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Climate and Crop Yields Tripp County

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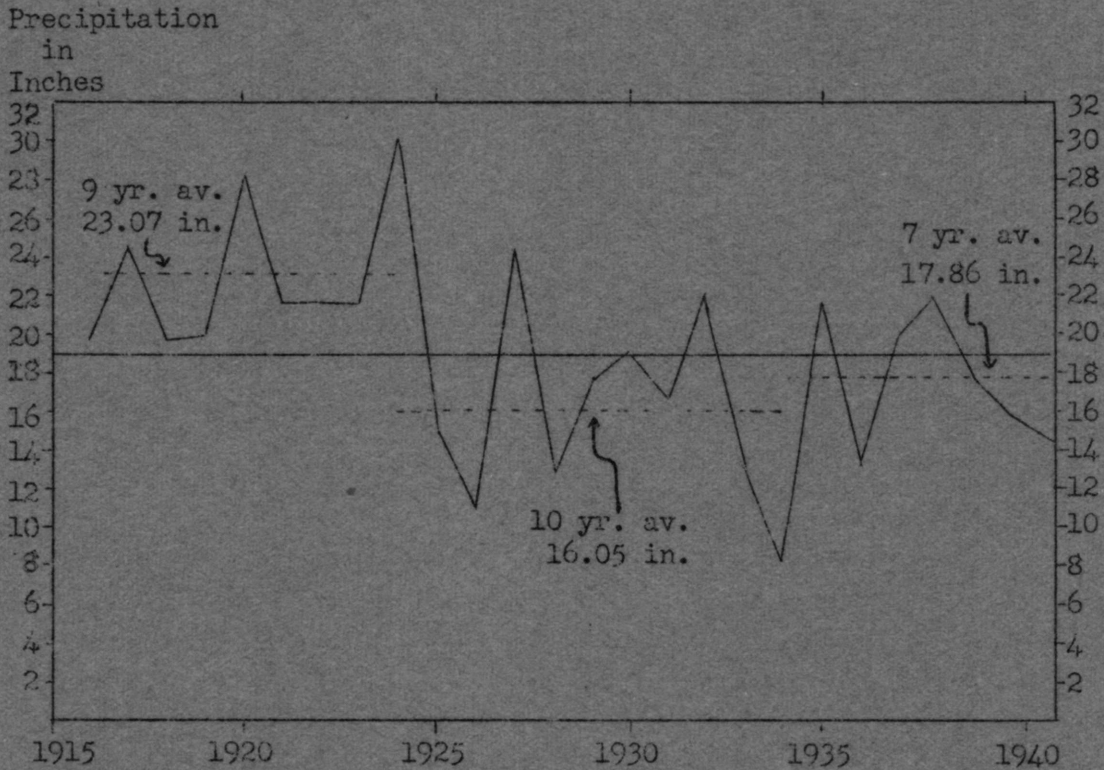
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CLIMATE AND CROP YIELDS

TRIPP COUNTY



Average Crop Year (Sept. 1 of previous year to Aug. 31 of designated year) Precipitation at Winner, South Dakota 1916 - 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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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, 1912 to 1941 *

Winner Weather Station

ELEVATION IN FEET	1965
GROWING SEASON	
Average date of last killing frost in spring	May 2
Average date of first killing frost in fall	October 4
Average length of frost-free period in days	155
Latest recorded killing frost in spring	May 21 (1931)
Earliest recorded killing frost in the fall	September 21 (1934)
Longest recorded growing season in days	176 (1933)
Shortest recorded growing season in days	147 (1934)
PRECIPITATION IN INCHES**	
For the Calendar Year, Jan. 1 to Dec. 31	
Average	17.11
Highest recorded	24.58 (1914)
Lowest recorded	10.93 (1934)
For the Crop Year, Sept. 1 of previous year to Aug. 31 of designated year	
Average	16.86
Highest recorded	24.69 (1927)
Lowest recorded	8.24 (1934)
For the Growing Season, April 1 to Aug. 31	
Average	12.19
Highest recorded	18.37 (1927)
Lowest recorded	5.71 (1934)
For the Critical Period for Small Grain, May 1 to June 30	
Average	5.85
Highest recorded	11.62 (1932)
Lowest recorded	2.19 (1934)
For the Critical Period for Corn, May 1 to July 31	
Average	8.39
Highest recorded	17.21 (1915)
Lowest recorded	3.06 (1934)
TEMPERATURE	
Average annual temperature	49.8°
Highest recorded -- Degrees above zero	115° (1934)
Lowest recorded -- Degrees below zero	38° (1936)

* Years reporting were 1912-1916, 1925-1929, 1931-1941.

