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Climate and Crop Yields Sanborn County

G. Aaron Nelson

Virgil Wintrode

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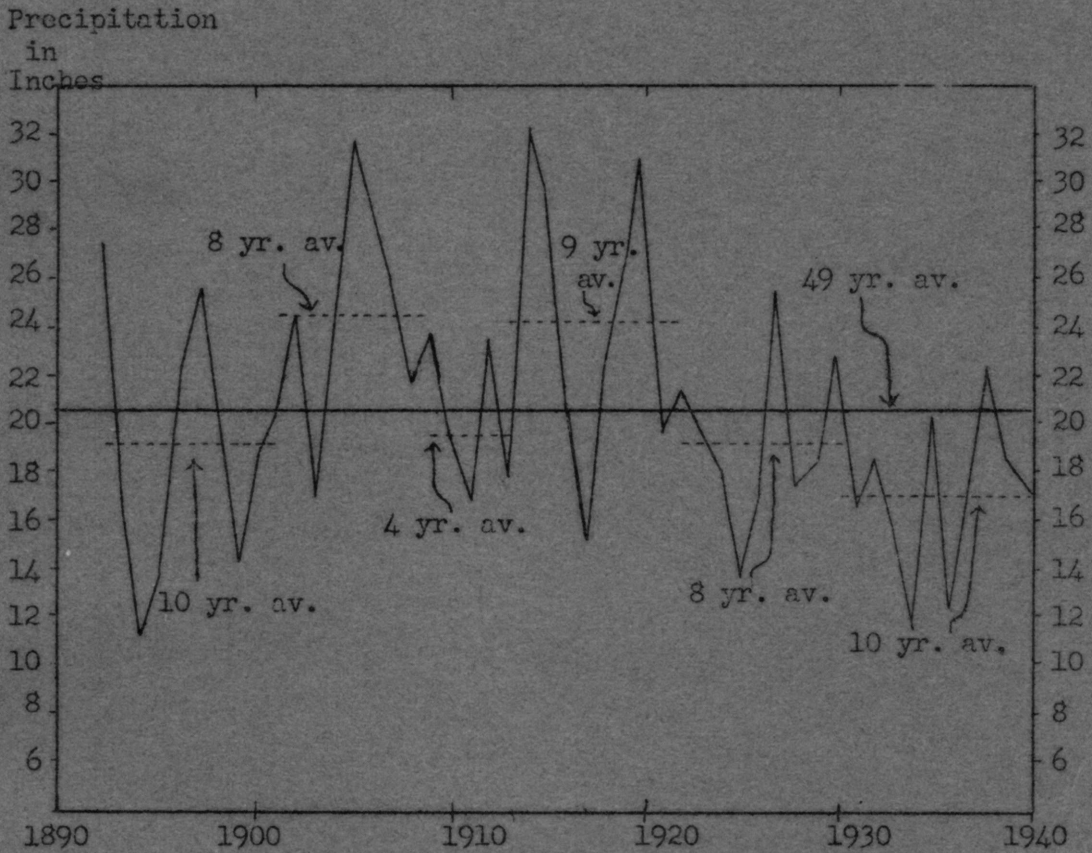
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CLIMATE AND CROP YIELDS

SANBORN COUNTY



Average Crop Year (Sept. 1 - Aug. 31) Precipitation at Forestburg, South Dakota, 1892-1940. The amount of precipitation varies greatly from year to year and from period to period.

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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* * * * *

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 Weather Observations, 1892 to 1940

