NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONSERVATION COVER
(acre)
CODE 327

DEFINITIONS

Establishing and maintaining permanent vegetative cover.

PURPOSE

This practice may be applied to accomplish one or more of the following:

- Reduce soil erosion and sedimentation,
- Improve water quality
- Improve air quality
- Enhance wildlife habitat
- Improve soil quality
- Manage plant pests

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on lands needing permanent vegetative cover. This practice does not apply to plantings for forage production or to critical area plantings.

CRITERIA

General Criteria Applicable to all Purposes

Species shall be adapted to soil, ecological sites, and climatic conditions.

Species planted shall be suitable for the planned purpose and site conditions.

Seeding rates and methods shall be adequate to accomplish the planned purpose. Seeding mixtures and rates of seeding or planting will be selected from the tables and charts in the specifications for this standard. Certified seed shall be used.

Planting dates, planting methods and care in handling and planting of the seed or planting stock shall ensure that planted materials have an acceptable rate of survival. See the attached specifications for planting dates.

Only adapted seed or planting stock shall be used. Vegetative planting material (e.g. sprigs, rhizomes, bulbs) shall be from a reliable supplier.

Site preparation shall be sufficiently adequate to eliminate weeds for establishment and growth of selected species.

Timing and use of equipment shall be appropriate for the site and soil conditions.

All nutrients shall be applies following the nutrient management requirements in the Field Office Technical Guide (FOTG).

No plants listed on the noxious weed list of the state will be established in this practice.

Additional Criteria to Reduce Soil Erosion and Sedimentation

The amount of plant biomass and cover needed to reduce wind and water erosion to the planned soil loss objective shall be determined using the current approved wind and/or water erosion prediction technology.

Additional Criteria for Improving Air Quality

In perennial crop systems such as orchards, vineyards, berries and nursery stock, vegetation established shall provide full ground coverage in the alleyway during mowing and harvest operations.

To sequester carbon, plant cover established will result in a positive CO2 equivalent value when determined by the current approved carbon prediction technology.

Additional Criteria for Enhancing Wildlife Habitat

Grasses, forbs, shrubs and/or legumes shall be planted in a diverse mix to promote bio-diversity and meet the needs of the targeted species of wildlife.

Maintenance practices and activities shall not disturb cover from May 1 – August 1, the reproductive period for grassland wildlife species.

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a “spot” basis to protect forbs and legumes that benefit native pollinators and other wildlife.

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Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact the MN Natural Resources Conservation Service in your area, or download it from the electronic Field Office Technical Guide for Minnesota.

Additional Criteria to Improve Soil Quality
Plants will be selected on the basis of producing high volumes of organic material to maintain or improve s oil organic matter. The amount of biomass needed will be determined using the current soil condition index procedure.

Additional Criteria to Manage Plant Pests
In perennial crop systems such as orchards, vineyards, berries and nursery stock, permanent vegetative cover shall be established and managed according to Land Grant University Integrated Pest Management (IPM) recommendations for the target pest species.

CONSIDERATIONS

This practice may be used to promote the conservation of wildlife species in general, including threatened and endangered species.

Certified seed and planting stock that is adapted to the site should be used when it is available.

In selection and management of plant species, consider long-term land use objectives of the landowner and habitat needs of target wildlife species.

Select plant species best adapted to the soils in the field. Consider the use of sod forming grasses where soil erosion is a concern.

Inoculating legume seed with the proper Rhizobia bacteria should be considered on sites where the legumes to be planted have not been previously grown.

Mowing may be needed during the establishment period to reduce competition from broadleaf annual weeds.

On sites where annual grasses are an expected weed problem it may be necessary to postpone nitrogen fertilizer application until the planted species are well established.

Where applicable this practice may be used to conserve and stabilize archeological and historic sites.

Other conservation practices, such as grassed waterways, terraces, etc. may be needed to complete the erosion control plan.

Consider using native species that are appropriate for the identified resource concern and management objective. Consider trying to re-establish the native plant community for the site.

When new native grass and forb plantings are located within one mile of existing high quality prairie remnants, local ecotypes are preferred for use in the new planting.

Native plant species usually benefit from periodic burning. Burning can stimulate growth by reducing unwanted competition from weedy plants and removing excessive plant residue, therefore helping to maintain plant community diversity. Refer to Prescribed Burning, Practice Code 338, for recommendations.

Consider rotating management and maintenance activities (e.g. mow only one-fourth or one-third of the area each year) throughout the managed area to maximize spatial and temporal diversity.

Where wildlife management is an objective, the food and cover value of the planting can be enhanced by using a habitat evaluation procedure to aid in selecting plant species and providing or managing for other habitat requirements necessary to achieve the objective.

PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. They shall include, but are not limited to:

- Recommended species
- Seeding rates and dates
- Establishment procedures
- Other management actions needed to insure an adequate stand

Specifications shall be recorded using approved job sheets, narrative statements in the conservation plan or other acceptable documentation. All specifications shall be consistent with Federal, State and Local regulations.

OPERATION AND MAINTENANCE

Mowing and harvest operations in perennial crop systems such as orchards, vineyards, berries and nursery stock shall be done in a manner which minimizes the generation of particulate matter.

If wildlife habitat enhancement is a purpose, maintenance practices and activities shall not disturb cover during the reproductive period for the desired species. Exceptions should be considered for periodic burning or mowing when necessary to maintain the health of the plant community.

Maintenance measures must be adequate to control noxious weeds and other invasive species.

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a “spot” basis to protect forbs and legumes that benefit native pollinators and other wildlife.

REFERENCES

K.G. Renard, G.R. Foster, G.A. Weesies, K.D.K. McCool and D.C. Yoder. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE). Agricultural Handbook Number 703.

Revised Universal Soil Loss Equation Version 2 (RUSLE@) website: http://fargo.nserl.purdue.edu/rusle2_dataweb/

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Specifications

Permanent, perennial vegetative cover and/or trees should be established during the first recommended seeding or planting period for the selected species within the first year of the land use conversion. If this is not possible because: 1) required seed or plant stock is not available; 2) the normal planting period for the species has passed; 3) chemical residue will not allow establishment of permanent cover immediately; or 4) it was not possible to prepare an adequate seedbed in time, a temporary cover shall be used. If temporary cover is used, the permanent vegetative cover must be established during the next seeding period

Criteria for Temporary Cover Establishment
The temporary cover crops and seeding rates are listed in Table 1.

Where chemical residue carryover is the cause of delayed planting, refer to the product label for crops to rotate to. A bioassay test may be used to better determine chemical carryover.

Small grain temporary cover crops shall be clipped in the boot stage in order to prevent seed formation. Spring seeded winter wheat and spring seeded winter rye will not require clipping. Millet and sorghums need to be clipped in the early heading stage to prevent viable seed formation. Forage sorghums, sudangrass and sorghum-sudangrass may need multiple clippings to control biomass accumulation and seed production.

Residue from the temporary cover may be fall tilled, leaving a minimum of 40% residue cover.

Seed permanent cover during the next seeding period.

Criteria for Permanent Vegetative Cover Establishment
Seeding Dates
Seeding dates are listed in Table 2. These are based on long term averages and may be extended by two weeks by the state agronomist. Extension of these deadlines shall be based on both favorable moisture and temperature for seed germination.

Fertilizer and Lime Requirements

For introduced grasses and legumes, fertilizer will be applied according to a soil test from the year of seeding, or from the two preceding calendar years. The rate of application of commercial fertilizer will be done according to Minnesota Extension Service recommendations. The rate applied shall be 100% of the recommended rate per acre of each nutrient for a 2 ton yield goal. Nitrogen is not recommended when legumes are part of the mixture.

Soil test requirements for phosphate and potash may be waived when the soil test is in the medium range.

Apply the recommended rate per acre of liming materials to raise the soil pH to 6.5 for alfalfa or 6.0 for other legume species. Liming materials shall be applied and incorporated prior to seeding. Liming materials normally contain enough fines to permit application at seeding time and still obtain an adequate stand of legumes.

Fertilizer and lime are not required for warm season grasses. However, if previous soil test history, current soil test results or the soils inherent fertility is low in phosphorus, apply 50 lbs. P_2O_5 per acre prior to seeding.

Seedbed Preparation and Seeding

No-till seeding: On cropland, leave the existing crop residue on the field with out tillage. In the spring, use a burndown chemical prior to or within 5 to 7 days after planting the grass, to kill any weeds and regrowth. On land currently in grass, kill the existing vegetation with herbicides, preferably in the fall prior to planting. Quackgrass and many broadleaf weeds are easier to control when herbicides are fall applied rather than spring applied. An additional burndown chemical may be needed in the spring prior to planting. Use a no-till drill and plant at a depth of ¼ to ½ inch.

Interseeding into existing stands for stand improvement: Chemicals or mechanical tillage may be used to suppress the current vegetation and weaken the stand. Both methods used separately or in combination will provide different levels of control. Use mowing, grazing where permitted or prescribed burning to remove or reduce vegetative growth that would interfere with chemical applications or planting. If mechanical tillage is being used, use a disk, cultivator or similar tool to disturb 40 to 50 percent of the existing stand. When chemicals are to be used, mow in midsummer and allow time for the vegetation to regrow prior to applying herbicides. Late summer to early fall herbicide applications can provide adequate suppression. Grasses and legumes may then be planted during the applicable seeding periods. Remove early spring regrowth by mowing or spraying to reduce competition and allow the new seedlings to become established. Chemicals may also be used in the fall to kill narrow (10 inches or so) strips of existing vegetation across the field. The entire field is then interseeded. In all cases, follow label instructions when applying herbicides.