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

COMPARISON OF PRECIPITATION AND CROP YIELDS

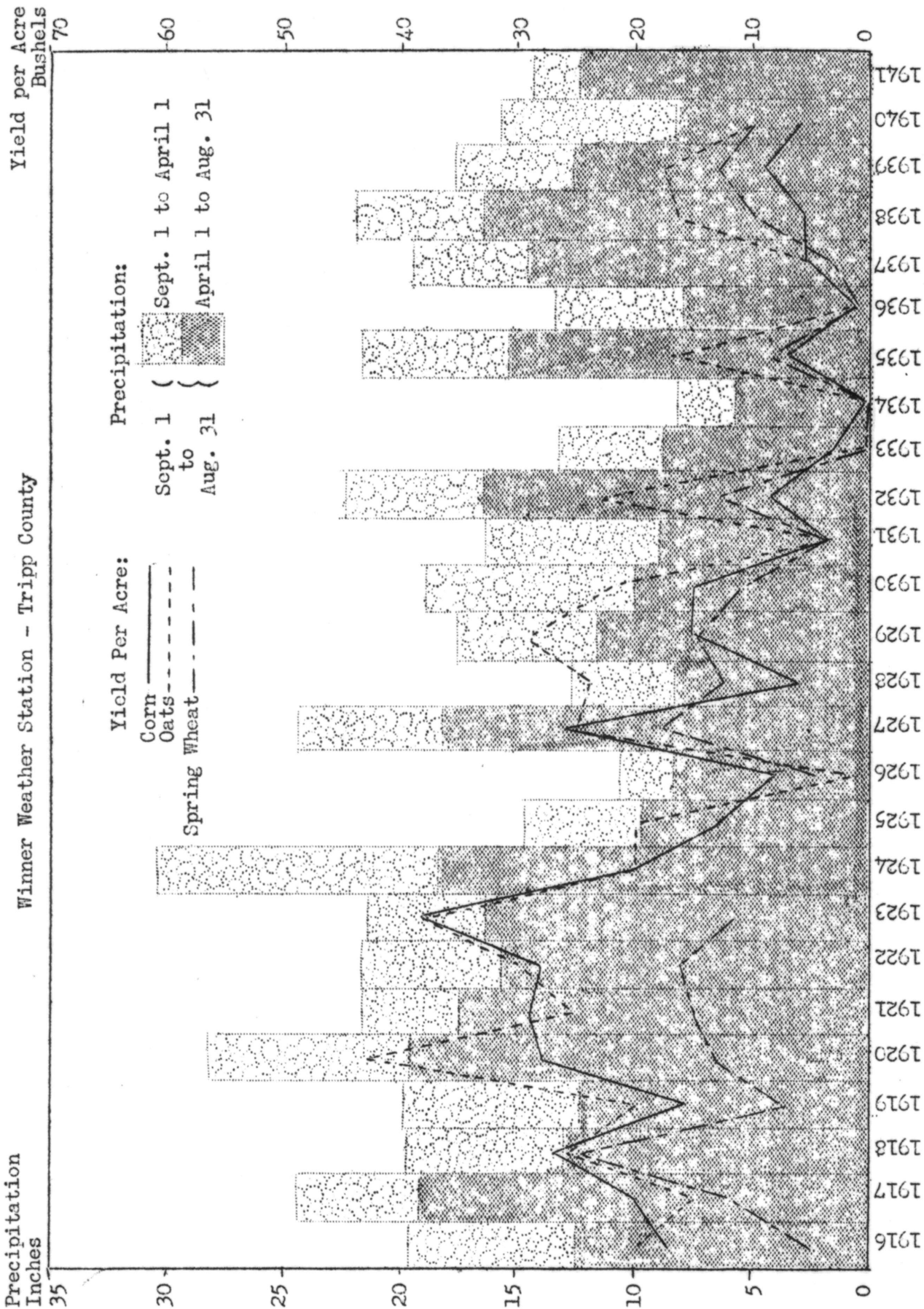
