than 60%. Germination of some native grasses, forbs, and shrubs may be lower, but can vary widely according to species.

Germination tends to decrease in all seed as it ages and some species loose germination more rapidly than other species, even under ideal seed storage conditions. For example, winterfat and forage kochia are noted for having a very short seed life and may be viable for only 1-2 years. Most species maintain germination at constant levels for several years and then slowly begin to decline as time passes. The rate of decline in germination varies widely between species as well as between seed lots of the same species.

The germination test date should be current due to the natural decline in germination over time. Grass, forb and legume seed should be updated every 9-18 months depending on state laws. Flower, shrub and tree seed should be updated every 9 months.

CERTIFIED SEED

The use of Certified seed helps protect the buyer**.** It is of the best quality because it must meet specific standards of high genetic purity, germplasm identity, high germinating ability, and minimum amounts of other crop seed, weed seed, and inert matter. A clear understanding of certified seed standards for each individual state is critical in order to know what is in a particular lot of seed.

AOSCA recently published "Pre-Varietal Germplasm Certification Standards" for the certification of germplasm that have not been released as a cultivar (variety). These standards offer a reliable way for the seed industry to offer Certified seed of races or ecotypes to the buyer that still have genetic identity but have not gone through the extensive testing required for a varietal release. This means that seed of plants released under the alternative release procedures can be made available to the user in the field much faster. It also means that the full range of adaptation and many performance traits may not be fully known. These new alternative release procedures are now commonly being used for many native species. See Figure 4 for examples of the tags used for both varietal and pre-varietal certified seed.

SECTION II

PURE LIVE SEED (PLS) –WHAT IT IS AND HOW TO USE IT

All NRCS recommendations for calculating seed mixtures are expressed in pounds of Pure Live Seed (PLS). PLS is defined as the percentage of pure seed that will germinate expressed as a percentage of a given weight of seed and is a means of expressing seed quality. It provides a common basis for comparing seed lots that differ in purity and germination. It is also used to adjust seeding rates to achieve the desired stand. Seeding rates based on a PLS basis, will insure that the same amount of viable seed per acre will be planted even though quality of different seed lots and total amount of material (bulk) seeded per acre may vary considerably. The basic formula to calculate PLS is:

$$\textbf{PLS} = \frac{\text{Percent Purity X Percent Germination}}{100}$$

The information necessary to complete this calculation is found on the seed tag or the Seed Analysis Report. Refer to Table 5 in the Practice Standard for Minimum Seed Quality Standards.

An example of how to calculate PLS is:

Creeping Red Fescue: Seed tag indicates this lot has 99.01% purity and 87% germination. The calculation would be:

$$\textbf{PLS} = \frac{(99.01) \times (87)}{100} \qquad \textbf{PLS} = 86.14\ \%$$

Once PLS is determined for the lot of seed, it can be used to compare the seed costs of two different priced lots of seed. For example, Dealer X has the same variety of creeping red fescue as Dealer Y, but it is $0.20 cheaper than Dealer Y's seed. Which is a better deal? The way to calculate this is to use the following formula:

$$\textbf{Price/Pound (PLS)} = \frac{\text{price / pound bulk}}{\text{percent PLS}}$$

Dealer Y's Creeping red fescue seed is selling for $.90 per pound. The seed analysis report lists the purity as 99.5% and the germination as 90.0%. Dealer X's Creeping red fescue seed is selling for $.70 per pound. The seed analysis report lists the purity as 93.0% and the germination as 60.0%. Using this information, the actual price per pound of Pure Live Seed is:

Dealer Y:

Bulk Price per pound (PLS) = $\frac{\$.90}{0.895}$

Price Per Pound (PLS) = $1.01

Dealer X:

Bulk Price per pound (PLS) = $\frac{\$.70}{0.558}$

Price Per Pound (PLS) = $1.25

From these calculations, it is easy to see that the posted price is not always the least price or the best buy.

