

## FORAGE SUITABILITY GROUP (FSG) Clayey Subsoil

**FSG No.:** G064XY210NE

**Major Land Resource Area (MLRA):** 64 - Mixed Sandy and Silty Tableland



### Physiographic Features

These soils are primarily found on upland slopes and some are found on stream terraces and alluvial fans.

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	2950	3940
<b>Slope (percent):</b>	0	15
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Medium	Very high

### Climatic Features

This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 64. Average annual precipitation for all climate stations listed below is about 16 inches. About 79 percent of the annual precipitation occurs during the months of April through September. On average, there are about 26 days with greater than .1 inches of precipitation during that same time period. Precipitation in this MLRA is less than needed for optimum forage production and is the single largest factor limiting production from this group on non-irrigated lands.

Average annual snowfall ranges from 20 inches at Interior, South Dakota (SD), to 60 inches at Harrison, Nebraska (NE). Snow cover at depths greater than 1 inch range from 28 days at Interior, SD, to 60 days at Long Valley, SD.

Average July temperatures across the MLRA are about 74°F and average January temperatures are about 22°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -45°F and a high of 114 both recorded at Porcupine, SD. The MLRA lies mostly in USDA Plant Hardiness Zones 4a and 4b, with a small area of warmer 5a around Alliance, NE.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data access the National Water and Climate Center at <http://www.wcc.nrcs.usda.gov>

	<b>From</b>	<b>To</b>
<b>Freeze-free period (28 deg)(days):</b> (9 years in 10 at least)	111	158
<b>Last Killing Freeze in Spring (28 deg):</b> (1 year in 10 later than)	Jun 01	May 05
<b>Last Frost in Spring (32 deg):</b> (1 year in 10 later than)	Jun 12	May 14
<b>First Frost in Fall (32 deg):</b> (1 year in 10 earlier than)	Sep 06	Sep 19

	<b>From</b>	<b>To</b>
<b>First Killing Freeze in Fall (28 deg):</b> (1 year in 10 earlier than)	Sep 11	Sep 28
<b>Length of Growing Season (32 deg)(days):</b> (9 years in 10 at least)	94	135
<b>Growing Degree Days (40 deg):</b>	3867	4974
<b>Growing Degree Days (50 deg):</b>	2128	2913
<b>Annual Minimum Temperature:</b>	-30	-15
<b>Mean annual precipitation (inches):</b>	15	18

**Monthly precipitation (inches) and temperature (F):**

<b>2 years in 10:</b>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
<b>Precip. Less Than</b>	0.07	0.10	0.32	0.71	1.22	1.19	1.43	0.66	0.34	0.47	0.12	0.15
<b>Precip. More Than</b>	0.37	0.61	1.87	3.10	4.14	5.14	3.84	2.61	2.02	1.57	0.81	0.50
<b>Monthly Average:</b>	0.33	0.38	0.97	1.88	2.89	2.90	2.32	1.50	1.33	0.97	0.47	0.38
<b>Temp. Min.</b>	8.5	13.4	19.6	28.9	38.8	48.6	55.1	52.7	42.0	31.1	19.8	11.0
<b>Temp. Max.</b>	35.1	40.2	49.7	63.0	73.1	83.6	92.0	91.0	79.9	67.9	48.9	37.1
<b>Temp. Avg.</b>	22.4	27.4	35.2	46.2	56.8	66.7	74.2	72.2	61.3	49.4	35.1	24.5

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
SD4184	Interior, SD	1961	1990
SD4983	Long Valley, SD	1961	1990
SD6736	Porcupine, SD	1963	1990
NE1575	Chadron, NE	1961	1990
NE0130	Alliance, NE	1961	1990
NE3615	Harrison, NE	1961	1990

**Soil Interpretations**

The clayey subsoil group consists of well drained, moderately deep to very deep, medium to fine textured soils formed from or overlying materials weathered from shale, or from silty and clayey sediments. Available water capacity ranges from low to high, and permeability ranges from moderately slow to very slow.

Some of these soils have medium surface textures, but all have clayey subsoils.

<b>Drainage Class:</b>	Well drained	To	Well drained
<b>Permeability Class:</b> (0 - 40 inches)	Moderately slow	To	Very slow
<b>Frost Action Class:</b>	Low	To	Low

	<u>Minimum</u>	<u>Maximum</u>
<b>Depth:</b>	20	
<b>Surface Fragments &gt;3" (% Cover):</b>	0	3
<b>Organic Matter (percent):</b> (surface layer)	0.5	4.0
<b>Electrical Conductivity (mmhos/cm):</b> (0 - 24 inches)	0	4
<b>Sodium Absorption Ratio:</b> (0 - 12 inches)	0	13
<b>Soil Reaction (1:1) Water (pH):</b> (0 - 12 inches)	6.6	8.4
<b>Available Water Capacity (inches):</b> (0 - 60 inches)	3	10
<b>Calcium Carbonate Equivalent (percent):</b> (0 - 12 inches)	0	10

**Soil Component List** (Some phases of these soils may also occur in other FSG's)

Buffington	Huggins	Norrest	Opal
Buften	Kyle	Okreek	Pierre

### Adapted Species List

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many of those species can be accessed on the web at <http://www.plants.usda.gov>