Conventional seeding into a tilled seedbed: A seedbed will be prepared that is free of all competing vegetation and is not subject to erosion. All existing vegetation will be killed prior to or during seedbed preparation with tillage and/or herbicides.

A firm seedbed will be provided in all cases. As a general rule, a seedbed is considered firm enough when the foot tracks left by an adult are no deeper than one-half inch. Harrowing, packing by two or more passes with an empty drill or cultipacking will firm seedbeds that are too soft. For warm season grasses, a firm seedbed is especially important. The seedbed shall be worked to a depth of three inches. Incorporate lime and fertilizer during seedbed preparation. It shall be reasonably smooth, friable and firm before seeding, and should contain enough fine soil particles for uniform, shallow coverage of the seed as well as contact with moist soil and nutrients.

Grass, legume and forb seed shall be drilled uniformly over the area at an average depth of 1/4 to 1/2 inch using a grassland drill, grain drill with press wheels or a cultipacker seeder; or broadcast uniformly and rolled into the seedbed. All broadcast-seeding operations require rolling or cultipacking prior to and immediately after seeding.

Seeding Rates and Approved Plant Species
Select combinations of plant species and cultivars best adapted to site conditions.

Acceptable varieties of introduced grasses and legumes shall be selected from those listed in the most current University of Minnesota Varietal Trials publication.

To insure longer life, alfalfa varieties shall have a Winter Survival Index of less than three, listed in the Very Good Winter Survival category. Varieties with no Winter Survival Index shall have a third year yield of at least 105% of check varieties.

Approved varieties of native grasses are listed in table 3. Approved forbs are listed in table 6. Where there are known native prairies or certified native grass or forb seed production fields present, maintain an isolation distance of 165 feet for grasses and 1320 feet for forbs when planting the same species that have different genetic origins.

Allowable seed mixture composition and pure stand seeding rates are shown in Tables 4 and 5. Seeding rates shall be based on Pure Live Seed (PLS), where PLS = % germination (+ dormant seed) x % purity. Total recommended seeding rate is a minimum of 30-40 PLS seeds per square foot. The recommended seeding rate for forbs in native seedings is a minimum of 4 oz PLS/acre. Designed seeding mixtures shall meet the criteria listed here and in these tables. Specific programs may have additional program requirements. Specific approved seeding mixtures may be developed for specific programs such as the Conservation Reserve Program.

Cool season grass/legume mixtures must contain at least 50% grass (based on seeds/square foot), and may include up to 20% warm season grasses. Use the criteria for introduced grass mixtures for stand establishment.

For native mixtures, annual and biannual forbs and legumes are to be limited to 20% of the forb/legume component.

Seed Quality
All seed shall be of high quality and be labeled in accordance with Minnesota Seed Law. For information about this law, see Minnesota Agronomy Tech Note MN-9. Seed tests must show the percentage of germination and percentage of purity.

Inoculate legume seed before seeding with the inoculant specific for the species. Preinoculated seed may be used but shall be reinoculated if used beyond dates specified on the seed tag. This does not apply to native legumes.

Companion Crops

For spring seedings of cool season species, a companion crop shall be used for erosion control and weed suppression. No companion crop is required for interseedings or for late summer seeding, but may be desirable for erosion control and to protect developing seedlings. Companion crop seeding rates shall be: Oats: ¾ to 1¼ bushels/acre; Barley: ½ to 1 bushel/acre; Winter Wheat: ½ bushel/acre (**spring seeding only**).

Companion crops are generally not recommended for warm season seedings. On highly erodible sites it may be desirable unless you are no-tilling into 70% residue cover or standing small grain stubble. Use a seeding of oats at ¾ to 1 ¼ bushels/acre. *Canada wildrye or Sideoats grama may also be considered as companion crops when included in the seeding mixture.*

Companion crops shall be clipped after jointing but before heading unless otherwise directed by the technical agency. Second and subsequent clippings are necessary when regrowth provides competition. Clipping height should be above developing seedlings. Where excessive growth has accumulated, the vegetation should be chopped and dispersed rather than swathed. Companion crops seeded with late summer cool season grass seedings do not require clipping.

Weed Control

Weed control must be provided to control competition during the seeding year. Mow when the weeds reach a height of 15 – 18 inches and mow to a height of 6 to 8 inches. Clip high enough to prevent damage to the permanent seeding. Mowing may be needed 2 - 3 times. The vegetation should be chopped and dispersed rather than swathed to prevent damage to developing seedlings.

Approved Herbicides may be used on both introduced and native plantings to control weed species. Dormant seedings will likely require some form of weed control the following spring.

