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## Climate and Crop Yields Hand County

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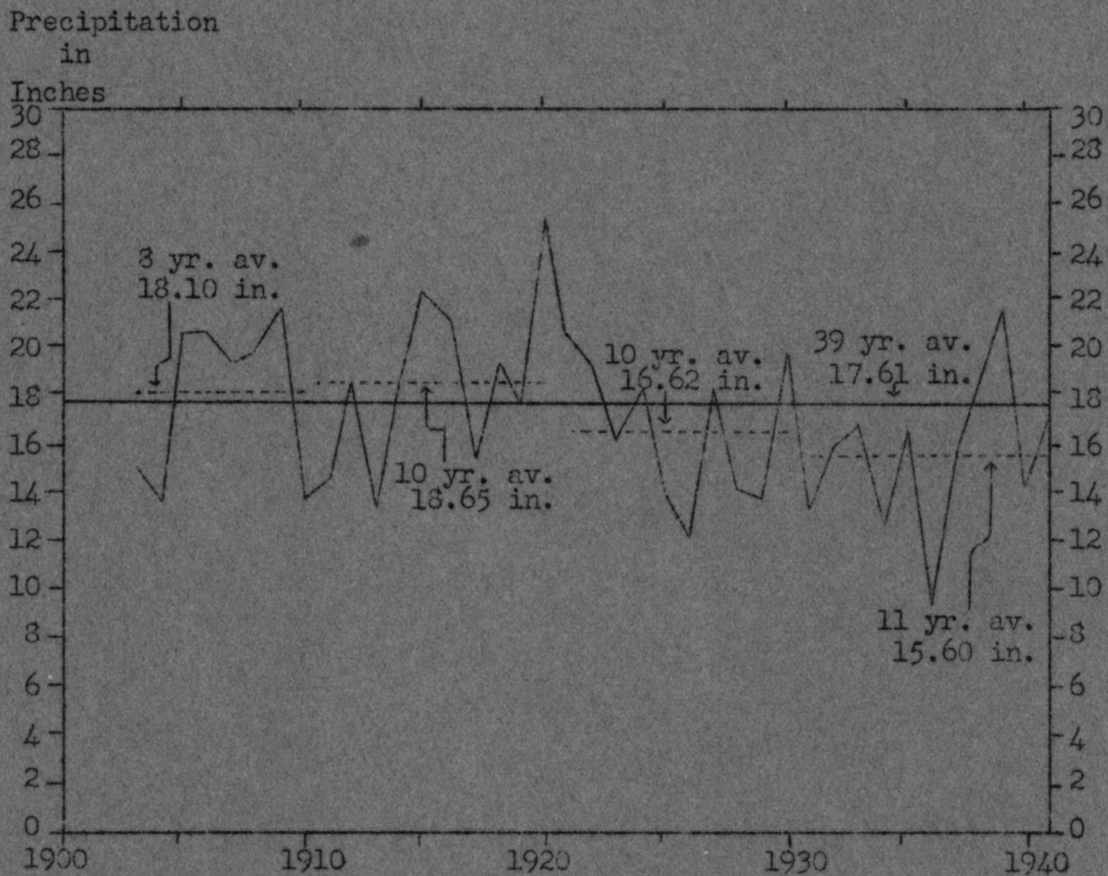
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CLIMATE AND CROP YIELDS

HAND COUNTY



Average Crop Year (Sept. 1 of previous year to Aug. 31 of designated year) Precipitation at Miller, South Dakota 1902-1941. The amount of precipitation varies greatly from year to year and from period to period. Precipitation is a major factor in crop yields (table III).

Department of Agricultural Economics  
Agricultural Experiment Station  
South Dakota State College  
Brookings, South Dakota

THE COUNTY PAMPHLET SERIES

IN

AGRICULTURAL ECONOMICS

The County Pamphlet Series in Agricultural Economics is intended to make available to each county economic data concerning its farm history and present agricultural situation. It is hoped that these facts will be of use to county planning groups, individual farmers, research and extension workers and other persons interested in the agriculture of the counties.

Each pamphlet will treat one subject for one county, and is to be released when completed. Pamphlets on various other economic subjects for the different counties will be prepared as soon as possible.

A few copies of each pamphlet will be placed with the county extension agent and a limited number will be sent to private persons upon request.

The project was initiated by the Department of Agricultural Economics and the work is under the direction of its regular staff.