Forestburg Weather Station

ELEVATION IN FEET	1231
GROWING SEASON	
Average date of last killing frost in spring	May 12
Average date of first killing frost in fall	Sept. 26
Average length of frost-free period in days	137
Latest recorded killing frost in spring	June 22 (1902)
Earliest recorded killing frost in the fall	Aug. 23 (1891)
Longest recorded growing season in days	193 (1938)
Shortest recorded growing season in days	82 (1902)
PRECIPITATION IN INCHES*	
For the Calendar Year, Jan. 1 to Dec. 31	
Average	20.48
Highest recorded	36.41 (1914)
Lowest recorded	11.77 (1925)
For the Crop Year, Sept. 1 to Aug. 31	
Average	20.53
Highest recorded	32.34 (1914)
Lowest recorded	11.03 (1894)
For the Growing Season, April 1 to Aug. 31	
Average	9.48
Highest recorded	23.65 (1905)
Lowest recorded	5.45 (1936)
For the Critical Period for Small Grain, May 1 to June 30	
Average	6.69
Highest recorded	16.67 (1914)
Lowest recorded	1.87 (1894)
For the Critical Period for Corn, May 1 to July 31	
Average	9.33
Highest recorded	21.49 (1905)
Lowest recorded	2.22 (1894)
TEMPERATURE	
Average annual temperature	45.4°
Highest recorded --Degrees above zero	116° (1934)
Lowest recorded -- Degrees below zero	46° **

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

** No date available.

COMPARISON OF PRECIPITATION AND CROP YIELDS

Forestburg -- Weather Station, Sanborn Co.

