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Soil and Climatic Limitations for Sprinkler Irrigated Potato Production in Six South Central South Dakota Counties

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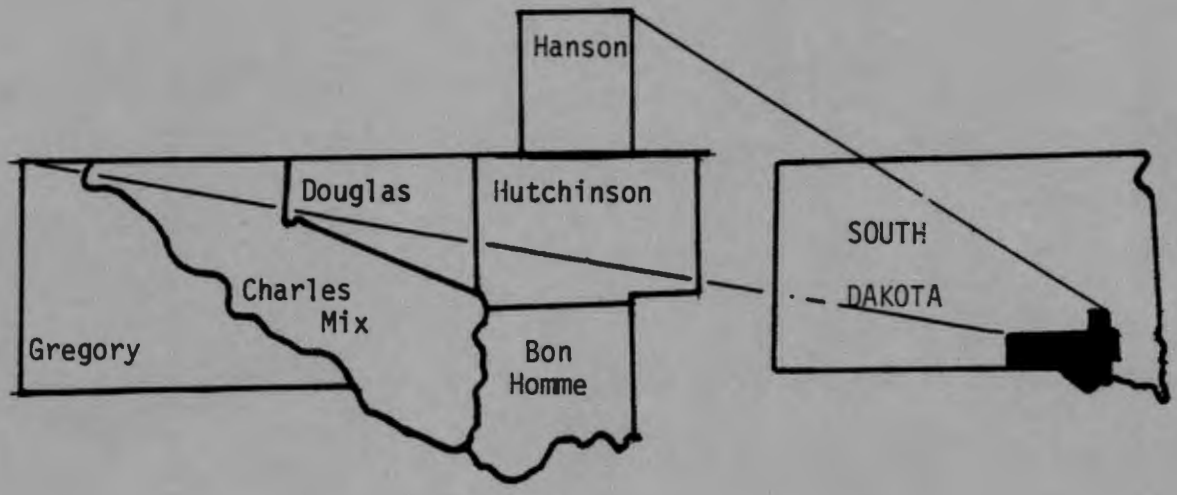
SOIL and CLIMATIC LIMITATIONS for SPRINKLER IRRIGATED POTATO PRODUCTION in SIX SOUTH CENTRAL SOUTH DAKOTA COUNTIES



AGRICULTURAL EXPERIMENT STATION
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Soil and Climatic Limitations for Sprinkler Irrigated Potato Production in Six South Central South Dakota Counties[1]

by

G. D. Lemme and D. D. Malo[2]

INTRODUCTION

The soils of South Central South Dakota are an important and vital agricultural resource. Recently, questions about expanding irrigated potato production into the six counties of Bon Homme, Hanson, Hutchinson, Douglas, Charles Mix, and Gregory Counties have been asked by state government officials and business leaders. Soils vary greatly in their suitability for sprinkler irrigated potato production. As a result of this concern a study was initiated to identify soil limitations and suitability for sprinkler irrigated potato production. The soils in five Southeastern Counties were evaluated for sprinkler irrigated potato production earlier (1984).

The objectives of this study were to:

1. describe the climate of the study area;
2. prepare and develop soil limitation ratings for sprinkler irrigated potato production for Bon Homme, Charles Mix, Douglas, Hanson, Hutchinson, and Gregory County soils, and;
3. prepare soil limitation maps for each county using the soil association map located in the published soil survey for each county.

This bulletin is meant to point out potential areas and not provide detailed site information. It is designed to serve as a guide for county, state, and business officials as they explore the potential for irrigated potato production in South Central South Dakota.

STUDY LIMITATIONS

The maps and data contained in this document are for planning purposes and are not meant to replace "on-site" investigation for potato development. Before any specific parcel of land can be evaluated for its suitability for potato development an on-site investigation by trained professionals is required.

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[1] Contribution from the Plant Science Department and the Agricultural Experiment Station, South Dakota State University, Brookings, 57007. Projects 287470 and 287548.

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This publication is intended to make the general public aware of the soils present in the five counties and their limitations for sprinkler irrigated potato production. With proper irrigation design, tillage, and water application management many of the limitations can be overcome. However, the costs will vary considerably with the limitation present.

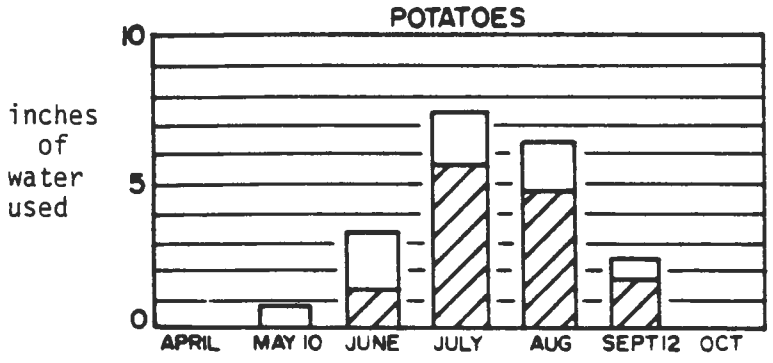
CLIMATE OF STUDY AREA

The climate of this area is continental with warm to hot summers and cold winters. Temperatures can fluctuate rapidly because there are no large bodies of water or mountains to modify temperature changes.

This climatic summary was based on weather records from Armour (1897-1983), Gregory (1925-1983), Menno (1896-1983), Pickstown (1956-1983), and Tyndall (1900-1983). Soil temperature data was based on weather records from the Southeast Experiment Farm near Centerville (1975-1983) and Pickstown (1975-1983). Total evaporation and wind information was based on weather records from Sioux Falls (1964-1983) and Pickstown (1956-1983).

Figure 1 illustrates the water demands for potato production in the study area. Note the large demand for water in the months of July and August. Consequently, a soil that is suited for potato production needs to store adequate amounts of plant available moisture until supplemental irrigation can supply the needed water.

Figure 1. Estimated seasonal and monthly consumptive use of water for potatoes in South central South Dakota.



		TOTAL CONS. USE	NET IRRIG.
Spring Date	May 10	0.8"	0.0"
	June	3.4"	1.4"
	July	7.5"	5.6"
	Aug.	6.4"	4.7"
Fall Date	Sept. 12	2.4"	1.7"
Seasonal Use		20.5"	13.4"

The total bar height (both light and dark portions) represents the total consumptive water use for the month. The light portion represents the portion of the total consumptive use which can be expected to be received from effective rainfall. The dark portion of the bar represents the portion of the total consumptive use required from irrigation.

Table 1. Average Air Temperature for Study Area.

Month	Location					
	Armour	Gregory	Menno	Pickstown	Tyndall	Average
January	17.5°F	19.2°F	16.5°F	19.1°F	17.1°F	17.9°F
February	23.9	25.3	22.4	25.6	24.2	24.3
March	32.6	33.3	31.9	33.6	33.5	33.0
April	47.9	47.7	48.4	48.6	49.0	48.3
May	59.8	59.0	59.7	60.3	61.0	60.0
June	69.5	68.3	69.0	70.2	70.5	69.5
July	75.2	74.7	74.8	76.4	75.5	75.3
August	73.7	73.4	73.3	74.8	73.8	73.8
September	62.9	63.3	63.0	63.6	63.8	63.3
October	51.8	52.3	52.2	52.9	52.6	52.4
November	35.7	35.9	35.4	36.8	36.0	36.0
December	23.0	24.5	22.4	24.5	23.1	23.5
Annual Avg.	47.8	48.1	47.4	48.9	48.4	48.1

Source: National Oceanic and Atmospheric Administration Climatological Data for South Dakota.

Table 2. Average Precipitation for Study Area.

Month	Location					
	Armour	Gregory	Menno	Pickstown	Tyndall	Average
January	0.45 in	0.50 in	0.41 in	0.36 in	0.38 in	0.42 in
February	0.89	0.91	0.70	0.71	0.78	0.80
March	1.32	1.52	1.21	1.23	1.32	1.32
April	2.45	2.83	2.21	2.25	2.37	2.42
May	3.07	3.24	3.17	2.97	3.48	3.19
June	3.96	3.97	4.29	3.98	3.99	4.04
July	3.05	2.83	3.05	2.64	3.52	3.02
August	2.47	2.11	2.67	2.49	2.61	2.47
September	2.14	2.09	2.43	2.28	2.59	2.31
October	1.31	1.23	1.51	1.24	1.32	1.32
November	0.79	0.95	0.75	0.78	0.82	0.82
December	0.78	0.68	0.56	0.62	0.68	0.66
Annual Avg.	22.68	22.86	23.04	21.55	23.86	22.79

Source: National Oceanic and Atmospheric Administration Climatological Data for South Dakota.

Tables 1 and 2 show the average annual temperature and precipitation data respectively, for the study area. The annual temperature averages 48.1°F with monthly averages of 75°F in July and 18°F in January. The annual precipitation averages 22.8 inches of which 17.5 inches, or 77 percent, falls during the growing season (April through September).

The probability dates of temperatures near freezing or below are shown in Table 3. Growing season lengths as influenced by selected temperatures and various probabilities are presented in Table 4.

Both air and soil temperatures have a significant influence on the growth and development of potatoes. Optimum soil temperatures for tuber production is in the range of 60 to 75°F. Warm days and cool nights are most desirable for potato production since it is a cool season crop.

Potatoes can do very well at high temperatures however, when adequate water supplies are present to meet evapotranspiration demands. The critical factor is a supply of water at soil moisture tensions low enough to keep the stomata open during the heat of the day so yield is not reduced.

The bare soil temperatures for the study area are shown in Table 5. The soil temperatures at the four and eight inch depths were selected for this study since they correspond to planting depth and the area of tuber production. In order to achieve high yields, potatoes should be planted in Mid-April when soil temperatures reach 50°F at the eight inch soil depth. The average soil temperatures in bare soil may exceed optimum conditions in July and August. A good crop canopy early in the season and proper irrigation management should minimize any potential for hot (>80°F) soil temperatures.

Table 3. Probabilities of Stated Temperatures After Specified Dates in Spring and Before Specified Dates in Fall for Study Area.

Probability	24°F or lower*	28°F or lower*	32°F or lower*
After specified date in Spring			
50 percent	April 13	April 24	May 7
30 percent	April 27	May 8	May 17
10 percent	May 3	May 15	May 23
Before specified date in Fall			
10 percent	Oct 9	Sept 28	Sept 18
30 percent	Oct 16	Oct 7	Sept 24
50 percent	Oct 26	Oct 14	Oct 3

* Average of climatic data from Armour, Gregory, Menno, Pickstown, and Tyndall.

Table 4. Number of Consecutive Days with Greater than Stated Spring and Fall Temperatures for Study Area.

	24°F Spring Probability*			28°F Spring Probability*			32°F Spring Probability*		
	50%	30%	10%	50%	30%	10%	50%	30%	10%
24°F Fall Probability	------- days --------			------- days --------			-------- days -------		
10%	179	167	163	168	156	151	157	147	141
30%	186	174	170	175	163	158	164	154	148
50%	196	184	180	185	173	168	174	164	158
28°F Fall Probability									
10%	168	156	152	157	145	140	146	136	130
30%	177	165	161	166	154	149	155	145	139
50%	184	172	168	173	161	156	162	152	146
32°F Fall Probability									
10%	158	146	142	147	135	130	136	126	120
30%	164	152	146	153	141	136	142	132	126
50%	173	161	157	162	150	145	151	141	135

*Average of Climatic Data from Armour, Gregory, Menno, Pickstown, and Tyndall.

Table 5. Average Bare Soil Temperatures for Study Area. (Data from Centerville and Pickstown)

Soil Depth	J	F	M	A	M	J	J	A	S	O	N	D	Avg.
4 in.	21.4	25.1	34.2	49.1	63.9	76.9	84.4	79.0	68.7	53.2	37.1	26.9	51.7°F
8 in.	21.5	23.2	30.3	44.5	58.0	70.5	76.6	72.6	64.1	50.5	37.4	27.5	48.1°F

RATING SOIL USE FOR SPRINKLER IRRIGATED POTATO PRODUCTION

Soils were rated based on the most restrictive features for sprinkler irrigated potato production. Thus, a soil rated severe gives only the soil property (ies) that caused the soil to be rated severe. This soil may have other restrictive features for sprinkler irrigated potato production. Soils were rated under natural conditions. No unusual modification of soil materials or site characteristics was considered.