Criteria for Establishment of Ground Cover for Fields to be Planted to Trees

All soils in Land Capability Classification IV, VI or VII will be seeded to a permanent cover or temporary cover. If the field is already in sod, then no additional cover is required. If the forester determines the existing sod will be a significant competitor to the trees, the field may be plowed and reseeded to a less competitive permanent or temporary cover.

All soils in Land Capability Classification I, II or III will be established to a temporary cover. Residue cover of at least 70% is acceptable in place of the temporary cover.

Cover is not required on a slope soils except for soils in Wind Erodibility group 1 or 2, which must be established to a temporary cover or have 70% residue in place of the temporary cover.

Cover crop seeding mixtures will be: Perennial ryegrass at 8 lbs/acre, Sideoats Grama at 5 lbs/acre, Canada wildrye at 10 lbs/acre, or a companion crop seeded with one of the following: Timothy at 3 lbs./acre, Creeping red fescue at 5 lbs/acre, hard fescue at 5 lbs/acre, orchardgrass at 2 lbs/acre, or Red Top at 2 lbs/acre. The entire field may be seeded prior to planting of the trees. Use the appropriate mechanical or chemical methods to control vegetation in the tree row or around individual trees. Adjust the width of the area where vegetation is controlled to maintain erosion control.

Planned access lanes within the tree planting will be seeded to permanent cover. Firebreaks will be managed according to the foresters' recommendations and fire potential.

Operation and Maintenance

Mow, clip or use approved herbicides as often as necessary to control noxious weeds and undesirable plants during the establishment period. Manage plantings to reduce competition of companion crops or undesired vegetation.

After the establishment period, use spot mowing or spot herbicide treatment to control noxious weeds and other undesirable plant growth. Annual mowing of the whole field will not be permitted unless recommended by a technical agency.

Any mowing after the seeding year (except for noxious weed control) should be done after August 1 to protect nesting wildlife, with approval by a technical agency.

Re-seed areas where stands fail to provide adequate ground cover.

Where plant vigor declines in introduced grass and legume plantings, maintenance levels of plant nutrients may be necessary. Refer to Nutrient Management, Practice Code 590, for recommendations.

Where plant vigor declines in native plant species or where invader species threaten native mix stands, burning or light disking may be appropriate. See Prescribed Burning, Practice Code 338, for information on burning criteria.

Occasional grazing and/or haying may benefit the stand. If grazing is to be used, develop a planned grazing system and follow management recommendations outlined in the Prescribed Grazing, Practice Code 528. Develop management criteria for haying based on the Forage Harvest management, Practice Code 511.

Areas used for disposal of organic waste shall have an approved Waste Utilization Plan prepared in accordance with Practice Code 633.

Table 1 - Temporary Cover Crops

Cover Crop	Seeding Rate/Acre	Seeding Dates - Statewide
Oats	2 1/2 bu	April 1 to June 1, August 1 to Sept. 1
Barley	1 1/2 bu.	April 1 to June 1 August 1 to Sept. 1
Spring or Winter Wheat	1 1/4 bu.	April 1 to June 1
Spring or Winter Rye	1 bu.	April 1 to June 1
Annual Ryegrass	8 lbs.	April 1 to June 1 August 1 to Sept. 1
Proso Millet	12 lbs.	May 15 to June 10
Sorghum/Sudangrass	12 lbs.	May 15 to June 10
Grain Sorghum	10 lbs.	May 15 to June 10
Corn	140,000 seeds	May 15 to June 10

Table 2 – Seeding Dates for Permanent Cover

Cool Season Grasses & Legumes

	Spring	Late Summer	Dormant
North	April 1 – June 15	July 15 – Sept. 1	Nov. 1- Freeze-up
South	April 1 – June 1	August 1 – Sept. 10	Nov. 1- Freeze-up

Warm Season Grasses, forbs and legumes (includes warm and cool season natives when planted in a mixture)

	Spring	Late Summer	Dormant
Statewide	May 15 to June 30	Not Recommended	Nov. 1 – Freeze-up

When mixtures containing both warm season native and cool season introduced grasses are to be planted, select the seeding date based on the predominant plants in the mixture.

Dormant seeding shall be made into at least 70% surface ground cover from temporary cover crop or row crop residues, or into standing small grain stubble.

Seeding of warm season grasses may begin before May 15th if the soil temperature is at least 50 degrees F.

