

FORAGE SUITABILITY GROUP
Sand

FSG No.: G060AY300SD

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



Physiographic Features

The soils in this group are found on flood plains and low terraces, or in sandhill-like dune and interdune and level areas.

| | <u>Minimum</u> | <u>Maximum</u> |
|--------------------------|----------------|----------------|
| Elevation (feet): | 2600 | 3300 |
| Slope (percent): | 0 | 12 |
| Flooding: | | |
| Frequency: | None | Frequent |
| Duration: | None | Brief |
| Ponding: | | |
| Depth (inches): | | |
| Frequency: | None | None |
| Duration: | None | None |
| Runoff Class: | Negligible | Very low |

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% 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, 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, WY.

Average July temperatures across the MLRA are about 74 degrees F., and average January temperatures are about 20 degrees F. 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% and average afternoon humidity is 49%.

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) | From Sep 02 | To 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 |
| 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: | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| 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 |

| | | | |
|------------------------|-----------------|-------------|-----------|
| Climate Station | Location | From | To |
| 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 very deep, somewhat excessively and excessively drained, coarse textured soils formed from alluvial and eolian sandy materials. Available water capacity is low and permeability is rapid.

| | | | |
|---|------------------------------|----|---------------------|
| Drainage Class: | Somewhat excessively drained | To | Excessively drained |
| Permeability Class: (0 - 40 inches) | Rapid | To | Rapid |
| Frost Action Class: | Low | To | Low |

| | | |
|---|----------------|----------------|
| | Minimum | Maximum |
| Depth: | 72 | |
| Surface Fragments >3" (% Cover): | 0 | 0 |
| Organic Matter (percent): (surface layer) | 0.5 | 3.0 |
| Electrical Conductivity (mmhos/cm): (0 - 24 inches) | 0 | 2 |
| Sodium Absorption Ratio: (0 - 12 inches) | 0 | 0 |
| Soil Reaction (1:1) Water (pH): (0 - 12 inches) | 6.6 | 9 |
| Available Water Capacity (inches): (0 - 60 inches) | 3 | 6 |
| Calcium Carbonate Equivalent (percent): (0 - 12 inches) | 0 | 6 |

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> | <u>Irrigated</u> |
|----------------------------|-----------------------|-------------------------|
| Altai wildrye | F | NS |
| Crested wheatgrass | G | NS |
| Intermediate wheatgrass | NS | G |
| Meadow bromegrass | NS | G |
| Newhy hybrid wheatgrass | F | NS |
| Orchardgrass | NS | G |
| Pubescent wheatgrass | F | G |
| Smooth bromegrass | NS | G |
| Streambank wheatgrass | G | NS |
| Thickspike wheatgrass | F | NS |
| Western wheatgrass | F | NS |

| Warm Season Grasses | <u>Dryland</u> | <u>Irrigated</u> |
|----------------------------|-----------------------|-------------------------|
| Big bluestem | F | G |
| Little bluestem | G | NS |
| Prairie sandreed | G | NS |
| Sand bluestem | G | NS |
| Sand lovegrass | F | NS |
| Sideoats grama | F | NS |
| Switchgrass | F | G |

| Legumes | <u>Dryland</u> | <u>Irrigated</u> |
|----------------------|-----------------------|-------------------------|
| Alfalfa | G | G |
| Birdsfoot trefoil | NS | G |
| Cicer milkvetch | G | F |
| Purple prairieclover | F | NS |
| Red clover | NS | G |
| White prairieclover | 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. On site 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 | <u>Dryland</u> | | <u>Irrigated</u> | |
|---------------------------------|------------------------|-------------------------|------------------------|-------------------------|
| | Management Intensity | | Management Intensity | |
| | <u>Low</u> (lbs/ac) | <u>High</u> (lbs/ac) | <u>Low</u> (lbs/ac) | <u>High</u> (lbs/ac) |
| Alfalfa | 2000 | 3100 | | |
| Alfalfa/Crested wheatgrass | 1700 | 2600 | | |
| Alfalfa/Intermediate wheatgrass | | | 8600 | 11400 |
| Alfalfa/Pubescent wheatgrass | 1700 | 2600 | 8600 | 11400 |
| Alfalfa/Smooth brome grass | | | 8600 | 14300 |
| Crested wheatgrass | 1400 | 2000 | | |
| Intermediate wheatgrass | | | 6900 | 9100 |
| Pubescent wheatgrass | 1400 | 2000 | 6900 | 9100 |
| Sand bluestem | 1700 | 3100 | | |
| Smooth brome grass | | | 6900 | 9100 |

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: SD0003

Growth Curve Name: Irrigated Alfalfa

Growth Curve Description: Irrigated Alfalfa, state wide

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 |

Growth Curve Number: SD0004

Growth Curve Name: Cool season grass

Growth Curve Description: Cool season grass, state wide

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, state wide

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: 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

Soil blowing is a severe hazard during stand establishment or renovation of forage stands on the soils of this group. Bare areas where livestock concentrate are also susceptible. Production potential is low to moderate due to the low available water capacity and droughtiness of these soils. Also, these soils are typically low in native fertility and have reduced capacity to supply plant nutrients. Species choices are somewhat limited for the same reasons.

Management Interpretations

The impact on yields of the low available water capacity of these soils can be reduced by selecting forage species that are highly tolerant to periods of drought and inadequate soil moisture and can grow on coarse soils. Incorporate wind erosion control practices during stand establishment. Properly locating facilitating practices such as fences, lanes, and water developments can help control livestock movement, reduce trailing perpendicular to steeper slopes, evenly distribute grazing pressure, and reduce bare areas.

FSG Documentation

Similar FSGs:

FSG ID

G060AY130SD

FSG Narrative

Very Droughty Loam soils have finer textures than sands.

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:

Original Author: Tim Nordquist

Original Date: 4/17/02

Approval by: Dave Schmidt

Approval Date: