U. S. DEPARTMENT OF AGRICULTURE
WEATHER BUREAU AND
BUREAU OF AGRICULTURAL ECONOMICS

In Co-operation with the

Iowa Weather and Crop Bureau

Annual Report for 1930

Reprint Part XVII of the Thirty-first Annual Iowa Year Book of Agriculture

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CHARLES D. REED, M. Sc. Agr

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Des Moines

LETTER OF TRANSMITTAL

HON. DAN W. TURNER, *Governor.*

SIR: I have the honor to submit herewith the forty-first annual report of the Iowa Weather and Crop Bureau for the year 1930.

MARK G. THORNBURG,
Secretary of Agriculture.

Des Moines, Iowa, January 15, 1931.

HISTORICAL

The Iowa Weather and Crop Service was established by an Act passed by the Twenty-third General Assembly, and approved by the Governor April 25, 1890. On July 1, 1923, it became a bureau of the State Department of Agriculture by act of the 40th General Assembly.

The object of the Service is to co-operate with Government Bureaus in collecting crop statistics and meteorological data, and more widely disseminate weather forecasts and storms and frost warnings for the producers and shippers of perishable products, and to promote general knowledge of meteorological science and the climatology of the State.

In accordance with the Act, on the recommendation of the directors of the State Agricultural Society, J. R. Sage was duly commissioned as director by Governor Boies on June 3, 1890, and General Greeley, then Chief Signal Officer, U. S. Army detailed Dr. George M. Chappel to serve as assistant director of the State Service. Mr. J. R. Sage resigned as director December 31, 1907, and Dr. George M. Chappel was commissioned on January 1, 1908, as director, and served in that capacity until March 31, 1918, when he resigned and was succeeded by Charles D. Reed. Toward the close of the year, 1919, co-operation in estimating acreage and production of crops was begun with the U. S. Bureau of Markets and Crop Estimates now known as the U. S. Bureau of Agricultural Economics, of which Mr. Leslie M. Carl is Senior Agricultural Statistician for Iowa.

OFFICE FORCE DECEMBER 31, 1930

Charles D. Reed, M. Sc. Agr., Senior Meteorologist and Director
J. Earl Cook, Statistician.
Hildur Renner, Stenographer.
Mildred T. Cannon, Stenographer.

CO-OPERATING ORGANIZATIONS

U. S. Weather Bureau

Fred L. Disterdick, Assistant Meteorologist.
Norbert G. Ribble, Observer.
Sterling R. Hatch, Junior Observer.
Milton L. Blanc, Junior Observer.
Wayne H. Bartlett, Minor Observer.

U. S. Bureau of Agricultural Economics
Division of Crop and Live Stock Estimates

Leslie M. Carl, Senior Agricultural Statistician for Iowa.
Julius H. Peters, Associate Agricultural Economist.
Gwen Sayler, Assistant Clerk.
Mildred S. Baldrige, Junior Clerk.
George Meader, Clerk.

ANNUAL REPORT, 1930

For convenient reference and comparison with past and future years, this report contains summaries of the weekly, monthly and annual bulletins of the Weather and Crop Bureau of the Iowa Department of Agriculture, in co-operation with the Weather Bureau and the Bureau of Agricultural Economics both of the United States Department of Agriculture, for the year 1930. Parts XVII, XVIII and XIX of the Year Book were prepared by the Weather and Crop Bureau as usual. Part XVIII, presenting in extensive tables and maps the agricultural statistics of 1930, gathered by assessors under the direction of the Weather and Crop Bureau, will also be published in the "Iowa Monthly Crop Report" for June, 1931. Part XIX of the Year Book, summarizing the statistics of the main crops of Iowa for all years of record, is revised and brought up to date. The usual weekly and monthly weather and crop bulletins were prepared and published.

Statistics of live stock marketed from Iowa and live stock shipped into Iowa during the year, 1930, will be published in the "Iowa Monthly Crop Report" for January, 1931, and appear in the 1930 Year Book.

WEATHER FORECASTS AND WARNINGS

Weather forecasts were distributed daily by newspapers and eight radio stations in or near Iowa. No other state has such a wide distribution of forecasts by radio broadcasting stations and probably no other state has so many receiving sets in rural homes —about one for each second farm.

TESTING CORN FOR MOISTURE

Testing well distributed and selected samples of shelled corn for moisture continued in the fall of 1930 as in the falls of 1928 and 1929. Composite samples numbering 212 from 98 counties, 1,738 fields and 13,842 ears on an average date of October 11, 1930, showed 23.4% moisture or 4.8% drier than on the same date in October 1929, and 0.1% wetter than on the same date in October 1928. In November composite samples numbering 186 from 95 counties, 1,199 fields or cribs and 9,325 ears, gathered on an average date of November 20, showed 18.1% moisture, or 3.1% drier than on November 20, 1929, and 1.7% drier than on November 21, 1928. Most of the November, 1930, samples were gathered

from cribs as practically all of the husking was done at the time the samples were gathered. Details of these tests will be founds elsewhere in this publication.

HAILSTORMS AND TORNADOES

Hail and tornado statistics continue to be outstanding features of the work. The fine spirit of co-operation shown by the farmer crop reporters, nearly one for each township in the State, makes it almost impossible for a storm or flood of importance to escape notice and the facts soon reach the office of the Weather and Crop Bureau. Later the township assessors inquire at each of about 213,000 farms, as to the loss sustained by hail. Eight years of hail data are now tabulated by townships.

Facilities for collecting tornado reports are so much better in Iowa than in other states that the number of tornadoes reported is outstandingly large, even though discretion is used in determining when a storm is really a tornado. In 1930 there were 41 tornadoes reported in Iowa, compared with 29 reported in 1929. The total damage for the 41 storms in 1930 was estimated to be about $444,850, with 3 people killed and 30 people injured. (For details of tornadoes, see Index).

CLIMATOLOGY OF THE YEAR

The mean temperature of the year 1930 for the State of Iowa as a whole, was 50.2°, or 2.2° above normal. January, June and October were the only months with a deficiency in temperature. February, July and November were noticeably warmer than normal. March, April, May, August, September and December were slightly warmer than normal. The mean temperature of the crop season, May to September inclusive, was 69.6°, or 1.8° above normal. The average length of the growing season for the State between the average date of last killing frost in spring, May 4, and the average date of first killing frost in autumn, October 12, was 161 days, or 6 more than the normal. Ninety-five per cent of the corn escaped frost damage.

Precipitation averaged 26.10 inches, or 6.05 inches less than the normal. Spring weather was favorable for seeding and planting. Excessive snows in January were followed by a dry, warm February. The State average snowfall for the year was 23.6 inches, or 7.1 inches below the normal. The greatest total snowfall of the year, 44.3 inches, occurred at Oskaloosa, Mahaska County. Sunshine was excessive and above normal every month

except August and December, which had slight deficiencies. Hail damage was more than in 1929, and there was more than the usual tornado and wind storm damage in May and June, but practically none after June.

AVERAGE TEMPERATURE DEPARTURE
State of Iowa, Year, 1930

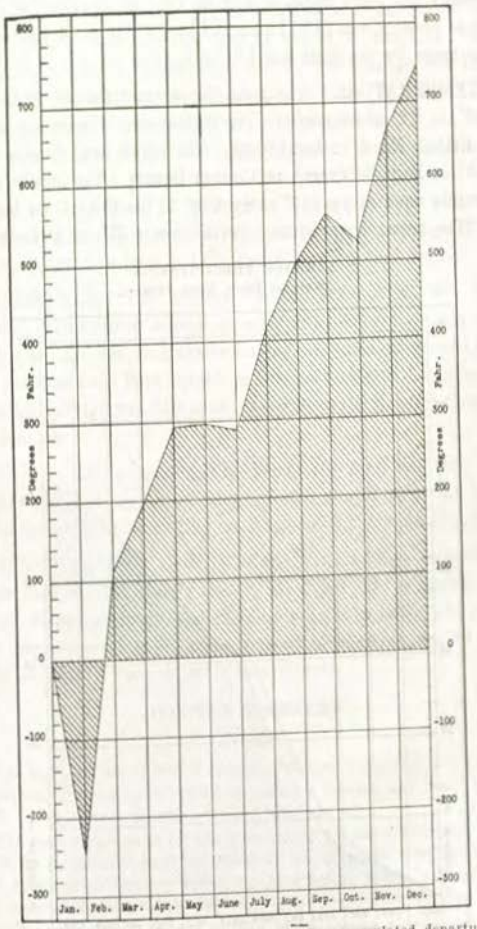


Figure 1.—Line bounding shaded area shows accumulated departure of temperature from normal. Upward slope means temperature above normal; downward, below.

Corn yield was considerably reduced by the heat and drought. Oats, wheat and hay yielded well, being out of the way before the heat and drought came.

BAROMETER: (Reduced to sea level). The average pressure of the atmosphere for the year was 30.02 inches. The highest pressure was 30.84 inches at Charles City on January 10. The lowest pressure was 29.03 inches at Charles City on November 16. The range for the State was 1.81 inches.

TEMPERATURE: The mean temperature for the State was 50.2°, or 2.2° above normal. The highest annual mean was 54.4° at Keokuk No. 2, in Lee County. The lowest annual mean was 45.6° at Postville (near), in Clayton County. The highest temperature reported was 113° at Sac City, in Sac County, on August 3. The lowest temperature reported was —37° at Decorah, in

AVERAGE PRECIPITATION
State of Iowa, Year, 1930

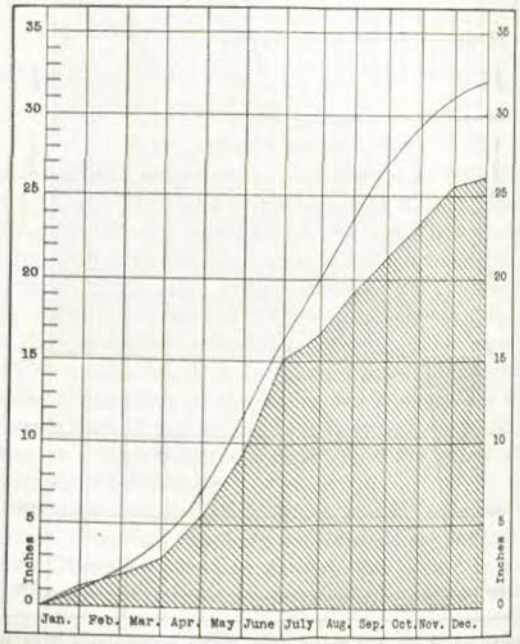


Figure 2.—Line bounding shaded area shows accumulated depth of precipitation in inches. Smooth curve shows normal.

Winneshiek County, on January 22. The range for the State was 150°.

PRECIPITATION: The average amount of rainfall and melted snow for the year was 26.10 inches, or 6.05 inches less than normal, and 4.10 inches less than the average for 1929. The greatest amount at any station was 35.65 inches at Oskaloosa, in Mahaska County, and the least amount was 16.15 inches at Perry, in Dallas County. The greatest monthly precipitation was 13.49 inches at Washington, in Washington County, in June. The least amount was a trace at Akron, in Plymouth County, in July, and also at Lake Park (near), in Dickinson County, in December. The greatest amount in any 24 consecutive hours was 9.63 inches at Washington, in Washington County, on June 14th and 15th. Measureable precipitation occurred on an average of 81 days, 13 days less than in 1929, and 4 days less than normal.

SNOWFALL: The average amount of snowfall was 23.6 inches. The greatest amount reported from any station was 44.3 inches at Oskaloosa, in Mahaska County, and the least amount was 8.7 inches at Lake Park (near), in Dickinson County. The greatest monthly snowfall was 24.9 inches at Oskaloosa, in Mahaska County, in January.

WIND: The prevailing direction of the wind was from the southwest. The highest velocity reported was 52 miles per hour from the south, at Sioux City, in Woodbury County, on May 6.

SUNSHINE AND CLOUDINESS: The average number of clear days was 181; partly cloudy, 95; cloudy, 89; as against 158 clear; 95 partly cloudy, and 112 cloudy days, in 1929. The average percentage of the possible amount of sunshine was 64 per cent, or about 5 per cent more than normal.

MONTHLY SUMMARIES

JANUARY

The main characteristics of January, 1930, were abnormally low temperatures, numerous and sudden temperature changes, and heavy snowfall. Severe winter weather prevailed after the 6th.

The mean temperature for the State, 10.5°, was the lowest since 1918, with the exception of 10.2° last January. The maximum temperature for the month at all stations during the mild period, 3d-5th, was followed by severe winter weather. Previous low temperature records were equalled or broken at several stations in the eastern districts and particularly in the lower Des Moines River Valley. The lowest temperature in the State was 37° below zero at Decorah on the 22d, which equals the

record established at that station on January 12, 1912, and is the lowest temperature recorded in the State for January since 1912. Cold waves passed over the State on the 7th, 15th and 18th. Unusual radiation cold waves occurred in eastern Iowa on the 10th and 22d. These are given special treatment elsewhere in this issue.

Precipitation averaged 25% above normal. The extreme southwest stations had the greatest excess, while some stations in the northern districts were below normal. There was no well defined precipitation period but most of the snow fell between the 10th and 20th. The snow did not drift to any great extent due to light winds during the snowstorms. With the exception of last year the snowfall this month was the greatest of record for January.

From the mild period until cold weather set in, winter wheat and grasses remained bare, but after that they were well protected by the heavy snows. Corn shelling and marketing was active during the mild period, but practically ceased during the cold, snowy weather, when farm work was limited to the care of live stock, which consumed much feed. Very little sickness existed among farm animals.

Ice harvest was in full swing during the last half of the month.

Aviation was not inconvenienced greatly by the heavy snows and cold weather. Landing fields were heavily covered with snow during the last half of the month, but were kept open to aviation by disking and rolling the runways. Air mail was carried successfully in spite of the abnormal weather conditions.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 99 stations, was 10.5°, or 8.0° below normal. There was a deficiency in all of the divisions of the State. The greatest deficiency, 8.7°, was in the south-central district, and the least, 7.3°, in the northeast district. The highest monthly mean was 16.9° at Keokuk, and the lowest was 4.7° at Lake Park. The absolute range for the State was 95°, from 58° at Keokuk No. 2 on the 5th, to —37° at Decorah on the 22d. Temperatures of zero or lower occurred at all stations. The average number of days with maximum temperatures 32° or lower was 25, ranging from 26 days in the northwest, north-central and central districts, to 23 days in the southeast district. The average number of days with the minimum temperatures 32° or below, was 31. The average number of days with the minimum temperatures zero or below, was 16, ranging from 23 days at 8 stations in the northwest and north-central districts, to 7 days at Keokuk. The greatest daily range in temperature at any one station was 50° recorded at Washta on the 29th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 108 stations, was 1.33 inches, or 0.26 inch above normal. The greatest district excess was in the southwest district, 0.58 inch, while the east-central district was exactly normal. The greatest precipitation deficiency, 0.54 inch, at any one station, was at West Bend. The greatest excess in the State was 1.09 inches at Thurman. Practically

all of the precipitation was in the form of snow. The greatest amount at a single station was 2.51 inches at Keokuk, and the least was 0.41 inch at West Bend. The greatest amount occurring in 24 consecutive hours was 1.00 inch at Stockport on the 9th. The average number of days with precipitation 0.01 inch or more for the State was 7.

Snowfall. The average snowfall for the State was 14.7 inches, or 8.0 inches above normal. The greatest total snowfall for the month at any one station was 24.9 inches at Oskaloosa, and the least, 5.0 inches at West Bend. The greatest snowfall in 24 hours was 10.0 inches at Stockport on the 9th.

Miscellaneous Phenomena. Aurora: 3d. Cold waves: 7th, 10th, 15th, 18th, 22d. Corona, lunar: 16th, 21st, 22d, 23d, 24th. Fog: 2d, 22d, 23d, 26th, 27th, 29th. Frost hoar: 27th. Halos, lunar, 7th, 10th, 14th, 15th. Halos, solar: 15th, 16th, 18th, 19th, 21st, 22d, 23d, 25th, 31st. Haze: 5th, 12th, 30th. Gales: 6th, 12th, 14th, 17th. Parhelia: 1st, 14th, 15th, 16th, 18th, 25th. Sleet: 2d, 6th, 7th, 11th, 12th, 13th, 14th.

Rivers. Moderately low stages prevailed on all the interior streams, with little fluctuations in their stages. The interior streams were frozen over the entire month.

On the Missouri River a peculiar situation existed in the river stages. At Sioux City the extreme stages were 5.0 feet and 6.8 feet, and the average stage was 5.6 feet or 0.4 foot below normal. At Omaha the extreme stages were 5.7 feet and 7.6 feet, and the average stage was 6.6 feet, or 1.1 feet above normal. The lowest stages for January at

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	1 Noon	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.25	30.84	10	29.48	14	89	72	84	44	4†	4,273	5.7	18	sw.	12	59	+10
Davenport	30.24	30.75	10	29.45	14	88	71	82	39	5	7,199	9.7	35	sw.	14	57	+10
Des Moines	30.27	30.76	10	29.60	14	86	71	77	39	4	6,878	9.2	25	nw.	6	63	+ 8
Dubuque	30.23	30.79	10	29.40	14	80	69	81	39	5	4,226	5.7	16	n.	9	50	+ 1
Keokuk	30.28	30.76	10	29.54	14	85	64	76	39	5	5,530	7.4	26	sw.	14	57	+ 5
Sioux City	30.29	30.74	9	29.65	5	78	67	72	38	8	7,891	10.6	37	nw.	14	72	+18
Omaha, Neb.	30.28	30.69	10	29.63	6	80	68	73	36	4	6,289	8.5	31	n.	6	68	+12
Means and extremes	30.26	----	----	----	----	84	70	78	----	----	----	8.1	----	----	----	61	+ 9
	----	30.84	10	29.40	14	----	----	----	36	4	----	----	37	sw.	14	----	----
Normals and records	30.14	----	25th	----	3d	84	----	77	----	19	----	----	----	----	6th	52	----
	----	§31.09	1905	§28.71	1908	----	----	----	§22	1958	----	----	§58	nw.	1903	----	----

§Sioux City, ‖Dubuque, ‡Local mean time, †And other dates.
‡‡January 1, 1928, 3-cup anemometers replaced the 4-cup instruments used since the establishment of the Weather Bureau stations. The new instruments will more accurately indicate the true wind movement. The records of the 4-cup instruments were somewhat too high at moderate velocities and considerably too high at the higher velocities. Tables of true velocities corresponding to indicated velocities appear in the January, 1928, Climatological Data. For purposes of comparison the highest velocity of record in the lower line of the table has been converted into a 3-cup velocity.

WIND VELOCITY CONVERSION TABLE
In Miles Per Hour

To convert 4-cup anemometer records into 3-cup anemometer equivalents

4-cup record	0	1	2	3	4	5	6	7	8	9
	3-cup equivalents									
0			2	3	4	5	6	7	8	9
10	9	10	11	12	13	14	14	15	16	17
20	18	18	19	20	21	22	23	23	24	25
30	26	26	27	28	29	30	30	31	32	33
40	33	34	35	36	36	37	38	39	40	40
50	41	42	43	44	44	45	46	47	47	48
60	49	50	51	51	52	53	54	54	55	56
70	57	57	58	59	60	60	61	62	63	64
80	64	65	66	67	67	68	69	70	71	71
90	72	73	74	74	75	76	77	78	78	79

both stations occurred the first few days. Then a gradual rise in the stages occurred throughout the month, resulting in the crest stages on the last day of the month.

The Mississippi River stages remained low throughout the month. At Dubuque the stages varied only 0.5 foot, the highest stage being 4.0 feet and the lowest 3.5 feet, both occurring on several days. The mean stage was 3.7 feet, or 3.7 feet lower than the average for January, 1929. At Davenport the extreme stages were 2.7 feet and 5.9 feet, and the average was 4.5 feet, or 0.3 foot above normal. The lowest stage occurred on the 3d, and the crest stage on the 11th, with fluctuation throughout the month. At Keokuk the stages were generally low but with slightly higher stages the last 10 days.

RADIATION COLD WAVES

Two remarkable cold wave conditions occurred in Iowa on January 10th and 22d, 1930, if a cold wave for Iowa be defined as a fall in temperature in 24 hours, maximum to maximum, minimum to minimum, or between hours of similar names, such as 7 a. m. to 7 a. m., or 7 p. m. to 7 p. m., amounting to 20° or more, and reaching approximately zero or lower.

In most cold waves there is a large fall in temperature in the rear or western side of an area of low barometer, in which masses of cold air rush down from northern latitude or slide down barometric surfaces from higher elevations in a blustery and boisterous manner, which give rise to the mythical Boreas of the ancients. Then a high barometer area follows with a clear still night, and the fall in temperature is augmented by loss of heat from the surface of the earth by radiation into higher levels. This radiation is accentuated if a fresh, loose, dry, feathery snow insulates the earth and prevents the replenishment of the heat of the lower air from the surface of the comparatively warm soil.

Following the undrifted snow of several inches on preceding days, the sky cleared and the wind became light during the night of January 9th-10th. The usual first phase, consisting of a blustery movement of masses of cold air from north to south, was practically absent unless the preceding cold wave of the 6th could be said to fulfill those conditions, which it might, for there had been no noticeable recovery from that cold wave.

On the accompanying map (fig. 1) the top figures entered near each station show the fall in temperature, minimum to minimum, in 24 hours ending at 7 p. m., January 10th, and the lower figures show the lowest temperature reached about 8 p. m., January 10th. Note the areas of

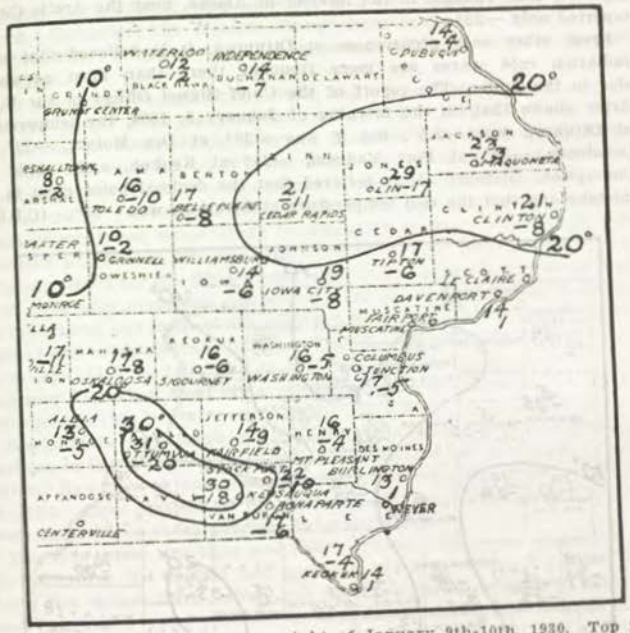


Fig. 1.—Radiation cold wave night of January 9th-10th, 1930. Top figures near each station show number of degrees temperature fell in 24 hours; lower figures the minimum temperature reached.

falls of 20° or more centered at Ottumwa and Olin. Radiation falls of 30° are exceptional. In contrast, slight rises occurred from Des Moines northward over Story and Boone counties, through the rest of the State had falls.

Record breaking intense cold occurred as a result of radiation on the night of January 21st-22d, as shown on the map (fig. 2). The 24-hour falls in temperature were not so great, yet sufficient to be called "cold wave." Minimum temperatures of —36° at Ottumwa and Keosauqua, —35° at Stockport and Olin, and —33° at Waterloo, break long records for lowest temperature ever observed at these stations, —37° at Decorah, the coldest in the State in January, 1930, just equals the low record for that station for 37 years. At Waverly, temperatures of —34° and Tipton, —30°, established new station records.

In this case also, Boreal characteristics were not marked, the ground was covered with 10 to 15 inches of porous snow that had accumulated

in several storms during the preceding 16 or 17 days, and the wind died down to almost absolute calm during the night.

Inspection of the Daily Weather Map shows that Decorah was probably the coldest place in North America, south of the Arctic Circle on that day. In fact, Tanana, in the interior of Alaska, near the Arctic Circle, reported only —22°.

From other such occurrences at Ottumwa, it is believed that such radiation cold waves are more frequent there than most anywhere else in the State. The report of the Chief Signal Officer of the U. S. Army shows that on the morning of January 5, 1884, the temperature at Ottumwa was —3.5°, but it was —30° at Des Moines, —29° at Oskaloosa, —34° at Fort Madison, —24° at Keokuk, and —31.5° at Conception, Missouri. It is believed that the decimal point crept in by mistake and that the real temperature at Ottumwa was —35°.—(C.D.R.)

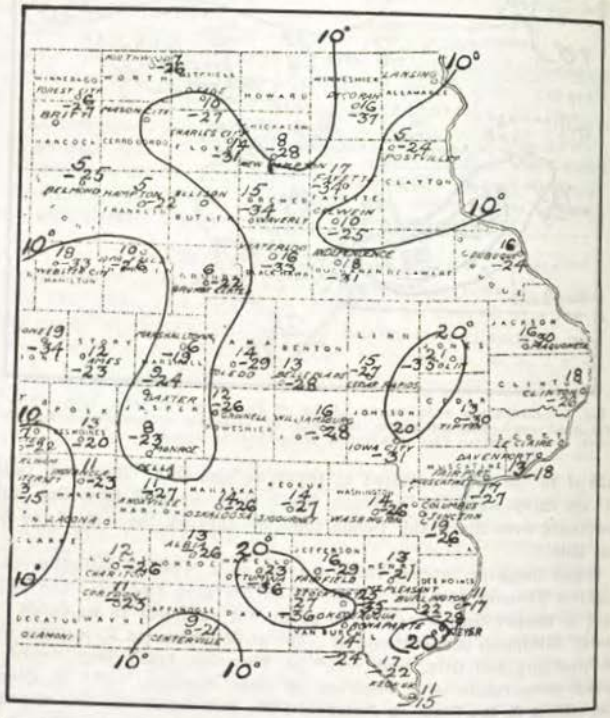


Fig. 2.—Radiation cold wave night of January 21st-22d, 1930. Top figures show number of degrees temperature fell in 24 hours; lower figures the minimum temperatures reached, breaking all records at some stations.

FEBRUARY

Violent temperature fluctuations broke more records during the month of February, 1930, than ever before in the history of the State. This was in striking contrast with the winter weather of last month. February averaged 25.0° warmer than January, and 0.9° warmer than a normal March. Heretofore the greatest change from January to February was in 1877, 20.3° warmer. Cold Januarys are generally followed by cold Februarys.

The mean temperature for the State, 35.5°, was 12.9° above the normal, and 1.1° higher than the previous record, 34.4°, in 1878. A cold wave passed over the State on the 14th and 15th, and a minimum temperature of —34° was recorded at Webster City. Following the cold wave the temperature rose rapidly until the maximum was reached at most stations on the 24th. During the exceedingly mild period, 19th to 24th, all previous maximum temperature records were broken. The highest temperature was 80° at Mt. Ayr and Clarinda on the 24th, surpassing the previous record for the State, which was 78° at Glenwood on February 26, 1896. Previous maximum temperature records were equalled or broken in the central and most of the southern districts, and particularly in the central and south-central districts. The extreme range of 114° occurred in 9 days, 15th to 24th, and is the greatest State range of record for February in such a short time. Other temperature features are treated elsewhere in this issue.

Precipitation was below normal in most of the State except slight excesses in the lower Iowa and Cedar valleys, and east to the Mississippi River. Rain fell at an excessive rate in the vicinity of Davenport on the 24th. Some stations in the west and southwest portion of the State were one inch or more deficient in precipitation.

The snow cover was light and below normal. The snow which fell on the 14th over the central and southern portions of the State and the lower Des Moines river valley, had an exceptionally wide ratio between snow depth and water content; in some localities the ratio was 41 to 1.

The ice harvest which was in full swing during the last half of January was completed by the end of the first week in February. In most cases ice houses were filled to full capacity.

From the agricultural standpoint the month was favorable. There was considerable marketing of grain and the moving of renters active. In the southern two-thirds of the State there was quite a little plowing. Winter wheat, grasses and clover greened a month early, with very little winter killing. Chick hatcheries were busy most of the month. In several localities bees were flying about the hives. Stock wintered well and did not use as much feed as during January. Very little sickness existed among farm animals and poultry. During the last ten days pussy willows, maple and elm trees were in bloom, lilac buds were well swollen, as were the buds of a few fruits. Tulips, irises and some other hardy perennials were two or three inches above the ground by the end of the month.

Ice in the rivers moved unusually early throughout the State, with no serious damage by ice gorges and back water. The crest stages on all streams and rivers was during the mild period, 19th to 25th, due to melt-

ing snow and moving ice. The ice jammed in the upper Iowa River in the northeast part of the State, causing damage by inundation of farm land. February river conditions will be more fully treated in the March issue.

Building construction got an early start.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 101 stations, was 35.5°, or 12.9° above normal. There was an excess in all of the divisions of the State. The greatest excess, 14.3°, was in the west-central district, and the least, 11.4°, in the northeast district. The highest monthly mean was 40.7° at Keokuk, and the lowest was 28.5° at Northwood. The absolute range for the State was 114°, from 80° at Mt. Ayr and Clarinda on the 24th, to —34° at Webster City on the 15th. Temperatures of zero or lower occurred at all stations. The average number of days with maximum temperature 32° or below was 4, ranging from 7 days in the north-central district, to 2 days in the west-central, southwest, south-central and southeast districts. The average number of days with the minimum temperature 32° or below, was 21. The average number of days with the minimum temperature zero or below, was 1, ranging from 3 days at Northwood and Decorah, to 1 day at 77 stations. The greatest daily range in temperature at any one station was 50°, at Spencer, on the 17th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 112 stations, was 0.67 inch, or 0.54 inch below normal. The greatest district deficiency was in the west-central district, 0.83 inch, while the east-central district was exactly normal. The greatest precipitation deficiency, 1.13 inches, at any one station, was at Iowa Falls. The greatest excess in the State was 1.01 inches at Williamsburg. The greatest amount at a single station was 2.45 inches at Fairport, and the least was 0.06 inch at Red Oak. The greatest amount occurring in 24 consecutive hours was 2.03 inches at Davenport on the 24th and 25th. The average number of days with precipitation 0.01 inch or more for the State was 5.

Snowfall. The average snowfall for the State was 2.8 inches, or 4.2 inches below normal. The greatest total snowfall for the month at any one station was 7.0 inches at Albia, and the least, 0.3 inch at Lamoni. The greatest snowfall in 24 hours was 6.0 inches at Albia, on the 14th.

Miscellaneous Phenomena. Aurora: 23. Birds (Migration of): Belmond, robins on 23d; Boone, bluebirds on 19th, robins on 20th, blackbirds on 25th, gulls along the river on 28th; Corydon, wild geese on 20th, robins on 22d; Earlham, wild ducks on 18th, bluebirds on 21st, robins on 22d; Oskaloosa, robins on 23d, meadowlarks on 23d; Stockport, robins on 18th, bluebirds on 19th, meadowlarks on 22d, blackbirds on 23d. Cold Waves: 14th-15th. Corona, lunar: 6th. Fogs: 1st, 2d, 3d, 17th, 18th, 24th. Frogs Croak: Corydon on 23d; Oskaloosa on 23d. Gales: 9th, 11th, 13th, 26th, 28th. Glaze: 17th. Hail, light: 23d, 24th, 25th, 26th, 28th. Halos, lunar: 6th, 7th, 8th, 10th, 11th, 12th, 13th, 18th, 20th. Halos, solar: 3d, 6th, 8th, 15th, 16th, 19th, 20th, 27th. Haze: 4th, 22d. Ice Moved in Rivers: 20th, 21st, 22d. Paraselene: 18th. Rainbows: 8th. Sleet: 2d, 3d, 8th, 12th, 16th, 17th, 28th. Thunderstorms: 21st, 22d, 23d, 24th, 25th.

Rivers. Moderate stages prevailed on all the interior streams, with moderate fluctuation in the stages, from the 20th to the end of the month, due to melting snow and ice in the drainage basins. The ice moved out on most of the interior streams during the mild period (19th to 25th). At Des Moines the extreme stages were 0.9 foot and 4.9 feet, and the average stage was 2.4 feet, or 0.6 foot below normal.

The Missouri River stages remained close to normal, with slight fluctuations. At Sioux City the extreme stages were 6.0 feet and 7.6 feet, and the average stage was 6.7 feet, or 0.1 foot below normal. The ice started to move out on the afternoon of the 21st, which is unusually early, but it has broken up as early or earlier on three other occasions, viz., on February 17th, 1907, February 21, 1916, and February 5, 1928, all of which were preceded by higher temperatures in January than prevailed during the present year. At Omaha the extreme stages were 7.3 feet and 9.8 feet, and the average stage was 8.0 feet.