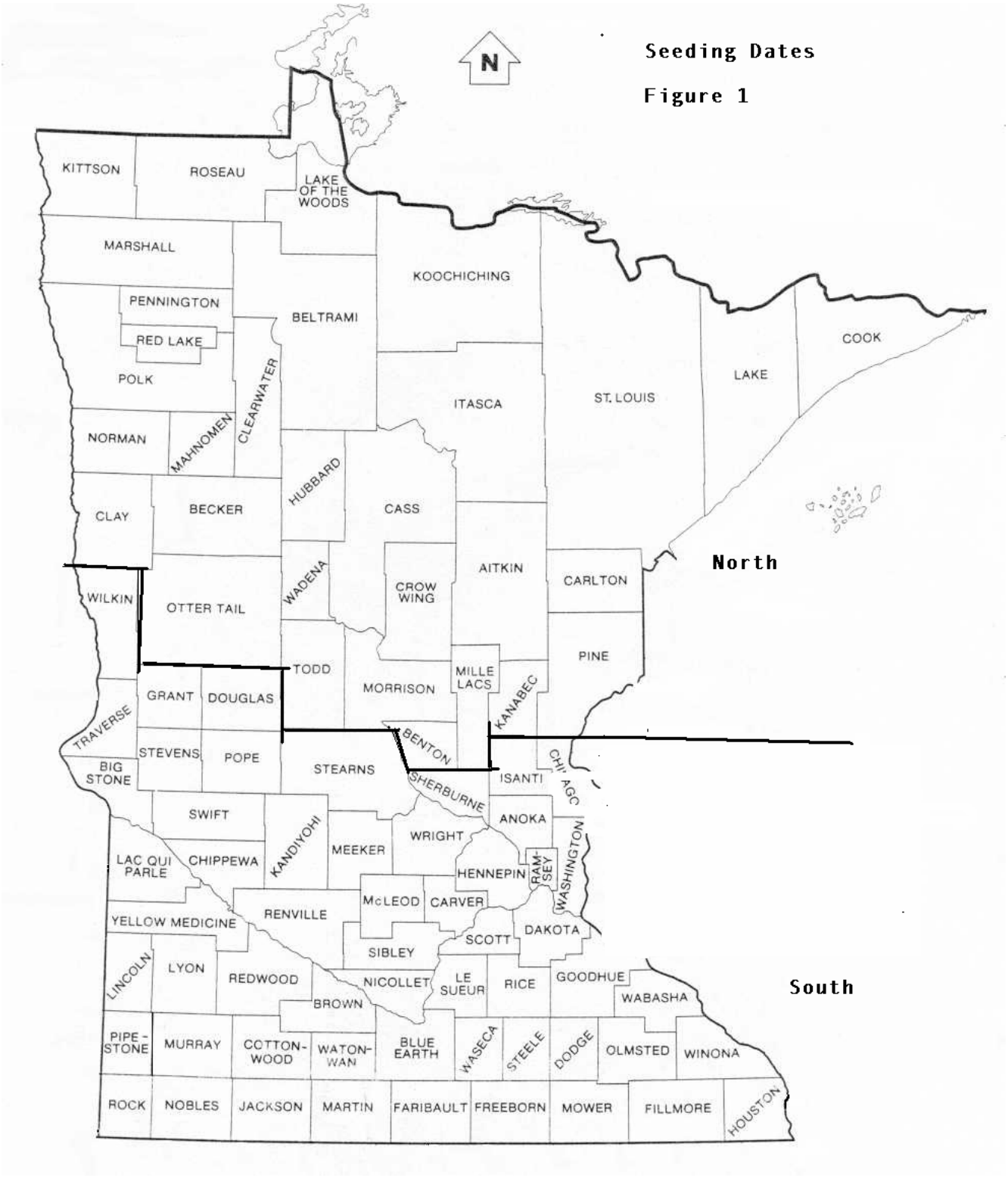
Seeding Dates
Figure 1
N
KITTSON
ROSEAU
LAKE OF THE WOODS
MARSHALL
KOOCHICHING
PENNINGTON
BELTRAMI
RED LAKE
POLK
CLEARWATER
ITASCA
ST. LOUIS
LAKE
COOK
NORMAN
MAHNOMEN
HUBBARD
CASS
CLAY
BECKER
AITKIN
CARLTON
North
WILKIN
OTTER TAIL
WADENA
CROW WING
PINE
TODD
MORRISON
MILLE LACS
KANABEC
GRANT
DOUGLAS
TRAVERSE
STEVENS
POPE
BENTON
STEARNS
CHI' AGC
BIG STONE
SHERBURNE
ISANTI
SWIFT
KANDIYOHI
ANOKA
WRIGHT
MEEKER
LAC QUI PARLE
CHIPPEWA
HENNEPIN
RAM-SEY
WASHINGTON
McLEOD
CARVER
YELLOW MEDICINE
RENVILLE
SCOTT
DAKOTA
SIBLEY
LINCOLN
LYON
REDWOOD
NICOLLET
LE SUEUR
RICE
GOODHUE
South
BROWN
WABASHA
PIPE-STONE
MURRAY
COTTON-WOOD
WATON-WAN
BLUE EARTH
WASECA
STEELE
DODGE
OLMSTED
WINONA
ROCK
NOBLES
JACKSON
MARTIN
FARIBAULT
FREEBORN
MOWER
FILLMORE
HOUSTON