ADJUSTING SEEDING RATES

In order to seed the recommended PLS seeding rate, the bulk rate of seeding needs to be determined. This is the rate at which the drill will be set. This rate will always be greater than the pure live seed rate. The formula to calculate the bulk seeding rate is:

$$\textbf{Pounds Bulk Seeding Rate Per Acre} = \frac{\text{Pounds PLS Recommended Rate/Acre}}{\text{Percent PLS}}$$

An example of how to use this formula is listed below. The NRCS recommended seeding rate for switchgrass is 5 pounds PLS per acre. The PLS is calculated to be 80.0 %. The bulk rate needed to seed the recommended PLS rate is determined by:

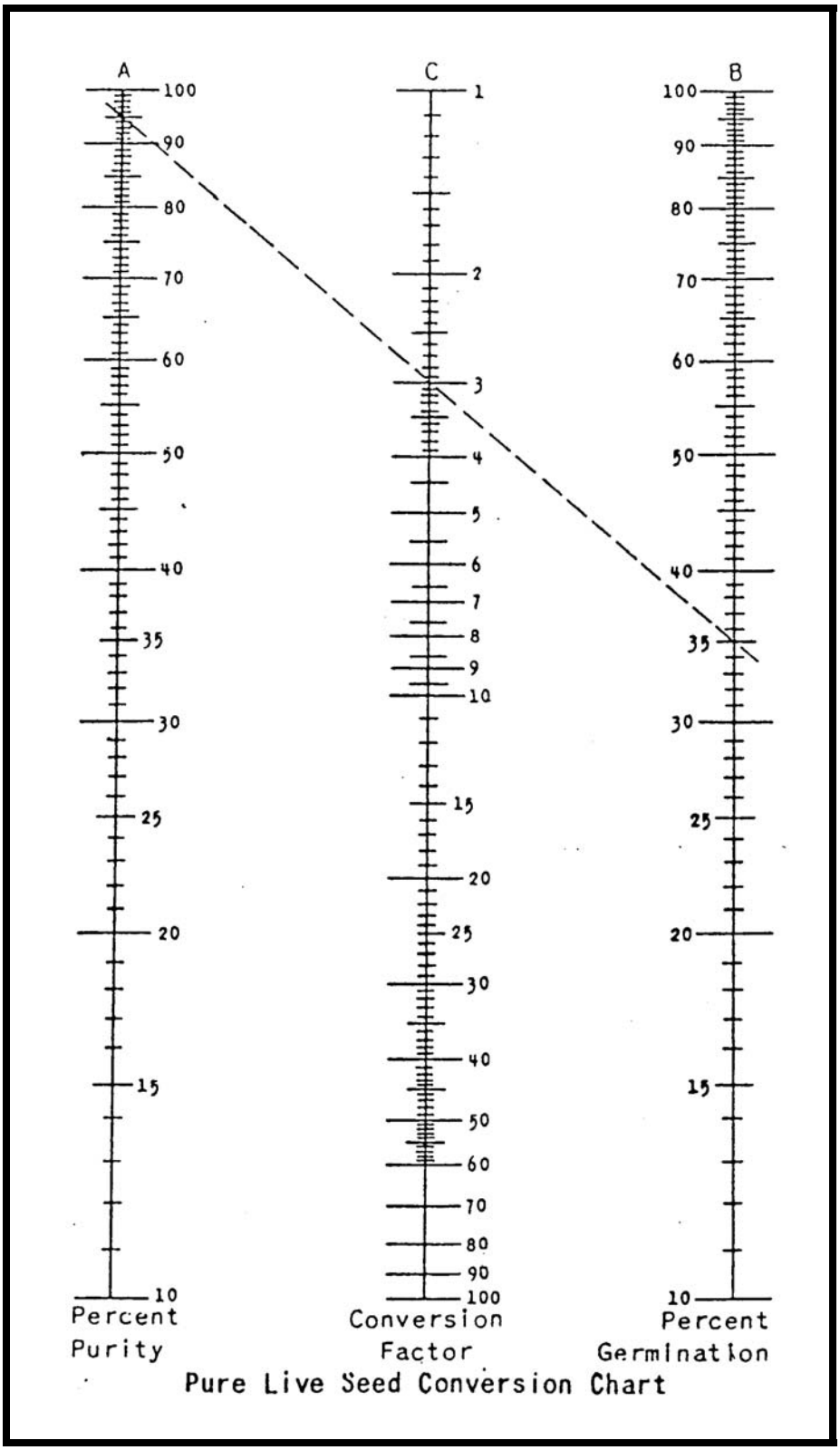
Pounds Bulk Seeding Rate Per Acre =

$$\frac{\text{5 lbs. PLS Recommended Rate/Acre}}{\text{0.80 PLS}}$$

Bulk Seeding Rate/Acre = 6.25 pounds

Based on these calculations, the drill box setting on the planting drill would be as close to 6.25 pounds per acre as the model of drill will allow.