Soil limitations are indicated by the ratings slight, moderate, severe, and not suited. Slight means that soil properties are favorable and the limitations are minor or easily corrected. No major problem in producing potatoes under sprinkler irrigation is expected.

Moderate means some soil and/or topographic properties are unfavorable but can be modified or corrected with management techniques and irrigation design such as tillage, artificial drainage, flood control, irrigation scheduling, and water application rates. During at least part of each year the use of these soils for sprinkler irrigated potato production is less favorable than for soils with slight limitations.

Severe means soil and/or topographic properties are unfavorable for use and are difficult and expensive to correct. These limitations require major soil reclamation, special irrigation equipment design or intensive management. In some instances the soil can be improved by reducing or removing the soil property limiting its use. Usually this practice is very difficult and costly.

Not suited means soil and/or topographic properties make the soil unsuited for sprinkler irrigated potato production based on criteria developed by USDA Soil Conservation Service (1978). Soils with steep slopes (>17%), clay textured, frequently flooded for long periods, and sodic soils are some examples of soils not suited for sprinkler irrigated potato production.

Many soils with moderate or severe limitations can be modified and/or managed to achieve satisfactory performance. It is important to remember that in rating soils for agricultural use, one can modify soil properties, site features, or can adjust system designs and management to compensate for most limitations. The key question, however, is cost. Such considerations were not considered in this publication. Soils were considered in their natural, unaltered state.

CRITERIA USED

The criteria used in this study to rank soils based on limitations for sprinkler irrigated potato production are presented in Table 6. They were modified from an earlier study (Malo and Lemme, 1983) using the best possible management information available.

The rationale used for the limitation criteria presented in Table 6 are as follows:

1. Flooding - Potatoes like most crop can not tolerate extended periods of flooding (>1-2 days).

TABLE 6 . SOIL LIMITATIONS CRITERIA FOR CENTER PIVOT SPRINKLER IRRIGATED POTATO PRODUCTION (Modified from Table 12 in Plant Science Pamphlet 82).

Property	Degree of Limitations: Slight	Moderate	Severe	Limitations
1. Flooding (during growing season)	None	Rare, occasionally (with very brief duration and HWT >24 in. deep)	Common, Occasionally (with longer than very brief duration), Frequently	Floods
2. Depth to High Water table (HWT)	>36 in.	24 to 36 in.	<24 in.	HWT
3. Surface Texture	Silt loam, Sandy loam, Loam, Fine sandy loam, Very fine sandy loam, Loamy fine sand, Loamy very fine sand	Silty clay loam, Clay loam , Sandy clay loam (unfavorable air/water relationships)	Clay, Silty clay, Sandy clay	Surface texture
		Very fine sand, Fine sand, Loamy, Coarse sandy loam, Coarse sand, Loamy sand (wind erosion)	Coarse sand, Sand	
4. Drainage Class	Well drained, Moderately well drained, Somewhat excessively drained	Excessively drained, Somewhat poorly drained (HWT >24 in.)	Somewhat poorly drained Poorly drained,(HWT <24 in) Very poorly drained	Poor drainage or excessive drainage
5. Soil Intake Family*	≥0.5	0.3	<0.1	Slow intake
6. Slope (percent)	0-3	4-6	>6	Slope
7. Surface pH	5.6-6.5	6.6-7.4	>7.4	pH
8. Surface Salinity (mmhos/cm)	0-2.0	2.1-4.0	>4.0	Excess salinity
9. Sodicity	---	---	natric horizon present	Excess sodium
10. Available Water Holding Capacity (in/24 in. soil)	>2.5 in.	1.6-2.5 in.	<1.6 in.	Droughty
11. Permeability	Moderate, Moderately rapid	Moderately slow, Rapid, Very rapid	Very slow, Slow	Percs slowly or percs rapidly
12. Soil Profile Thickness	---	---	<24 in.	Rooting depth
13. Stoniness (>3 in. in diameter)	---	---	>15% by Vol. (top 24 inches	Excess stones
14. Accessibility for machinery and irrigation equipment	---	---	Channelled phase of map unit	Inaccessible

* Irrigation Guide for South Dakota. 1978

2. Depth to High Water Table - Potatoes need soils with a water table greater than 24 inches and preferably at 36 inches. A water table shallower than 24 inches prevents root growth, aeration, nutrient uptake, and thus causes a yield reduction.

3. Surface Texture - The physical characteristics of medium textured soils provides good air/moisture relationships, friable consistence for tuber expansion, and easy tuber cleaning after harvest. Fine textured soils cling to tubers at harvest, limit tuber growth, and prevent rapid infiltration of air and water to the potato tuber and roots. Very coarse textured soils are susceptible to wind erosion and need to be protected to prevent this problem. Potatoes are vulnerable to wind erosion.

4. Drainage Class - The early planting of potato fields can be limited by excess spring moisture in somewhat poorly, poorly, and very poorly drained soils. Excessively drained soils often can have a limitation for droughty conditions because of a low water holding capacity. Potatoes need a well aerated soil which holds adequate moisture to meet evapotranspiration demands.

5. Soil Intake Family - Soil intake families of 0.3 or less are limited for sprinkler irrigated potato use due to the slow rate of water infiltration allowed by these soils. Definitions and descriptions of the soil intake families can be found in the Irrigation Guide for South Dakota (USDA-Soil Conservation Service, 1978).

6. Slope - Potato fields are exceptionally erosive because of the open canopy, low residue cover, and soil loosening affect of the potato tuber.

7. Surface pH - Alkaline soil pH (>7.4) favors the pathogen responsible for potato scab. In addition, the availability of soil phosphorus is greatly reduced in moderately alkaline soils.

8. Surface Salinity - Potatoes are sensitive to high salinity levels. Electrical conductivity values of 4 mmhos/cm will cause a yield reduction of at least 25 percent.

9. Sodicity - The presence of a natric horizon and its associated characteristics (high pH, slow to very slow permeability, and high bulk density values) cause a soil to have a severe limitation for potato production.

10. Available Water Holding Capacity - Potatoes require approximately 20 inches of water per year. Soils with low and very low available water holding capacity will be highly dependent upon frequent small quantity irrigation to supply the potato crop with needed moisture. Potato scab is favored by hot dry soil conditions. Thus, neutral and alkaline soils should be irrigated in a manner so that they are at or near field capacity most of the time.

11. Permeability - Potatoes need a soil which has a moderate permeability rate to allow for adequate air and water movement.

12. Soil Profile Thickness - Soils with less than 24 inches of good soil material do not have adequate rooting depth for the potato crop. Nutrient storage and water holding capacity are limitations associated with thin soils.

13. Stoniness - Soils containing a significant percentage of stones (>15% by volume) have severe limitations for potato production due to harvesting and cultivational problems.

14. Accessibility - Channeled phases of soil mapping units have fields which are small in size and often inaccesible for irrigation equipment and cultivational activities.

RANKING OF SOILS

Using the criteria developed in the previous section and listed in Table 6, the soils of the study area were categorized according to their limitations for sprinkler irrigated potato production (See Tables 7 through 11). Detailed soils information was obtained from the published soil surveys for each county (Johnson, 1978; Reber, 1982; Ward, 1981, 1983; Weisner, 1984) and from detailed soil series information sheets available from the USDA-National Cooperative Soil Survey.

TABLE 7. DEGREE OF LIMITATION FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN BON HOMME COUNTY, SOUTH DAKOTA

Symbol	Name	Degree of Limitation	Limitations	Acres
AaA	Alcester Silt loam	Severe	Floods	1,790
AcA	Alcester-Chancellor complex			630
	Alcester	Severe	Floods	
	Chancellor	Not Suited	HWT, Poor drainage, Percs slowly, Floods	
Bn	Bon Loam	Severe	Floods	4,945
Bo	Bon Loam, Channeled	Severe	Floods, Inaccessible	6,320
Br	Bonilla-Crossplain complex			2,020
	Bonilla	Moderate	Floods	
	Crossplain	Not Suited	Floods, HWT, Poor drainage, Percs slowly, Slow intake	
BsE	Boyd-Sansarc Clays, 15 to 40% slopes			4,545
	Boyd	Not Suited	Surface texture, Slow intake, Slope, pH, Percs slowly	
	Sansarc	Not Suited	Surface texture, Slow intake, Slope, pH, Percs slowly	
CmA	Clarno-Bonilla Loams 0 to 2% slopes			33,490
	Clarno	Moderate	Slow intake	
	Bonilla	Moderate	Floods	
CmB	Clarno-Bonilla Loams, 2 to 6% slopes			8,730
	Clarno	Moderate	Slow intake, Slope	
	Bonilla	Moderate	Floods, Slope	
CnA	Clarno-Crossplain-Davison complex, 0 to 3% slopes			60,630
	Clarno	Moderate	Slow intake	
	Crossplain	Not Suited	Floods, HWT, Poor drainage, Slow intake, Percs slowly	
	Davison	Severe	HWT, pH	

Table 7 . Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
CsB	Clarno-Ethan-Bonilla Loams, 2 to 6% slopes			28,330
	Clarno	Moderate	Slow intake, Slope	
	Ethan	Moderate	Slope, pH	
	Bonilla	Moderate	Floods, Slope	
DaB	Davis Loam, 0 to 6% slopes	Moderate	Slope, pH	880
DaC	Davis Loam, 6 to 15% slopes	Severe	Slope	490
DlC	Delmont-Talmo Loams, 6 to 9% slopes			305
	Delmont	Severe	Slope	
	Talmo	Not Suited	Slope, Droughty	
EaA	Eltree Silt loam, 0 to 2% slopes	Moderate	pH	2,830
EaB	Eltree Silt loam, 2 to 6% slopes	Moderate	Slope, pH	3,355
EbC	Eltree-Ethan complex, 6 to 9% slopes			755
	Eltree	Severe	Slope	
	Ethan	Severe	Slope, pH	
EbE	Eltree-Ethan complex, 9 to 40% slopes			595
	Eltree	Severe	Slope	
	Ethan	Severe	Slope, pH	
EcD	Eltree-Crofton Silt loams, 9 to 15% slopes			1,075
	Eltree	Severe	Slope	
	Crofton	Severe	Slope, pH	
EdA	Enet-Delmont Loams 0 to 2% slopes			1,700
	Enet	Slight		
	Delmont	Moderate	pH	

Table 7. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
EdB	Enet-Delmont Loams, 2 to 6% slopes			1,625
	Enet	Moderate	Slope	
	Delmont	Moderate	Slope, pH	
EhB	Ethan-Alcester complex, 1 to 6% slopes			2,375
	Ethan	Moderate	pH	
	Alcester	Severe	Floods	
EhC	Ethan-Alcester complex, 1 to 9% slopes			1,765
	Ethan	Moderate	pH	
	Alcester	Severe	Floods	
EmE	Ethan-Betts Loams, 15 to 40% slopes			12,715
	Ethan	Not Suited	Slope	
	Betts	Not Suited	Slope	
EnC	Ethan-Bonilla Loams, 1 to 9% slopes			7,960
	Ethan	Severe	pH	
	Bonilla	Moderate	Floods, Slope, pH	
EoD	Ethan-Davis Loams, 9 to 15% slopes			8,160
	Ethan	Severe	Slope, pH	
	Davis	Severe	Slope	
EpC	Ethan-Homme complex, 6 to 9% slopes			15,090
	Ethan	Severe	Slope, pH	
	Homme	Severe	Slope	
Fv	Fluvaquents, ponded	Not Suited	Floods, HWT, Poor drainage	4,844
GeE	Gavins-Ethan Loams, 15 to 40% slopes			1,610
	Gavins	Not Suited	Slope	
	Ethan	Not Suited	Slope	