On the Mississippi River the ice began moving on the 20th, and a general break up occurred on the 21st, 22d and 23d, causing considerable fluctuations in stages. At La Crosse, Wisconsin, the ice moved out on the 23rd, the earliest date in the history of that station. At Dubuque the stages varied 4.4 feet, the crest stage being 8.0 feet on the 28th, and the lowest 3.6 feet on the 1st and 2d. Ice moved out on the 21st and caused some damage to bathing beach equipment.

At Davenport the extreme stages were 4.0 feet and 7.4 feet, and the average was 5.1 feet, or 0.1 foot above normal. Ice broke up on the 20th at Davenport. At Keokuk the extreme stages were zero and 8.7 feet. The river was open almost continuously during the last half of the month.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	1† Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.98	30.63	15	29.48	24	89	73	79	52	23	4,188	6.2	22	nw.	9	48	— 5
Davenport	30.01	30.60	15	29.55	24	83	69	72	41	23	6,873	10.2	38	nw.	9	41	+ 4
Des Moines	29.99	30.64	15	29.40	24	80	63	64	32	23	6,199	9.2	31	nw.	10	42	—10
Dubuque	29.99	30.61	15	29.53	24	88	70	78	46	8	4,035	6.0	22	nw.	9	40	— 5
Keokuk	30.03	30.64	15	29.56	24	77	59	63	36	20†	4,852	7.2	25	nw.	9	64	+ 7
Sioux City	29.98	30.59	15	29.44	24	81	62	62	27	13	7,523	11.2	42	nw.	9	76	+18
Omaha, Neb.	29.99	30.62	15	29.34	24	75	54	60	29	9	4,896	7.3	29	nw.	9	76	
												8.2				57	+ 2
Means and extremes	29.99	30.64	15	29.34	24	82	64	68	21	9			42	nw.	9		
Normals and records	30.10	§31.07	21st 1918	*28.69	28th 1902	83	74	78	¶13	22d 1880			¶56	nw.	4th 1917	55	

§Sioux City. *Davenport. ¶Des Moines. ‡Local mean time. †And other dates.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

THE WINTER OF 1929-1930

The mean temperature for the three winter months was 23.6°, which is 1.9° above the normal for the State, and 6.0° above the mean of 1928-1929. The winter was characterized by a nearly normal December, a very cold January, 8.0° below normal, and the warmest February on record. Out of 57 winters for which State-wide average temperatures are available, 37 have been as cold or colder and 19 have been warmer. The coldest winter of record was 1874-75, with a mean of 11.8°, and the warmest was 1877-78, with a mean of 32.2°. The highest temperature during the winter was 80° at Mt. Ayr and Clarinda on the 24th of February, and the lowest was—37° at Decorah on January 22.

The average monthly precipitation for the State was 0.80 inch, and the average total was 2.39 inches, or 1.03 inches less than the normal. December precipitation averaged 0.39 inch, which was 0.75 below normal, January was 1.33 inches, or 0.26 inch above normal, and February 0.67 inch, or 0.54 inch below normal.

The average snowfall for the winter was 21.3 inches, which is 0.6 inch below normal, and 11.0 inches less than the winter of 1928-29. December and February snowfall was below normal and January was above.

The average number of days with 0.01 inch or more of precipitation, was 18, or 4 days less than last winter. The average number of clear days was 37, partly cloudy 24, and cloudy 29, as compared with 33 clear days, 20 partly cloudy and 37 cloudy days during the winter of 1928-1929.

COLD JANUARYS INDICATE COLD FEBRUARYS

In 12 out of 14 cases in the last 58 years, 1873-1930 inclusive, when January state mean temperatures have been 5° or more below the 58-year average (18.0°), the mean temperature of February has been below the 58-year average of that month (22.0°). In other words, at the close of a January, 5° or more colder than the average, a prediction that February will be colder than the average would be verified 86% of the time. These averages differ slightly from the adopted normals.

However, February, 1930, was remarkably abnormal in that the preceding January, colder by 7.5° than the 58-year average, was followed by the warmest February in a century, 13.5° warmer than the 58-year average. The rule has been broken only once before, in 1918, when a cold January was followed by a February only 1.0° above the average.

Warm Januarys are not followed by warm Februarys so consistently, the frequency being only 11 out out of 17 cases, or 65%.

VIOLENT TEMPERATURE FLUCTUATIONS

February, 1930, was the warmest in a century in most of Iowa, excepting only some stations along the Mississippi River. At a good many stations in central and southwest Iowa previous high records were exceeded by 5 or more degrees. While no single station has a record of 100 years, there has not been a time in 110 years when there were not two or more temperature records in every month which can be compared with other records in the vicinity. The months of February in 1825, 1834 and 1851, were notably warm.

Heretofore, in most of the State, the warmest Februarys were in 1926

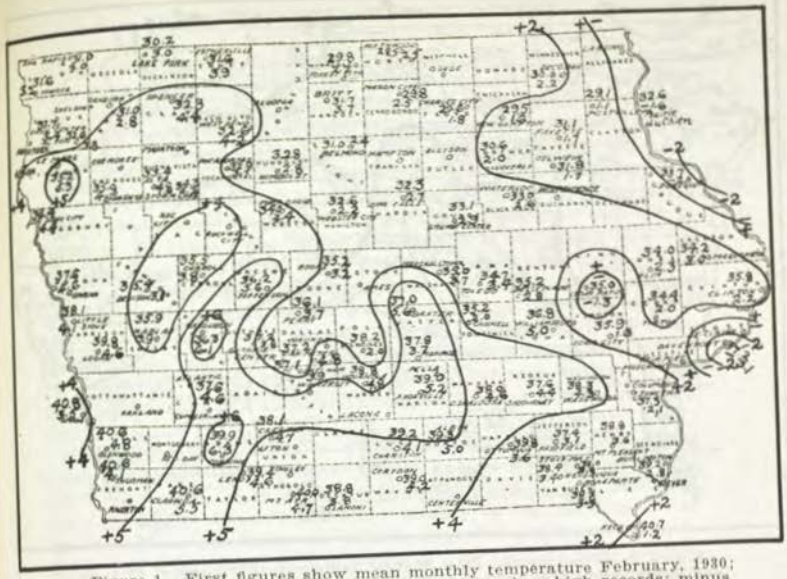


Figure 1. First figures show mean monthly temperature February, 1930; second figures and lines show excess over all previous high records; minus signs show lower than previous high record.

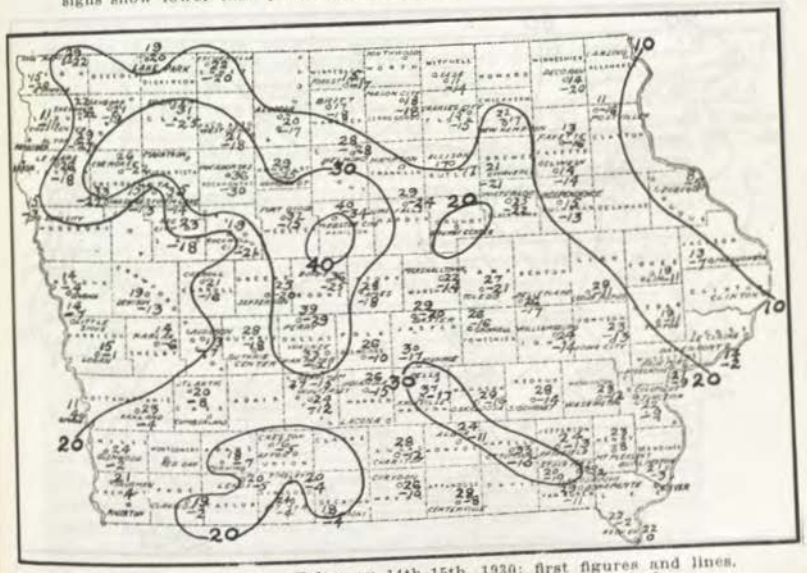


Figure 3. Cold wave February 14th-15th, 1930; first figures and lines, fall in temperature in 24 hours; second figures, minimum reached.

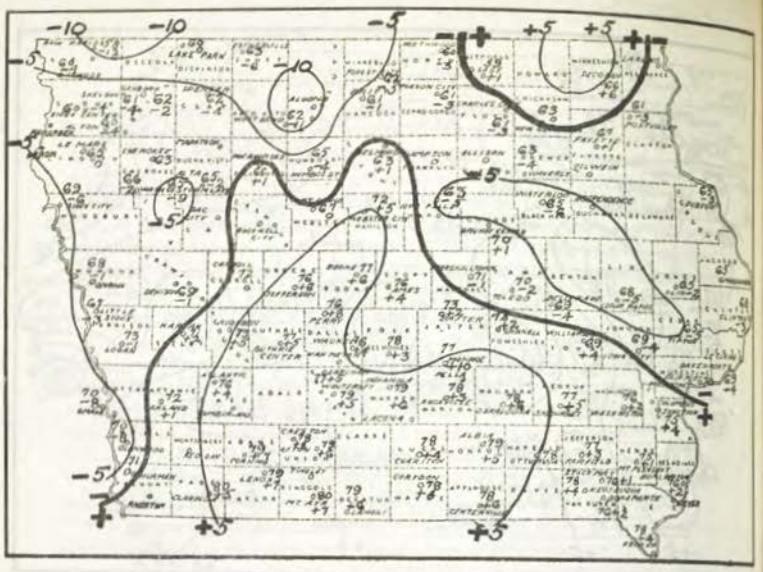


Figure 2. First figures show highest temperature February, 1930; second figures and lines, number of degrees this was higher or lower (minus) than previous high record.

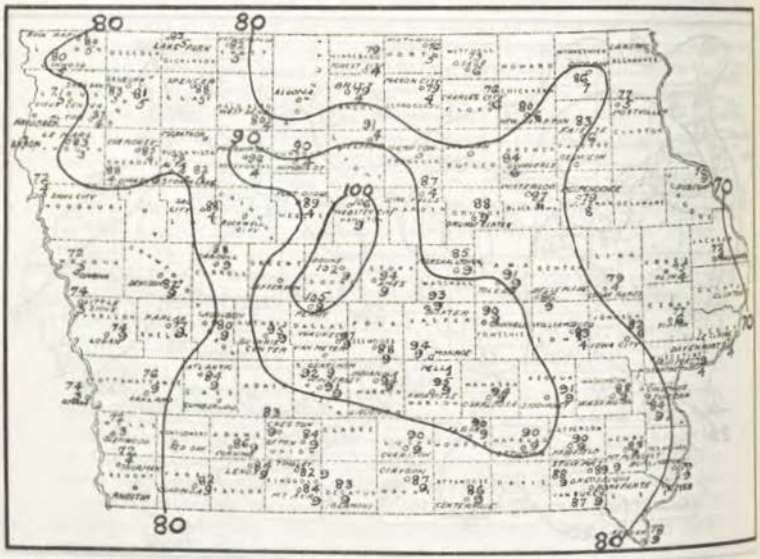


Figure 4. First figures and lines, monthly range of temperature; second figures, number of days between extremes, February, 1930.

or 1921, but along the Mississippi, 1882 was and is still the warmest, while along the Missouri River, 1877 was the warmest till this year. The map (fig. 1) shows near each station the mean temperature of 1930 and the second figures show how much this is above the previous high record, except a few stations in eastern Iowa, where a minus sign before the figures shows how much lower the mean was than the previous high record. Also, in southern and central Iowa, in about half the area of the State, records were broken for highest temperature ever observed in February. In figure 2 the highest temperature of the month is shown near each station and below it the number of degrees this was higher or lower than the previous absolute maximum. The heavy lines mark the areas where records were broken. Minus signs show where the temperature was below the record. Heretofore, in the western third of the State, most of the stations had their highest temperature of record on February 26, 1896, if their records extended back that far, while in the eastern two-thirds the warmest day whatever the length of record, was February 15, 1921.