Table 3 – Native Grass Recommended Varieties

SPECIES	VARIETY	ADAPTABILITY ZONE RATINGS[1] A	B	C	D	E
Switchgrass	Forestburg	1	1	1	2	3
	Sunburst	1	1	1	2	3
	Nebraska 28	1	1	2	3	4
	Summer	1	2	3	4	4
	Dacotah	3	2	1	1	1
	Pathfinder	1	2	3	4	4
Big Bluestem	Bonilla	1	1	1	2	3
	Champ	1	1	2	3	4
	Rountree	1	2	3	4	4
	Pawnee	1	2	3	4	4
	Bison	3	2	1	1	1
	Sunnyview	1	1	1	2	3
Indiangrass	Holt	1	1	2	3	4
	Oto	2	3	4	4	4
	Tomahawk	2	1	1	1	1
Sideoats Grama	Pierre	1	1	1	2	3
	Butte	1	1	2	3	4
	Trailway	1	2	3	4	4
	Killdeer	3	2	1	1	1
Little Bluestem	Itasca	1	1	1	1	1
	Badlands	2	1	1	1	1
	Camper	2	3	3	4	4
	Blaze	2	3	4	4	4
Green Needlegrass	Lordorm			Statewide		
	MN, ND and SD Common			Statewide		
Prairie Sandreed	Goshen	1	1	2	4	4
Blue Grama	Bad River ecotype			Statewide		
	ND or SD Common			Statewide		
Western Wheatgrass	Rodan, Rosana and Flintlock			Statewide		
Canada wildrye	Mandan			Statewide		
Prairie Cordgrass	Red River			Statewide		

Local seed sources of the above species may be used if it has been tested for germination and purity and if the seed is used within 200 miles north or 150 miles south of the seed origin.

[1]ADAPTABILITY ZONE RATINGS: 1= Adapted with optimum performance; 2= Moderately adapted under haying or grazing; may not always produce mature seed; 3= Poorly adapted; 4=Not adapted.

