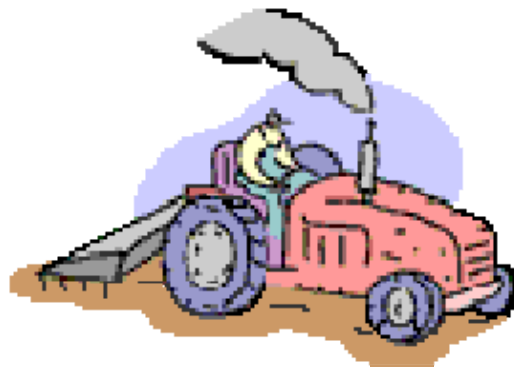


Seeding Handbook for Highway Maintenance



State of Nebraska
Department of Roads
2010

Seeding Handbook for Highway Maintenance

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Introduction

Establishing vegetation in a disturbed area is a key tool in reducing soil erosion and containing sedimentation. Selecting the most appropriate complement of plant species, and implementing the right seeding method and follow-up improves the likelihood of successful stabilization.

This handbook is intended to give recommendations for seeding disturbed areas, especially areas affected by road maintenance projects. Recommendations for fertilizing, mulching, inspection, and management are given for increasing the success of vegetation establishment. The information in this handbook supersedes that given in the 2005 Nebraska Department of Roads (NDOR) handbook.

Erosion control planning is required prior to disturbing the soil. The “Erosion Control Products” section (see page 9) provides NDOR’s website locations to help you design the project to minimize erosion, and to select erosion control products for your project.

This handbook emphasizes the use of plant species native to Nebraska. However, small quantities of introduced species, such as Kentucky fescue and perennial ryegrass, are included in the seed mixtures.

Native species evolved in North America. Species native to Nebraska are adapted to withstand temperature extremes, drought conditions, day length, wind, and being covered with snow. Natives belong here and are preferred for use in NDOR’s mixtures. The deeper root systems of native plants hold soil more effectively and can harvest water from soils in drought (allowing the plants to survive in drought conditions).

Introduced species were brought to the continent, either on purpose or by accident. They can have both useful and problematic traits. For example, Kentucky fescue (tall fescue) germinates and becomes established quickly, but may out-compete some of the native species. NDOR may include small quantities of introduced species in some of its mixtures because of its need for rapid, reliable establishment of grass cover.



Seeding Practices for Optimizing Results

1 Seed mixtures designed for the purpose

No single plant species has the ability to thrive in every setting. However, each species has qualities that can be put into service where needed. NDOR designs seed mixtures that include species with complementary traits in order to stabilize roadsides and other right-of-way areas (suggested seed mixtures are included in the Appendix).

Benefits to this approach include

1. Increased likelihood of the seeded plants germinating
2. Increased durability and permanence of the vegetation
3. Active plant growth throughout the growing season
4. Increased control of soil erosion
5. Lower maintenance and mowing costs
6. Planted areas blend with the natural context of the surrounding area

Areas typically seeded for highway maintenance are unique both in their site conditions (for example, soil type and slope) and in the type of vegetation that will perform best in that setting. Typical settings are described below:

Rural Highway Shoulders seeding is appropriate for the median areas and for a width of approximately 16 feet adjacent to the edge of the pavement or surfaced shoulder of roadways and ramps. This seeding may be referred to as “Type B” seeding.

Species included in the shoulder seed mixture are generally short-growing and durable. The roadway shoulder may be impacted by straying vehicles or chemical treatments. Establishing vegetation in this harsh environment is a challenge, even with good soil and moisture conditions.

Urban Roadsides and Lawns usually receive a seed mixture of grasses selected to give a manicured appearance and tolerate frequent mowing. In addition to being seeded on shoulders, city boulevards, urban interchanges, rest areas, and NDOR lawn areas may receive this mixture.

Foreslopes, Ditches, and Backslopes (FDB) seeding is recommended on most non-shoulder areas within the limits of the project, except areas designated with specialty mixtures. This seeding is also known as “Type A” seeding.

FDB areas generally extend from 16 feet from the pavement edge out to the right-of-way boundary, so use of taller species and inclusion of flowers is possible. FDB seeding usually is on slopes, increasing the importance of year-long living vegetation cover. Seeding several species on these disturbed slopes helps to ensure vegetation cover during all seasons.

