

FORAGE SUITABILITY GROUP CLAYPAN

FSG No.: G060AY800SD

Major Land Resource Area: 60A - Pierre Shale Plains and Badlands

Physiographic Features

These soils are found in drainageways and on terraces and sedimentary plains, upland fans, flats and hill slopes, and in upland depressions.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2600	3300
Slope (percent):	0	9
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	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 60A. Average annual precipitation for all climate stations listed below is about 15 inches. About 77 percent of the annual precipitation occurs during the months of April through September. On average, there are about 24 days with greater than .1 inches of precipitation during that same time period.

Average annual snowfall ranges from 25 inches at Newell, South Dakota (SD,) to 45 inches at Oelrichs, SD. Snow cover at depths greater than 1 inch range from 40 days at Newell, SD, to 82 days at Colony, Wyoming (WY.)

Average July temperatures across the MLRA are about 74⁰F and average January temperatures are about 20⁰F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -47 at Redbird, WY, and a high of 114 recorded at Oelrichs, SD. The MLRA lies mostly in USDA Plant Hardiness Zones 4a and 4b.

At Rapid City, SD, the closest station with records, it is cloudy about 139 days a year. Average morning relative humidity in June is about 78 percent and average afternoon humidity is 49 percent.

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>.

	From	To
Freeze-free period (28 deg)(days): (9 years in 10 at least)	118	137
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)	May 26	May 14
Last Frost in Spring (32 deg): (1 year in 10 later than)	Jun 07	May 26
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Sep 02	Sep 13
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 11	Sep 21
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	96	117

	From	To
Growing Degree Days (40 deg):	4231	4913
Growing Degree Days (50 deg):	2400	2852
Annual Minimum Temperature:	-30	-20
Mean annual precipitation (inches):	14	17

Monthly precipitation (inches) and temperature (F):

2 years in 10:	<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>
Precip. Less Than	0.11	0.09	0.30	0.65	1.05	1.04	1.06	0.52	0.37	0.38	0.20	0.15
Precip. More Than	0.49	0.74	1.27	2.50	4.02	4.63	2.98	2.22	1.68	1.62	0.89	0.66
Monthly Average:	0.33	0.42	0.83	1.71	2.69	2.78	1.99	1.47	1.24	1.03	0.53	0.41
Temp. Min.	5.3	10.9	20.0	30.6	40.5	49.8	56.3	53.2	41.7	29.9	18.2	6.5
Temp. Max.	34.3	40.5	49.5	61.5	71.8	82.5	91.2	89.8	79.0	65.6	48.3	36.3
Temp. Avg.	19.9	25.3	34.0	45.8	56.0	66.0	73.6	71.5	60.2	48.0	33.5	22.0

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
SD0236	Ardmore, SD	1961	1990
SD6054	Newell, SD	1961	1990
SD6212	Oelrichs, SD	1961	1990
SD8911	Wasta, SD	1961	1990
SD9537	Zeona, SD	1961	1990
WY1905	Colony, WY	1961	1990
WY7555	Redbird, WY	1961	1990

Soil Interpretations

This group consists of moderately well and well drained, medium to coarse textured soils formed in alluvial deposits and other sediments. They have claypan subsoils with slow and very slow permeability. The underlying material and lower part of the subsoil typically have high amounts of soluble salts and are sodic.

Drainage Class:	Moderately well drained	To	Well drained
Permeability Class: (0 - 40 inches)	Slow	To	Very slow
Frost Action Class:	Low	To	High

	<u>Minimum</u>	<u>Maximum</u>
Depth:	20	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	0.5	4.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	4	16
Sodium Absorption Ratio: (0 - 12 inches)	0	20
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.6	8.4
Available Water Capacity (inches): (0 - 60 inches)	4	9
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	9

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>.

Cool Season Grasses	<u>Dryland</u>
Beardless wildrye	F
Crested wheatgrass	F
Green needlegrass	F
Intermediate wheatgrass	F
Newhy hybrid wheatgrass	F
Pubescent wheatgrass	F
Russian wildrye	F
Slender wheatgrass	F
Smooth brome	F
Tall wheatgrass	G
Western wheatgrass	G

Legumes

Alfalfa	F
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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

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.

Forage Crop	Management Intensity	
	<u>Low</u> (lbs/ac)	<u>High</u> (lbs/ac)
Alfalfa	1800	3700
Alfalfa/Intermediate wheatgrass	1500	3000
Intermediate wheatgrass	1500	3000
Tall wheatgrass	1300	2900
Western wheatgrass	900	1920

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: 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: SD0002
Growth Curve Name: Alfalfa
Growth Curve Description: MLRA 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

Soil Limitations

These soils have severe limitations to the production of climatically adapted forage species. The claypan and the soluble salts and sodicity in the subsoil produce an unfavorable rooting environment, limiting species selection and production potential. Some of these soils have sandy surfaces and are subject to wind erosion.

Management Interpretations

The impact on yields can be reduced by selecting forage species that are tolerant of salinity and sodicity and can root in dense, clayey subsoils. On soils with coarser surface textures incorporate wind erosion control practices during the establishment period.

FSG Documentation

Similar FSG's:

<u>FSG ID</u>	<u>FSG Narrative</u>
G060AY210SD	Clayey subsoils are less saline and/or sodic and have a more favorable rooting zone.

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 (NASIS) for soil surveys in South Dakota, Nebraska, Wyoming, and Montana counties in MLRA 60A
- South Dakota, Nebraska, Wyoming, and Montana NRCS Field Office Technical Guides
- NRCS National Range and Pasture Handbook
- Various 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: MT, NE, SD, WY

Forage Suitability Group Approval

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Original Date: 4/17/02
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