Figure 2

NATIVE WARM SEASON GRASS VARIETY ADAPTABILITY ZONES

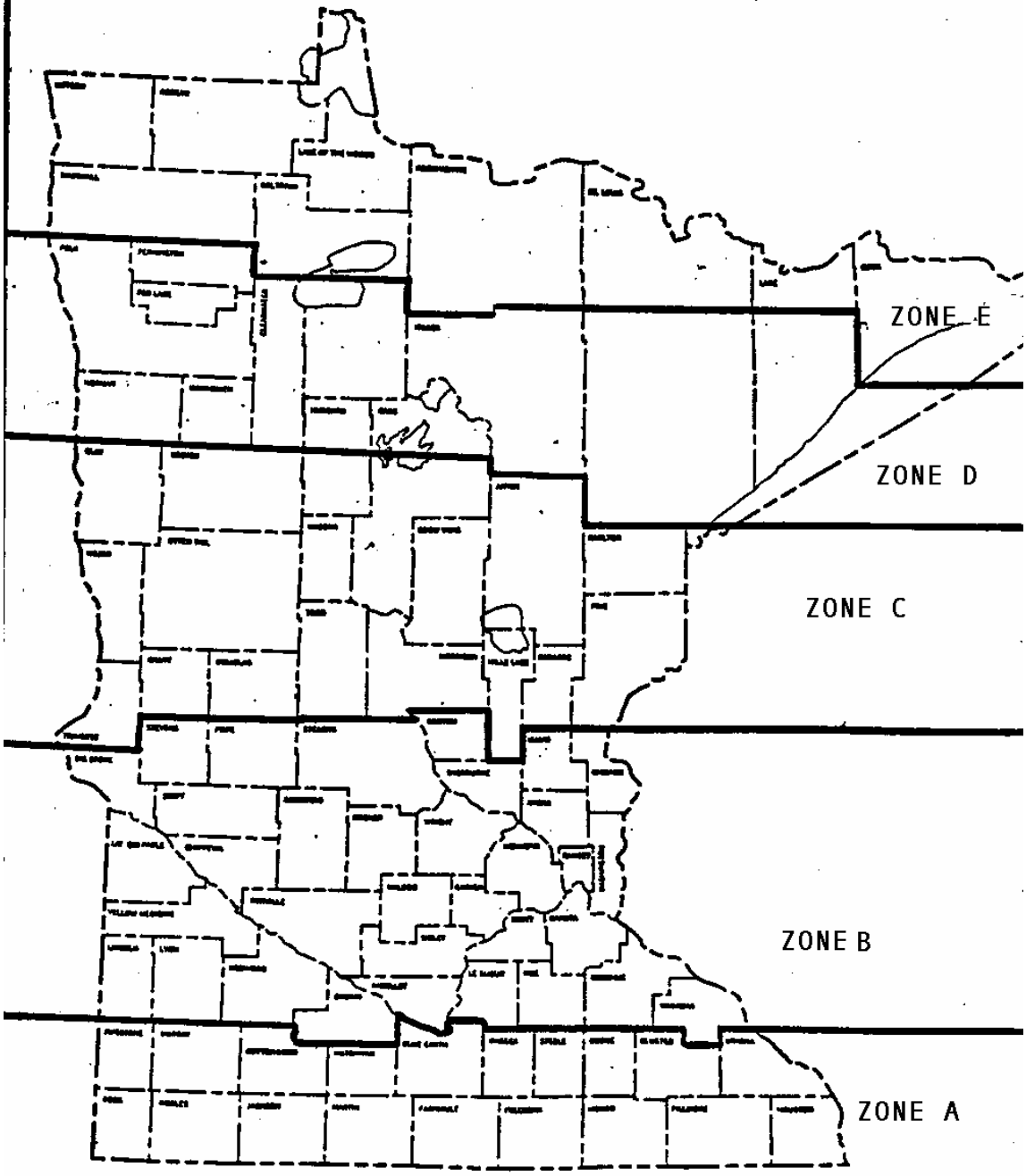

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Table 4: Seeding Chart for Introduced Plant Species

Seeding rates are listed in pounds pure live seed per acre. All seeds shall be tested by a qualified laboratory and labeled for sale in Minnesota as prescribed by the Minnesota Department of Agriculture.

Grasses and Legumes:

Species	% Allowed in Mix	Full Seeding Rate (PLS)	Seeds per Square Ft. (1 lb./ac)	Invasive-ness 3/	Wet Soils 1/	Drought Tolerance 2/	Flood Tolerance 3/
Smooth bromegrass 5/	0 - 100	14.0	3.1	High	No	Good	Fair
Orchardgrass	0-50	5.0	15.0	Low	No	Fair	Fair
Timothy	0-50	4.0	28.2	Low	Yes	Poor	Good
Red Top	0-50	1.0	114.6	Low	Yes	Good	Excellent
Creeping Foxtail	0-50	3.0	14.0	High	Yes	Poor	Excellent
Dahurian Wildrye	0-50	12.0	4.0	Low	No	Good	Fair
Intermediate Wheatgrass	0-50	20.0	2.0	Low	No	Fair	Fair
Tall Wheatgrass	0-50	22.0	1.8	Low	Yes	Poor	Good
Western Wheatgrass4/	0-20	16.0	2.5	N/A	Yes	Good	Good
Switchgrass4/	0-20	5.0	8.9	N/A	Yes	Fair	Good
Alfalfa	0-50	12.0	4.6	Low	No	Good	Poor
Red Clover	0-50	9.0	6.3	Low	No	Fair	Poor
White Clover	0-50	3.0	18.3	Low	Yes	Poor	Good
Alsike Clover	0-50	2.0	16.0	Low	Yes	Poor	Good

1/ Wet soils are those classified as somewhat poorly drained to very poorly drained.
2/ Droughty soils are those classified as excessively drained.
3/ Refers to the potential for a species to spread into adjoining areas. **Species rated "high" should be avoided adjacent to existing native prairie or other sensitive areas and certified seed production fields.**
4/ Switchgrass and/or Western Wheatgrass may be included in introduced grass-legume mixtures.
5/ Smooth Bromegrass has a potential for invasiveness. Use should be avoided adjacent to existing native prairie, state wildlife or conservation easement areas, high quality wetlands or other sensitive areas where native prairie species have been planted.

Table 5: Seeding Chart for Native Plant Species

Seeding rates are listed in pounds pure live seed per acre. All seeds shall be tested by a qualified laboratory and labeled for sale in Minnesota as prescribed by the Minnesota Department of Agriculture.

Species	% Allowed in Mix	Full Seeding Rate (PLS)	Seeds per Square Ft. (1 lb./ac)	pH Minimum	Wet Soils 1/	Drought Tolerance 2/	Flood Tolerance
Big Bluestem	0-30	8	3.8	>5.5	Yes	Moderate	Good
Indiangrass	0-30	8	4.0	>5.5	No	Moderate	Moderate
Green Needlegrass	0-30	8	4.0	>5.5	No	Moderate	Fair
Little Bluestem	0-30	8	6.0	>5.5	No	Good	Poor
Sideoats Grama	0-30	8	4.4	>5.5	No	Good	Poor
Prairie Sandreed	0-30	5	6.6	>5.5	No	Excellent	Poor
Canada Wildrye	0-20	12	2.6	>5.5	Yes	Moderate	Moderate
Blue Grama	0-30	2	17.5	>5.5	No	Excellent	Poor
Switchgrass	0-30	5	9.0	>5.5	Yes	Poor	Good
Western Wheatgrass	0-30	16	2.5	>5.5	Yes	Good	Good
Canada Bluejoint	0-40	1	91.0	>5.5	Yes	Poor	Excellent
Prairie Cordgrass	0-30	8	3.8	>5.5	Yes	Fair	Excellent

1/ Wet soils are those classified as somewhat poorly drained to very poorly drained.
2/ Droughty soils are those classified as excessively drained.