Wetland seeding usually is performed at NDOR wetland mitigation sites or mitigation bank sites. Species used in the mixture(s) must tolerate soil moisture. Species are selected from categories of moisture tolerance - - inundated, saturated, and moist soils.

When possible, planting the seed with a seed drill is preferred. However, if the site is too wet, seed may be broadcast over the area. Following the broadcast seeding, raking would be beneficial for improving seed-to-soil contact.

Buffer Areas sometimes are specified slightly above a wetland or waterway. Usually a buffer area is sloped, so selecting species that grow deep root systems is a priority. Plant species selected here are bunch-grasses and sod-forming native grasses. Legumes and flowers may also be included, depending on the setting. Buffer areas are not meant to be mowed, except infrequently by request from the Planning and Project Development Division's Environmental Section.

Temporary Cover is intended for areas needing vegetation for 1-4 years. Examples of this seeding include stockpiles and graded areas that will be worked on again in the future. Keeping cost low and providing good grass cover are priorities. Temporary cover mixtures will include fewer species than other mixtures.

Cover Crop is intended for disturbed areas that will not be worked on again for 14 days or more. The seeding usually is limited to one species of a cereal grain. The plant cover grows quickly and lasts up to 1 year. The species to use depends on the time of year that seeding will occur:

Other right-of-way areas may include bike or pedestrian paths, or special scenic planting areas, possibly within a rest area. Each of these settings has factors to be considered when choosing the species to be seeded. Bicycle/pedestrian pathways generally will include a larger proportion of flowers, along with grasses for stabilization. Generally, a rest area will have a lawn-type seed mixture with areas of flowers or ornamental grasses.

2 Seeding Materials and Methods

Acquiring Seed

No seed shall be mixed until the Engineer (NDOR Project Manager) provides the Contractor a seed order list. The Engineer will determine the total seed requirement for the areas of the project that are ready for seeding.

Seed mixtures for shoulders and FDB for all regions in the state are provided in the Appendix. Select the seed mixture for the Nebraska region in which your project occurs (see the map on page 12), then order and obtain the seed for the appropriate mixture for your region. NOTE: the “Foreslope, Ditch and Backslope” mixture for each region contains four species of wildflowers (listed just above the oats or rye cover crop on pages 13–18).

The Contractor shall obtain from the seed dealer and furnish to the Department (the Environmental Section’s Roadside Stabilization Unit - RSU) a laboratory analysis of each type and lot of seed proposed for use. The analysis shall be performed by an accredited seed laboratory, and shall provide complete information on the seed as required by State and Federal seed laws. The Department will approve use of the seed, if the information on the analysis is satisfactory.

The minimum percentage of purity for seed to be used shall be as specified. Varieties of seeds and their proportions required in the mixtures shall be as specified. The seed shall be mixed, bagged and tagged at the seed company after the Department (RSU) approves the analysis and gives the seed company authorization for a project. The Contractor is not allowed to attach the tags to the bags.

Small/light seed shall be bagged separately from large/fluffy seed *when specified in the special provisions*.

The seed shall be delivered to the project with tags attached to the bags. The seed shall not be used until the Engineer collects the tags from the bag immediately prior to use.

Seed proposed for use shall not be planted without the prior approval of the Engineer.

When to Plant

Prior to planting any roadside seed mixture, install all erosion control Best Management Practices (BMPs) that require earth moving, such as sediment basins, dikes and berms, in the area to be seeded.

Seeding operations shall be performed only during the periods March 15 to June 15, and August 1 to September 15. If conditions allow, dormant seeding may occur from November 1 through March 14. The reasoning behind not seeding in late June and July is that the soil is too hot and precipitation generally is too infrequent in mid-summer to

give newly-planted seeds what they need for germination and initial seedling growth. Resuming seeding operations when soil temperature is cooler and rain is more likely gives the roadside seed mixture a better chance of growing.

No seeding shall be performed when the ground is frozen, wet or otherwise un-tillable, or when even distribution of materials cannot be attained.

Seedbed Preparation

The Contractor shall prepare the seed bed not more than 5 days prior to seeding.