Table 7 . Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
GrA	Graceville Silty clay loam, 0 to 2% slopes	Moderate	Surface texture	385
HmA	Homme-Davison-Tetonka complex, 0 to 3% slopes			9,960
	Homme	Moderate	Surface texture	
	Davison	Severe	HWT, pH	
	Tetonka	Not Suited	Floods, HWT, Poor drainage, Percs slowly	
HnB	Homme-Ethan-Onita complex, 1 to 6% slopes			37,120
	Homme	Moderate	Surface texture, Slope	
	Ethan	Moderate	pH	
	Onita	Severe	Floods	
HpB	Homme-Ethan-Tetonka complex, 0 to 6% slopes			21,070
	Homme	Moderate	Surface texture, Slope	
	Ethan	Moderate	Slope, pH	
	Tetonka	Not Suited	Floods, HWT, Poor drainage, Percs slowly	
HpC	Homme-Ethan-Tetonka complex, 0 to 9% slopes			3,530
	Homme	Moderate	Surface texture, Slope	
	Ethan	Moderate	Slope, pH	
	Tetonka	Not Suited	Floods, HWT, Poor drainage, Percs slowly	
HrA	Homme-Onita Silty clay loams, 0 to 2% slopes			12,025
	Homme	Moderate	Surface texture	
	Onita	Severe	Floods	
HrB	Homme-Onita Silty clay loams, 1 to 6% slopes			14,565
	Homme	Moderate	Surface texture, Slope	
	Onita	Severe	Floods	
HtA	Homme-Onita-Tetonka complex, 0 to 3% slopes			5,585
	Homme	Moderate	Surface texture	
	Onita	Severe	Floods	
	Tetonka	Not Suited	Floods, HWT, Poor drainage, Percs slowly	

Table 7 . Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
La	Lamo Silt loam	Severe	Floods, HWT, Poor drainage, pH	560
OcA	Onita-Chancellor Silty clay loams,			2,680
	Onita	Severe	Floods	
	Chancellor	Not Suited	Floods, HWT, Poor drainage, Percs slowly	
ReD	Redstoe Variant-Gavins complex, 6 to 25% slopes			525
	Redstoe Variant	Severe	Slope, pH	
	Gavins	Severe	Slope	
Sa	Salmo Silty clay loam	Not Suited	Floods, HWT, Poor drainage, pH, Excess salinity	2,350
Sb	Sarpy-Waubonsie complex			1,165
	Sarpy	Severe	Floods	
	Waubonsie	Severe	pH	
TaE	Talmo-Delmont Loams, 15 to 40% slopes			630
	Talmo	Not Suited	Slope	
	Delmont	Not Suited	Slope	
TbE	Talmo-Ethan complex, Stony, 6 to 40% slopes			1,370
	Talmo	Not Suited	Slope, Excess stones	
	Ethan	Not Suited	Slope, Excess stones	
Te	Tetonka Silt loam	Not Suited	Floods, HWT, Poor drainage, Percs slowly	9,195
ThC	Thurman Loamy sand, 6 to 15% slopes	Severe	Slope	495
ThE	Thurman Loamy sand,	Not Suited	Slope	2,765
Wg	Worthing Silty clay loam	Not Suited	Floods, HWT, Poor drainage, Percs slowly	1,385
Wo	Worthing Silty clay loam,	Not Suited	Floods, HWT, Poor drainage, Percs slowly	1,600
YaA	Yankton-Alcester Silt loams, 0 to 2% slopes			5,275
	Yankton	Slight		
	Alcester	Severe	Floods	
YaB	Yankton-Alcester Silt loams, 1 to 6% slopes			4,395
	Yankton	Moderate	Slope	
	Alcester	Severe	Floods	

TABLE 8. DEGREE OF LIMITATION FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN CHARLES MIX COUNTY, SOUTH DAKOTA

Symbol	Name	Degree of Limitation	Limitations	Acres
AaA	Agar Silt loam, 0 to 2% slopes	Slight		9,270
AaB	Agar Silt loam, 2 to 6% slopes	Moderate	Slope	14,690
AaC	Agar Silt loam, 6 to 9% slopes	Severe	Slope	1,440
Ab	Albaton Silty clay	Not Suited	Floods, HWT, Surface texture, Poor drainage, pH, Percs slowly	2,250
An	Albaton Silty clay, depressional	Not Suited	Floods, HWT, Surface texture, Poor drainage, pH, Percs slowly	220
Ao	Aowa Silty clay loam	Severe	pH	2,000
Ar	Arlo Silt loam, wet	Severe	HWT, Poor drainage, pH	210
AsA	Arlo-Enet loams, 0 to 2% slopes			210
	Arlo	Severe	Floods, Poor drainage, pH	
	Enet	Slight		
BbC	Beadle-Eakin complex, 6 to 9% slopes			2,640
	Beadle	Severe	Slope	
	Eakin	Severe	Slope	
BcA	Beadle-Jerauld complex, 0 to 4% slopes			5,345
	Beadle	Moderate	Slope, Percs slowly	
	Jerauld	Not Suited	Excess Sodium, Percs slowly	
BdF	Betts Loam, 25 to 40% slopes	Not Suited	Slope, pH	21,630
BeE	Betts-Ethan Loams, 9 to 25% slopes			19,700
	Betts	Not Suited	Slope, pH	
	Ethan	Severe	Slope, pH	
Bn	Bon Silt loam	Severe	Floods	5,310
Bo	Bon Silt loam, Channeled	Severe	Floods, HWT, Inaccessible	6,890
BaD	Boyd-Sansarc complex, 6 to 15% slopes			5,910
	Boyd	Not Suited	Surface texture, Slope, pH, Percs slowly	
	Sansarc	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	

Table 8. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
CeB	Clarno-Ethan Laoms, 2 to 6% slopes			3,495
	Clarno	Moderate	Slope, pH	
	Ethan	Severe	pH	
CeC	Clarno-Ethan Loam, 6 to 9% slopes			1,465
	Clarno	Severe	Slope	
	Ethan	Severe	Slope, pH	
Da	DeGrey-Jerauld Silt loams			5,005
	DeGrey	Severe	Excess sodium, Percs slowly	
	Jerauld	Not Suited	Excess sodium, Percs slowly	
Db	DeGrey-Walke Silt loams			19,095
	DeGrey	Severe	Excess sodium, Percs slowly	
	Walke	Severe	Excess sodium, Percs slowly	
DmC	Delmont-Talmo complex, 2 to 9% slopes			1,180
	Delmont	Severe	Slope, Rooting depth	
	Talmo	Not Suited	Slope, pH, Droughty, Rooting depth	
DnA	Dorna Silt loam, 0 to 4% slopes	Moderate	Slope, pH	570
Du	Durrstein Silt loam	Not Suited	Poor drainage, Excess salinity, Excess sodium, Percs slowly	575
EaA	Eakin Silt loam, 0 to 2% slopes	Moderate	Slow intake, pH	11,070
EbB	Eakin-Beadle complex, 2 to 6% slopes			7,005
	Eakin	Moderate	Slow intake, Slope, pH	
	Beadle	Moderate	Slow intake, Slope	
EdA	Eakin-DeGrey Silt loams, 0 to 4% slopes			13,975
	Eakin	Moderate	Slow intake, Slope, pH	
	DeGrey	Severe	Excess sodium, Percs slowly	

Table 8. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
EeB	Eakin-Ethan complex, 2 to 6% slopes			98,105
	Eakin	Moderate	Slow intake, Slope, pH	
	Ethan	Severe	pH	
EeC	Eakin-Ethan complex, 6 to 9% slopes			43,025
	Eakin	Severe	Slope	
	Ethan	Severe	Slope, pH	
EmA	Enet Loam, 0 to 2% slopes	Slight		895
EnC	Enet-Delmont, 2 to 9% slopes			1,145
	Enet	Moderate	Slope	
	Delmont	Severe	Rooting depth	
EtD	Ethan-Clarno Loams, 9 to 15% slopes			16,725
	Ethan	Severe	Slope, pH	
	Clarno	Severe	Slope	
EuC	Ethan-Homme complex, 6 to 9% slopes			4,540
	Ethan	Severe	Slope, pH	
	Homme	Severe	Slope	
GsE	Gavins-Sansarc complex, 15 to 25% slopes			440
	Gavins	Not Suited	Slope, Rooting depth	
	Sansarc	Not Suited	Slope, pH, Droughty, Percs slowly, Rooting depth	
Gr	Graceville Silt loam	Moderate	pH	555
HaA	Hand Loam, 0 to 2% slopes	Moderate	pH	1,675
Hb	Haynie Silt loam	Severe	pH	800
Hc	Haynie Variant Silt loam	Severe	pH	1,015
HeB	Henkin Loam, 2 to 6% slopes	Moderate	Slope, pH	215
HgA	Highmore Silt loam, 0 to 2% slopes	Moderate	pH	50,125
HhB	Highmore-Eakin Silt loams, 2 to 6% slopes			84,765
	Highmore	Moderate	Slope, pH	
	Eakin	Moderate	Slope, pH	

Table 8. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
HlA	Highmore-Walke Silt loams, 0 to 2% slopes			34,480
	Highmore	Moderate	pH	
	Walke	Severe	Excess sodium	
HmB	Homme-Ethan-Onita complex 1 to 6% slopes			16,210
	Homme	Moderate	Slope, pH, Percs slowly	
	Ethan	Severe	pH	
	Onita	Severe	Floods	
HoA	Homme-Onita Silty clay loams, 0 to 2% slopes			5,800
	Homme	Moderate	Surface texture, pH, Percs slowly	
	Onita	Severe	Floods	
HoB	Homme-Onita Silty clay loams, 1 to 6% slopes			6,040
	Homme	Moderate	Surface texture, Slope, pH, Percs slowly	
	Onita	Severe	Floods	
HuA	Houdek Loam, 0 to 2% slopes	Moderate	Slow intake, pH	1,190
HuB	Houdek Loam, 2 to 6% slopes	Moderate	Slow intake, Slope, pH	965
Hv	Hoven Silt loam	Not Suited	Slow intake, Slope, pH	5,385
InB	Inavale Fine sand, 2 to 6% slopes	Severe	pH	230
IvA	Inavale Loamy find sand, 0 to 6% slopes	Severe	pH	610
Ix	Inavale Variant Loamy fine sand	Severe	Floods, Poor drainage, pH	435
LaA	Lane Silty clay loam, 0 to 2% slopes	Moderate	pH, Percs slowly	2,645
LaB	Lane Silty clay loam, 2 to 6% slopes	Moderate	Slope, pH, Percs slowly	1,285
LoA	Lowry Silt loam, 0 to 2% slopes	Moderate	pH	3,460
LoB	Lowry Silt loam, 2 to 6% slopes	Moderate	Slope, pH	3,195
LoC	Lowry Silt loam, 6 to 9% slopes	Severe	Slope	1,390

Table 8. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
LrF	Lowry-Gavins Silt loams, 6 to 40% slopes			1,325
	Lowry	Severe	Slope	
	Gavins	Not Suited	Slope, Rooting depth	
LsD	Lowry-Sully Silt loams, 9 to 15% slopes			690
	Lowry	Severe	Slope	
	Sully	Severe	Slope, pH	
MeE	Meadin Loam, 15 to 30% slopes	Not Suited	Slope, Rooting depth	315
Mo	Mobridge Silt loam	Moderate	Floods, pH	4,820
Mu	Munjor Fine sandy loam	Severe	pH	920
OeF	Okaton Silty clay, 15 to 40% slopes	Severe	Surface texture, Slope, pH, Percs slowly, Rooting depth	7,305
Oh	Onawa Fine sandy loam, overwash	Not Suited	Surface texture, Poor drainage, pH	270
Om	Onawa Silty clay	Not Suited	Surface texture, Poor drainage, pH	745
On	Onita Silt loam	Severe	Floods	29,505
Oo	Onita-Davison complex			850
	Onita	Severe	Floods	
	Davison	Severe	pH	
Os	Onita-Hoven Silt loams			5,540
	Onita	Severe	Floods	
	Hoven	Not Suited	Poor drainage, pH, Excess sodium, Percs slowly	
Ot	Onita-Tetonka Silt loams			26,205
	Onita	Severe	Floods	
	Tetonka	Not Suited	Poor drainage, pH, Percs slowly	
Pg	Pits, gravel	Not Suited		360
PoA	Promise Silty clay, 0 to 2% slopes	Not Suited	Surface textute, pH, Percs slowly	1,350
PoB	Promise Silty clay, 2 to 6% slopes	Not Suited	Surface texture, pH, Percs slowly	2,820
Pr	Prosper Loam	Severe	Floods	955
Sa	Salmo Silty clay loam	Not Suited	Floods, Surface texture, Poor drainage, pH, Excess sodium	3,575
Sm	Salmo-Napa complex			2,020
	Salmo	Not Suited	Floods, HWT, Surface texture, Poor drainage, pH, Excess Salinity	
	Napa	Not Suited	Floods, HWT, Poor drainage, pH, Excess sodium, Percs slowly	