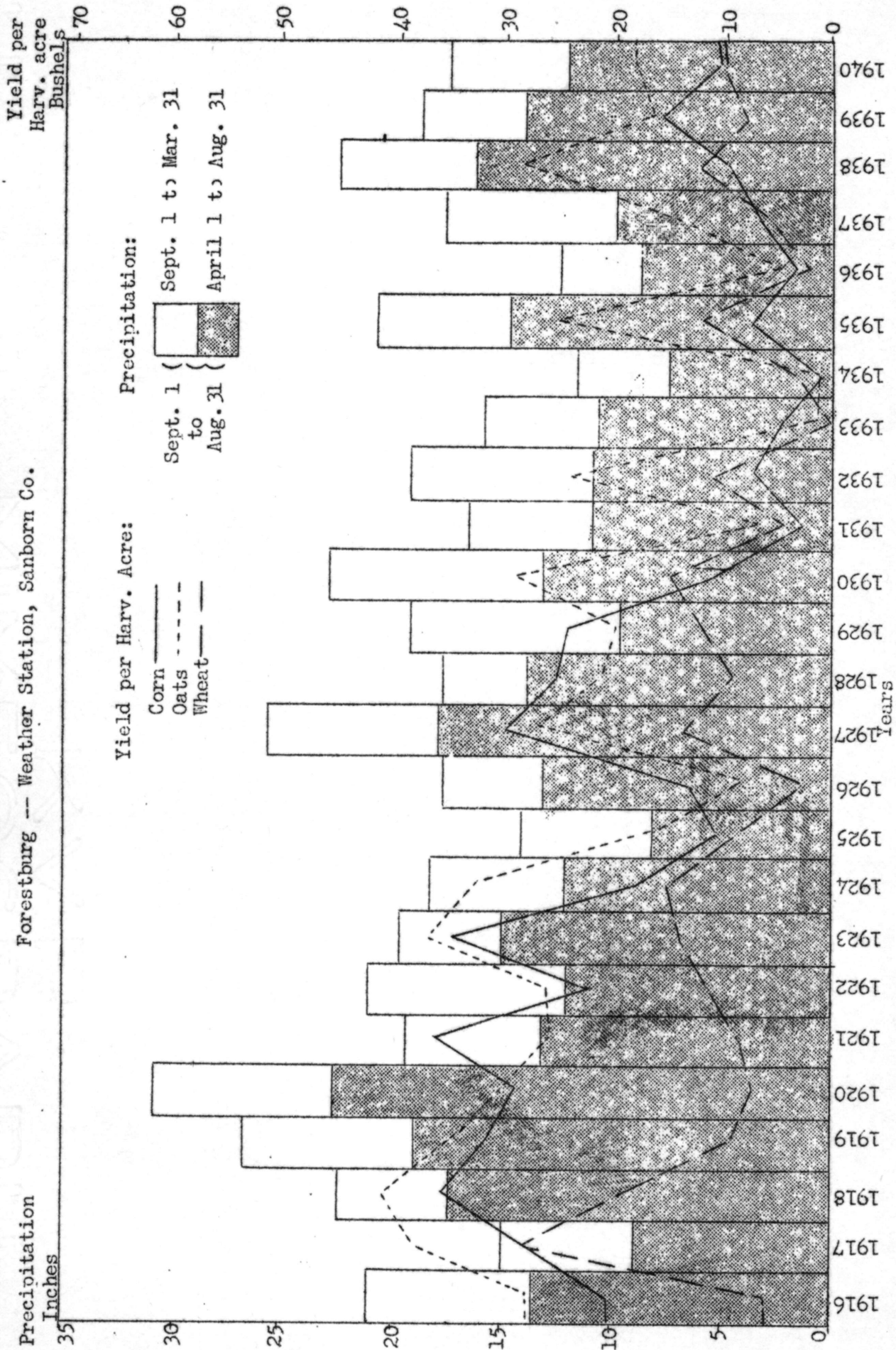


Fig. 1-Precipitation is probably the most important factor affecting crop yields.