In heavily vegetated areas to be seeded, the Contractor shall mow vegetation growth that cannot be disced under. The Contractor shall rake and remove the mowing residue if it cannot be satisfactorily tilled into the seedbed. The Contractor shall till existing weed stubble, small weeds, and other vegetation into the soil during seedbed preparation.

Seedbed preparation culminates in loosening the soil to a depth of not less than 3 inches with a disc, harrow, rake or by other approved means. Several passes may be required, depending on soil conditions, to provide a satisfactory seedbed. Discing, harrowing, and raking shall be done parallel to the land contour.

When salvaged topsoil is available for use, discing after spreading the topsoil will reduce large clumps and evenly distribute the soil.

The Engineer may direct that areas of desirable vegetation be preserved. Extreme care shall be exercised to avoid injury to trees and shrubs that have been designated by the Engineer to be preserved.

Seedbed preparation should not be performed when soils are excessively wet.

Fertilizer

Where a top-dressing of manure or salvaged and re-spread topsoil is used, commercial fertilizer is not required. Fertilizer use on the shoulder may be helpful, but is not recommended in areas that have received re-spread topsoil. NDOR is conducting research on fertilizer use in roadside seeding. When research results are available, these recommendations may be updated.

Fertilizer shall be a synthetic organic or inorganic product of an approved commercial type, containing nitrogen, phosphoric acid, and potash in a recognized plant nutrient form, and shall be guaranteed to comply with the minimum requirements of these specifications.

Fertilizer shall be furnished and delivered in standard bags or bulk. If distributed in bulk, a written or printed statement of the weight and preceding information shall accompany delivery and be supplied to the Engineer.

All fertilizers shall be checked and approved by the Engineer for acceptability prior to their use. The Engineer may approve immediate use of any commercial inorganic fertilizer that is registered for sale in Nebraska.

The grade and the guaranteed analysis of a fertilizer express the minimum total nitrogen (N) content, and the minimum phosphorus content (P) and the minimum potassium/potash (K) content, in that order. For example, 16-48-0 grade fertilizer contains 16 percent total nitrogen, 48 percent available phosphorus (as phosphoric acid), and zero percent water soluble potassium/potash.

Any grade or mixture of grades of nitrogen and phosphoric acid fertilizer may be used in order to provide the minimum pounds per acre of nitrogen, available phosphoric acid, and water soluble potash, in conformance with the special provisions.

Fertilizer may be blended before delivery to the site.

The fertilizer shall be applied with approved mechanical spreaders or with a hydraulic seeder at the rate specified in the special provisions and shall uniformly cover the entire area.

Fertilizer shall be incorporated into the soil before seeding.

If the desired fertilizer rate is unknown, use 200 lb/acre of either 16-48-0 or 18-46-0. However, if the special provision for seeding specifies 0 pounds of fertilizer, then those seeding areas should not receive fertilizer.

Planting the Seed Mixture

Seed may be planted by using a seed drill, or with a hydraulic seeder (also known as hydro-seeding). Broadcast seeding is allowed only in areas where erosion control blanket will be placed over the seed. This method is used where slopes generally are too steep for seeding machinery to be operated safely.

1. Seed drills:

- a. Seed drills shall be equipped with press wheels or drag chains. The seed delivery system shall space rows no greater than 8 inches apart and shall be capable of metering seed at the rate specified in the special provisions.
- b. Planting depth is critical to good germination. If planted too shallow, the seeding will dry out and if too deep, the seedlings will not emerge. Seed shall not be planted greater than ½ inch deep. In sandy soil, plant at ½ inch depth or shallower, because the movement of sand particles may bury the seed.
- c. Seed drills should also have multiple seed boxes to provide separate seeding of large/fluffy seed and small/light seed, *when separation of seed types is specified in the special provisions.*

2. Hydraulic Seeders:
 - a. Hydraulic seeding equipment shall have suitable pressure and a nozzle adapted for hydraulic seeding
 - b. Storage tanks of irregular shapes shall have a means of estimating the volume used or remaining in the tank.
 - c. When using a hydraulic seeder, the fertilizer and mulch shall be applied separately from the seed.

3 Post-Seeding Treatments

Mulch

This work consists of providing, placing and securing mulch on areas shown in the plans or designated by the Engineer.

Mulch shall be either dry cured native prairie hay, native grass hay from seed growing operations, native grass hay from planted warm season grass stands, or threshed grain straw. Brome hay is not allowed.