In the midst of the mildness a sharp cold wave swept southeastward across the State on the 14th-15th. Figure 3 shows near each station the fall in temperature in 24 hours, minimum to minimum, and the second figure shows the lowest temperature reached on the morning of the 15th throughout the State. At Webster City the cold wave was most severe, with a fall of 40° to a minimum of —34°, and in many counties from Cherokee and Clay southeast to Van Buren, the temperature fell 30° or more to far below zero.

This was followed by a rapid change to the record breaking high temperatures in half of the State on the afternoon of the 24th. Where the cold wave and the record warm area overlapped in Hamilton, Boone and portions of adajcent counties, there was a change to warmer, amounting to more than 100° in 9 days, and about 8 hours, the greatest being 106° at Webster City, 105° at Perry, and 102° at Boone. Figure 4 shows near each station the monthly range in temperature for February, 1930, and the number of days between the lowest and highest temperatures. In the extreme west and extreme east the range was only about 70° but it occurred in 3 or 4 days. The extreme range for the State, from —34° at Webster City on the 15th, to 80° at Clarinda and Mt. Ayr, on the 24th amounted to 114°. Only in February, 1899, has this record for monthly range in temperature been exceeded in any month, and then only by one degree, in a period two days longer.

MARCH

The main characteristics of March, 1930, were the high wind movement and a large deficiency in precipitation.

The mean temperature for the State, 37.3°, was 2.7° above the normal, and only 1.8° higher than that of last month. At several stations in the south and west portions February averaged warmer than March. The maximum temperature occurred at all stations about the middle of the month, the highest reported being 80° at Little Sioux and Onawa. The only zero weather occurred during a cold wave that passed over the west-

ern and northern portions of the State attending a high pressure area that moved down the Missouri Valley on the 1st and 2d.

Precipitation was below normal at all stations except Algona, Carroll and Mt. Ayr. Most of the stations except in the southwest portion of the State was one inch or more deficient in rainfall. Comparing the March mean precipitation with that of previous records, it is interesting to note that only six times since 1873 has the total mean precipitation been less than it was this month. Also, only seven times previous since 1873 for March, has the greatest total precipitation at any one station been less than was recorded this month.

The snow cover was light and below normal. The heaviest snowfall in the State occurred in Monroe, Appanoose, Mahaska and Black Hawk counties, on the 24th and 25th.

The favorable weather permitted much outdoor work. Plowing was possible early in the month over nearly all portions of the State, and much seeding of oats and other small grains was done, and started very early. Grasses stood the winter well, as did fruits. There apparently was little or no winter killing aside from a negligible amount to clover. Soil was in excellent condition for working, but its moisture content was considerably lower than usual. Farm work averaged about two or three weeks ahead of normal by the end of the month, but many farmers had neglected to start field work. At the close of the month wheat and pasture were green and in good condition. About 95% of the sod ground had been plowed. Stalk fields were clear and ready for the plow. There has been considerable baling of corn stalks in northwest Iowa to be shipped to the Maizewood Factory at Dubuque. Very little sickness existed among the farm animals and poultry. The weather was favorable for the raising of chicks, although the chick hatcheries were not run to full capacity. Some potatoes were planted and truck gardening was active. Many of the early flowers were in bloom by the end of the month.

For the most part, March was very pleasant. About the usual number of storms passed near and over the State. A heavy local hailstorm occurred at Harlan on the 16th. Many stones as large as hens' eggs were reported. The only damage of any consequence consisted mainly of broken glass in greenhouses. A tornado occurred in Webster County on the 16th between 7:00 and 8:00 p. m., crossing most of Dayton and Lost Grove townships and causing about $3,600 damage to buildings.

The unusually dry weather during February and March, and the exceedingly dry atmospheric conditions, resulted in an unusually large number of fires. Many cities in the State reported record number of fires in their localities. Roads were generally good the entire month, and in many places very dusty. Building construction was well under way and progressed rapidly with very little interference.

A meteor of more than ordinary brilliancy was observed in the northeast, from Mt. Pleasant, about 9:15 p. m. on the 23d.

The wind movement for March was unusually large. At Des Moines the total movement, 9,073 miles, was the greatest for any month, with the exception of April, 1892, when the total movement was 9,612 miles. The 4-cup anemometer was in use at that time, while the record of the current month was with a 3-cup instrument. Part of the increased velocity is due to the change in location and exposure of the anemometer. At most of the other first order Weather Bureau stations, the wind movement did not closely approach the record. The exceedingly high velocity was mentioned by cooperative observers over the State on an unusually large number of days.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 101 stations, was 37.3°, or 2.7° above normal. There was an excess in all of the divisions of the State. The greatest excess, 3.5°, was in the north-central district, and the least, 2.1°, in the southeast district. The highest monthly mean was 40.8° at Thurman and Keokuk No. 2, and the lowest was 33.2° at Lake Park. The absolute range for the State was 84°, from 80° at Little Sioux and Onawa on the 16th, to —4° at Sanborn on the 2d. Temperatures of zero or lower occurred at 12 stations. The average number of days with the maximum temperature 32° or below was 2, ranging from 3 days in the northwest and west-central districts, to 1 day in central, east-central, southwest, south-central and southeast districts. The average number of days with the minimum temperature 32° or below, was 27, ranging from 29 days in the north-central district, to 24 days in the southeast district. There was only 1 day with minimum temperature of zero or below being recorded at 13 stations. The greatest daily range in temperature at any one station was 53°, at Corning, on the 11th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 119 stations, was 0.89 inch, or 0.88 below normal. The greatest district deficiency was in the east-central district, 1.50 inches, while the least deficiency was in the south-central district, 0.46 inch. The greatest precipitation deficiency, 2.29, at any one station, was at Tipton. The greatest excess in the State was 0.52 inch at Mr. Ayr. The greatest amount at a single station was 2.42 inches at Mt. Ayr, and the least was 0.04 inch at Inwood. The greatest amount occurring in 24 consecutive hours was 1.10 inches at Mt. Ayr, on February 28 and March 1. The average number of days with precipitation 0.01 inch or more for the State was 4.

Snowfall. The average snowfall for the State was 1.6 inches, or 3.6 inches below normal. The greatest total snowfall for the month at any one station was 9.4 inches at Centerville, and 8 stations received none. The greatest snowfall in 24 hours was 5.2 inches at Centerville on the 25th.

Miscellaneous Phenomena. Aurora: 3d, 23d. Birds (Migration of): Boone, bluebirds on 24th, fox sparrows on 17th, phoebes on 16th, robins on 24th, song sparrows on 12th; Earlham, blackbirds on 4th, turtle doves on 28th; Independence, blackbirds on 7th, robins on 9th. Cold Waves: 1st, 2d. Dust storm: 2d, 25th. Gales: 1st, 2d, 10th, 11th, 16th, 20th, 25th, 26th. Hail, light: 13th, 15th, 16th, 23d. Hail, moderate: 15th, 17th. Hail, heavy: 16th. Halos, lunar: 6th, 9th, 12th. Halos, solar: 2d, 3d, 6th, 7th, 9th, 13th, 16th, 21st, 23d, 27th, 28th, 30th, 31st. Haze, dense: 6th, 21st. Meteor: 23d. Parhelia: 2d, 7th, 13th, 21st. Rainbows: 17th, 23d. Sleet: 11th, 17th, 18th, 22d, 23d, 24th, 25th, 26th, 31st. Thunderstorms: 14th, 15th, 16th, 17th, 23d. Tornado: 16th.

Rivers. Extremely low stages prevailed on all interior streams, with little fluctuation in their stages. The interior streams were free from ice over the entire month, except at Charles City the ice left the Cedar River above the dam on the 10th, with no rise in the river stage.

The Missouri River stages averaged nearly normal, with considerable fluctuation in the stages throughout the month. At Sioux City the extreme stages were 4.0 feet and 8.9 feet, and the average stage was 7.1 feet, or 0.9 foot below normal. At Omaha the extreme stages were 5.5 feet and 11.9 feet, and the average stage was 9.9 feet, or 1.5 feet above normal.

The Mississippi River stage fluctuation was not as great as that on the Missouri River. At Dubuque the crest stages, 8.2 feet, recorded on the first two days of the month, after which the river fell rather steadily to the lowest reading, 6.0 feet on the 20th, and remained practically stationary until the end of the month. The mean stage was 6.8 feet, or 1.2 feet above normal. At Davenport the extreme stages were 5.1 feet and 7.8 feet, and the average stage was 6.0 feet, or 0.5 foot above normal. At Keokuk the stages, contrary to the usual course of action for the month of March, were on a downward trend. Beginning with the crest stage, 8.6 feet, on the 1st, the river fell steadily to a little above 3 feet on the 31st. Navigation on the Mississippi River officially opened at Dubuque on the 15th and at Davenport on the 11th.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.95	30.46	2	29.57	4	77	48	57	23	30	6,842	8.1	25	w.	16	70	+21
Davenport	29.92	30.45	14	29.56	11	72	45	49	16	31	9,522	12.8	37	nw.	11	61	+ 6
Des Moines	29.95	30.53	2	29.56	6	73	45	46	18	4	9,673	12.2	37	nw.	11	74	+18
Dubuque	29.91	30.49	14	29.52	4	78	52	59	28	31	6,672	8.2	26	n.	25	58	+ 4
Keokuk	29.97	30.46	2	29.55	7	67	42	44	18	4	7,527	9.7	30	nw.	11	59	0
Sioux City	30.00	30.69	2	29.48	6	73	43	46	21	30	10,343	13.9	42	nw.	10	77	+19
Omaha, Neb.	29.97	30.67	2	29.47	6	67	39	38	8	3	7,656	10.3	33	n.	11	78	+19
Means and extremes	29.95					72	45	48				10.7				68	+11
		30.69	2	29.47	6				8	3			42	nw.	10		
Normals and records	30.04		28th		29th	80		67		18th					16th	57	
		†30.82	1921	*28.79	1924				*5	1918			§53	w.	1930		

‡Sioux City. *Davenport. ‡‡Local mean time. †And other dates.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

APRIL

The main characterists of April, 1930, were the record breaking temperature, a severe dust storm, and unusually dry weather during the first ten days of the month.