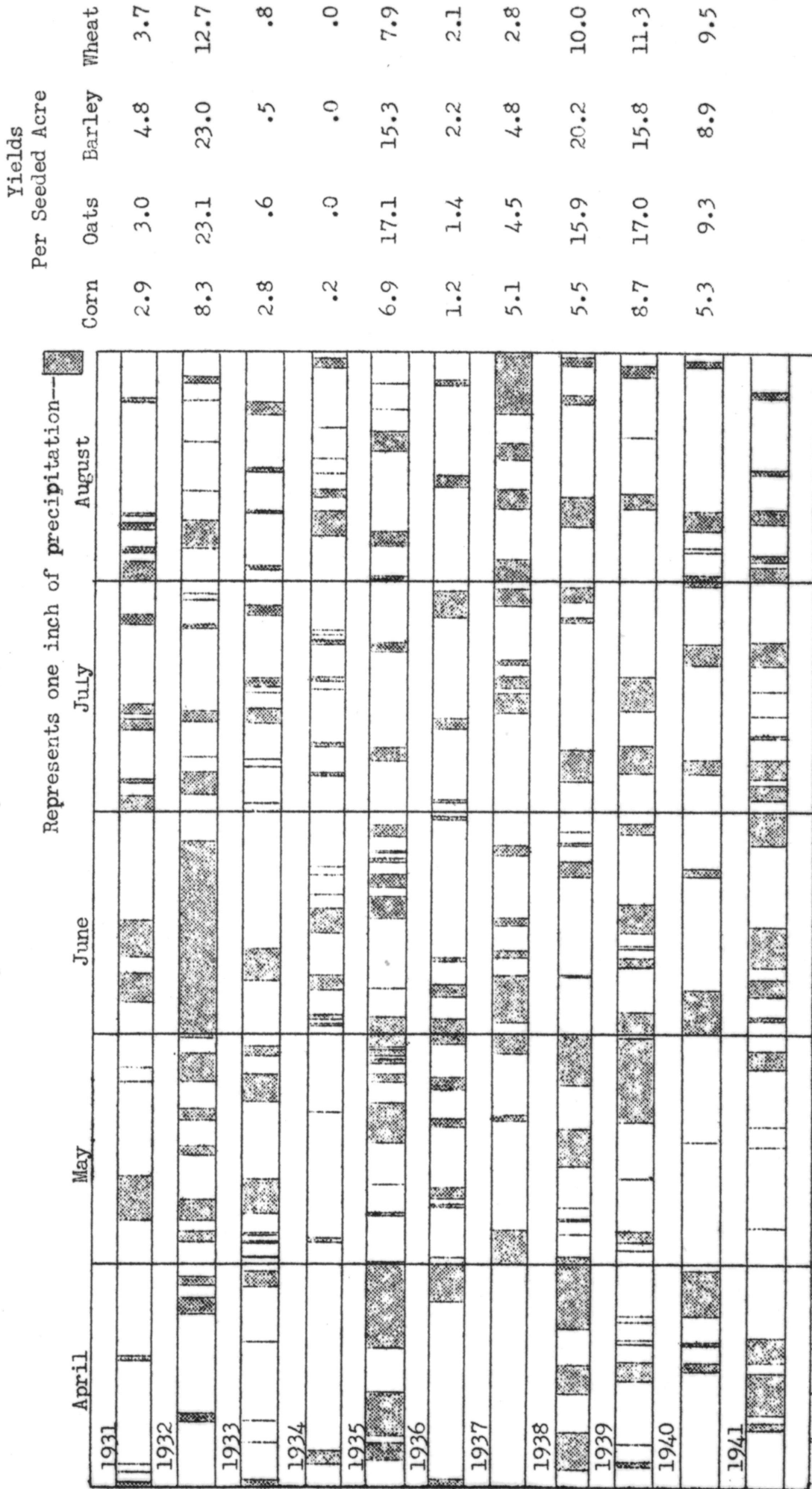


Fig. 1 - Precipitation is probably the most important factor affecting crop yields. Source: Tables II and III.