Table 8. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
SnF	Sansarc Clay, 25 to 70% slopes	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	8,585
SoF	Sansarc-Boyd complex, 15 to 40% slopes			31,735
	Sansarc	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	
	Boyd	Not Suited	Surface texture, Slope, pH, Percs slowly	
SrF	Sansarc-Rock outcrop complex, 15 to 40% slopes	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	680
SuE	Sully Silt loam, 9 to 25% slopes	Not Suited	Slope, pH	2,750
TaC	Talmo Gravelly sandy loam, 2 to 9% slopes	Not Suited	Surface texture, pH, Rooting depth	220
TbE	Talmo-Betts complex, 9 to 25% slopes			440
	Talmo	Not Suited	Surface texture, Slope, pH, Rooting depth	
	Betts	Not Suited	Slope, pH	
Te	Tetonka Silt loam	Not Suited	Poor drainage, pH, Percs slowly	9,020
Tn	Tetonka-Chancellor Silty clay loam			1,270
	Tetonka	Not Suited	Poor drainage, pH, Percs slowly	
	Chancellor	Not Suited	Floods, Poor drainage, Percs slowly	
Wd	Wendte Variant Silty clay	Not Suited	Floods, Surface texture, pH, Percs slowly	1,060
Wo	Worthing Silty clay loam	Not Suited	Poor drainage, Percs slowly	4,685
Wp	Worthing Silty clay loam, ponded	Not Suited	Poor drainage, Percs slowly	3,500

TABLE 9. DEGREE OF LIMITATIONS FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN DOUGLAS COUNTY, SOUTH DAKOTA

Symbol	Name	Degree of Limitation	Limitations	Acres
Ar	Arlo Loam	Severe	Floods, HWT, Poor drainage, pH	650
Av	Arlo Loam, Wet	Severe	Floods, HWT, Poor drainage, pH	110
BaB	Beadle Clay loam, 2 to 6% slopes	Severe	Percs slowly	160
BeE	Betts-Ethan Loams, 15 to 40% slopes			1,620
	Betts	Not Suited	Slope	
	Ethan	Severe	Slope, pH	
Bn	Bon Loam	Severe	Slope, pH	1,280
Bo	Bon Loam, Channeled	Severe	Floods, pH	3,460
CeC	Clarno-Ethan Loams, 6 to 9% slopes			4,200
	Clarno	Severe	Slope	
	Ethan	Severe	Slope, pH	
CnA	Clarno-Ethan-Prosper Loam, 0 to 3% slopes			9,070
	Clarno	Moderate	Slow intake	
	Ethan	Severe	pH	
	Prosper	Severe	Floods	
CnB	Clarno-Ethan-Prosper, 1 to 6% slopes			32,980
	Clarno	Moderate	Slope, Slow intake	
	Ethan	Severe	pH	
	Prosper	Moderate	Floods	
CpA	Clarno-Prosper Loams, 0 to 2% slopes			16,940
	Clarno	Moderate	Slow intake	
	Prosper	Moderate	Floods	
CsA	Clarno-Stickney-Prosper 0 to 3% slopes			6,690
	Clarno	Moderate	Slow intake	
	Stickney	Severe	Slow, Percs slowly, Excess Sodium	
	Prosper	Moderate	Floods	

Table 9. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
DaB	Davis Silt loam, 2 to 6% slopes	Moderate	Slope, pH	400
DbA	DeGrey-Walke Silt loams, 0 to 4% slopes			7,710
	DeGrey	Severe	Percs slowly, Excess sodium	
	Walke	Severe	Slow intake, Excess sodium	
DeA	Delmont Loam, 0 to 2% slopes	Severe	Rooting depth	770
DlB	Delmont-Enet Loams, 2 to 6% slopes			940
	Delmont	Severe	Rooting depth	
	Enet	Moderate	Rooting depth	
DmC	Delmont-Talmo Loams, 2 to 9% slopes			1,620
	Delmont	Severe	Rooting depth	
	Talmo	Not Suited	pH, Rooting depth	
Do	Dimo Loam	Severe	Floods, Poor drainage	660
EaA	Eakin-Ethan complex, 0 to 3% slopes			7,750
	Eakin	Moderate	Slow intake	
	Ethan	Severe	pH	
EaB	Eakin-Ethan complex, 3 to 6% slopes			50,460
	Eakin	Moderate	Slope, Slow intake	
	Ethan	Severe	pH	
EaC	Eakin-Ethan complex, 6 to 9% slopes			7,170
	Eakin	Severe	Slope	
	Ethan	Severe	Slope, pH	
EdA	Enet-Delmont Loams, 0 to 2% slopes			3,350
	Enet	Slight		
	Delmont	Severe	Rooting depth	
EtD	Ethan-Clarno Loams, 9 to 15% slopes			1,830
	Ethan	Severe	Slope, pH	
	Clarno	Severe	Slope	

Table 9. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
Fa	Farmsworth Silt loam	Severe	Percs slowly, Excess sodium	1,440
HbA	Henkin-Blendon Fine sandy loam, 0 to 2% slopes			1,570
	Henkin	Slight		
	Blendon	Slight		
HbB	Henkin-Blendon Fine sandy loam, 2 to 6% slopes			1,820
	Henkin	Moderate	Slope	
	Blendon	Moderate	Slope	
HeA	Highmore-Eakin Silt loams, 0 to 2% slopes			15,960
	Highmore	Moderate	pH	
	Eakin	Moderate	Slow intake	
HeB	Highmore-Eakin Silt loams, 2 to 6% slopes			7,800
	Highmore	Moderate	Slope, pH	
	Eakin	Moderate	Slope	
HgA	Highmore-Walke Silt loam, 0 to 3% slopes			27,620
	Highmore	Moderate	pH	
	Walke	Severe	Slow intake, pH, Percs slowly, Excess sodium	
HhB	Homme Silty clay loam, 2 to 6% slopes	Moderate	Surface texture, Slope, pH, Percs slowly	810
HmB	Homme-Ethan complex, 1 to 6% slopes			1,220
	Homme	Moderate	Surface texture, Slope, Percs slowly	
	Ethan	Severe	pH	
HnA	Homme-Onita Silty clay loam, 0 to 2% slopes			5,480
	Homme	Moderate	Surface texture, pH, Percs slowly	
	Onita	Moderate	Slow intake, pH, Percs slowly	
Hv	Hoven Silt loam	Not Suited	HWT, Surface texture, Percs slowly	2,990
La	Lane Silty clay loam	Moderate	Surface texture, pH, Percs slowly	2,380
Ma	Macken Silty clay	Not Suited	HWT, Surface texture, Poor drainage, Percs slowly	2,250
Na	Napa Silt loam	Not Suited	Floods, HWT, Poor drainage, pH, Percs slowly	810

Table 9. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
Oa	Onita Silt loam	Severe	Floods	1,440
On	Onita-Tetonka Silt loams			14,290
	Onita	Severe	Floods	
	Tetonka	Not Suited	HWT, Percs slowly	
Pg	Pits, gravel	Not Suited		110
Pt	Prsoper-Tetonka complex			8,650
	Prosper	Moderate	Floods	
	Tetonka	Not Suited	HWT, Poor drainage, Percs slowly	
TaC	Talmo Gravelly sandy loam, 2 to 9% slopes	Not Suited	Slope, pH, Rooting depth	380
Te	Tetonka Silt loams	Not Suited	HWT, Poor drainage, Percs slowly	14,360
Wo	Worthing Silty clay loam	Not Suited	HWT, Poor drainage, Percs slowly	4,130
Wp	Worthing Silty clay loam, ponded	Not Suited	HWT, Surface texture, Poor drainage, Percs slowly	2,790

TABLE 10. DEGREE OF LIMITATION FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN GREGORY COUNTY, SOUTH DAKOTA

Symbol	Name	Degree of Limitation	Limitations	Acres
AaA	Agar Silt loam, 0 to 3% slopes	Moderate	pH	2,270
AaB	Agar Silt loam, 3 to 6% slopes	Moderate	Slope, pH	3,675
AdC	Anselmo-Dunday complex, 3 to 9% slopes			2,870
	Anselmo	Severe	Slope	
	Dunday	Severe	Slope	
AhB	Anselmo-Holt Fine sandy loams, 2 to 6% slopes			6,490
	Anselmo	Moderate	Slope	
	Holt	Moderate	Slope, pH	
AhC	Anselmo-Holt Fine sandy loams, 6 to 9% slopes			4,430
	Anselmo	Severe	Slope	
	Holt	Severe	Slope	
AtE	Anselmo-Tassel Fine sandy loams, 6 to 25% slopes			27,050
	Anselmo	Severe	Slope	
	Tassel	Not Suited	Slope, pH, Droughty, Rooting depth	
BaE	Betts Loam, 15 to 40% slopes	Not Suited	Slope, pH	760
Bb	Bon Silt loam	Moderate	Floods, pH	3,530
Bc	Bon Silt loam, channeled	Severe	Floods, Inaccessible	11,100
BlD	Boro-Lakoma Silty clays, 9 to 15% slopes			13,450
	Boro	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly	
	Lakoma	Not Suited	Surface texture, Slope, pH, Percs slowly	
BmB	Boro-Millboro Silty clays, 2 to 6% slopes			7,410
	Boro	Not Suited	Surface texture, pH, Droughty, Percs slowly	
	Millboro	Not Suited	Surface texture, Percs slowly	

Table 10. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
BmC	Boro-Millboro Silty clays, 6 to 9% slopes			4,530
	Boro	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly	
	Millboro	Not Suited	Surface texture, Slope, Percs slowly	
CaA	Carter-Hurley complex 0 to 3% slopes			910
	Carter	Not Suited	pH, Percs slowly	
	Hurley	Not Suited	Excess sodium, Percs slowly	
CbA	Carter-Promise complex, 0 to 3% slopes			2,505
	Carter	Not Suited	pH, Percs slowly	
	Promise	Not Suited	Surface texture, Percs slowly	
Cd	Cass Fine sandy loam, channeled	Severe	Floods, Inaccessible	2,735
CrC	Coly Silt loam, 6 to 9% slopes	Severe	Slope, pH	1,075
CrE	Coly Silt loam, 9 to 25% slopes	Severe	Slope, pH	1,135
DaA	Dunday Loamy fine sand, 0 to 3% slopes	Moderate	Excessive drainage, pH, Percs rapidly	425
Du	Durrstein Silt loam	Not Suited	Floods, Poor drainage, pH, Excess salinity, Excess sodium, Percs slowly	655
Fd	Fedora Loam	Not Suited	Poor drainage, pH	325
Ha	Haynie Variant-Munjor complex			620
	Haynie Variant	Severe	pH	
	Munjor	Severe	pH	
HoA	Holt Fine sandy loam, 0 to 3% slopes	Moderate	pH	740
HoB	Holt Fine sandy loam, 3 to 6% slopes	Moderate	Slope, pH	7,720
HoC	Holt Fine sandy loam, 6 to 9% slopes	Severe	Slope	6,075
HoD	Holt Fine sandy loam, 9 to 15% slopes	Severe	Slope	3,255