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\*  
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## Climate and Crop Yields

Prepared under the direction of Aaron G. Nelson and Virgil Wintrode

Climate is one of the principal limiting factors in South Dakota agriculture. A knowledge of its effects on crop conditions should, therefore, be of value to farmers in making farm plans and adjustments in their farm operations. Information regarding length of growing season, temperatures, precipitation and variations in these during specified periods and the relationship between climatic factors and crop conditions should be of value in determining what climatic risks are probable and which crops are best adapted to a particular area.

While annual variations in crop yields are primarily dependent on climatic conditions one must not overlook other factors which may have a very marked effect on yields. Insect pests or crop diseases may reduce yields or completely destroy crops in spite of favorable weather conditions. Crop yields may also be greatly affected by short periods of adverse weather conditions, such as the occurrence of hot dry weather during the pollination period for corn.

No set rules or absolute conclusions can be made regarding the relationship between yields and climatological factors; if, however, other factors are given due consideration much can be learned regarding the effect of climatic factors on crop yields. It is believed, for example, that if variety of crop and time of planting are given careful consideration much can be done to abate losses from weather adversities.

Table 1. Summary of Observations  
Miller Weather Station

ELEVATION IN FEET	1,585
GROWING SEASON	
Average date of last killing frost in spring	May 8
Average date of first killing frost in fall	Sept. 28
Average length of frost-free period in days	144
Latest recorded killing frost in spring	May 25
Earliest recorded killing frost in the fall	Sept. 9
Longest recorded growing season	172 (1922)
Shortest recorded growing season	107 (1910)
PRECIPITATION IN INCHES*	
For the Calendar Year, Jan. 1 to Dec. 31	
Average	17.70
Highest recorded	25.90 (1920)
Lowest recorded	9.57 (1936)
For the Crop Year, Sept. 1 of previous year to Aug. 31 of designated year	
Average	17.61
Highest recorded	25.28 (1920)
Lowest recorded	9.08 (1936)
For the Growing Season, April 1 to Aug. 31	
Average	12.51
Highest recorded	20.73 (1920)
Lowest recorded	6.40 (1931)
For the Critical Period for Small Grain, May 1 to June 30	
Average	6.07
Highest recorded	13.76 (1920)
Lowest recorded	2.43 (1936)
For the Critical Period for Corn, May 1 to July 31	
Average	8.33
Highest recorded	14.24 (1905)
Lowest recorded	2.59 (1936)
TEMPERATURE	
Average annual temperature	44.8°
Highest recorded - Degrees above zero	113° (1931)
Lowest recorded - Degrees below zero	48° **

\* All rainfall, snow and other moisture measured as inches of water.

\*\* No date available.