SUMMER PRECIPITATION, SANBORN COUNTY, 1931 - 1940

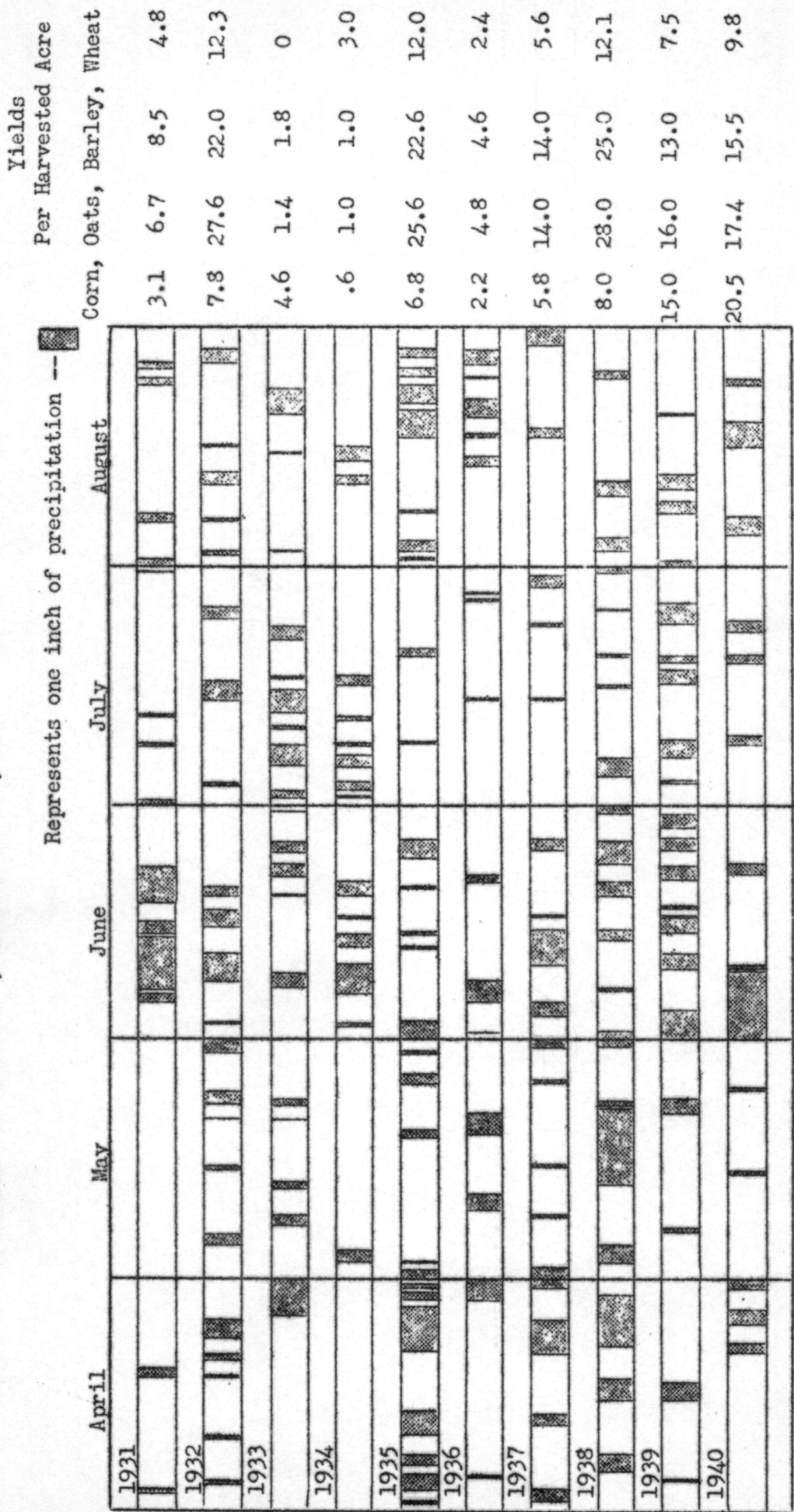


Fig. III. The amount and distribution of precipitation during the growing season has an important effect on crop yields.

DAYS WITH TEMPERATURES ABOVE 90 DEGREES
 Huron Weather Station*
 May 15 - Aug. 14

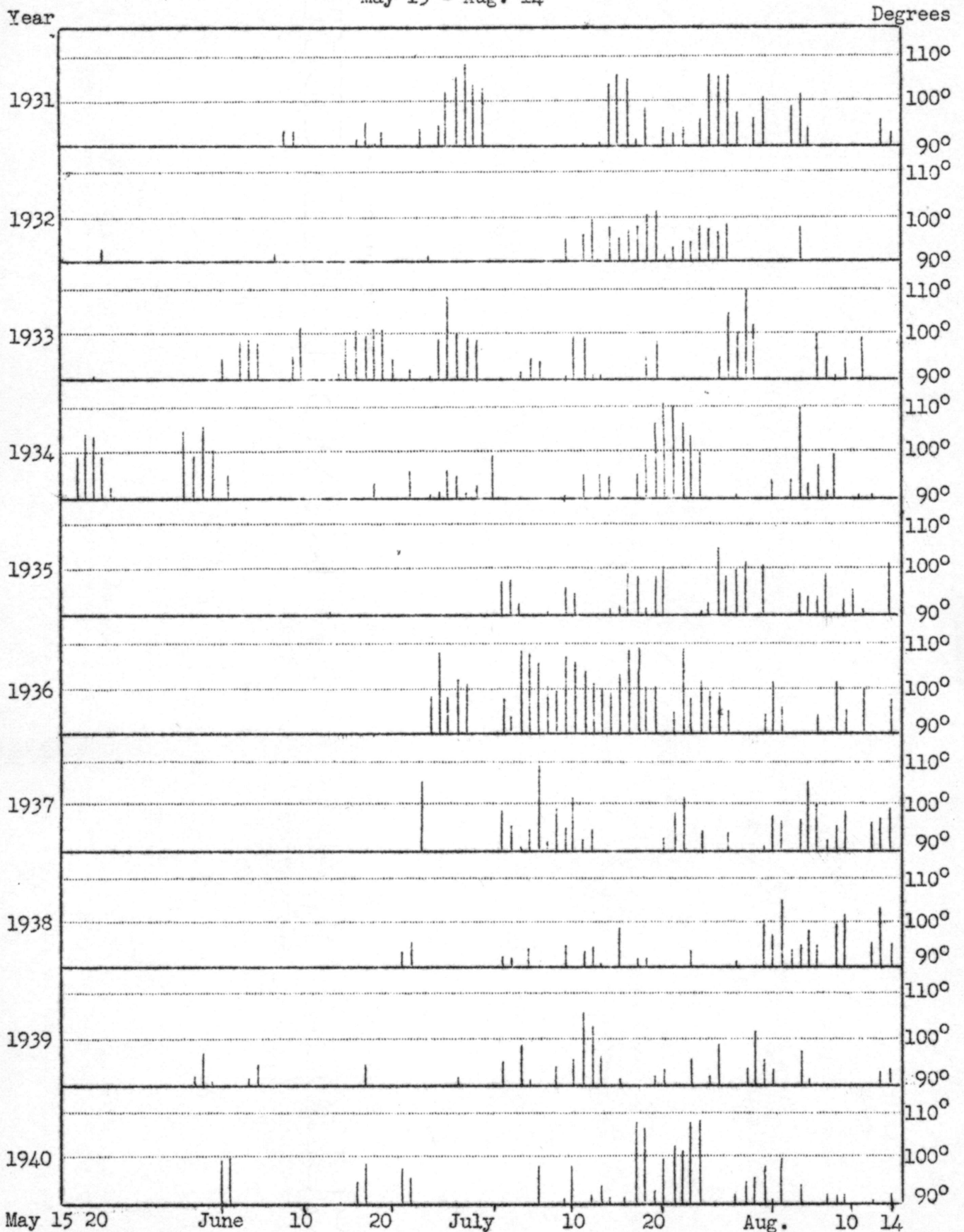


Fig. IV. The vertical lines represent the highest temperatures of each day if over 90°.

* No data for Sanborn County.

The Number and Distribution of Frost-Free Days, 1891 - 1940
Forestburg Weather Station