Rushes, cattails, reed-canary grass and other wide-bladed or invasive species are not allowed.

Hay or straw in a stage of decomposition so advanced as to “powder” in the mulch blower will be rejected.

Straw shall be from threshed oats, wheat, or rye. Rye straw shall not be used in any wheat-growing area. The straw shall be baled before the seasonal growth of annual weeds.

Both native hay mulch and straw mulch shall be CERTIFIED NOXIOUS WEED FREE (certification is performed by the county weed superintendent or other authorized agents approved by the Roadside Stabilization Unit) and relatively free from seeds of all other weeds.

All mulch deliveries shall have tickets from a scale approved by the Engineer before the mulch is unloaded for use on the project. The scale ticket shall indicate the weight and be dated and signed by the scale operator. The Contractor shall give the Engineer a scale ticket for each load of mulch delivered to the site.

The Contractor shall apply the mulch within 24 hours after planting the seed, unless otherwise directed by the Engineer. The mulch shall be applied uniformly over tilled areas with a mulch blowing machine.

The mulch shall be loose enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, reduce water evaporation and reduce wind and water erosion.

Normally, the mulch application rate is 2 tons per acre for dry cured native hay. The normal application rate for dry threshed grain straw is 2.5 tons per acre.

Immediately following the spreading of the mulch, the material shall be disc-anchored to the soil by a mulch crimper with approximately 6 inch cleats, or other approved equipment with perpendicular, dull disc blades.

All mulch shall be crimped the same day it is applied. More than one crimping may be necessary.

Erosion Control Products

Complying with state and federal stormwater management laws is a must. Information on the erosion control products used by NDOR is available on NDOR's Approved Products website.

<http://www.nebraskatransportation.org/mat-n-tests/index.htm>

Additional information pertaining to designing stormwater management and erosion control features is available in Chapter 2 of NDOR's "Drainage Design and Erosion Control Manual," available on the internet:

<http://www.dor.state.ne.us/roadway-design/>

Maintenance and Inspection

During vegetation establishment, the seeded area should be inspected regularly. If areas of erosion or "bald spots" in the seeded areas are noted during an inspection, the area should be repaired immediately.

A uniform perennial vegetation cover with 70% density is required to close the stormwater permit (compliance with this permit is documented in each project's SWPPP manual).

Mowing may be necessary if weed infestation or shading of the planted seedlings by tall weeds occurs. NDOR's "Highway Mowing Guidelines" promotes mowing as necessary to control weeds during the establishment period (item #4 in the Guidelines).

Year 1 Evaluation:

Cover crop grows within 2 weeks of planting (except late fall or dormant plantings).

Seedlings should be apparent within the drill rows.

Native grass seedlings may only be 4-6 inches tall.
If you notice a flush of growth from pigweed, foxtail, or sunflowers, then mow as necessary.
Spot-spray thistles.

Year 2 Evaluation:

Cover crop may return in smaller amounts the second year.
Seeded grasses are apparent in drill rows.
Some seeded flowers should bloom this year.
If the vegetation stand is inadequate for erosion control, overseed and apply mulch.
If you notice a flush of growth from pigweed, foxtail, or sunflowers, then mow as necessary.
Spot-spray thistles.

Appendix: Suggested Seed Mixtures for Nebraska Roadsides

NDOR has developed a plan to promote the use of native plant species that are most likely to thrive in the different regions of the state. Conditions such as climate, soils, and topography differ among regions across the state. For example, rainfall varies from about 16 inches annually in the northwest at Harrison to 34 inches annually in the southern part of the state at Falls City.

NDOR's roadside seeding mixtures include cool- and warm-season grasses, legumes, and flowers. Species are selected for inclusion in roadside seed mixtures according to the region in which the project occurs. Additional information is available in NDOR's "Discover Nebraska's Roadside Flowers and Grasses" brochure on the web at www.transportation.nebraska.gov/docs/flowers