COMPARISON OF PRECIPITATION AND CROP YIELDS

Miller Weather Station - Hand County

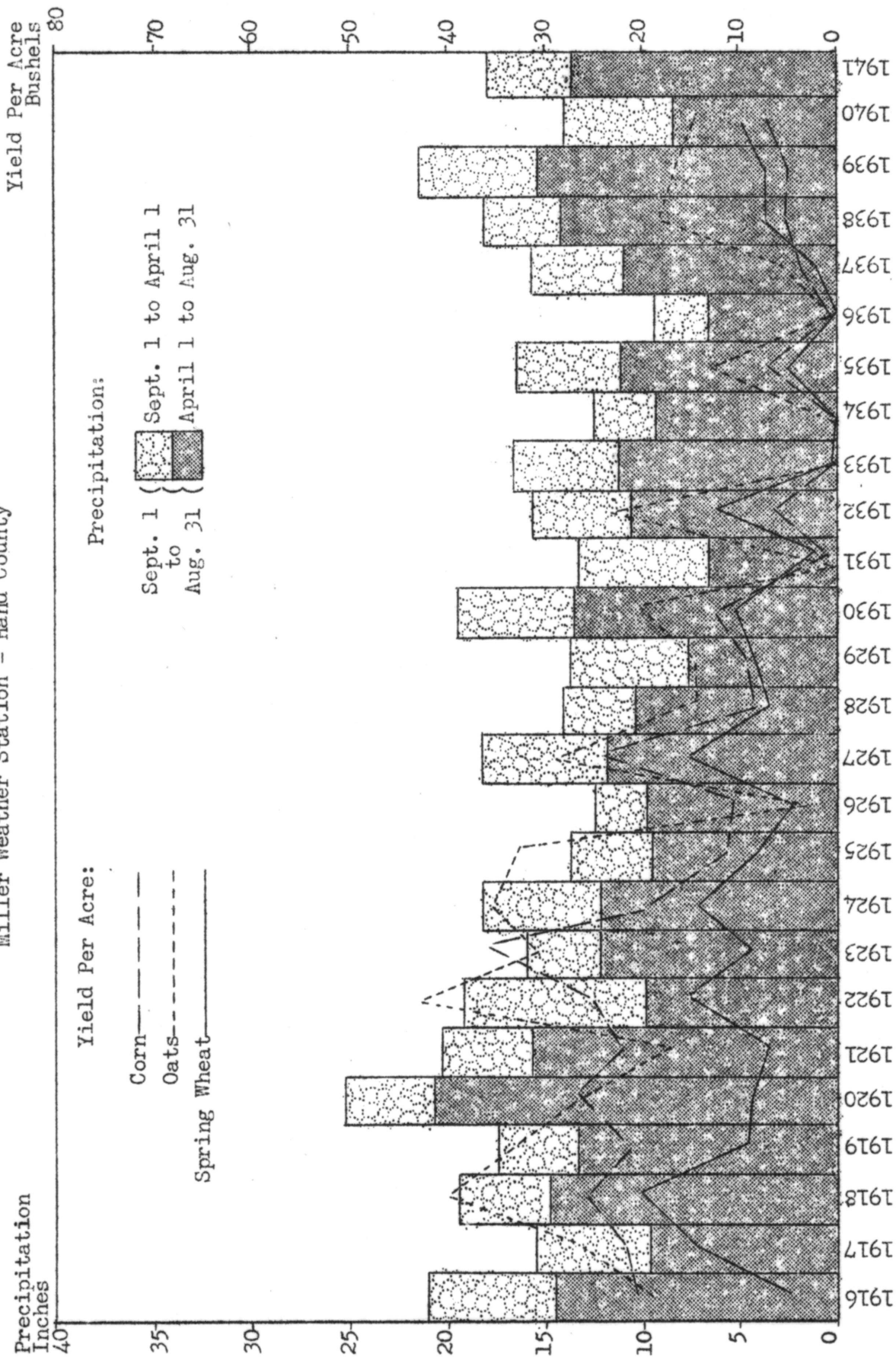


Fig. 1 - Precipitation is probably the most important factor affecting crop yields.