SUMMER PRECIPITATION, TRIPP COUNTY, 1931 - 1941



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

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

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

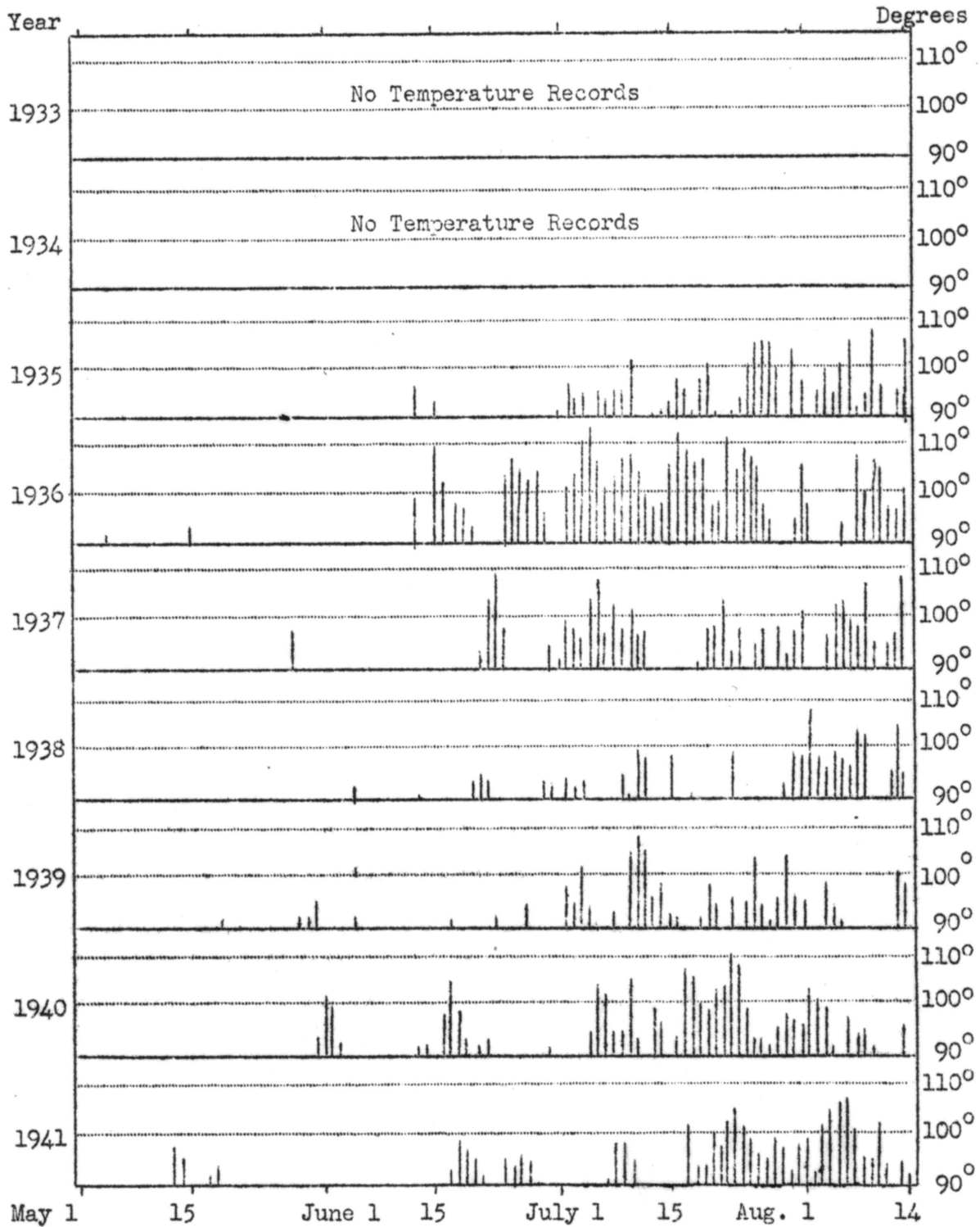


Fig. III. The vertical lines represent the highest temperatures of each day if over 90°.