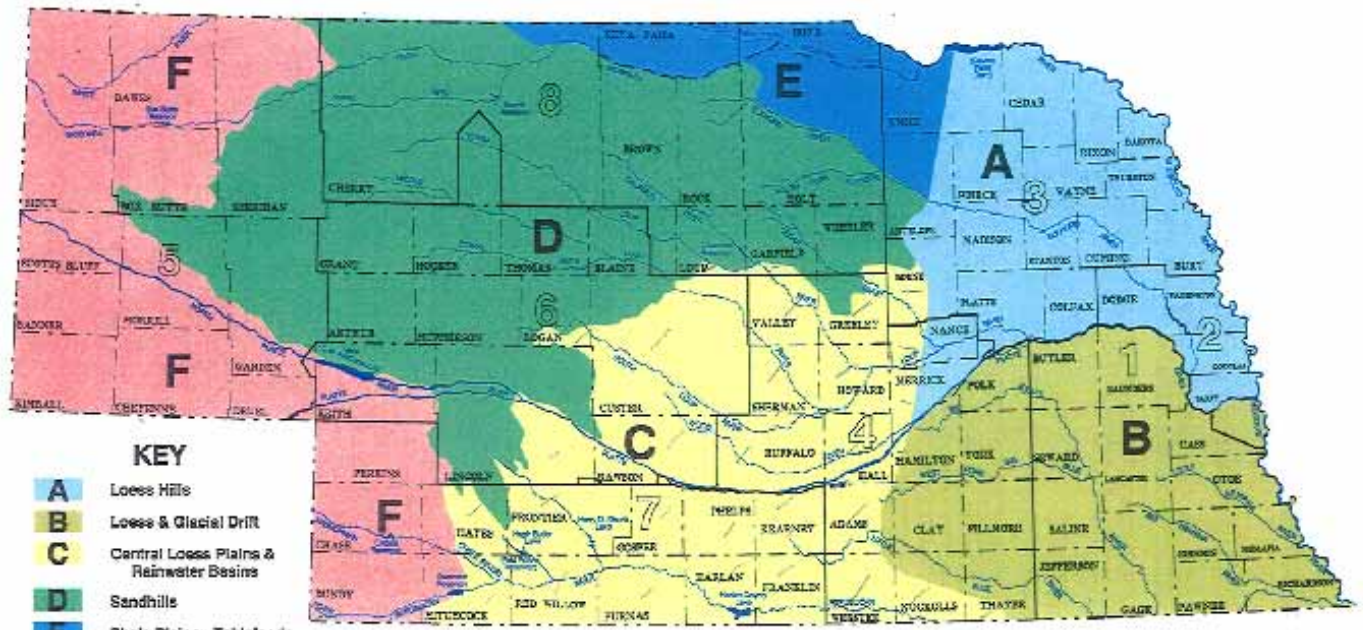
To select a seed mixture to use on your roadside maintenance project, first determine in which region your project occurs, using the map below. Seed mixtures suggested for each region follow the map. Specialized mixtures for rural highway shoulders and foreslope, ditch, and backslope are provided for each region.

Seed mixtures suitable for urban roadside areas and lawns statewide, for wetlands statewide, and buffer areas statewide are also provided in the Appendix. These mixtures contain species that occur statewide, are native, and are commonly used in NDOR seeding projects. However, the wetlands and buffer areas mixtures are simplified versions of the usual mixtures that the Roadside Stabilization Unit creates. To request a more customized seed mixture that would include flowers and more regionally-specific grasses, contact Carol Wienhold (contact information is given below).

Please contact NDOR's Roadside Stabilization Unit if you have questions regarding roadside seeding.

Ron Poe	Ronald.Poe@Nebraska.gov	(402) 479-4499
Carol Wienhold	Carol.Wienhold@Nebraska.gov	(402) 479-3917

NEBRASKA DEPARTMENT OF ROADS LANDSCAPE REGIONS



- KEY**
- A** Loess Hills
 - B** Loess & Glacial Drift
 - C** Central Loess Plains & Rainwater Basins
 - D** Sandhills
 - E** Shale Plains - Tablelands
 - F** High Plains
 - 1** NDOR District



SEED MIXTURES FOR NEBRASKA REGION A

Loess Hills (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	7
Slender wheatgrass	85	4
Western wheatgrass – Flintlock, Barton	85	6
Kentucky fescue	85	1.5
Blue grama – NE, KS, CO	30	2
Buffalograss – Cody, Bison, Sharp's Improved, Texoka	80	4
Sideoats grama – Trailway, Butte	75	3
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.2
Oats/Wheat (wheat in the fall)	90	14