Source: Tables II and III

SUMMER PRECIPITATION, HAND COUNTY, 1931 - 1941

Represents one inch of precipitation-

Yields

Per Seeded Acre

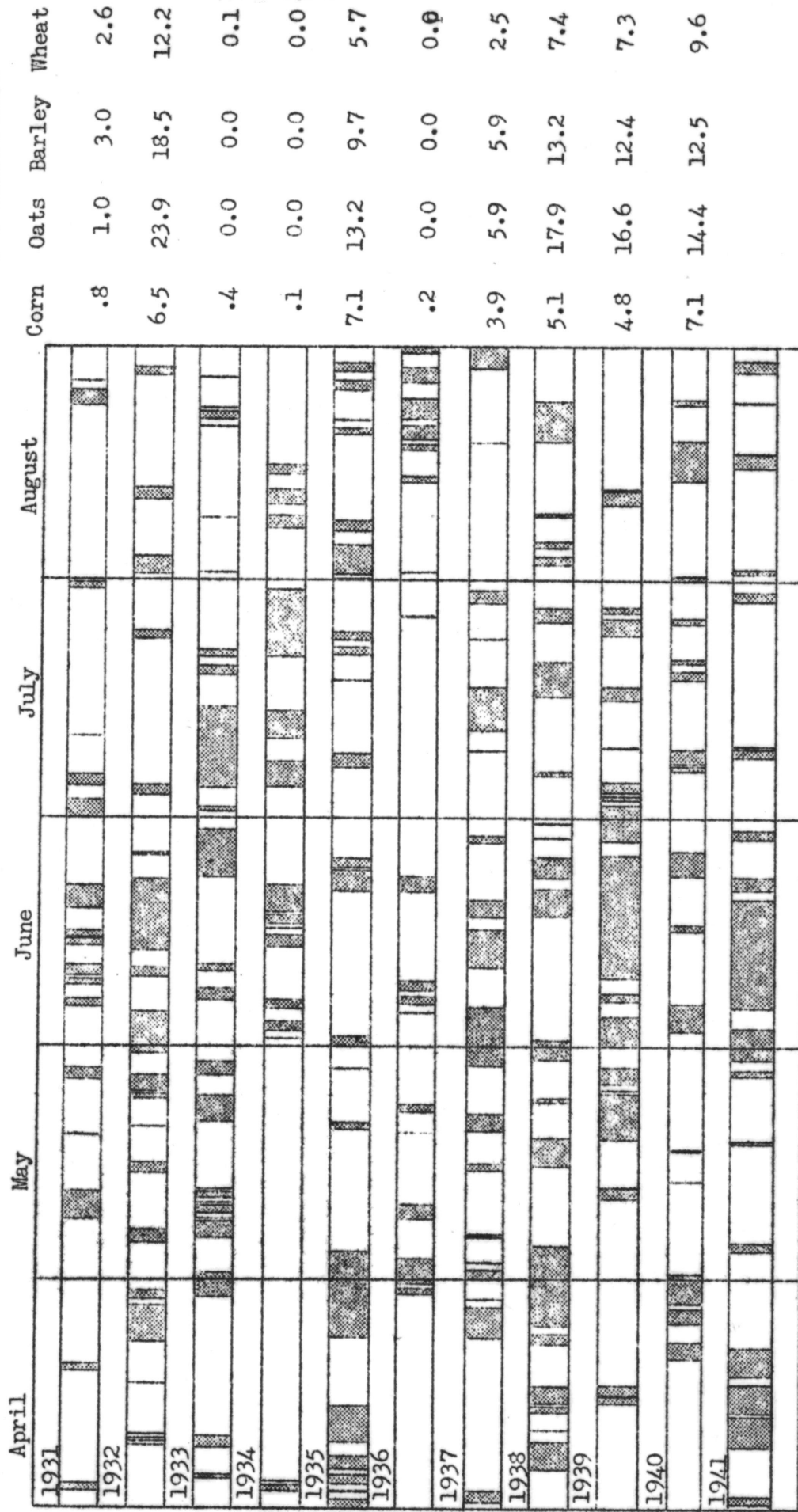


Fig. II. The distribution as well as the amount of precipitation during the growing season has an important effect on crop yields.

Source: Precipitation data from Weather Bureau and Yields from table III.

DAYS WITH TEMPERATURES ABOVE 90 DEGREES  
Miller Weather Station  
May 1 - Aug. 14