Table 10. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
Ia	Inavale Loamy sand	Severe	Floods	2,550
JaA	Jansen Loam, 0 to 3% slopes	Moderate	pH	10,170
JaB	Jansen Loam, 3 to 6% slopes	Moderate	Slope, pH	14,030
JaC	Jansen Loam, 6 to 9% slopes	Severe	Slope	2,185
JbA	Jansen-Brocksburg Loams, 0 to 2% slopes			6,185
	Jansen	Moderate	pH	
	Brocksburg	Slight		
Ko	Kolls Clay	Not Suited	Surface texture, Poor drainage, pH, Droughty, Percs slowly	1,075
LaB	Labu Clay, 2 to 6% slopes	Severe	Surface texture, pH, Percs slowly	1,205
LaC	Labu Clay, 6 to 9% slopes	Severe	Surface texture, Slope, pH, Percs slowly	4,540
LaD	Labu Clay, 9 to 15% slopes	Severe	Surface texture, Slope, pH, Percs slowly	26,640
LcF	Labu-Sansarc Clays, 15 to 50% slopes			125,455
	Labu	Severe	Surface texture, Slope, pH, Percs slowly	
	Sansarc	Not Suited	Surface texture, Slope, Droughty, Percs slowly, Rooting depth	
LoD	Lakoma-Okaton Silty clays, 9 to 15% slopes			4,045
	Lakoma	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly	
	Okaton	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	
LwB	Lakoma-Wewela complex, 2 to 6% slopes			475
	Lakoma	Not Suited	Surface texture, pH, Droughty, Percs slowly	
	Wewla	Severe	Slope	
LwC	Lakoma-Wewela complex, 6 to 9% slopes			730
	Lakoma	Not Suited	Surface texture, Slope, pH, Percs slowly	
	Wewela	Severe	Slope	

Table 10. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
MaD	Mariaville Loam, 6 to 15% slopes	Severe	Slope, pH, Rooting depth	2,540
MaF	Mariaville Loam, 15 to 40% slopes	Severe	Slope, pH, Rooting depth	13,190
MdF	Mariaville-Labu-Anselmo complex, 15 to 40% slopes			1,810
	Mariaville	Severe	Slope, pH, Rooting depth	
	Labu	Severe	Surface texture, Slope, pH, Percs slowly	
	Anselmo	Severe	Slope	
MeC	Meadin Sandy loam, 3 to 9% slopes	Not Suited	Slope, Rooting depth	11,480
MeE	Meadin Sandy loam, 9 to 25% slopes	Not Suited	Slope Rooting depth	11,530
MoA	Millboro Silty clay, 0 to 2% slopes	Not Suited	Surface texture, Percs slowly	5,415
MoB	Millboro Silty clay, 2 to 6% slopes	Not Suited	Surface texture, Percs slowly	17,975
MoC	Millboro Silty clay, 6 to 9% slopes	Not Suited	Surface texture, Slope, Percs slowly	2,760
MpB	Millboro-Lakoma Silty clays, 2 to 6% slopes			2,665
	Millboro	Not Suited	Surface texture, Percs slowly	
	Lakoma	Not Suited	Surface textute, pH, Percs slowly	
MpC	Millboro-Lakoma Silty clays, 6 to 9% slopes			10,675
	Millboro	Not Suited	Surface texture, Slope, Percs slowly	
	Lakoma	Not Suited	Surface texture, Slope, pH, Percs slowly	
Mr	Mosher Silt loam	Not Suited	Excess sodium, Percs slowly	6,400
Ms	Mosher-Jerauld Silt loams			3,120
	Mosher	Not Suited	Excessive sodium, Percs slowly	
	Jerauld	Not Suited	Excessive sodium, Percs slowly	
ObE	Okaton-Lakoma Silty clays, 15 to 50% slopes			53,710
	Okaton	Not Suited	Surface texture, Slope, pH, Percs slowly, Rooting depth	
	Lakoma	Not Suited	Surface texture, Slope, pH, Percs slowly	

Table 10. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
OcF	Okaton-Mariaville complex, 15 to 50% slopes			3,190
	Okaton	Not Suited	Surface texture, Slope, pH, Droughty, Percs slowly, Rooting depth	
	Mariaville	Severe	Slope, pH, Rooting depth	
OeC	O'Neill Fine sandy loam, 3 to 9% slope	Severe	Slope, pH	1,950
On	Onita Silt loam	Severe	pH	2,180
Ot	Onita Silt loam, occasionally flooded	Severe	Floods, pH	11,380
Pg	Pits, gravel	Not Suited		220
Pm	Platte Loam	Severe	Floods, Poor drainage, pH, Rooting depth	1,395
PrA	Promise Clay, 0 to 3% slopes	Not Suited	Surface texture, Percs slowly	8,640
PrB	Promise Clay, 3 to 6% slopes	Not Suited	Surface texture, Percs slowly	10,200
PrC	Promise Clay, 6 to 9% slopes	Not Suited	Surface texture, Slope, Percs slowly	3,880
RaA	Ree Loam, 0 to 3% slopes	Slight		3,390
RaB	Ree Loam, 3 to 6% slopes	Moderate	Slope	16,925
RaC	Ree Loam, 6 to 9% slopes	Severe	Slope	6,195
RbA	Ree Loam, gravelly substratum, 0 to 2% slopes	Slight		7,995
RcC	Ree-Tassel complex, 3 to 9% slopes			1,380
	Ree	Severe	Slope	
	Tassel	Not Suited	Slope, pH, Droughty, Rooting depth	
ReA	Reliance Silty clay loam, 0 to 3% slopes	Moderate	Surface texture, pH, Percs slowly	19,915
ReB	Reliance Silty clay loam, 3 to 6% slopes	Moderate	Surface texture, Slope, pH, Percs slowly	47,950
ReB2	Reliance Silty clay loam, 2 to 6% slopes, eroded	Moderate	Surface texture, Slope, pH, Percs slowly	2,265
ReC	Reliance Silty clay loam, 6 to 9% slopes	Severe	Slope	10,345
ReC2	Reliance Silty clay loam, 6 to 9% slopes, eroded	Severe	Slope	4,680

Table 10. Continued.

Symbol	Name	Degree of Limitation	Limitations	Acres
ReD	Reliance Silty clay loam, 9 to 15% slopes	Severe	Slope	2,430
ReD2	Reliance Silty clay loam, 9 to 15% slopes, eroded	Severe	Slope	1,630
Rv	Riverwash	Not Suited		90
ScE	Sansarc-Rock outcrop complex, 9 to 40% slopes	Not Suited	Surface texture, Slope, Droughty, Percs slowly, Rooting depth	1,340
So	Scott Silt loam	Not Suited	Poor drainage, pH, Percs slowly	4,245
TrE	Tassel-Rock outcrop complex, 9 to 30% slopes	Not Suited	Slope, pH, Droughty, Rooting depth	1,595
UlA	Uly Silt loam, 0 to 2% slopes	Moderate	pH	275
UlB	Uly Silt loam, 2 to 6% slopes	Moderate	Slope, pH	2,645
VaC	Valentine Loamy fine sand, 3 to 9% slopes	Moderate	Excessive drainage, Slope, pH, Percs rapidly	975
VaD	Valentine Loamy fine sand, 9 to 18% slopes	Severe	Slope	620
Vt	Vetal Fine sandy loam,	Moderate	Floods, pH	885
Wd	Wendte Silty clay	Not Suited	Surface texture, pH, Percs slowly	960
We	Wendte Silty clay, channeled	Not Suited	Floods, Surface texture, pH, Percs slowly, Inaccessible	9,100
Wh	Whitelake Fine sandy loam	Not Suited	pH, Excess sodium, Percs slowly	620
Wn	Witten Silty clay	Not Suited	Floods, pH, Percs slowly	2,525

TABLE 11. DEGREE OF LIMITATION FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN HANSON AND HUTCHINSON COUNTIES, SOUTH DAKOTA

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
BeE	Betts-Ethan Loams, 15 to 40% slopes			11,725	22,700
	Betts	Not Suited	Slope, pH		
	Ethan	Severe	Slope, pH		
Bo	Bon Loam	Severe	Floods	1,405	
Ca	Chaska soils	Not Suited	Floods, HWT, Poor drainage	740	2,905
Cb	Chaska soils, channeled	Not Suited	Floods, Poor drainage, Percs slowly, Inaccessible	2,805	10,775
Cc	Clamo Silty clay loam	Not Suited	Floods, Poor drainage, Percs slowly	3,070	2,930
CdA	Clarno Loam, 0 to 3% slopes	Moderate	Slow intake, pH	76,130	91,025
CdB	Clarno Loam, 3 to 6% slopes	Moderate	Slow intake, Slope, pH	23,120	53,635
CeA	Clarno-Davison Loams, 0 to 2% slopes				10,790
	Clarno	Moderate	Slow intake, pH		
	Davison	Severe	HWT, pH		
CeB	Clarno-Davison Loams, 2 to 4% slopes			15,470	12,300
	Clarno	Moderate	Slow intake, pH		
	Davison	Severe	HWT, pH		
CnC	Clarno-Ethan Loams, 6 to 9% slopes			6,275	12,315
	Clarno	Severe	Slope		
	Ethan	Severe	Slope, pH		
CsA	Clarno-Stickney Loams, 0 to 2% slopes				4,900
	Clarno	Moderate	Slow intake, pH		
	Stickney	Not Suited	Slow intake, Excess sodium, Percs slowly		
Ct	Crossplain-Harps complex				3,390
	Crossplain	Not Suited	Floods, HWT, Poor drainage, Percs slowly		
	Harps	Not Suited	HWT, Poor drainage		

Table 11. Continued.

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
DaB	Davis Loam, 2 to 6% slopes	Moderate	Floods, Slope	1,510	3,860
DaC	Davis Loam, 6 to 9% slopes	Severe	Slope	270	
DbA	Davison soils, 0 to 3% slopes	Severe	HWT, pH	900	2,405
DcB	Davison-Onita complex, 2 to 6% slopes				1,325
	Davison	Severe	HWT, pH		
	Onita	Severe	Floods		
DeA	Delmont Loam, 0 to 3% slopes	Severe	Rooting depth	195	3,795
DeB	Delmont Loam, 3 to 6% slopes	Severe	Rooting depth	1,990	2,250
DmB	Delmont-Rock outcrop complex, 2 to 9% slopes	Severe	Rooting depth	430	
DnD	Delmont-Talmo complex, 6 to 12% slopes			590	915
	Delmont	Severe	Slope, Rooting depth		
	Talmo	Not Suited	Slope, pH, Rooting depth		
Do	Dimo Loam	Severe	Floods	770	1,605
DsA	Dudley-Stickney complex, 0 to 2% slopes			8,820	10,840
	Dudley	Not Suited	Excess sodium, Percs slowly		
	Stickney	Severe	Slow intake, Percs slowly		
Du	Durrstein Silt loam	Not Suited	Floods, Poor drainage, Excess salinity, Excess sodium	600	1,205
EaC	Egan Silt loam, 6 to 9% slopes	Severe	Slope		835
EbC2	Egan-Betts complex, 3 to 9% slopes, eroded				1,280
	Egan	Severe	Slope		
	Betts	Not Suited	Slope, pH		

Table 11. Continued.

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
EgB	Egan-Wentworth Silt loams, 2 to 6% slopes				4,440
	Egan	Moderate	Slow intake, Slope		
	Wentworth	Moderate	Slope		
EnA	Enet Loam, o to 2% slopes	Slight		2,740	
EtB	Ethan-Betts Loams, 3 to 6% slopes				5,090
	Ethan	Severe	pH		
	Betts	Not Suited	pH		
EtC2	Ethan-Betts Loams, 6 to 9% slopes				8,305
	Ethan	Severe	Slope, pH		
	Betts	Not Suited	Slope, pH		
EtD	Ethan-Betts Loams, 9 to 15% slopes			3,560	8,675
	Ethan	Severe	Slope, pH		
	Betts	Not Suited	Slope, pH		
EuB	Ethan-Clarno Loams, 2 to 6% slopes			730	
	Ethan	Severe	pH		
	Clarno	Severe	pH		
EuC	Ethan-Clarno Loams, 6 to 9% slopes			3,440	
	Ethan	Severe	Slope, pH		
	Clarno	Severe	Slope		
EwC	Ethan-Homme complex, 6 to 9% slopes				1,210
	Ethan	Severe	Slope, pH		
	Homme	Severe	Slope		
Fa	Fedora soils	Not Suited	HWT, Poor drainage, pH		655
HaA	Hand Loam, 0 to 3% slopes	Slight		12,425	13,710
HaB	Hand Loam, 3 to 6% slopes	Moderate	Slope	5,885	14,000

Table 11 Continued.