The chart on the following page can be used to convert any Lot of Seed to the bulk equivalent based on purity and germination.



To Use the Chart

Locate the percent purity and percent germination from the seed lot on lines A and B.

Lay a straight edge between these two points.

The point of intersection with line C is the conversion factor for this lot of seed.

Example:

Purity 95% - line A

Germination 35% line B

Conversion factor = 3.0 line C

It will take 3 pounds of this seed lot to equal 1 pound pure live seed (PLS).

If the PLS seeding rate is 5 lb./ac., then 5 x 3 = 15 lb./ac. would be the bulk seeding rate for this seed lot.

SECTION III

STEPS IN PLANNING A SEED MIXTURE

PLANNING A SEEDING MIXTURE

1. Select desired and adapted species to be used from Table 3. in Specifications Guide.
2. Determine species composition of mixture using information in the following Table 1.
3. Calculate PLS pounds/acre by species:

   $$\frac{\text{(PLS seeds/sq. ft. } \mathbf{x} \text{ 43,560)}}{\text{(\# seeds/pound)}}$$

4. Calculate planting PLS pounds for each species:

   (PLS pounds/ac. **x** number of acres)

5. Order seed on a PLS basis.
6. For broadcast seedings, blend the species together into the seeding mixture prior to planting. If using a native grass drill, keep chaffy seeds, small seeds (smooth grass/forb seed), and large seeds separate. Each type of seed will be placed in a separate box on the drill, which the seeding rate can be calibrated independently.

Sample Seeding Mixture Rate Calculation

Where a seed mix will be used, the percent of each species desired in the mixture needs to be determined. This calculation is (the percent desired in seed mix) **x** (pounds PLS recommended per acre)= Pounds PLS mix per acre.

An example: Of the desired seed mix, 85% will be **'Rumsey'** indiangrass. This lot of seed has a 90% PLS. The NRCS recommended seeding rate is 4 pounds PLS/acre. The remaining 15% of the mix is '**Covar'** sheeps fescue. This lot of seed has an 85% PLS. The NRCS recommended seeding rate is 20 pounds PLS/acre.

- **Rumsey** (0.85%) x (4 Pounds PLS/Acre)
  = 3.4 Pounds PLS/Acre Mixed
- **Covar** (0.15%) x (20 Pounds PLS/Acre)
  = 3.0 Pounds PLS/Acre Mixed

Next, determine the amount of bulk seed (mixed) per acre. This will use the same formula as explained above:

- **Rumsey**: $\frac{\text{3.4 Pounds PLS/Acre}}{\text{90\%}}$

  = 3.7 Pounds Bulk Mixed/Acre

- **Covar**: $\frac{\text{3.0 Pounds PLS/Acre}}{\text{85\%}}$

  = 3.5 Pounds Bulk Mixed/Acre

Finally, multiply the pounds of bulk seed per acre for each species by the acres to be seeded to obtain the total bulk seed required for the entire seeding project acreage