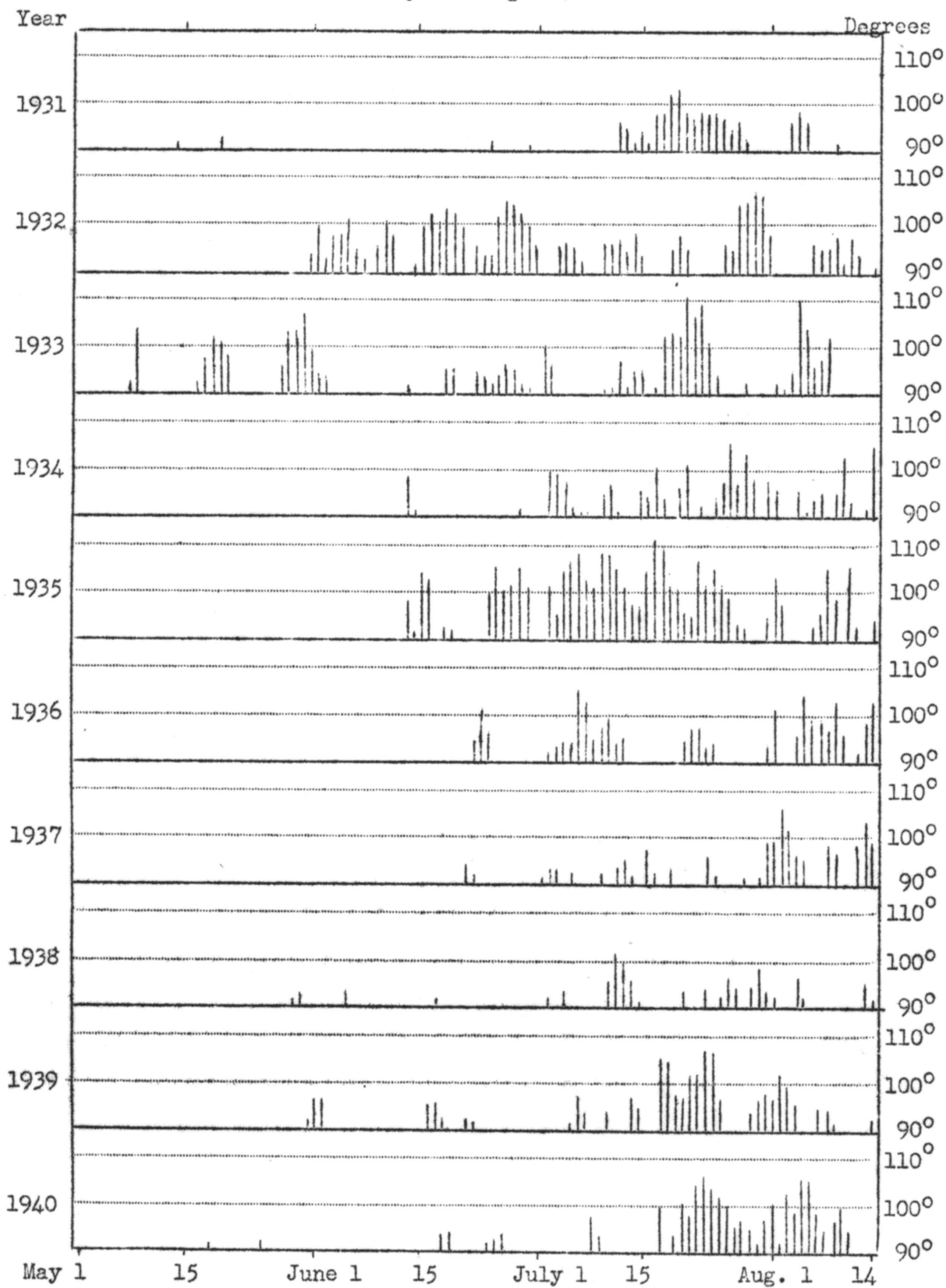


Fig. III. The vertical lines represent the highest temperatures of each day if over 90°.



The Number and Distribution of Frost-Free Days, 1902-1941  
Miller Weather Station