Foreslope, Ditch & Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye – Mandan, Nebraska native	85	4
Slender wheatgrass	85	3
Western wheatgrass – Flintlock, Barton	85	4
Indiangrass – Oto, NE-54, Holt	75	3
Switchgrass – Pathfinder, Blackwell, Shawnee, Trailblazer	90	1.5
Big bluestem – Pawnee, Roundtree, Bonanza	60	3
Little bluestem – Blaze, Camper, Aldous, Nebr. native	60	2.5
Sand lovegrass – NE-27, Nebraska native	90	0.5
Purple prairie clover – Kaneb, inoculated	90	0.25
OR		or
Partridge pea - inoculated		0.25
Black-eyed Susan (<i>Rudbeckia hirta</i>)	85	0.4
Blue flax (<i>Linum lewisii</i>)	85	1
Plains coreopsis (<i>Coreopsis tinctoria</i>)	85	0.3
Mexican red hat (<i>Ratibida columnifera</i> , red)	85	0.5
Oats/Wheat (wheat in the fall)	90	10

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

SEED MIXTURES FOR NEBRASKA REGION B

Loess & Glacial Drift (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	7
Slender wheatgrass	85	4
Western wheatgrass – Flintlock, Barton	85	6
Kentucky fescue	85	1.5
Blue grama – NE, KS, CO	30	2
Buffalograss – Cody, Bison, Sharp's Improved, Texoka	80	5
Sideoats grama – Trailway, Butte, El Reno	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.2
Oats/Wheat (wheat in the fall)	90	14

Foreslope, Ditch & Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye – Mandan, Nebraska native	85	4
Slender wheatgrass	85	3
Western wheatgrass – Flintlock, Barton	85	4
Indiangrass – Oto, NE-54, Holt	75	3
Switchgrass – Pathfinder, Blackwell, Trailblazer	90	1.5
Big bluestem – Pawnee, Roundtree, Bonanza	60	3
Little bluestem – Aldous, Blaze, Camper, Nebraska native	60	2.5
Sideoats grama – Butte, El Reno, Trailway	75	4
Illinois bundleflower – inoculated OR Partridge pea – inoculated	90	0.25 or 0.25
Black-eyed Susan (<i>Rudbeckia hirta</i>)	85	0.4
Blue flax (<i>Linum lewisii</i>)	85	1
Rocky Mountain bee plant (<i>Cleome serrulata</i>)	85	0.3
Grayhead prairie coneflower (<i>Ratibida pinnata</i>)	85	0.25
Oats/Wheat (wheat in the fall)	90	10

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SEED MIXTURES FOR NEBRASKA REGION C

Central Loess Plains & Rainwater Basins (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	7
Slender wheatgrass	85	4
Western wheatgrass – Barton, Flintlock	85	6
Kentucky fescue	85	1.5
Blue grama – NE, KS, CO	30	2.5
Buffalograss – Cody, Bison, Sharp's Improved, Texoka	80	5
Sideoats grama – Butte, Trailway	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	85	0.2
Oats/Wheat (wheat in the fall)	90	14

Foreslope, Ditch and Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye * – Mandan, Nebraska native	85	4
Virginia wildrye – Omaha, Cuivre River, Nebraska native	85	3
Slender wheatgrass	85	4
Western wheatgrass – Barton, Flintlock	85	4
Indiangrass – Holt, NE-54, Oto	75	3
Switchgrass – Blackwell, NE-28, Trailblazer	90	1.5
Big bluestem – Pawnee, Kaw, Bonanza, Champ	60	3
Little bluestem – Aldous, Cimarron, Camper, Nebraska native	60	2.5
Sideoats grama – Butte, Trailway	75	3
Sand lovegrass – NE-27, Nebraska native	90	0.5
Purple prairie clover – inoculated OR Partridge pea – inoculated	90	0.5 or 0.25
Maximilian sunflower (<i>Helianthus maximiliani</i>)	85	0.75
Rocky Mountain bee plant (<i>Cleome serrulata</i>)	85	0.3
Upright prairie coneflower (<i>Ratibida columnifera</i>)	85	0.5
Yarrow (<i>Achillea millefolium</i>)	85	0.2
Oats/Wheat (wheat in the fall)	90	10

* Don't include Canada wildrye in mixtures for Frontier, Hitchcock, or Red Willow Counties