TABLE 1: Seeding Chart for Grasses & Legumes					
Common Name	**Scientific Name**	**Max. % of mixture**	**Seeding rate (PLS) lb./ac.**	**Seeds/sq. ft.**	**# seeds/lb.**
Beachgrass, American	*Ammophila breviligulata*	N/A	Veg. only	Veg. only	Veg. only
Bentgrass, Creeping	*Agrostis stolonifera var. palustris*	5	0.5-1.0	52-104	4,540,000
Bluestem, Big	*Andropogon gerardii*	75	2.0-4.0	7.5-15	165,000
Bluestem, Little	*Schizachryrium scoparium*	50	2.0-4.0	11-21	240,000
Bromegrass, Fringed	*Bromus, ciliatus*	---	---	---	---
Broomsedge	*Andropogon virginicus*	50	1.0-3.0	18-55	800,000
Bushclover, Hairy	*Lespedeza hirta*	20	1.0-2.0	2.6-5.2	113,636
Bushclover, Round Head	*Lespedza capitata*	20	1.0-2.0	3.5-7.0	154,000
Cordgrass, Freshwater	*Spatina pectinata*	100	5.0-10	22-45	197,000
Cordgrass, Saltmeadow	*Spartina patens*	N/A	Veg. Only	Veg. Only	Veg. only
Cordgrass, Smooth	*Spartina alterniflora*	100	1.2-2.5	5-10	175,000
Deertongue Grass	*Dicanthelium clandestinum*	20	5.0-8.0	46-73	400,000
Dropseed, Poverty	*Sporobolus vaginiflorus*	---	---	---	---
Fescue, (Red, Chewings, Hard, Sheeps)	*Festuca rubra, longifolia, ovina*	60-85	15-20	211-282	615,000
Flatpea	*Lathyrus sylvestris*	15	5-10	1.0-2.0	8,000
Groundnut	*Apios americana*	---	---	---	---
Indiangrass, Yellow	*Sorghastrum nutans*	75	2.0-4.0	8.0-16	175,000
Lovegrass, Purple	*Eragrostis spectabilis*	3.0-5.0	0.5-1.0	17-34	1,500,000
Meadow Grass, Fowl	*Poa palustris*	25-50	1.0-3.0	23-69	1,000,000
Orchardgrass	*Dactylis glomerata*	85	8.0-10	117-147	640,000
Pea, Beach	*Lathyrus japonicus*	10-15	2.0-3.0	---	---
Pea, Partridge	*Chamecrista fasciculata*	20-30	2.0-4.0	3.0-6.0	64,000
Red Top	*Agrostis alba*	5	0.5-1.0	56-112	4,900,000

Table 1, cont.

Reed Grass, Blue Joint	*Calamagrostis canadensis*	5	0.5-1.0	46-92	4,000,000
Ryegrass, Perennial	*Lolium perenne*	10	10-15	53-79	230,000
Rye, Canada Wild	*Elymus canadensis*	20	5.0-10	13-26	121,000
Rye, Riverbank Wild	*Elymus riparius*	20	5.0-10	11-22	96,000
Rye, Virginia Wild	*Elymus virginicus*	20	5.0-10	8.0-16	73,000
Saltgrass, Alkali	*Puccinellia distans*	50	1.0-2.0	50-100	2,200,000
Switchgrass	*Panicum virgatum*	100	2.0-5.0	18-44	389,000
Trefoil, Showy-Tick	*Desmodium canadense*	20-30	1.0-3.0	---	---
Wild Indigo	*Baptisia tinctoria*	20-30	1.0-2.0	18-36	800,000
Wood Reed, Stout	*Cinna arundinacea*	10-15	1-2	48-96	2,100,000

RECOMMENDATIONS

Use the information on the seed label and in the Seed Analysis Report to determine the quality of the seed you are purchasing. This will ensure that genetic identity and mechanical purity needed to help ensure a successful, weed-free, uniform seeding.

Purity and germination percentages found on the seed tag determine Pure Live Seed from which the bulk-seeding rate is calculated. The seed tag and Seed Analysis Report also will list the weeds including common, restricted noxious, and prohibited noxious found in the seed lot. Remember that weeds listed as common, restricted, and prohibited vary by state and no seed can be sold if it contains prohibited noxious weeds. Seed that is moved across state lines must meet the requirements of the state that is most restrictive. By monitoring the weed species in the lot, you can influence l what weeds are seeded in a planting.

The cheapest seed is not always the most economical. By comparing the purity and germination percentage between seed lots or mixes, you can see clearly which lots or mixes will produce the most potential seedlings after planting. All seeding recommendations are given in Pure Live Seed rates.

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FOUNDATION TAG – WHITE

TESTED CLASS TAG - BLUE

REGISTERED TAG – PURPLE

SELECTED CLASS TAG - GREEN

CERTIFIED TAG – BLUE

SOURCE IDENTIFIED TAG – GOLD

Figure 2: Exam ples of different certification tags that can be found on a seed bag. These certification tags will be in addition to the act ual seed tag that lists the purity, germ ination percentage, variety, lot num ber, origin, net we ight, percent inert m atter, weed seed, noxious weed seed and the seller's name and address.

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NOTE: The RINRCS Critical Area Planting Specifications was adopted from the Massachusetts NRCS version dated October 2002.