Minnesota Native Harvest Prairie Mix may be used for warm season grass seedings statewide, within 200 miles north or 150 miles south of its' origin. It must be tested for germination and purity like other seed varieties. Seed at a rate of 30 - 50 PLS seeds per square foot.

Table 6: Seeding Chart for Native Forbs and Legumes

The following list identifies native forbs and wildflowers beneficial to upland wildlife and native habitat restoration. The list is not inclusive, and identifies those species, which are readily available through private vendor seed supplies. It is desirable for seed sources to originate from as close to the planting site as possible. Recommended forbs and legumes must be native to Minnesota. When local Minnesota seed sources are not available, native forb and legume seed shall originate from or be grown in Wisconsin, northern Iowa, northern Nebraska, South Dakota, North Dakota and the Canadian provinces of Manitoba and Ontario. Forb and legume seed from other sources is not acceptable to be used in Minnesota plantings. If the true origin of the seed can be certified as one of the accepted states or provinces, then there would be no restriction on where the seed is grown. Certification must be provided by the grower, and responsibility for obtaining certification rests with the producer.

Species		Value to Wildlife	Seeding Rate Oz/Acre	Seeds Per Square Ft 1/
DRY				
Dotted Blazingstar	(Liatris punctata)	EX	2.0	0.6
Silky Aster	(Aster sericeus)	EX	1.5	0.9
Purple Coneflower	(Echinacea angustifolia)	EX	2.0	0.5
Showy Penstemon	(Penstemon grandifloris)	G	2.0	0.5
Bush Clover	(Lespedeza capitata)	G	2.0	0.5
DRY to MESIC				
Leadplant	(Amorpha canescens)	EX	2.0	0.8
Butterfly Weed	(Asclepias tuberosa)	EX	2.0	0.2
Smooth Aster	(Aster laevis)	EX	1.5	1.5
Heath Aster	(Aster ericoides)	EX	1.5	1.5
Stiff Tickseed	(Coreopsis palmata)	EX	2.0	0.6
Showy Goldenrod	(Solidago speciosa)	G	2.0	2.4
Rough Blazingstar	(Liatris aspera)	EX	2.0	0.6
Compass Plant	(Silphum laciniatum)	G	2.0	0.1
Hoary Vervain	(Verbena stricta)	G	2.0	1.5
Prairie Smoke	(Geum triflorum)	G	2.0	2.0
MESIC to WET				
Rattlesnake Master	(Eryngium yuccifolium)	EX	2.0	0.4
Giant Sunflower	(Helianthus giganteus)	EX	2.0	0.6
Common Ox-eye	(Heliopsis helianthoides)	EX	2.0	0.4
Tall Blazingstar	(Liatris pycnostachya)	EX	2.0	0.6
Yellow Coneflower	(Ratibida pinnata)	EX	3.0	1.8
Golden Alexanders	(Zizia aurea)	G	2.0	0.6
Canada Tick Trefoil	(Desmodium canadense)	G	3.0	0.3
Wild Bergamot	(Monarda fistulosa)	EX	1.5	2.5
WET				
Swamp Milkweed	(Asclepias incarnata)	EX	2.0	0.2
Panicled Aster	(Aster lanceolatus)	EX	1.5	1.5
Boneset	(Eupatorium perfoliatum)	EX	2.0	N/A
New England Aster	(Aster novae-angliae)	G	1.5	2.0
Joe-pye Weed	(Eupatorium maculatum)	G	1.0	2.0
Blue Vervain	(Verbena hastata)	G	2.0	2.0
DRY to WET				
Yarrow	(Achillea millefolium)	EX	2.0	1.9
Maximillian Sunflower	(Helianthus maximiliani)	EX	1.5	1.4
Black-eyed Susan	(Rudbeckia hirta)	EX	2.5	5.4
Stiff Goldenrod	(Solidago rigida)	EX	2.0	2.1
Purple Prairie Clover	(Dalea purpurea)	EX	2.0	1.8
Illinois bundleflower	(Desmanthus illinoensis)	EX	3.0	0.2

1/ **Seeds per square foot** based on recommended seeding rate