

FORAGE SUITABILITY GROUP Clayey Subsoil

FSG No.: G102AY210SD

Major Land Resource Area: 102A - Rolling Till Prairie

Physiographic Features

The soils in this group are found on nearly level to strongly sloping upland positions such as backslopes, footslopes, toe slopes.

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	980	1970
Slope (percent):	0	15
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):		
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	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 102A. Average annual precipitation for all climate stations listed below is about 23 inches. About 75 percent of that occurs during the months of April through September. On average, there are about 31 days with greater than .1 inches of precipitation during the same timeframe. Precipitation 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 36 inches at Britton to 48 inches at Tracy. Snow cover at depths greater than 1 inch range from 56 days at Milbank to 105 days at Morris.

Average July temperatures are about 72^oF and average January temperatures are about 11^oF. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -40 at Brookings and a high of 108 recorded at both Britton and Milbank. The MLRA lies in USDA Plant Hardiness Zones 4a and 4b.

Average annual wind speeds range from about 8 mph in the eastern part of the MLRA to about 11 mph in the west. The highest wind speeds occur during March through May. It is cloudy about 154 days a year in the west and 166 days in the east. Average morning relative humidity in June is about 86 percent and average afternoon humidity is 59 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)	127	145
Last Killing Freeze in Spring (28 deg): (1 year in 10 later than)	May 22	May 11

	From	To
Last Frost in Spring (32 deg): (1 year in 10 later than)	May 31	May 17
First Frost in Fall (32 deg): (1 year in 10 earlier than)	Sep 08	Sep 19
First Killing Freeze in Fall (28 deg): (1 year in 10 earlier than)	Sep 17	Sep 26
Length of Growing Season (32 deg)(days): (9 years in 10 at least)	109	134
Growing Degree Days (40 deg):	4066	4515
Growing Degree Days (50 deg):	2441	2698
Annual Minimum Temperature:	-30	-20
Mean annual precipitation (inches):	19	26

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	0.13	0.19	0.28	0.66	1.29	1.83	1.54	0.91	0.68	0.45	0.17	0.10
Precip. More Than	0.97	1.08	2.70	3.68	4.83	4.92	5.21	3.75	4.63	3.32	2.19	1.19
Monthly Average:	0.54	0.59	1.37	2.20	2.88	3.67	3.21	2.77	2.32	1.83	0.96	0.54
Temp. Min.	-2.8	3.1	17.6	32.8	44.6	54.6	59.3	56.2	45.7	34.2	20.5	4.6
Temp. Max.	21.4	26.5	39.3	56.5	70.4	80.5	85.5	82.9	73.2	61.0	42.0	26.6
Temp. Avg.	10.1	15.9	29.0	44.6	57.2	66.8	72.0	69.5	59.3	47.5	30.8	15.6

<u>Climate Station</u>	<u>Location</u>	<u>From</u>	<u>To</u>
SD1049	Britton, SD	1961	1990
SD1076	Brookings, SD	1961	1990
SD1739	Clark, SD	1961	1990
SD1777	Clear Lake, SD	1961	1990
SD5536	Milbank, SD	1961	1990
MN5400	Milan, MN	1961	1990
MN5638	Morris, MN	1961	1990
MN8323	Tracy, MN	1961	1990

Soil Interpretations

This group consists of very deep, well drained, moderately fine to fine textured soils formed in glacial sediments or glacial till. Permeability is slow to moderately slow.

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

	<u>Minimum</u>	<u>Maximum</u>
Depth:	72	
Surface Fragments >3" (% Cover):	0	3
Organic Matter (percent): (surface layer)	2.0	7.0
Electrical Conductivity (mmhos/cm): (0 - 24 inches)	0	4
Sodium Absorption Ratio: (0 - 12 inches)	0	5
Soil Reaction (1:1) Water (pH): (0 - 12 inches)	5.6	8.4
Available Water Capacity (inches): (0 - 60 inches)	7	10
Calcium Carbonate Equivalent (percent): (0 - 12 inches)	0	18

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 those species can be accessed at <http://plants.usda.gov>.

<u>Cool Season Grasses</u>	<u>Dryland</u>	<u>Irrigated</u>
Canada wildrye	F	NS
Green needlegrass	G	NS
Intermediate wheatgrass	G	G
Meadow brome	G	G
Orchardgrass	F	G
Pubescent wheatgrass	G	G
Smooth brome	G	G
Tall fescue	F	F
Tall wheatgrass	F	NS
Timothy	NS	F
Virginia wildrye	F	NS
Western wheatgrass	F	NS

<u>Warm Season Grasses</u>	<u>Dryland</u>	<u>Irrigated</u>
Big bluestem	G	G
Indiangrass	F	G
Little bluestem	F	NS
Sideoats grama	F	NS
Switchgrass	G	G

<u>Legumes</u>	<u>Dryland</u>	<u>Irrigated</u>
Alfalfa	G	G
Birdsfoot trefoil	F	G
Canada milkvetch	F	NS
Cicer milkvetch	G	F
Illinois bundleflower	F	NS
Purple prairieclover	F	NS
Red clover	F	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. 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		Management Intensity	
	<u>High</u> (lbs/ac)	<u>Low</u> (lbs/ac)	<u>High</u> (lbs/ac)	<u>Low</u> (lbs/ac)
Alfalfa	8600	4000		
Alfalfa/Intermediate wheatgrass	7700	3500	14300	8600
Alfalfa/Smooth brome grass	7700	3500	14300	8600
Big bluestem	8000	3700		
Intermediate wheatgrass	6600	2800	11400	6900
Smooth brome grass	6600	2800	11400	6900
Switchgrass	8000	3700		

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: ND0001
Growth Curve Name: Alfalfa
Growth Curve Description: Alfalfa

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	30	20	15	5	0	0	0

Growth Curve Number: ND0002
Growth Curve Name: Cool season grass
Growth Curve Description: Cool season grass

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	40	35	10	5	5	0	0	0

Growth Curve Number: ND0003
Growth Curve Name: Warm season grass
Growth Curve Description: Warm season grass

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

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 somewhat droughty. Water holding capacity ranges from moderate to high. Forage production on soils of moderate water holding capacity will be noticeably affected during dry growing seasons. 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 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 FSGs:

<u>FSG ID</u>	<u>FSG Narrative</u>
G102AY800S	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 (NASIS) for soil surveys in South Dakota and Minnesota counties in MLRA 102A
South Dakota NRCS SDTG and Minnesota NRCS FOTG
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: Minnesota and South Dakota

Forage Suitability Group Approval

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Original Date: 1/23/02
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Approval Date: 1/3/03