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

SEED MIXTURES FOR NEBRASKA REGION D

Sandhills (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	7
Slender wheatgrass	85	4
Western wheatgrass – Rodan, Rosana, Barton, Flintlock	85	6
Kentucky fescue	85	1.5
Blue grama – NE, KS, CO	30	3
Sideoats grama – Pierre, Butte	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.2
Sand lovegrass – NE-27, Nebraska native	90	1
Purple prairie clover – inoculated	90	0.2
Rye	90	16

Foreslope, Ditch and Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/Acre
Canada wildrye * – Mandan, Nebraska native	85	4
Western wheatgrass – Rodan, Rosana, Barton, Flintlock	85	5
Slender wheatgrass	85	4
Thickspike wheatgrass (western sandhills) – Critana	85	3
Indiangrass - Holt	75	3
Switchgrass – NE-28, Pathfinder, Trailblazer, Blackwell	90	1.5
Sand bluestem – Gold Strike, Garden County, Champ	60	3
Little bluestem – Cimarron, Pastura, Nebraska native	60	2
Prairie sandreed – Goshen, Pronghorn	40	0.75
Sand lovegrass – NE-27, Nebraska native	90	0.5
Purple prairie clover – inoculated	90	0.5
Blue flax (<i>Linum lewisii</i>)	85	1
Upright prairie coneflower (<i>Ratibida columnifera</i>)	85	1
Plains coreopsis (<i>Coreopsis tinctoria</i>)	85	0.3
Rocky Mountain bee plant (<i>Cleome serrulata</i>)	85	0.3
Cereal Rye	90	14

* Don't include Canada wildrye for mixtures in Frontier, Hayes, Keith, or Lincoln Counties

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

SEED MIXTURES FOR NEBRASKA REGION E

Shale Plains & Tableland (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	7
Slender wheatgrass	85	4
Western wheatgrass – Rosana, Rodan, Barton, Flintlock	85	6
Kentucky fescue	85	1.5
Blue grama – NE, KS, CO	30	2.5
Buffalograss – Bison, Cody, Sharp's Improved, Texoka	80	5
Sideoats grama – Butte, Pierre, Trailway	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.1
Oats/Wheat (wheat in the fall)	90	14

Foreslope, Ditch & Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye – Mandan, Nebraska native	85	4
Green needlegrass (<i>Nassella viridula</i>) – Lodorm	75	2
Western wheatgrass – Rosana, Rodan, Barton, Flintlock	85	5
Switchgrass – Blackwell, NE-28, Pathfinder, Trailblazer	90	1.5
Big bluestem – Champ, Bonanza, Pawnee, Roundtree	60	3
Sideoats grama – Butte, Pierre, Trailway	75	4
Little bluestem – Camper, Blaze, Pastura, Nebraska native	60	2
Blue grama – NE, KS, CO	30	0.5
Purple prairie clover – inoculated	90	0.5
Black-eyed Susan (<i>Rudbeckia hirta</i>)	85	0.5
Blue flax (<i>Linum lewisii</i>)	85	1
Yarrow (<i>Achillea millefolium</i>)	85	0.2
Mexican red hat (<i>Ratibida columnifera</i> , red)	85	0.5
Oats/Wheat (wheat in the fall)	90	10

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

SEED MIXTURES FOR NEBRASKA REGION F

High Plains (see the map on page 12)

Rural Highway Shoulder Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	8
Slender wheatgrass	85	4
Western wheatgrass – Arriba, Barton, Flintlock, Rodan, Rosana	85	6
Kentucky fescue	85	2
Blue grama – NE, KS, CO	30	2.5
Buffalograss – Bison, Cody, Sharp's Improved, Texoka	80	4
Sideoats grama – Butte, El Reno, Pierre	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.2
Sand lovegrass – NE-27, Nebraska native	90	0.5
Oats or wheat	90	14

* Use of Canada wildrye is limited to Banner, Box Butte, Dawes, Kimball, Morrill, Sheridan, Scotts Bluff, and Sioux Counties in this region

Foreslope, Ditch & Backslope Mixture

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye * – Mandan, Nebraska native	85	4
Slender wheatgrass	85	4
Thickspike wheatgrass – Critana	85	3
Western wheatgrass – Arriba, Barton, Flintlock, Rodan, Rosana	85	6
Switchgrass – NE-28, Trailblazer	90	1.5
Little bluestem – Camper, Cimarron, Pastura, Nebraska native	60	2.5
Blue grama – NE, KS, CO	30	0.5
Buffalograss – Bison, Cody, Sharp's Improved, Texoka	80	2
Sideoats grama – Butte, Pierre, El Reno	75	4
Sand dropseed (<i>Sporobolus cryptandrus</i>)	90	0.2
Purple prairie clover – inoculated	90	1
Blue flax (<i>Linum lewisii</i>)	85	2
Rocky Mountain bee plant (<i>Cleome serrulata</i>)	85	0.5
Upright prairie coneflower (<i>Ratibida columnifera</i>)	85	1
Mexican red hat (<i>Ratibida columnifera</i> , red)	85	1
Oats or wheat	90	10

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

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URBAN ROADSIDES AND LAWNS

Species	Minimum Purity	Broadcast or Hydraulic Seeder Application Rate in lb. of PLS/Acre	Approved Mechanical Drill Application Rate in lb. of PLS/Acre
Turf type perennial ryegrass	90	30	15
Turf type tall fescue	90	528	264
Kentucky bluegrass	90	42	21

WETLANDS

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Big bluestem – Bonanza, Champ, Pawnee, Roundtree	60	2
Indiangrass – Holt	75	2
Switchgrass – Nebraska-28, Trailblazer	90	1
Prairie cordgrass (Spartina pectinata)	85	1
Fox sedge (Carex vulpinoidea)	85	0.5
Arrowhead (Sagittaria cuneata or Sagittaria latifolia)	85	4
Water plantain (Alisma triviale)	85	1.5

BUFFER AREAS

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Canada wildrye – Mandan (see note below)	85	4
Slender wheatgrass	85	4
Thickspike wheatgrass (see note below)	85	3
Western wheatgrass – Barton, Flintlock	85	4
Sand lovegrass – Nebraska-27	90	0.25
Big bluestem – Bonanza, Champ, Pawnee, Roundtree	60	3
Prairie cordgrass (Spartina pectinata)	85	0.6
Switchgrass – Nebraska-28, Trailblazer	90	1
Indiangrass – Holt	75	2.5
Sideoats grama – Butte (Trailway is suitable in all except Region F and western Region D)	75	3
Little bluestem – (Regions A,B,C use Blaze or Camper; Regions D,E,F use Cimarron or Pastura)	60	2
Oats or wheat	90	Oats 12 Wheat 19

(**Canada wildrye** should not be included in Perkins, Chase, Dundy, Hayes, Frontier, Hitchcock, or Red Willow Counties)

(**Thickspike wheatgrass** is appropriate in Region D (western portion) and Region F)

PLS (pure live seed) is a term used in the seed industry to describe the percentage of a quantity of seed that will germinate. It is a tool for comparing the quality of seed lots.

TEMPORARY COVER – usually persists for 3-5 years

Species	Minimum Purity (percent)	Lbs. of PLS/acre
Perennial ryegrass – Linn	85	6
Slender wheatgrass	85	4
Western wheatgrass – Arriba, Barton, Flintlock, Rodan, Rosana	85	3
Kentucky fescue	85	1.5
Sideoats grama – Butte, El Reno, Pierre	75	4
Redtop (<i>Agrostis stolonifera</i>)	90	0.5
Oats or wheat	90	14

COVER CROP – usually persists for one year

Cover Crop Seed and Seeding Dates	Minimum Purity (%)	Minimum Germination (%)	Approved Broadcast or Hydraulic Seeder Application Rate	Approved Mechanical Drill Application Rate
Oats Jan. 1 to Aug 31	90	80	140 lbs/acre (157 kg/ha)	70 lbs/acre (78 kg/ha)
Foxtail Millet May 2 to July 15	85	80	30 lbs/acre (33 kg/ha)	15 lbs/acre 16 kg/ha)
Winter wheat Sept. 1 to Dec. 31	90	80	160 lbs/acre (179 kg/ha)	80 lbs/acre (89 kg/ha)
Annual Rye Jan. 1 to Dec. 31	85	80	50 lbs/acre (55 kg/ha)	25 lbs/acre (28 kg/ha)