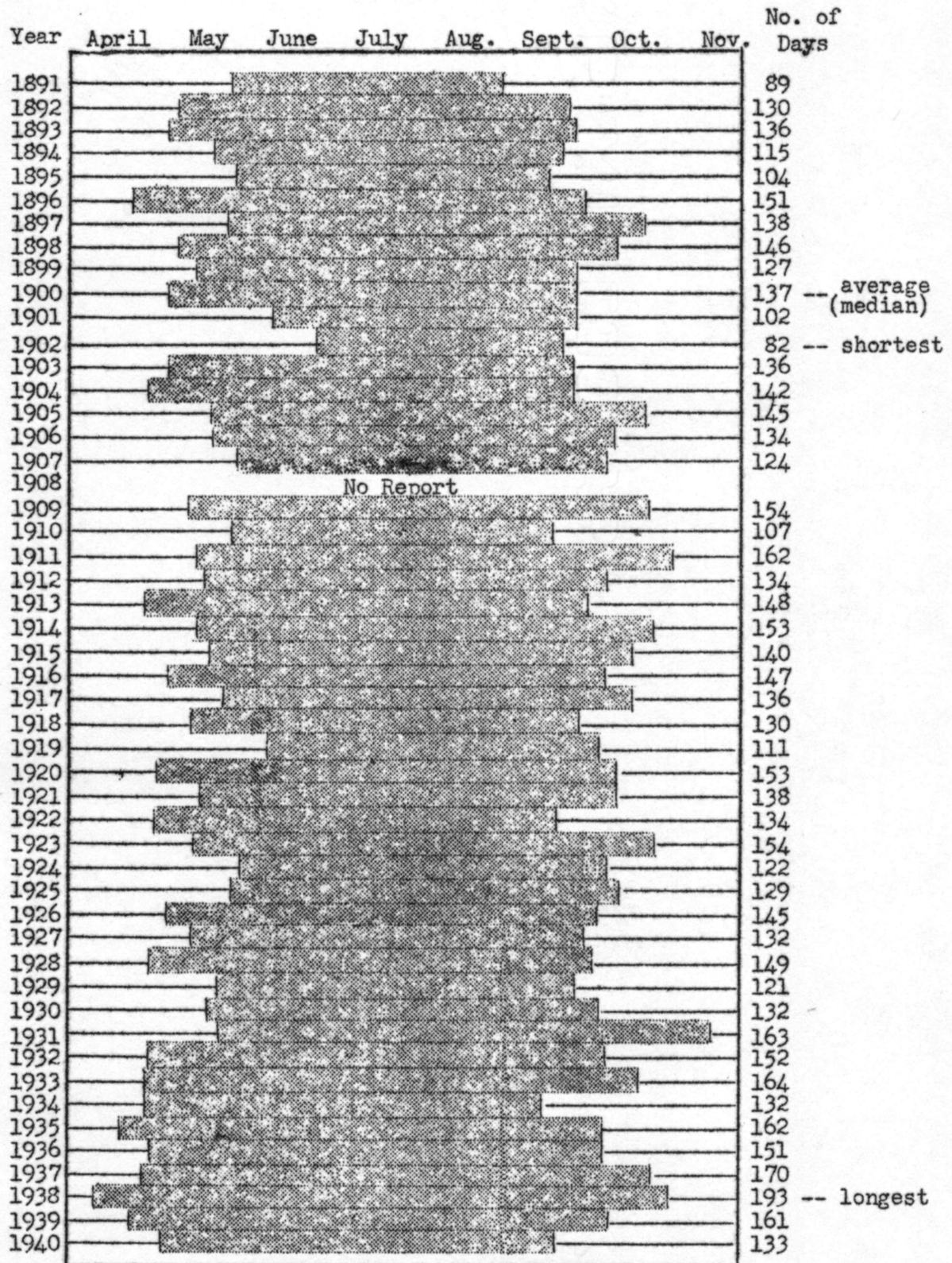


Fig. V

Table II

PRECIPITATION

Forestburg Weather Station, 1892 - 1940

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 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.
1892	27.23	133	18.37	157	21.50	154	26.57	129
1893	16.51	80	8.42	72	10.01	72	15.85	77
1894	11.03	54	5.61	48	6.46	46	12.85	63
1895	13.75	67	7.09	60	8.75	63	13.10	64
1896	22.12	108	14.19	121	15.15	108	23.80	116
1897	25.58	124	12.76	109	15.45	110	25.49	124
1898	20.36	99	13.62	116	14.15	101	17.32	84
1899	14.14	69	9.53	81	11.26	81	16.27	79
1900	18.57	90	10.21	87	13.01	93	20.11	98
Av. 1892-1900								
	18.81	92	11.09	95	12.86	92	19.04	93
1901	20.27	99	11.86	101	13.65	98	22.80	111
1902	24.29	118	8.72	74	13.72	98	19.77	96
1903	16.90	82	9.87	84	10.95	78	19.23	94
1904	24.66	120	13.83	118	17.98	129	22.72	111
1905	31.76	155	23.65	202	25.66	184	32.01	156
1906	27.95	136	13.99	119	20.52	147	31.75	155
1907	25.72	125	15.08	129	15.48	111	19.77	96
1908	21.80	106	15.33	131	17.20	123	27.95	136
1909	23.70	115	10.65	91	12.60	90	21.33	104
1910	19.61	96	8.39	72	10.53	75	16.63	81
Av. 1901-1910								
	23.67	115	13.14	112	15.83	113	23.40	114

Table II Cont.

Sanborn County

Table II

PRECIPITATION

Forestburg Weather Station, 1892 - 1940

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 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.
1911	16.76	82	7.93	68	12.21	87	21.26	104
1912	23.52	114	12.44	106	15.69	112	18.59	90
1913	17.92	87	12.81	109	14.53	104	18.77	91
1914	32.34	158	22.54	192	26.45	189	36.41	177
1915	29.49	144	17.38	148	18.46	132	26.49	129
1916	20.77	101	11.80	101	13.56	97	18.97	92
1917	15.03	73	8.23	70	8.89	64	15.90	77
1918	22.40	109	14.31	122	17.32	124	24.40	119
1919	26.70	130	18.32	156	19.06	136	26.92	131
1920	31.05	151	19.63	168	22.68	162	29.39	143
Av. 1911-1920	23.60	115	14.54	124	16.89	121	23.71	116
1921	19.45	95	11.21	96	13.18	94	19.91	97
1922	21.35	104	11.41	97	12.08	86	21.27	104
1923	19.63	96	12.19	104	14.94	107	18.97	92
1924	18.11	88	8.91	76	12.22	87	18.38	90
1925	13.62	66	7.21	62	8.22	59	11.77	57
1926	17.30	84	9.12	78	13.35	96	22.04	107
1927	25.67	125	15.21	130	16.84	120	21.28	104
1928	17.36	84	11.89	102	13.88	99	20.94	102
1929	18.52	90	8.53	73	9.30	66	21.31	104
1930	22.96	112	7.24	62	13.10	94	18.69	91
Av. 1921-1930	19.40	94	10.29	88	12.71	91	19.46	95

Table II Cont.