The mean temperature for the State, 52.1°, was 3.2° above normal. The chief feature relative to temperature conditions was the abnormally warm period, 3d-13th. The peak of maximum temperature records was reached on the 9th, 10th and 11th. It was during this period that July weather prevailed over almost the entire State, and 46 stations in the southern half and the extreme eastern portions reported the highest temperature ever experienced for the month of April.

Precipition averaged below normal. With only a few exceptions, the entire south half and the extreme northwestern portions of the State were deficient in precipitation, the remaining portions being in excess of the normal. During the first ten days of the month there was no rain of any consequence.

The first half of the month was very favorable for outdoor work and much was done. The soil was in excellent condition to work, and preparations for corn planting made unusual progress, with few weather handicaps to add to the expense. Some corn planting was done before the 15th in a few scattered localities in southern Iowa and extending as far north as Hamilton and Marshall counties. The cool and rainy weather during the third week of the month retarded germination and much of it had to be replanted. Oats that were sown early in the month came up to a good stand but made slow progress, due to the frequently heavy frosts and freezes which followed the mild period. The color of the oats was generally rather pale. Spring wheat and barley were doing fairly well by the end of the month, and winter wheat looked good generally. Pastures, meadows, alfalfa and sweet clover were benefited by the rains and doing well. Livestock was on pasture in much of the State somewhat earlier than usual, but the pastures were not yet able to entirely sustain livestock. The dry, sunny and mostly warm weather during the first half of the month was generally favorable for young pigs, lambs and chicks, but the young animals did not thrive so well during the last two weeks. Plums, apples and currants were in full bloom in the south half of the State, and in some localities they were a little past the blooming stage. Some of the early fruits and strawberry buds were damaged by the freeze on the morning of the 19th. Gardening was much farther advanced than usual. Rhubarb was very plentiful. In many favored localities where cloudy weather prevailed during the nights of frost and freezing temperatures, the fruits were protected enough so there may be a large quantity of the early crops. Potato planting was finished and truck gardening was in full swing. The early flowers were in full bloom most of the month.

A severe dust storm, which occurred on the 5th and 6th, was also a notable feature. The dust and red sand came from the northwest, covered the entire State, and filled the air to an unusual height. The strong winds also picked up considerably local dirt from roads and plowed fields. At the Des Moines Airport a visibility of one-half mile and a ceiling of 300 feet were reported. Commercial aviation was suspended during the storm. In places the dust was drifted along the road similar to snow. No severe damage occurred other than discomfort to persons working in the open, and dust blowing into dwellings and buildings.

A light local hailstorm occurred in Oto Township, Woodbury County, on the 30th. Many stones as large as walnuts were reported. The only

damage of any consequence consisted of a few broken glass in greenhouses and hot beds in the vicinity of Danbury.

General outdoor activities were about normal. Dirt roads were in good condition most of the month. Building was not handicapped by weather conditions.

A partial eclipse of the sun occurred on the 28th. In some localities the eclipse was visible for short intervals through rifts in the clouds. In most of the State the clouds completely obscured the sun's disk.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 106 stations, was 52.1° or 3.2° above normal. There was an excess in all of the divisions of the State. The greatest excess, 4.3°, was in the north-central district, and the least, 2.0°, in the northeast district. The highest monthly mean was 57.0° at Keokuk No. 2, and the lowest was 48.0° at Decorah. The absolute range for the State was 91°, from 5° at Afton on the 1st, to 96° at Clarinda on the 10th. The average number of days with the maximum temperature 90° or above, was 1, ranging from no days at 26 stations to 3 days at Wever. Maximum temperature of 32° or higher occurred at all stations. The average number of days with the minimum temperature 32° or below, was 8, ranging from 2 days at 6 stations to 12 days at 5 stations. The greatest daily range in temperature at any one station was 58° at Corning, on the 8th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 119 stations, was 2.67 inches, or 0.29 inch below normal. The greatest district deficiency was in the south-central district, 1.28, and the northeast district had the greatest district excess, 0.88 inch. The greatest precipitation deficiency, 2.25 inches at any one station, was at Chariton. The greatest excess in the State was 1.74 inches at Oskaloosa. The greatest amount at a single station was 4.59 inches at Oskaloosa, and the least was 1.05 inches at Chariton. The greatest amount occurring in 24 consecutive hours was 2.24 inches at Postville on the 15th. The average number of days with 0.01 inch or more of precipitation for the State was 9, ranging from 8 days in the west-central, central and south-central districts, to 10 days in the northwest, east-central and southwest districts. For individual stations the range was from 4 days at Guthrie Center to 13 days at Red Oak.

Snowfall. The average snowfall for the State was 0.3 inch, or 1.6 inches below normal. The greatest total snowfall for the month at any one station was 3.1 inches at Cedar Falls. There were 15 stations that received only a trace of snow for the month, and 76 stations received none. The greatest snowfall in 24 hours was 3.1 inches at Cedar Falls on the 1st.

Miscellaneous Phenomena. Aurora: 7th. Birds (Migration of): Webster City, martins on 4th; Earlham, mocking birds on 26th; Riverton, wrens on 28th. Coronas, Lunar: 10th, 13th. Dust Storm: 4th, 5th, 6th, 7th, 9th, 10th. Eclipse of Sun, partial: 28th. Fog: 3d, 12th, 14th, 15th, 16th, 17th, 21st, 28th, 29th. Frost, light: 3d, 7th, 19th, 21st, 22d, 23d, 24th. Frost, heavy: 2d, 3d, 19th, 22d, 23d, 24th, 25th, 26th. Frost, killing: 1st, 2d, 3d, 4th, 6th, 7th, 8th, 19th, 22d, 23d, 24th, 25th. Gales: 4th, 5th, 6th, 8th, 9th, 10th, 11th, 14th, 17th. Hail, light: 12th. Hail, moderate:

17th, 18th, 30th. Halos, lunar: 9th, 11th, 12th. Halos, solar: 4th, 5th, 8th, 10th, 12th, 17th, 19th, 22d, 25th, 26th, 29th. Rainbows: 4th, 9th, 10th, 12th, 16th, 25th, 26th, 29th. Haze: 12th. Sleet: 1st, 19th. Thunderstorms: 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 29th, 30th.

Rivers. Moderately low stages prevailed on all the interior streams, with little fluctuation. At Des Moines the extreme stages were 1.7 feet and 3.4 feet, and the average stage was 2.2 feet, or 2.4 feet below normal.

The Missouri River stages averaged nearly normal. At Sioux City the extreme stages were 6.3 feet and 9.6 feet, and the average stage was 7.2 feet, or 1.7 feet below normal. At Omaha the extreme stages were 9.1 feet and 12.1 feet, and the average stage was 9.8 feet, or 1.4 feet above normal.

On the Mississippi River stages were exceptionally low. At Dubuque the average stage was 5.1 feet, or considerably lower than the average for March, and nearly four feet lower than the past average for April. Starting at the maximum for the month, or 6.1 feet on the 1st, the stage fell steadily to the lowest reading of the month, 4.4 feet on the 14th and 15th. It then rose until the 21st, after which date it remained practically stationary to the end of the month. At Davenport the extreme stages were 3.7 feet and 5.5 feet, and the average stage was 4.6 feet, or 3.2 feet below normal. At Keokuk the stages fell rather steadily until the middle of the month when heavy rains occurred in the drainage district. There was then a rising tendency until the 27th, when the flow again began to decrease. The average stage for the month was slightly over 3 feet, which is exceptionally low for this season of the year.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.03	30.29	24	29.56	17	76	46	51	17	10	4,987	6.9	19	s.	10	64	+ 6
Davenport	30.01	30.28	8	29.60	17	73	47	48	17	10	7,864	10.9	37	sw.	11	63	+ 6
Des Moines	30.00	30.28	22	29.59	17	74	44	47	11	10	6,805	9.4	31	s.	17	64	+ 5
Dubuque	30.02	30.28	8	29.59	17	76	52	53	23	10	4,645	6.5	27	nw.	6	62	+ 5
Keokuk	30.02	30.32	8	29.64	17	67	43	48	16	5†	5,319	7.4	26	sw.	17	69	+12
Sioux City	30.01	30.30	22	29.62	17	71	50	50	13	4	7,738	10.7	39	nw.	5	56	0
Omaha, Neb	29.99	30.27	22	29.57	17	64	48	47	10	5	4,964	6.9	30	nw.	5	65	+ 6
Means and extremes	30.01	30.32	8	29.56	17	72	47	49	10	5		8.4	39	nw.	5	63	+ 6
Normals and records	29.98	§30.78	9th 1918	*28.90	20th 1898	76	57	¶10		25† 1902			¶60	n.	25th 1902	57	

§Dubuque. *Davenport. ¶Sioux City. ‡Local mean time. †And other dates.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

MAY

The chief characteristics of May, 1930, were the unusually late frosts and the record number of tornadoes.

Temperatures averaged nearly normal, which rarely occurs. The minimum temperatures at all stations occurred after the 17th. The maximum temperatures also occurred mostly toward the close of the month. Stations in the lower Des Moines and Iowa River valleys recorded the highest monthly mean temperatures.

Precipitation averaged below normal. With only a few exceptions, the entire State was below normal, except the extreme northwestern portion, the eastern half of the southwest district, and the upper Cedar River Valley. There were no well defined precipitation periods during the month, but the heaviest daily falls occurred during the period, 6th to 12th.

May was not entirely favorable for agriculture. Heavy, general rains in the week ending the 12th delayed corn planting and the cool, cloudy week that followed caused slow germination and growth and lengthened the exposure to attacks of grubs, wire-worms, cutworms, squirrels, mice, rotting, etc., which necessitated much replanting. However, the warm dry April preceding had advanced the preparation of an excellent seed bed ahead of the normal, and planting went forward rapidly whenever there were a few favorable hours. On the 15th, 57 per cent of the planting had been done, or 6 per cent more than the normal, and on June 1, 97 per cent, or 3 per cent above normal. Reckoned in days, planting was two days earlier than usual on the 15th, and three days earlier on June 1.

In southern Iowa considerable corn had been cultivated twice and in some localities the third plowing had been started. Winter wheat was heading in the southern counties, shooting in the central counties, and looked well generally. Oats were beginning to head in sections as far north at Marshall County, and mostly doing well but needed rain. Hay crops were in serious need of rain by the end of the month. Alfalfa had made good growth and cutting was started in many localities. Strawberries and gardens were in good condition considering they had withstood the cool weather and being frequently nipped by frost. Young animals and chicks did not do so good during the first half of the month, but greatly improved during the last half. Some serious but scattered outbreaks of hog cholera existed and steps to immunize pigs by vaccination had been taken.

Frosts were frequent during the last half of May. The last killing frost of the season occurred on the 17th and 18th at nearly all the stations. Heavy frost occurred on the 17th, 24th and 30th, and light frosts were frequent even to the end of the month. While the frosts occurred usually late, they were not unprecedented.

For the most part, May was a very stormy month. An unusual large number of severe storms occurred and several were very destructive. During May there were 19 tornadoes, having a total path of 120 miles. This is the greatest number of tornadoes recorded in any month since careful records have been compiled. The tornadoes causing the greatest damage are treated in detail elsewhere in this issue. (See index.)