The Number and Distribution of Frost-Free Days, 1913-1941*
Winner Weather Station

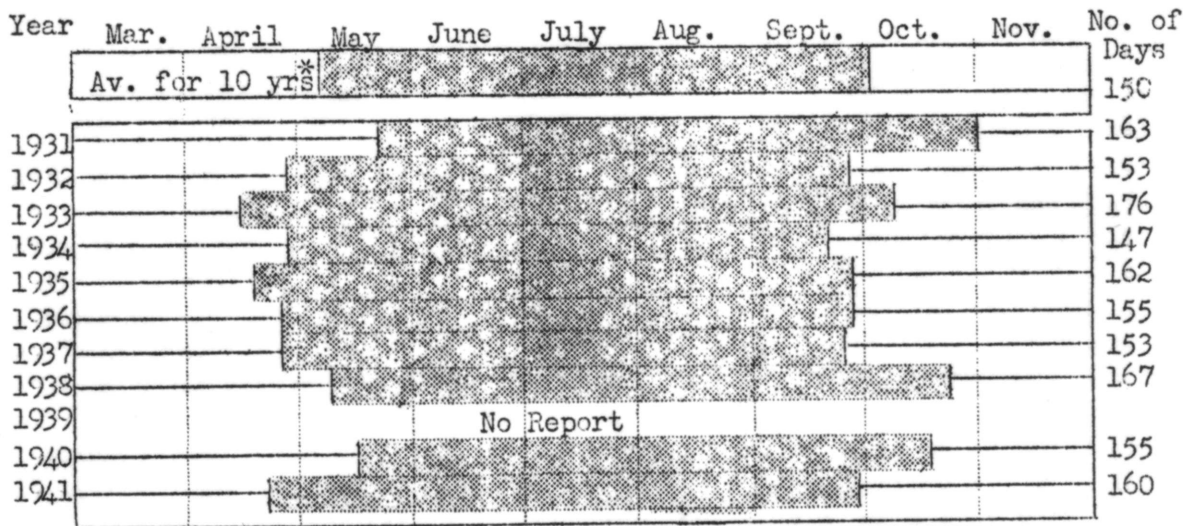


Fig. IV

* There are no published data available for individual years prior to 1931. However, the average number of frost-free days for the years 1913-1916 and 1924-1930 is given in climatological records. There was an average of 154 frost-free days for all years prior to 1942 for which data are available. For the period 1931-1941, except 1939, the longest growing season recorded was 176 days, while the shortest was 147 days.

Table II

PRECIPITATION
Winner Weather Station, 1916 - 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 1916-1941 Av.	Inches	Percent of 1916-1941 Av.	Inches	Percent of 1916-1941 Av.	Inches	Percent of 1916-1941 Av.
1916	19.77	102	10.95	102	12.70	97	15.70	84
1917	24.55	129	16.75	156	19.14	147	26.47	140
1918	19.87	105	10.40	97	13.02	100	21.21	112
1919	20.04	106	11.50	107	12.47	95	21.23	112
1920	28.15	148	16.48	154	19.42	149	25.30	134
Av. 1916-20	22.48	119	13.22	123	15.35	118	21.98	116
1921	21.60	114	11.27	105	17.46	134	22.53	119
1922	21.70	114	13.16	123	15.81	121	21.35	113
1923	21.51	113	11.66	109	16.17	124	24.66	130
1924	30.43	160	11.69	109	18.38	141	27.63	146
1925	14.93	79	8.96	84	9.85	75	11.71	62
1926	10.89	57	6.43	60	8.28	63	13.33	70
1927	24.69	130	15.86	148	18.37	141	23.28	123
1928	12.73	67	7.06	66	8.39	64	14.14	75
1929	17.69	93	10.89	101	11.77	90	21.61	114
1930	19.20	101	8.36	78	10.06	77	15.90	84
Av. 1921-30	19.52	103	10.53	98	13.45	103	19.61	103

Table II Cont'd

Tripp County

Table II

PRECIPITATION

Winner Weather Station, 1916 - 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 1916-1941 Av.	Inches	Percent of 1916-1941 Av.	Inches	Percent of 1916-1941 Av.	Inches	Percent of 1916-1941 Av.
1931	16.56	87	7.50	70	9.00	69	15.16	80
1932	22.36	118	14.79	138	16.67	128	21.36	113
1933	13.23	70	7.53	70	8.87	68	11.72	62
1934	8.24	43	3.66	34	5.71	44	10.93	58
1935	21.91	115	13.87	129	15.52	119	19.97	105
1936	13.38	71	7.50	70	7.98	61	14.42	76
1937	19.81	104	9.73	91	14.86	114	18.85	99
1938	21.96	116	14.16	132	16.57	127	22.10	117
1939	17.75	94	11.53	103	12.60	96	20.34	107
1940	15.70	83	6.84	64	8.32	64	12.43	66
<i>f.v.</i> 1931-40	17.09	90	9.72	91	11.61	39	16.72	88
1941	14.53	77	10.42	97	12.17	93	19.52	103
<i>f.v.</i> 1916-41	18.97	100	10.73	100	13.06	100	18.95	100