Sanborn County

Table II

PRECIPITATION

Forestburg Weather Station, 1892 - 1940

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 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.	Inches	Percent of 1892-1940 Av.
1931	16.38	80	9.28	79	10.89	78	18.11	88
1932	18.93	92	8.85	76	10.86	78	15.31	75
1933	15.49	75	9.00	77	10.72	77	15.54	76
1934	11.45	56	6.09	52	7.31	52	12.30	60
1935	20.64	100	10.68	91	14.69	105	19.23	94
1936	12.07	59	5.45	46	7.83	56	13.69	67
1937	17.33	84	8.44	72	9.83	70	16.14	79
1938	22.38	109	14.90	127	16.46	118	22.86	111
1939	18.30	89	12.68	108	13.93	100	17.65	86
1940	17.21	84	9.10	78	12.08	86	17.88	87
Av. 1931-1940	17.02	83	9.44	81	11.46	82	16.87	82
Av. 1892-1940	20.53	100	11.71	100	13.97	100	20.52	100

Table III

Yield Per Harvested Acre of Various Grain Crops 1916 - 1940 ^{1/}

Year	Corn	Winter Wheat	Durum ^{2/} Wheat	Spring ^{2/} Wheat	Oats	Barley	Rye	Flax
1916	20.7			6.0	27.5	30.0		8.0
1917	28.0			28.0	38.0	25.0	15.0	7.0
1918	35.0			19.5	41.0	31.0		8.5
1919	31.5			9.0	34.0	28.0	12.0	10.0
1920	29.0			7.0	30.0	18.0	17.0	9.0
Av. 1916-20	28.8			13.9	34.1	26.4	14.7 ^{3/}	8.5
1921	36.0			8.5	25.0	24.0	19.0	7.5
1922	23.0			11.5	25.0	20.0	21.0	9.0
1923	35.0			14.0	36.5	26.0	15.0	7.0
1924	17.8	14.6		15.1	32.8	23.5	15.3	7.4
1925	11.0	8.2		8.1	18.5	17.8	9.7	3.9
1926	13.6	6.0		3.7	9.1	9.5	5.1	5.7
1927	31.0	13.5		15.6	23.9	25.3	18.6	9.1
1928	24.8	9.0	9.4	8.9	23.7	21.9	10.5	6.8
1929	24.0	13.0	12.6	12.8	23.0	16.8	10.8	7.3
1930	12.6	24.4	13.7	14.6	29.5	27.3	19.9	5.6
Av. 1921-30	22.9	12.7 ^{3/}	11.9 ^{3/}	11.3	25.2	21.2	14.5	6.9
1931	3.1	7.6	4.6	4.8	6.7	8.5	4.7	2.0
1932	7.8	15.5	14.5	12.6	27.6	22.0	13.2	4.5
1933	4.6	2.5	0.0	0.0	1.4	1.8	1.8	0.0
1934	.6	0.0	0.0	3.0	1.0	1.0	1.0	0.0
1935	6.8	11.0	10.5	11.9	25.6	22.6	15.4	5.1
1926	2.2	0.0	2.8	2.4	4.8	4.6	4.8	0.0
1937	5.8	10.0	6.0	5.6	14.0	14.0	14.0	2.0
1938	8.0	7.0	14.0	12.2	28.0	25.0	18.0	0.0
1939	15.0	10.0	8.0	7.5	16.0	13.0	6.0	4.0
1940	9.9	0.0	8.6	9.8	17.4	15.5	9.6	6.0
Av. 1931-40	6.4	6.4	6.9	7.0	14.3	12.8	8.9	2.4
Av. 1916-40	17.5	9.0 ^{3/}	8.1 ^{3/}	10.1	22.6	18.9	12.1 ^{3/}	5.4

- ^{1/} Farm Production and Prices, 1890-1926, Agr. Exp. Sta. Bulletin #225
 South Dakota Agricultural Statistics, 1924-1936, U.S.D.A. (Unpublished)
 South Dakota Agricultural Statistics, Annual Report, 1937-1940, U.S.D.A.
- ^{2/} Durum wheat yields were included with spring wheat for the period 1916-1928.
- ^{3/} Average for years reporting.