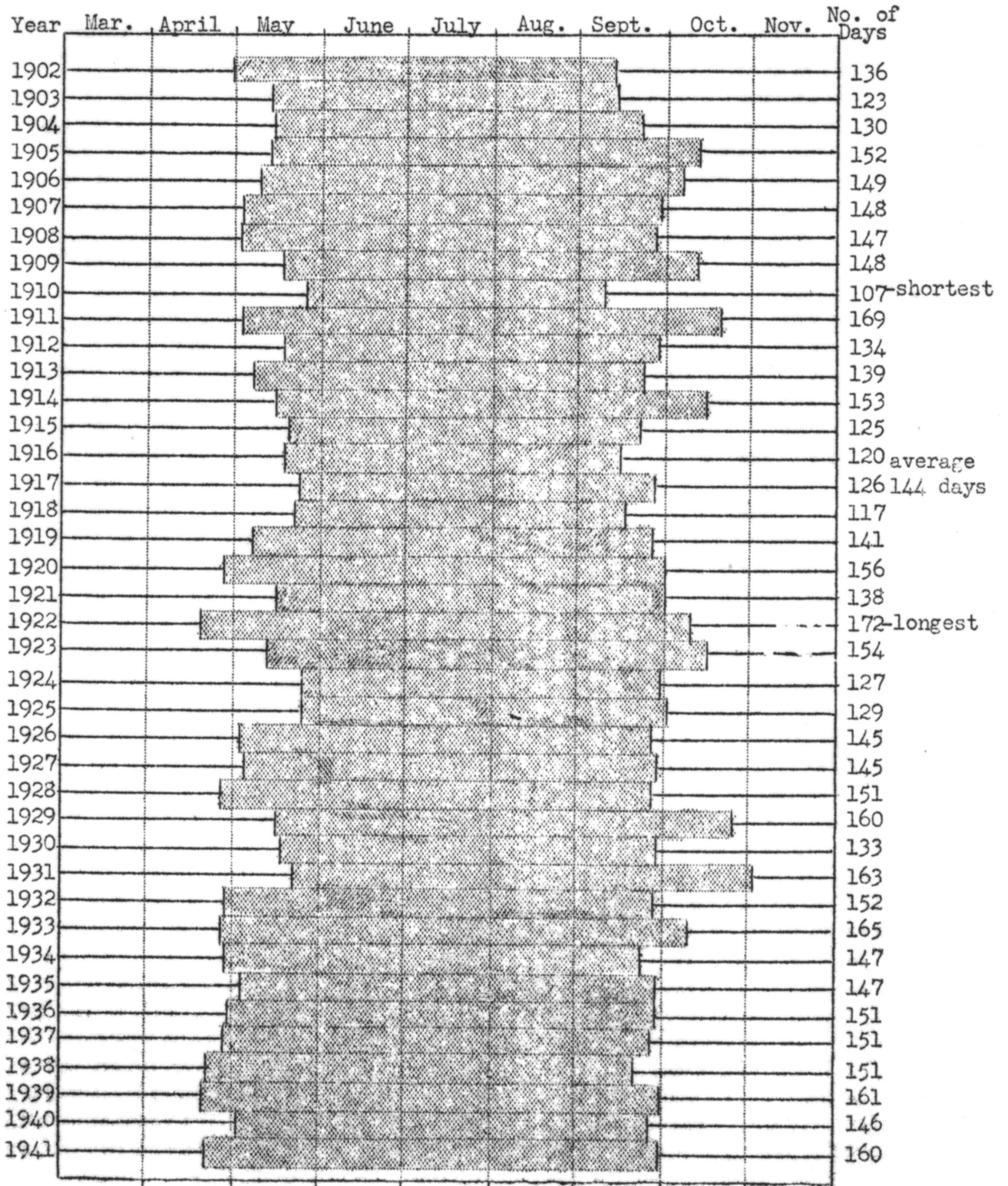


Fig. IV.

Table II

Hand County

## PRECIPITATION

Miller Weather Station, 1902 - 1941

Year	Crop Year Sept. 1 - Aug. 31		Short Growing Season April 1 - July 31		Long Growing Season April 1 - August 31		Calendar Year Jan. 1 - Dec. 31	
	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.
1902			9.46	92	11.94	95	17.42	98
1903	15.00	85	8.34	81	10.60	85	15.32	87
1904	13.76	78	8.99	87	10.32	82	12.42	70
1905	20.64	117	15.10	147	18.18	145	22.29	126
1906	20.67	117	11.11	108	16.48	132	23.45	132
1907	19.40	110	10.96	107	11.59	93	16.89	95
1908	19.82	113	11.51	112	14.79	118	20.26	114
1909	21.67	123	12.85	125	16.64	133	22.60	128
1910	13.82	78	6.24	61	6.82	55	10.95	62
Av. 1902-10	18.10	103	10.51	102	13.04	104	17.96	101
1911	14.86	84	6.16	60	11.03	88	17.93	101
1912	18.53	105	8.98	87	12.39	99	15.19	86
1913	13.28	75	9.42	92	10.46	84	12.71	72
1914	18.75	106	13.06	127	15.24	122	19.68	111
1915	22.38	127	15.85	154	17.27	138	23.76	134
1916	21.03	119	8.38	81	14.51	116	18.84	106
1917	15.47	88	8.23	80	9.83	79	15.91	90
1918	19.34	110	12.81	124	14.78	118	19.09	108
1919	17.59	100	12.32	120	13.39	107	18.44	104
1920	25.28	144	18.73	182	20.73	166	25.90	146
Av. 1911-20	18.65	106	11.39	111	13.96	112	18.75	106

Table II, Cont.