Temperature. The mean temperature for the state, derived from the means of 9 districts of nearly equal area, and based on the records of 105 stations, was 60.2° or 0.1° above normal. The greatest excess, 1.1°, was in the southeast district, and the greatest deficiency, 0.5°, in the southwest district. The highest monthly mean was 64.8° at Keokuk No. 2, and the lowest 56.6° at Sanborn. The absolute range for the State was 65°, from 26° at Sanborn on the 17th, to 91° at Denison and Lenox on the 27th. The average number of days with the maximum temperature 90° or above, was zero, ranging from no days at 95 stations to 2 days at Burlington. At no station was there a daily maximum temperature lower than 32°. The average number of days with the minimum temperature 32° or below, was zero, ranging from 3 days at Estherville, to no days at 60 stations. The greatest daily range in temperature at any one station was 48° at Washta on the 24th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 119 stations, was 3.72 inches, or 0.86 inch below normal. The greatest district deficiency was in the southeast district, 1.74 inches, and the northwest district had the greatest district excess, 0.22 inch. The greatest precipitation deficiency, 2.97 inches, at any one station, was at Mt. Pleasant. The greatest excess in the State was 2.28 inches at Rock Rapids. The greatest amount at a single station was 7.20 inches at Corning and the least was 1.61 inches at Mt. Pleasant. The greatest amount in 24 consecutive hours was 3.66 inches at Corning on the 6th and 7th. The average number of days with 0.01 inch or more of precipitation for the State was 11, ranging from 9 days in the west-central to 13 days in the northeast district. For individual stations the range was from 6 days at Sioux Center and Guthrie Center, to 16 days at Waverly.

Snowfall. The only snow reported was a trace, which melted as it fell,

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.95	30.40	24	29.28	7	76	55	60	27	30	5,144	6.9	23	sw.	21	61	— 1
Davenport	29.97	30.43	25	29.43	7	76	51	52	25	31	8,509	11.4	40	nw.	1	61	— 1
Des Moines	29.94	30.37	24	29.22	7	78	56	56	26	30	7,608	10.3	36	nw.	1	60	— 2
Dubuque	29.95	30.45	25	29.39	7	77	56	56	31	30	4,875	6.6	23	s.	7	62	+ 4
Keokuk	29.98	30.40	25	29.44	7	73	50	54	27	31	6,106	8.2	37	sw.	7	69	+ 3
Sioux City	29.93	30.36	24	29.28	7	75	55	53	21	23	9,458	12.7	52	s.	6	57	— 1
Omaha, Neb	29.93	30.37	24	29.23	7	72	53	52	21	24	5,594	7.4	24	nw.	7	70	+ 8
Means and extremes	29.95	30.45	25	29.22	7	76	54	55	21	23		9.1	52	s.	6	63	+ 1
Normals and records	29.95	*30.58	4th 1910	§29.02	§17 1875	77		59	§10	3d 1889			§67	nw.	1st 1894	62	

*Dubuque. §Omaha. ‖Also Sioux City, 9th, 1927. ¶Sioux City. †Local mean time.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

at Monroe, Oskaloosa and Corydon, on the 17th. The normal May snowfall for the state is 0.1 inch.

Miscellaneous Phenomena. Aurora: 4th, 5th, 29th, 30th, 31st. Birds (migration of): Washta, orioles on 1st, brown thrush on 2d. Corona, lunar: 3d, 9th. Dust storm: 21st, 23d. Fog: 19th, 29th. Frost, light: 16th, 17th, 18th, 24th, 28th, 29th, 30th, 31st. Frost, heavy: 17th, 24th, 30th. Frost, killing: 17th, 18th. Gales: 1st, 2d, 3d, 5th, 6th, 7th, 9th, 10th, 11th, 12th, 13th, 14th, 21st, 22d, 27th, 31st. Hail, light: 1st, 2d, 5th, 6th, 8th, 9th, 11th, 17th, 22d, 27th. Hail moderate: 1st, 6th, 9th. Hail, heavy: 1st, 9th. Halos, lunar: 3d, 9th, 10th. Halos, solar: 1st, 8th, 13th, 17th, 26th, 28th. Haze: 23d. Sleet: 17th. Snow: 17th. Thunderstorms: 1st, 2d, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 17th, 18th, 19th, 21st, 22d, 23d, 26th, 27th. Tornadoes: 1st, 5th, 6th, 8th, 9th.

Rivers. All rivers, both interior and boundary, averaged below normal in stage; and fluctuations were small for the time for year.

JUNE

Damaging downpours of rain, with attendant floods and much wind squall damage were the outstanding features of the weather of June, 1930.

Sioux City experienced a loss of $300,000 in connection with one of the heaviest deluges of record in the interior sections of the United States on Friday morning, the 13th. Rain fell at an excessive rate from 6:05 to 6:40 a. m., amounting to 2.80 inches; 2.85 inches were recorded from 5.34 a. m. to 6.54 a. m., the total duration of the storm. This broke all previous rainfall records for the month of June at Sioux City, for all intervals of time up to 24 hours. The greatest amount in 5 minutes was 0.76; 10 minutes, 1.25; 15 minutes, 1.75; and 30 minutes, 2.73. The heavy rains which fell in the south-central and southeastern districts on the 14th and 15th caused floods in rivers and arroyos and did over a million dollars of damage. The extent of the damage done by the rain which occurred at Washington, Iowa, was not as great as might be expected, although the heaviest total precipitation for 24 hours for the State, 9.63 inches occurred at that station. The total damage by high winds, rain, hail, tornadoes and floods, was approximately $3,561,675. Seven tornadoes did approximately $39,050 damage, injured two persons, and left clearly marked paths totaling about 39 miles.

In large areas in central, nothern and western Iowa, precipitation was deficient. June temperatures averaged practically normal but alternated frequently above and below normal, except for a rather continuously cool week from the 5th to the 12th.

Farm work progressed a little above normal in most sections, and crops appeared in excellent condition, with the exception of localities where bad storms had occurred.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 103 stations, was 69.0°, or 0.3° below normal. The east-central district, with a departure of 0.6°, was the only district with an excess, and the greatest deficiency was 0.7° in the southwest district. The highest monthly mean was 72.6° at Keokuk No. 2, and the lowest 65.4°at Postville. The absolute range for the State was 64°, from 37° at Denison on the 8th, to 101° at

Little Sioux on the 22d and Keokuk No. 2 on the 23d. The average number of days with the maximum temperature 90° or above, was 3, ranging from no days at Mason City and Northwood to 8 days at Tipton. At no station was there a maximum or minimum temperature lower than 32°. The greatest daily range in temperature at any one station was 44° at Inwood, (near) on the 2d.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 117 stations, was 5.83 inches, or 1.33 inches above normal. The greatest district deficiency was in the west-central district, 0.44 inch; and the southeast district had the greatest district excess, 3.59 inches. The greatest deficiency at any station 1.87 inches, was at Marshalltown and Onawa. The greatest excess was 9.58 inches at Washington. The greatest amount at a single station was 13.49 inches at Washington, and the least was 2.48 inches at Spencer. The greatest amount in 24 consecutive hours was 9.63 inches at Washington on the 14th and 15th. The average number of days with 0.01 inch or more of precipitation for the State was 10, ranging from 8 days in the south-central, west-central and southwest districts, to 12 days in the east-central. For individual stations the range was from 5 days at Onawa and Corning, to 15 days at Dubuque and Davenport.

Miscellaneous Phenomena. Aurora: 1st, 16th, 26th. Coronas, Lunar: 2d, 3d. Dust Storm: 12th. Flood: 1st, 2d, 3d, 4th, 5th, 7th, 8th, 10th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 21st. Fog, light: 8th, 11th, 12th, 13th, 18th, 20th, 21st. Fog, dense: 8th, 13th. Frost, light: 7th. Gales: 1st, 2d, 3d, 12th, 13th, 24th, 25th, 26th, 28th, 29th, 30th. Hail, light: 1st, 2d, 3d, 4th, 8th, 9th, 13th, 20th, 22d, 25th, 26th, 29th, 30th. Hail, moderate: 5th, 10th, 21st, 23d, 24th, 25th, 26th. Hail, heavy: 10th, 13th, 20th, 22d, 24th. Halos, solar: 4th, 7th, 10th, 11th, 14th, 19th, 23d, 27th. Meteor: 23d. Rainbows: 5th, 15th, 16th. Thunderstorms: 2d, 3d,

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.90	30.24	8	29.52	12	80	54	64	34	15	3,979	5.5	27	nw.	29	65	— 3
Davenport	29.92	30.22	8	29.59	23	74	54	55	26	1	6,355	8.8	36	s.	22	68	— 1
Des Moines	29.90	30.23	8	29.56	13	79	52	53	32	27	6,234	8.7	35	s.	13	70	+ 4
Dubuque	29.90	30.20	8	29.52	23	80	57	59	34	1	4,115	5.7	19	s.	12	68	+ 4
Keokuk	29.94	30.23	8	29.66	23	72	52	52	27	8	4,912	6.8	24	w.	30	72	0
Sioux City	28.89	30.24	8	29.43	13	76	48	46	24	1	7,314	10.2	42	sw.	3	76	+13
Omaha, Neb	29.90	30.23	8	29.49	13	72	45	46	24	15	4,869	6.8	33	n.	25	83	+15
Means and extremes	29.91	----	----	----	----	76	52	54	----	----	----	7.5	----	----	----	72	+ 5
	----	30.24	8	29.43	13	----	----	----	24	1	----	----	42	sw.	3	----	----
Normals and records	29.93	----	10th	----	5th	79	----	60	----	7th	----	----	----	----	22d	67	----
	----	*30.61	1913	§29.04	1880	----	----	----	¶13	1926	----	----	968	w.	1917	----	----

*Dubuque. §Omaha: ¶Sioux City. ‡‡Local mean time.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

4th, 6th, 12th, 13th, 14th, 18th, 21st, 22d, 24th, 25th, 26th, 28th, 29th, 30th. Tornadoes: 2d, 13th, 14th, 20th, 22d, 24th, 25th.

Rivers. Considerable fluctuation occurred on the interior streams and flood stages were reached at many places, caused by heavy rains during the middle of the month, which inundated the farm land and did approximately one million dollars worth of damage, most of which was in southeastern Iowa.

The Missouri River stages averaged more than two feet below normal at both Sioux City and Omaha, with little fluctuation.

On the Mississippi River, stages averaged nearly normal, with only slight fluctuations at Dubuque and Davenport. At Keokuk the Mississippi rose rapidly from a stage of 4.5 feet on the 14th to 14.0 feet in the afternoon of the 18th. The crest equalled the official flood stage, but the water receded rather rapidly after the 19th, and had reached a stage of 7.5 feet by the 23d, after which there was little fluctuation.

JULY

The weather during July was noteworthy because of high maximum temperatures and a prolonged dry spell with its effect on vegetation.