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
HaC	Hand Loam, 6 to 9% slopes	Severe	Slope	2,255	2,725
HbC	Hand-Betts Loam, 6 to 9% slopes				1,335
	Hand	Severe	Slope		
	Betts	Not Suited	Slope, pH		
HcA	Hand-Bonilla Loams, 0 to 3% slopes				1,485
	Hand	Slight			
	Bonilla	Moderate	Floods		
HdB	Hand-Davison Loams, 3 to 6% slopes			3,740	6,660
	Hand	Moderate	Slope		
	Davison	Severe	HWT, pH		
HmA	Henkin Fine sandy loam, 0 to 2% slopes	Slight		1,065	
HmB	Henkin Fine Sandy loam, 2 to 6% slopes	Moderate	Slope	2,270	4,010
HnB	Henkin Variant Fine sandy loam, 0 to 6% slopes	Moderate	Slope	210	1,700
HoC	Homme-Ethan complex, 6 to 9% slopes				2,150
	Homme	Severe	Slope		
	Ethan	Severe	Slope, pH		
HtA	Homme-Onita complex, 0 to 2% slopes				3,200
	Homme	Moderate	Surface texture, Percs slowly		
	Onita	Severe	Floods		
HtB	Homme-Onita complex, 2 to 6% slopes				5,950
	Homme	Moderate	Surface texture, Slope, Percs slowly		
	Onita	Severe	Floods		

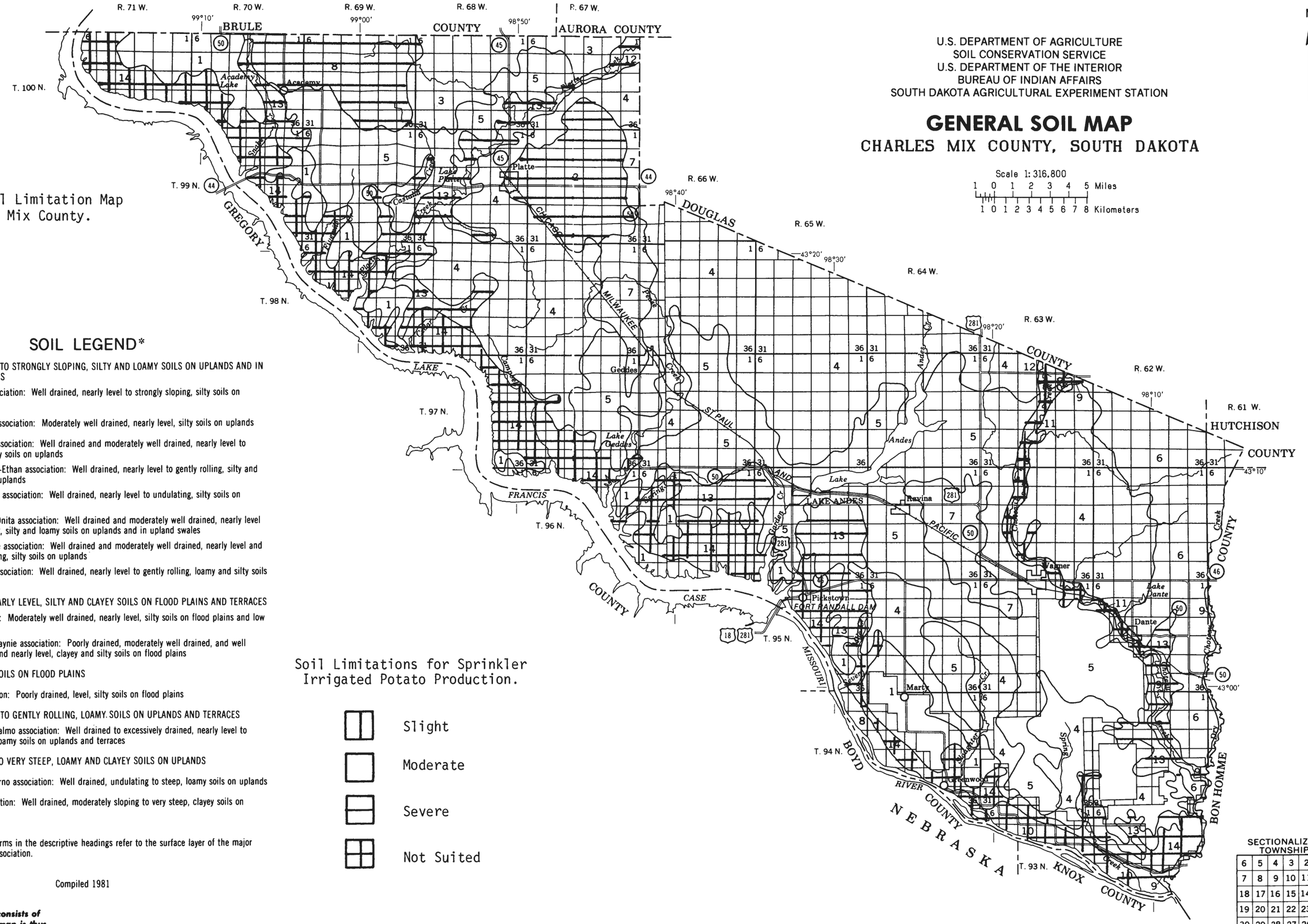
Table 11. Continued.

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
Ja	James Silty clay	Not Suited	Floods, HWT, Surface texture, Poor drainage, pH, Excess salinity, Percs slowly	870	870
La	Lamo Silty clay loam	Severe	Floods	395	2,160
Lm	Lamo-Wann complex, frequently flooded			1,050	605
	Lamo	Severe	Floods		
	Wann	Severe	Floods		
Ma	Marsh	Not Suited	Floods, HWT, Poor drainage	2,580	1,695
OaA	Onita Silt loam, 0 to 3% slopes	Severe	Floods		820
PcA	Prosper-Clarno loams, 0 to 2% slopes			11,930	66,425
	Prosper	Severe	pH		
	Clarno	Moderate	Slow intake, pH		
Pr	Prosper-Stickney complex			29,600	33,185
	Prosper	Severe	pH		
	Stickney	Severe	Slow intake, pH, Excess sodium, Percs slowly		
Ps	Prosper-Crossplain soils				13,565
	Prosper	Severe	pH		
	Crossplain	Not Suited	Floods, HWT, Poor drainage, Percs slowly		
ReB	Redstoe Silt loam, 0 to 6% slopes	Moderate	Slope, pH	760	
Sa	Salmo Silty clay loam	Not Suited	Floods, HWT, Poor drainage, pH, Excess salinity	1,250	2,035
St	Storla Variant loam	Severe	HWT, Poor drainage, pH		635
Te	Tetonka Silty clay loam	Not Suited	Floods, HWT, Poor drainage, Percs slowly	21,790	27,875
Tt	Tetonka-Harps complex			1,740	6,900
	Tetonka	Not Suited	Floods, HWT, Poor drainage, Percs slowly		
	Harps	Not Suited	HWT, Poor drainage		

Table 11. Continued.

Symbol	Name	Degree of Limitation	Limitations	Hanson Co. Acres	Hutchinson Co. Acres
Tw	Tetonka-Whitewood Silty clay loams			3,845	14,000
	Tetonka	Not Suited	Floods, HWT, Poor drainage		
	Whitewood	Not Suited	Floods, HWT, Poor drainage		
Wa	Wann Loam	Moderate	Floods, HWT, Poor drainage, pH		795
Ww	Worthing Silty clay loam	Not Suited	Floods, HWT, Poor drainage, pH	3,385	4,470

Figure 2. Soil Limitation Map for Charles Mix County.



U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
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SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

CHARLES MIX COUNTY, SOUTH DAKOTA

Scale 1:316,800

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 6 7 8 Kilometers

SOIL LEGEND*

NEARLY LEVEL TO STRONGLY SLOPING, SILTY AND LOAMY SOILS ON UPLANDS AND IN UPLAND SWALES

- 1 — Agar-Lowry association: Well drained, nearly level to strongly sloping, silty soils on uplands
- 2 — DeGrey-Walke association: Moderately well drained, nearly level, silty soils on uplands
- 3 — Eakin-DeGrey association: Well drained and moderately well drained, nearly level to undulating, silty soils on uplands
- 4 — Eakin-Highmore-Ethan association: Well drained, nearly level to gently rolling, silty and loamy soils on uplands
- 5 — Highmore-Eakin association: Well drained, nearly level to undulating, silty soils on uplands
- 6 — Homme-Ethan-Onita association: Well drained and moderately well drained, nearly level to gently rolling, silty and loamy soils on uplands and in upland swales
- 7 — Highmore-Walke association: Well drained and moderately well drained, nearly level and gently undulating, silty soils on uplands
- 8 — Beadle-Eakin association: Well drained, nearly level to gently rolling, loamy and silty soils on uplands

LEVEL AND NEARLY LEVEL, SILTY AND CLAYEY SOILS ON FLOOD PLAINS AND TERRACES

- 9 — Bon association: Moderately well drained, nearly level, silty soils on flood plains and low terraces
- 10 — Albaton-Aowa-Haynie association: Poorly drained, moderately well drained, and well drained, level and nearly level, clayey and silty soils on flood plains

LEVEL, SILTY SOILS ON FLOOD PLAINS

- 11 — Salmo association: Poorly drained, level, silty soils on flood plains

NEARLY LEVEL TO GENTLY ROLLING, LOAMY SOILS ON UPLANDS AND TERRACES

- 12 — Delmont-Enet-Talmo association: Well drained to excessively drained, nearly level to gently rolling, loamy soils on uplands and terraces

UNDULATING TO VERY STEEP, LOAMY AND CLAYEY SOILS ON UPLANDS

- 13 — Ethan-Betts-Clarno association: Well drained, undulating to steep, loamy soils on uplands
- 14 — Sansarc association: Well drained, moderately sloping to very steep, clayey soils on uplands

*The texture terms in the descriptive headings refer to the surface layer of the major soils in each association.

Compiled 1981

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Soil Limitations for Sprinkler Irrigated Potato Production.