* Precipitation records for Tripp County are not available for a number of years, necessitating the use of records taken at the Fairfax Weather Station in Gregory County. The precipitation data for the Fairfax and Winner Weather Stations are assumed to be fairly comparable.
The years affected are: 1916 through 1924, 1929 and 1930, also September 1925 and September through December of 1931.

Table III

Yield Per Acre of Various Grain Crops, Tripp County, 1916 - 1940 ^{1/}

Year	Corn	Winter Wheat	Durum ^{2/} Wheat	Spring Wheat	Oats	Barley	Rye	Flax
1916	17.2			5.5	20.0	20.0	14.8	8.0
1917	20.6			12.0	15.0			10.0
1918	27.0			24.0	26.0	26.0	26.0	8.5
1919	15.0			7.0	20.0		16.0	7.0
1920	28.0			13.0	43.5	27.0	15.0	6.5
Av. 1916-20	21.6			12.3	24.9	24.3 ^{3/}	18.0 ^{3/}	8.0
1921	29.0			15.0	25.0	23.0	27.0	
1922	28.0			16.0	30.0	24.0	19.5	9.5
1923	38.0			11.5	37.5	29.0	13.0	12.0
	Yield per Seeded Acre ^{4/}							
1924	19.6			9.7 ^{5/}	20.5	18.1	8.8	6.3
1925	12.8			10.1 ^{5/}	20.4	15.3	9.5	5.1
1926	7.8	3.2		4.5	1.4	2.1	1.8	3.5
1927	26.0	14.9		16.7	24.8	23.1	15.1	5.7
1928	5.7	5.9	13.4	12.2	23.8	18.5	10.1	3.8
1929	15.0	13.8	18.1	14.2	28.7	28.9	14.8	4.1
1930	14.5	10.7	14.1	10.9	21.9	19.7	15.7	2.7
Av. 1921-30	19.6	9.7 ^{3/}	15.2 ^{3/}	12.6 ^{3/}	23.4	20.2	13.5	5.9 ^{3/}
1931	2.9	4.0	3.6	3.4	3.0	4.8	5.1	.2
1932	8.3	11.2	14.3	11.7	23.1	23.0	10.6	2.3
1933	2.8	1.7	.3	.1	.6	.5	.9	---
1934	.2	.0	.1	.0	---	---	---	---
1935	6.9	8.1	7.7	8.2	17.1	15.3	11.3	1.0
1936	1.2	4.6	1.5	.9	1.4	2.2	1.1	---
1937	5.1	3.4	2.3	3.0	4.5	4.8	3.1	.4
1938	5.5	5.9	11.9	9.9	15.9	20.2	5.9	4.0
1939	8.7	4.0	15.7	12.6	17.0	15.8	5.6	2.5
1940	5.3	9.9	9.0	9.8	9.3	8.9	4.3	1.5
Av. 1931-40	4.7	5.3	6.6	6.0	10.2 ^{3/}	10.6 ^{3/}	5.3 ^{3/}	1.7 ^{3/}
Av. 1916-40	14.0	6.8 ^{3/}	8.6 ^{3/}	9.6 ^{3/}	18.8 ^{3/}	16.8 ^{3/}	11.1 ^{3/}	4.8 ^{3/}

^{1/} Farm Production and Prices, 1890-1926, Agr. Exp. Sta. Bulletin #225.

South Dakota Agricultural Statistics, 1924-1936, U.S.D.A. (Unpublished).

^{2/} South Dakota Agricultural Statistics, Annual Report, 1937-1940, U.S.D.A.^{2/} Durum Wheat yields were included with spring wheat for the period 1916-28.^{3/} Average for years reporting.^{4/} Prior to 1924 records do not tell whether yields were per harvested or seeded acre.^{5/} Yield per harvested acre.