<u>Cool Season Grasses</u>	<u>Symbol</u>	<u>Dry</u>	<u>Irrig</u>	<u>Warm Season Grasses</u>	<u>Symbol</u>	<u>Dry</u>	<u>Irrig</u>
Altai wildrye	LEAN3	F	NS	Big bluestem	ANGE	F	G
Crested wheatgrass	AGCR	G	NS	Little bluestem	SCSC	F	NS
Green needlegrass	NAVI4	G	NS	Sideoats grama	BOCU	G	NS
Intermediate wheatgrass	THIN6	G	G	Switchgrass	PAVIV	F	G
Meadow brome	BRBI2	F	G	<u>Legumes</u>	<u>Symbol</u>	<u>Dry</u>	<u>Irrig</u>
Orchardgrass	DAGL	NS	G	Alfalfa	MESA	G	G
Pubescent wheatgrass	THIN6	G	G	Birdsfoot trefoil	LOCO6	NS	G
Russian wildrye	PSJU3	G	NS	Canada milkvetch	ASCAC6	F	NS
Smooth brome	BRINI2	F	G	Cicer milkvetch	ASCI4	G	F
Streambank wheatgrass	ELLAL	F	NS	Purple prairieclover	DAPUP	F	NS
Thickspike wheatgrass	ELMA7	F	NS	Red clover	TRPR2	NS	G
Western wheatgrass	PASM	G	NS	Sainfoin	ONVI	F	NS
				White prairieclover	DACAC	F	NS

G - Good adaptation for forage production on this group of soils in this MLRA

F - Fair adaptation but will not produce at its highest potential

NS - Species is not adapted to the site and should not be planted

### Production Estimates

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

<u>Forage Crop</u>	<u>Dryland</u>		<u>Irrigated</u>	
	<u>Management Intensity</u>		<u>Management Intensity</u>	
	<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u>
	(lbs/ac)	(lbs/ac)	(lbs/ac)	(lbs/ac)
Alfalfa	4300	2000		
Alfalfa/Crested wheatgrass	4000	1700		
Alfalfa/Intermediate wheatgrass	4000	1700	14300	8600
Alfalfa/Pubescent wheatgrass	4000	1700	14300	8600
Alfalfa/Smooth brome			14300	8600
Crested wheatgrass	3100	1400		
Intermediate wheatgrass	3100	1400	11400	6900
Pubescent wheatgrass	3100	1400	11400	6900
Smooth brome			11400	6900

### Forage Growth Curves

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

**Growth Curve Number:** SD0002  
**Growth Curve Name:** Alfalfa  
**Growth Curve Description:** Alfalfa, MLRA's 65, 64, 60A  
**Percent Production by Month**

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	35	35	15	5	5	0	0	0

**Growth Curve Number:** SD0004  
**Growth Curve Name:** Cool season grass  
**Growth Curve Description:** Cool season grass, statewide  
**Percent Production by Month**

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	10	40	30	10	5	5	0	0	0

**Growth Curve Number:** SD0005  
**Growth Curve Name:** Warm season grass  
**Growth Curve Description:** Warm season grass, statewide  
**Percent Production by Month**

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	0	10	40	35	15	0	0	0	0

**Growth Curve Number:** SD0003  
**Growth Curve Name:** Irrigated Alfalfa  
**Growth Curve Description:** Irrigated Alfalfa, statewide  
**Percent Production by Month**

<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
0	0	0	5	25	25	20	15	10	0	0	0

### Soil Limitations

The primary limiting factors to these soils are their tight, slowly permeable nature. Because of their slow water intake runoff is increased causing the soils to be droughty. This will be especially apparent on those soils with lower available water holding capacity. On steeper slopes, water erosion is a potential problem during establishment, when renovating stands, and in thin established stands. Livestock trail erosion is a potential problem in established stands.

### Management Interpretations

The impact on yields due to the tight, slowly permeable nature and droughtiness of these soils can be reduced by selecting species adapted to those soil conditions when establishing new stands or renovating stands. Including sod forming grass species in stands, especially on steeper slopes will reduce the potential for sheet and rill erosion. Incorporate erosion control practices during the establishment period. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, and evenly distribute grazing pressure.

### FSG Documentation

**Similar FSG's:**

**FSG ID**

G064XY800N

**FSG Narrative**

Claypan soils have elevated salinity, sodicity, and/or alkalinity and are less productive.

**Inventory Data References:**

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas  
Natural Resources Conservation Service (NRCS) National Water and Climate Center data  
USDA Plant Hardiness Zone Maps  
National Soil Survey Information System for soil surveys in South Dakota, Nebraska, and Wyoming counties in MLRA 64  
NRCS Nebraska and Wyoming Field Office Technical Guides and South Dakota Technical Guide  
NRCS National Range and Pasture Handbook  
Various South Dakota and Nebraska Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

**State Correlation:**

This site has been correlated with the following states: Nebraska, South Dakota, and Wyoming

**Forage Suitability Group Approval:**

Original Author: Tim Nordquist  
Original Date: 4/15/02  
Approval by: Dave Schmidt  
Approval Date: 9/17/04