Hand County

PRECIPITATION

Miller Weather Station, 1902-1941

Year	Crop Year Sept. 1 - Aug. 31		Short Growing Season April 1 - July 31		Long Growing Season April 1 - August 31		Calendar Year Jan. 1 - Dec. 31	
	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.	Inches	Percent of 1902-1941 Av.
1921	20.56	117	11.37	110	15.78	126	23.38	132
1922	19.06	108	9.01	88	9.93	79	15.56	88
1923	16.09	91	9.62	93	12.11	97	16.45	93
1924	18.29	104	10.39	101	12.10	97	18.45	104
1925	13.91	79	9.13	89	9.53	76	11.50	65
1926	12.56	71	5.41	53	9.81	78	16.37	92
1927	18.12	103	10.69	104	11.90	95	16.23	92
1928	14.01	80	8.10	79	10.17	81	14.31	81
1929	13.83	79	7.39	72	7.89	63	15.26	86
1930	19.72	112	10.14	88	13.46	108	19.79	112
Av. 1921-30	16.62	94	9.13	89	11.27	90	16.73	95
1931	13.22	75	5.78	56	6.40	51	12.44	70
1932	15.99	91	9.57	93	10.75	86	14.88	84
1933	16.72	95	10.65	103	11.32	90	16.23	92
1934	12.49	71	7.89	77	9.05	72	12.72	72
1935	16.61	94	9.12	89	11.50	92	14.78	84
1936	9.08	52	3.95	38	6.62	53	9.57	54
1937	15.94	91	10.30	100	11.16	89	15.56	88
1938	18.16	103	11.38	111	14.10	113	19.35	109
1939	21.49	122	13.98	136	15.44	123	21.66	122
1940	14.08	80	6.35	62	8.30	66	14.17	80
Av. 1931-40	15.38	87	8.90	86	10.46	84	15.14	86
1941	17.84	101	12.43	121	13.63	109	22.67	128
Av. 1902-41	17.61	100	10.29	100	12.51	100	17.70	100

Table III

Yield Per Acre of Various Grain Crops, Hand County, 1916-1940<sup>1/</sup>

Year	Corn	Winter Wheat	Durum <sup>2/</sup> Wheat	Spring <sup>2/</sup> Wheat	Oats	Barley	Rye	Flax
1916	21.4			4.5	19.6	21.3	15.0	7.1
1917	22.8			14.2	26.5	30.0	15.0	4.0
1918	26.0			21.0	40.0	35.0	20.0	11.0
1919	22.0			9.0	33.0	20.0	15.0	7.5
1920	27.5			8.5	27.5	18.5	13.5	11.5
Av. 1916-20	23.9			11.4	29.2	25.0	15.7	8.2
1921	22.5			7.0	17.5	14.0	16.0	7.0
1922	25.0			15.5	43.0	28.0	20.0	9.0
1923	36.0			8.5	31.0	21.5	11.0	8.0
		Yield Per Seeded Acre <sup>3/</sup>						
1924	20.4			14.1 <sup>4/</sup>	35.8	21.8	9.6	8.6
1925	11.0			8.3 <sup>4/</sup>	33.3	19.3	5.7	4.8
1926	10.7	4.8		4.6	2.9	4.6	1.6	3.1
1927	24.0	12.4		15.4	29.0	24.2	19.2	8.5
1928	8.6	3.2	9.4	6.9	14.2	13.0	7.6	4.4
1929	9.0	9.5	8.8	8.8	14.5	11.3	8.4	3.5
1930	12.6	10.3	11.1	10.8	20.8	18.7	12.4	3.3
Av. 1921-30	18.0	8.0 <sup>5/</sup>	9.8 <sup>5/</sup>	10.0	24.2	17.6	11.2	6.0
1931	.8	3.1	2.4	2.6	1.0	3.0	1.9	.2
1932	6.5	15.4	8.2	12.2	23.9	18.5	11.8	1.0
1933	.4	.6	0.0	0.0	0.0	0.0	0.4	0.0
1934	.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1935	7.1	6.6	6.0	5.7	13.2	9.7	10.8	1.3
1936	.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1937	3.9	3.5	3.5	2.5	5.9	5.9	5.2	4.2
1938	5.1	0.0	7.6	7.4	17.9	13.2	4.7	4.8
1939	4.8	1.5	8.1	7.3	16.6	12.4	2.2	2.4
1940	7.1	8.0	9.1	9.7	14.4	12.5	5.7	3.0
Av. 1931-40	3.6	3.9	4.5	4.7	9.3	7.5	4.3	1.7
Av. 1916-40	13.4	5.3 <sup>5/</sup>	5.7 <sup>5/</sup>	7.9	19.3	15.1	9.3	4.7

<sup>1/</sup> Farm Production and Prices, 1890-1926, Agr. Exp. Sta. Bulletin #225.  
South Dakota Agricultural Statistics, 1924-1936, U.S.D.A. (Unpublished).

<sup>2/</sup> South Dakota Agricultural Statistics, Annual Report, 1937-1940, U.S.D.A.  
<sup>3/</sup> Durum Wheat yields were included with spring wheat for the period 1916-1923.

<sup>3/</sup> Prior to 1924 records do not tell whether yields were per harvested or seeded acre.

<sup>4/</sup> Yield per harvested acre.

<sup>5/</sup> Average for years reporting.