- Slight
- Moderate
- Severe
- Not Suited

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

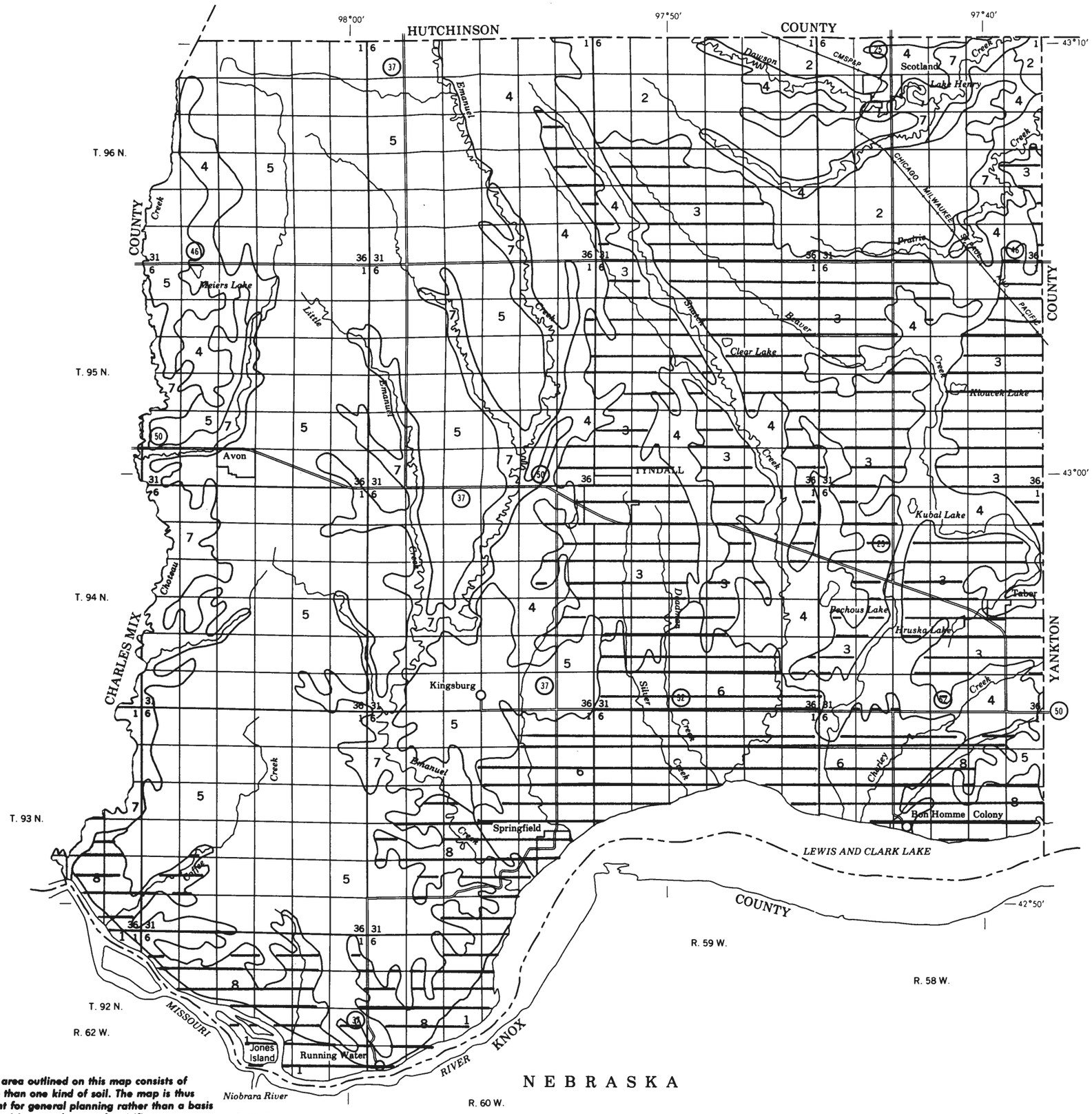


Figure 3 . Soil Limitation Map for Bon Homme County.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
BON HOMME COUNTY, SOUTH DAKOTA

Scale 1:190,080

1 0 1 2 3 4 Miles
1 0 1 2 3 4 5 6 Kilometers

SOIL LEGEND*

1	Fluvaquents-Sarpy association: Very poorly drained and excessively drained, level and nearly level, loamy and sandy soils on flood plains along the Missouri River
2	Clarno-Bonilla association: Well drained and moderately well drained, nearly level and undulating, loamy soils on uplands and in upland swales
3	Clarno-Crossplain-Davison association: Moderately well drained and somewhat poorly drained, nearly level, loamy soils on uplands and in upland swales
4	Clarno-Ethan-Bonilla association: Well drained and moderately well drained, nearly level to rolling, loamy soils on uplands and in upland swales
5	Homme-Ethan-Onita association: Well drained and moderately well drained, nearly level to rolling, silty and loamy soils on uplands and in upland swales
6	Eltree-Yankton-Alcester association: Well drained and moderately well drained, nearly level to strongly sloping, silty soils on uplands and in upland swales
7	Ethan-Bon association: Well drained and moderately well drained, nearly level to steep, loamy soils on uplands, flood plains, and terraces
8	Ethan-Boyd-Thurman association: Well drained, moderately sloping to steep, loamy, clayey, and sandy soils on uplands

*The texture terms in the descriptive headings refer to the surface layer of the major soils in each association.

Compiled 1982

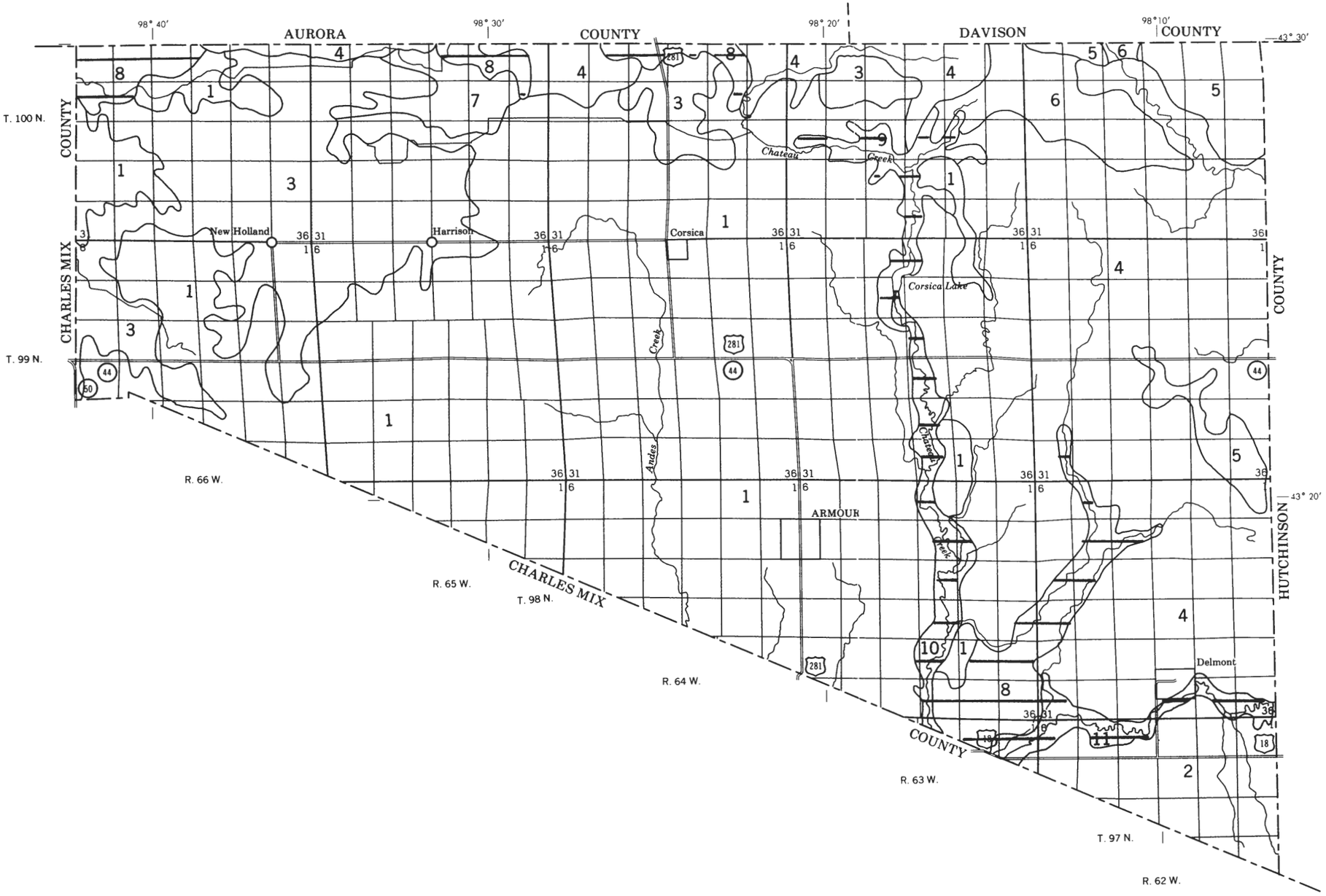
Soil Limitations for Sprinkler Irrigated Potato Production.

- Slight
- Moderate
- Severe
- Not Suited

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
DOUGLAS COUNTY, SOUTH DAKOTA

Scale 1:190,080

1 0 1 2 3 4 Miles

1 0 1 2 3 4 5 6 Kilometers

N

SOIL LEGEND*

NEARLY LEVEL TO GENTLY ROLLING, SILTY AND LOAMY SOILS ON UPLANDS AND IN UPLAND SWALES

1 — Eakin-Highmore-Ethan association: Well drained, nearly level to gently rolling, silty and loamy soils on uplands

2 — Homme-Onita-Ethan association: Well drained and moderately well drained, nearly level to gently rolling, silty and loamy soils on uplands and in upland swales

3 — Highmore-Walke association: Well drained, nearly level to undulating, silty soils on uplands

NEARLY LEVEL TO ROLLING, LOAMY SOILS ON UPLANDS AND IN UPLAND SWALES

4 — Clarno-Ethan-Prosper association: Well drained and moderately well drained, nearly level to rolling, loamy soils on uplands and in upland swales

5 — Clarno-Prosper-Stickney association: Well drained and moderately well drained, nearly level, loamy soils on uplands and in upland swales

6 — Clarno-Prosper association: Well drained and moderately well drained, nearly level, loamy soils on uplands and in upland swales

NEARLY LEVEL TO GENTLY ROLLING, LOAMY SOILS ON UPLANDS AND TERRACES

7 — Henkin-Blendon association: Well drained, nearly level to undulating, loamy soils on uplands and terraces

8 — Delmont-Enet-Talmo association: Well drained to excessively drained, nearly level to gently rolling, loamy soils on uplands and terraces

NEARLY LEVEL TO STEEP, LOAMY SOILS ON UPLANDS AND FLOOD PLAINS

9 — Ethan-Bon-Betts association: Well drained and moderately well drained, nearly level to steep, loamy soils on uplands and flood plains

NEARLY LEVEL, LOAMY AND SILTY SOILS ON FLOOD PLAINS, TERRACES, AND FOOT SLOPES

10 — Bon-Farmsworth-Napa association: Moderately well drained to poorly drained, nearly level, loamy and silty soils on flood plains

11 — Lane-Bon association: Well drained and moderately well drained, nearly level, silty and loamy soils on stream terraces, foot slopes, and flood plains

*The texture terms in the descriptive headings refer to the surface layer of the major soils in each association.

Soil Limitations for Sprinkler Irrigated Potato Production.

Slight — Severe

Moderate — Not Suited

Compiled 1980

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Figure 4. Soil Limitation Map for Douglas County.

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Figure 5. Soil Limitation Map for Gregory County.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
GREGORY COUNTY
SOUTH DAKOTA

Scale 1:253,440
1 0 1 2 3 4 Miles
1 0 4 8 Km

Soil Limitations for Sprinkler Irrigated Potato Production

- Slight
- Moderate
- Severe
- Not Suited

LEGEND *

NEARLY LEVEL TO STRONGLY SLOPING, SILTY AND LOAMY SOILS ON UPLANDS

1 — Reliance association: Deep, well drained, nearly level to strongly sloping, silty soils on uplands

2 — Ree association: Deep, well drained, nearly level to moderately sloping, loamy soils on uplands

3 — Agar association: Deep, well drained, nearly level and gently sloping, silty soils on uplands

NEARLY LEVEL TO STEEP, LOAMY SOILS ON UPLANDS

4 — Anselmo-Holt-Tassel association: Deep to shallow, well drained, nearly level to steep, loamy soils on uplands

NEARLY LEVEL TO MODERATELY STEEP, LOAMY SOILS UNDERLAIN BY SAND OR SAND AND GRAVEL; ON UPLANDS

5 — Jansen association: Well drained, nearly level to moderately sloping, loamy soils that are moderately deep over sand; on uplands

6 — Meadin-Jansen association: Excessively drained and well drained, gently sloping to moderately steep, loamy soils that are shallow or moderately deep over sand and gravel; on uplands

NEARLY LEVEL TO STRONGLY SLOPING, CLAYEY SOILS ON UPLANDS

7 — Promise association: Deep, well drained, nearly level and gently sloping, clayey soils on uplands

8 — Millboro-Boro association: Deep, well drained, nearly level to strongly sloping, clayey soils on uplands

9 — Labu-Promise association: Moderately deep and deep, well drained, moderately sloping and strongly sloping, clayey soils on uplands

STRONGLY SLOPING TO VERY STEEP, CLAYEY AND LOAMY SOILS ON UPLANDS

10 — Labu-Sansarc association: Moderately deep and shallow, well drained, strongly sloping to very steep, clayey soils on uplands

11 — Okaton-Mariaville association: Shallow, well drained, moderately steep to very steep, clayey and loamy soils on uplands

NEARLY LEVEL, CLAYEY AND LOAMY SOILS ON FLOOD PLAINS

12 — Wendte-Haynie Variant association: Deep, moderately well drained and well drained, nearly level, clayey and loamy soils on the flood plains along the Missouri River

* The texture terms in the descriptive headings refer to the surface layer of the major soils in each association.

Compiled 1983

N

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

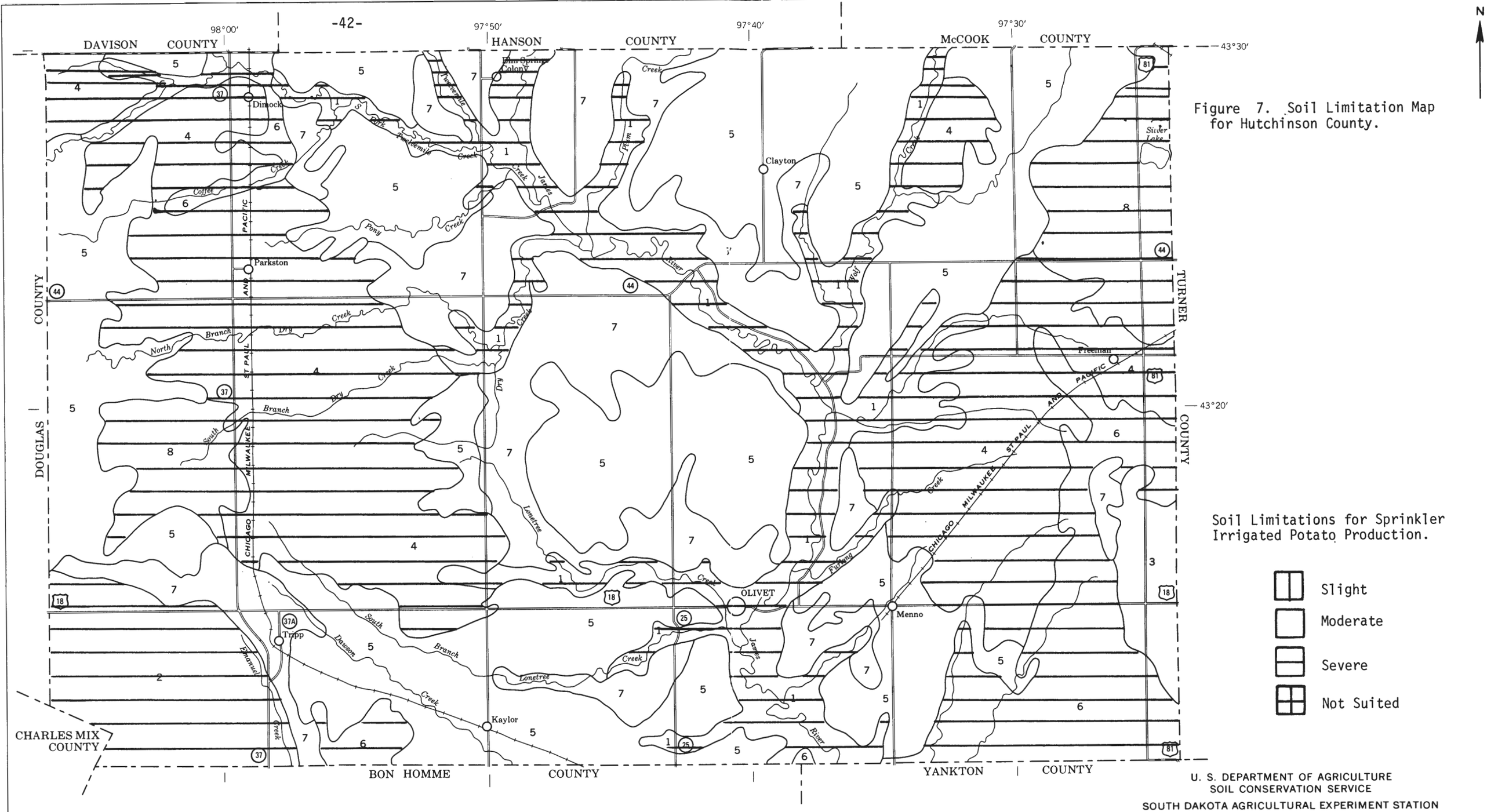


Figure 7. Soil Limitation Map for Hutchinson County.

Soil Limitations for Sprinkler Irrigated Potato Production.

- Slight
- Moderate
- Severe
- Not Suited

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

HUTCHINSON COUNTY, SOUTH DAKOTA

Scale 1:190,080

1 0 1 2 3 4 Miles

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL ASSOCIATIONS

1 Ethan-Betts-Chaska association: Well drained to excessively drained, rolling to steep, loamy soils that formed in glacial till on uplands; and somewhat poorly drained and poorly drained, nearly level, silty and loamy soils on bottom land

2 Homme-Onita-Whitewood association: Well drained to somewhat poorly drained, nearly level to moderately sloping, silty soils that formed in glacial drift and alluvium on uplands

3 Egan-Wentworth association: Well drained, gently sloping and moderately sloping, silty soils that formed in glacial drift on uplands

4 Prosper-Clarno-Stickney association: Moderately well drained and well drained, nearly level to undulating, loamy and silty soils that formed in alluvium and glacial till on uplands

5 Clarno-Tetonka-Prosper association: Well drained, poorly drained, and moderately well drained, level to undulating, loamy and silty soils that formed in glacial till and alluvium on uplands

6 Clarno-Ethan-Tetonka association: Well drained and poorly drained, level to rolling, loamy and silty soils that formed in glacial till and alluvium on uplands

7 Hand-Clarno-Davison association: Well drained and moderately well drained, nearly level to gently rolling, loamy soils that formed in glacial melt-water deposits and glacial till on uplands

8 Crossplain-Clarno-Tetonka association: Poorly drained and well drained, nearly level and level, loamy and silty soils that formed in glacial till and alluvium on uplands

Compiled 1977

SUMMARY

The six county area of south central South Dakota (Bon Homme, Hanson, Hutchinson, Douglas, Charles Mix, and Gregory Counties) has been evaluated for its potential as a commercial potato production area. It was assumed that sprinkler irrigation would be used to supplement the natural precipitation of the area. The criteria used to evaluate the soils of the area were obtained from a review of pertinent literature and conversations with Extension Potato Specialists from other states. A table of the criteria used to evaluate soils is found on page 7 of this report.

The acreage within each county with slight, moderate, and severe limitations for potato production plus the acreage of soils not suitable for sprinkler irrigation is given in Table 12.

Table 12. Degree of Limitation of South Central South Dakota Soils for Potato Production Under Sprinkler Irrigation.

County	Slight	Moderate	Severe	Not Suited
		Degree of Limitation Acres*		
Bon Homme	1,200	198,544	88,959	70,026
Charles Mix	10,249	299,882	253,591	137,533
Douglas	3,747	144,640	91,711	38,022
Gregory	13,241	145,214	201,922	291,888
Hanson	16,230	128,104	74,977	55,019
Hutchinson	14,750	226,740	158,157	119,668
Total	59,417	1,143,124	869,317	712,156
% of area	2.1%	41.0%	31.2%	25.5%

*Estimated total acres per county based on mapping unit composition information from detailed soil survey reports.

Those soils with moderate and severe limitations can successfully be used for potato production if management measurements are taken to overcome the listed limitations. The indirect and direct costs of production increase as the limitations are overcome. Generally soils with slight and moderate limitations are well enough suited for the given use to be considered potentially suitable acreage. Sound soil management practices can generally reduce the limitations associated with soils with moderate limitations.

The ratings given in Table 9 assume that good quality irrigation water is available. The Water Resource Institute (SDSU) and the South Dakota State Geologic Surey should be consulted as to the availability and quality of ground and surface water in those areas selected for serious planning.

Over half of the soils in the area either have severe limitations for potato production or are unsuited for sprinkler irrigation (Table 12.) These acreages would not generally be considered suitable for commercial potato production. However, 1.2 million acres within the six county area have either slight or moderate limitations for potato production. The degree of limitation figures (Fig. 2-7) of the various counties indicate what locations within the six county area would have a sufficient concentration of soils with slight and moderate limitations to make commercial development feasible.

The acreage of soils with various limitations associated with the sprinkler irrigated potato production are shown in Table 13, for those soils not considered unsuitable for irrigation in the Soil Conservation Service's irrigation guide for South Dakota (SCS, 1978). Acreages and limitations are included under all appropriate limitations. For example, Agar Silt loam, 3 to 6% slopes, in Gregory County, has moderate limitations due to slope and pH. Thus, the 3,675 acres of this soil were included in both the slope and pH total for Gregory County.

Moderate slope and pH limitations were the most common soil limitations in the six county area. Residue management, reduced tillage, and crop rotations should minimize these soil limitations and not involve a large capital investment. A two or three year rotation with other crops grown in the area would be adequate to overcome the potential for potato pathogen buildup.

All six of these counties have adequate soil resources (soils with slight and moderate limitations) to support a commercial potato development. Other counties along the east side of the Missouri River have soils similar to those found in Charles Mix County. These areas may also have a large acreage of soils with slight or moderate limitations for potato production.

TABLE 13. SUMMARY OF SOIL LIMITATIONS FOR SPRINKLER IRRIGATED POTATO PRODUCTION IN SOUTH CENTRAL SOUTH DAKOTA

	Flood		HWT		Drainge		Intake		Slope		pH		Salinity		Sodicity	
County	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe
Charles Mix	4,820	69,696	--	7,100	--	771	97,973	--	210,330	89,654	337,591	100,083	--	--	--	37,333
Douglas	6,625	29,273	--	760	--	1,420	104,456	5,810	46,945	28,770	42,435	55,078	--	--	--	23,919
Gregory	4,415	29,160	--	--	1,400	1,395	--	--	54,725	209,846	123,452	152,386	--	--	--	--
Bon Homme	26,115	41,700	--	15,674	--	560	70,249	--	72,840	46,050	40,738	30,659	--	--	--	--
Hanson	1,510	3,620	--	6,663	--	--	114,851	12,849	34,863	20,622	34,709	59,967	--	--	--	8,880
Hutchinson	5,249	12,173	795	11,301	795	635	192,504	15,917	95,222	43,547	64,874	147,508	--	--	--	9,955
Total Acres	48,734	185,622	795	41,498	2,195	4,781	580,033	34,576	514,925	438,489	643,799	545,681				80,087
%	1.09%	4.15%	T	0.93%	T	T	12.97%	0.77%	11.51%	9.81%	14.40%	12.20%				1.79%
of area	5.2 %		.9 %		T		13.7%		21.3%		26.6%					1.8%

	Available H_2O		Permea-bility		Depth		Stones		Channel		Surface texture		Unsuited
County	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	Moderate	Severe	
Charles Mix	--	--	24,726	34,294	--	8,528	--	--	--	6,890	10,028	7,305	137,533
Douglas	--	--	9,463	20,610	376	20,610	--	--	--	3,460	7,545	--	38,022
Gregory	--	--	71,530	95,655	--	17,911	--	--	--	13,835	70,130	95,655	291,888
Bon Homme	--	107	--	--	--	--	--	--	--	6,320	61,561	--	70,026
Hanson	--	--	--	12,849	--	2,999	--	--	--	--	--	--	55,019
Hutchinson	--	--	6,405	15,917	--	6,640	--	--	--	--	6,405	--	119,668
Total Acres	--	107	112,124	179,325	376	56,688	--	--	--	30,505	155,669	102,960	712,156
%		T	2.51%	4.01%	T	1.27%				0.68%	3.48%	2.30%	15.93%
of area	T		6.5%		1.2%				.7%		5.8%		

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