The average temperature for the State was more than four degrees above normal, due to three periods of exceedingly high temperatures. Only three times since 1873 has the July mean exceeded that of this month. At Keokuk No. 2 the thermometers registered 112° on the 27th, which came within one degree of equaling the state record for July, which was 113° in 1901 at Sigourney on the 22d. The absolute range in temperature for the State was 72°, which came within one degree of the record, 73°, in 1911. At 14 stations July maximum temperature records were broken on the 27th. While crops suffered untold damage from the heat, it was reliably reported that a 40-acre field of corn on peat land in the vicinity of Sac City was completely killed by frost on the morning of the 15th.

With only two exceptions, this month, with average rainfall of 1.49 inches, was the driest July of record. The driest was 1886, with an average of 0.50, and the next driest, 1894, with 0.63. The number of days with precipitation, 0.01 inch or more, averaged 4; only 1894 with 3, had less, though records of this feature are not available in 1886. Akron, with only a trace, was the driest station. Only in 1886 was this record surpassed, when three stations in Jefferson and Wayne counties had none.

The most severe drouth was in the southern and western portions of the State. Berries were the first affected, and in some localities the crop was reduced as much as 50% to 75%; next the truck crops, and some were utterly ruined and others seriously injured. Later, pastures and corn became involved. Small grains were matured and harvested generally before any great effects were noticable, except some slight shrinking of many late oats. Corn tassels and occasional top leaves were burned white, and the silk dried up, except in the northeast portion of the State. Second growth hay and pastures rapidly dried up, and over much of the State turned brown. Live stock were put on winter feed in many localities, due to the scarcity of pasturage.

All kinds of building construction advanced above normal this month, except road paving was hampered because the water supply became locally exhausted. In stretches of road construction it had to be piped as far as 7 or 8 miles.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 104 stations, was 77.9°, or 4.2° above normal. The greatest district excess, 6.1°, was in the west-central district and the least district excess, 2.1°, was in the northeast district. The highest monthly mean was 81.5° at Little Sioux, and the lowest, 71.2° at Postville. The absolute range for the State was 72°, from 112° at Keokuk No. 2 on the 27th, to 40° at Earlham (near), and Decorah, on the 15th. The average number of days with the maximum temperature 100° or above, was 6.3, ranging from 13 days at Glenwood and Chariton, to none at 9 northeast stations. The average number of days with the maximum temperature 90° or above, was 18, ranging from 6 days at Postville to 24 days at Spencer and Lenox. The greatest daily range in temperature at any one station was 51° at Britt on the 16th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 118 stations, was 1.49 inches, or 2.34 inches below normal. The greatest district deficiency was in the northwest and south-central districts, 3.09; and the north-central district had the least deficiency, 1.05 inches. The greatest deficiency at any station, 3.91 inches, at Estherville, and the greatest excess, was 1.93 at Hampton. The greatest amount at a single station was 5.58 at Hampton, and the least was a trace at Akron. The greatest amount in 24 consecutive hours was 1.95 inches at Oelwein on the 8th. The average number of days with 0.01 inch or more

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.96	30.27	30	29.68	12	75	47	54	25	31	3,498	4.7	22	s.		17	76 + 1
Davenport	29.97	30.23	15	29.67	12	69	48	45	26	1	4,732	6.4	30	sw.		4	76 + 2
Des Moines	29.94	30.23	30	29.66	20	66	40	37	22	17†	5,844	7.9	33	nw.		4	81 + 8
Dubuque	29.96	30.24	14	29.62	12	74	50	50	29	20	3,792	5.1	30	n.		27	81 +11
Keokuk	29.99	30.23	15	29.75	12	64	42	43	23	18	4,017	5.4	21	se.		5	81 + 4
Sioux City	29.95	30.31	14	29.72	27	66	40	37	23	16	6,458	8.7	27	se.		3	81 + 9
Omaha, Neb.	29.99	30.28	30	29.70	18	69	39	36	16	16	4,349	5.8	20	se.*		21	81 + 6
Means and extremes	29.96	30.31	14	29.62	12	68	43	43	16	16		6.3	33	nw.		4	80 + 7
Normals and records	29.97	*30.47	7th 1892	§29.29	9th 1906	79	57	¶15	25th 1894				152	ne.		13th 1905	73

*Davenport. §Sioux City. ¶Des Moines. ‖Omaha. ‡Local mean time. †And other dates. *Also other dates and directions.

‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

of precipitation for the State was 4, ranging from 6 days in the north-central, northeast and east-central districts, to 3 days in the northwest, west-central and south-central districts. For individual stations the range was from none at Akron to 9 days at Allison.

Miscellaneous Phenomena. Aurora: 10th, 22d, 24th, 25th. Birds (migration southward): Webster City, martins on 31st. Coronas, Lunar: 2d, 9th, 16th, 29th. Dust storm: 19th. Fog, light: 25th. Frost, killing: (40 acres of corn on peat ground near Sac City) 15th. Gales: 8th, 16th, 18th, 20th. Hail, light: 4th, 5th, 27th. Hail, moderate: 1st, 2d, 5th, 20th, 25th, 26th, 27th. Hail, heavy: 25th, 26th. Halos, lunar: 9th, 16th. Halos, solar: 2d, 3d, 17th, 22d, 30th. Haze: 3d, 17th, 23d. Hot winds: 9th, 17th, 18th, 19th, 25th, 26th, 27th. Rainbows: 4th, 21st, 25th, 26th. Thunderstorms: 2d, 3d, 4th, 5th, 8th, 12th, 19th, 20th, 21st, 25th, 26th, 27th, 28th. Tornadoes: 5th, 19th, 20th, 26th.

Rivers. The lack of moisture was reflected in the interior streams and unusually low stages prevailed with very little fluctuation. Many of the small streams were completely dry the last half of the month. The Missouri River midsummer rise failed to materialize by August 1. Instead, the river fell gradually throughout the month and averaged more than 2.5 feet below normal along the Iowa boundary. The Mississippi River fell rapidly throughout the month.

EXTREME JULY WEATHER INDICATES AUGUST WEATHER

Five times during the last 58 years in Iowa, the State mean temperature for July has been 4° or more above normal and in every case the mean temperature of August has been above normal; also there have been 3 cases where the July mean was 4° or more below normal and in each case the August mean was below normal, so extreme July temperatures have been followed by the same tendency in August 100% of the time.

As to rainfall, there have been 8 cases in 58 years when the State average rainfall for July was 2 inches or more above normal and in 6 of the 8 cases, or 75%, the average rainfall of the following August was above normal; also there were 6 cases where the average rainfall of

Iowa July mean temperatures 4° or more from normal (8 cases) and average rainfall 2 inches or more from normal (14 cases) in 58 years, 1873-1930; and departures from normal in the following August.

Temperature			Rainfall		
Year	July Degrees	August Degrees	Year	July Inches	August Inches
1874	+ 4.1	+ 2.6	1875	+2.22	+0.60
1901	+ 8.7	+ 2.1	1876	+2.32	+1.71
1916	+ 6.0	+ 2.3	1896	+3.07	+0.08
1921	+ 4.2	+ 0.4	1900	+2.32	+1.21
1930	+ 4.2	+ 2.7	1902	+4.84	+3.14
1882	— 4.6	— 0.2	1907	+3.44	+0.89
1891	— 5.2	— 2.6	1915	+4.49	—0.63
1915	— 4.2	— 5.8	1922	+2.48	—0.38
			1886	—3.33	—1.42
			1894	—3.20	—1.86
			1913	—2.01	—0.76
			1916	—2.05	—0.86
			1923	—2.08	+1.98
			1930	—2.34	—1.02

July was 2 inches or more below normal and in 5 out of the 6 cases, or 83%, the average rainfall of the following August was below normal.

Briefly, there seems to be a well marked tendency for abnormal Iowa weather in July to perpetuate itself through August. In other corn belt states, this weather sequence is not so well defined, though Missouri shows a tendency in that direction.—C. D. R.

AUGUST

August weather was noteworthy because of record breaking maximum temperatures, and a continuation of the prolonged dry spell with its effect on vegetation.

The average temperature for the State was nearly three degrees above normal, due to the exceedingly high temperatures during the first week of the month and the near normal temperatures the rest of the month. Sunday, August 3, 1930 "the hot Sunday" will be long remembered as the hottest August day in most of Iowa. The highest temperature, 113° at Sac City, exceeded by 5° the all time record at that station and equalled the state record for all months including August, which was 113° at Clarinda and Knoxville on the 4th in 1918 and the same temperature at Sigourney, July 22, 1901. At twenty-five stations mostly in the northwest counties, all-time heat records were broken while sixty-five stations established new records for August, mostly in the eastern and northern counties. During July and August, the number of days per station with temperatures 100° or higher average 8.8, compared with 13.4 days in 1901, the record year; however, 5 stations exceeded the 1901 record. (See maps on pages 38 and 39.)

The hot, dry weather was very detrimental to crops. Corn was further damaged. It is estimated that the yield per acre was reduced four bushels making a total reduction of nine bushels due to the adverse weather of July and August. Pastures were absolutely bare over much of the State. Much live stock was put on full winter rations because of lack of pastures. The truck crops, except melons and cucumbers, were ruined in the drier portions of the State, and the blackberry crop was greatly curtailed. Lack of bee pasture caused the bees to attack the grapes and greatly damage them. Apples were small and falling badly.

The rainfall was unevenly distributed with a great variation in the number of rainy days. For the state as a whole the number of days with 0.01 inch or more averaged nearly normal, but ranged from 2 at some stations to 15 at others. Harlan reported rainfall on 17 consecutive days, including 8 days when only traces occurred.

The lack of rain caused a serious shortage of stock water, interfered with paving operations and caused a great many wells to go dry, making it necessary to haul or pump water long distances. Fish in ponds and smaller streams died in large numbers due to the lack of water or the stagnant condition.

Farm operation was greatly interrupted over most of the State. Fall plowing and preparation for seeding winter wheat, rye, alfalfa, clover and timothy, have been greatly delayed and made next to impossible by the continued drouth and hard baked and cracked soil.

Temperature. The mean temperature for the State, derived from the

means of 9 districts of nearly equal area, and based on the records of 103 stations, was 74.4°, or 2.7° above normal. The greatest district excess, 3.9°, was in the northwest district, and the least district excess, 2.3° was in the northeast and southwest districts. The highest monthly mean was 78.8° at Keokuk No. 2, and the lowest, 69.3° at Postville (near). The absolute range for the State was 72°, from 113° at Sac City on the 3d, to 41° at Earlham (near) on the 12th, Decorah on the 11th and 22d, and Oelwein on the 20th. The average number of days with the maximum temperature 100° or above, was 2.5, ranging from 8 days at Keokuk No. 2, to none at Independence, Postville (near) and Fairport. The average number of days with the maximum temperature 90° or above, was 12, ranging from 18 days at Estherville and Lenox, to 1 day at Postville (near). The greatest daily range in temperature at any one station was 46° at Decorah on the 24th.

Precipitation. The average precipitation for the state, derived from the averages of 9 districts of nearly equal area, and based on the records of 118 stations, was 2.42 inches, or 1.02 inches below normal. The greatest district deficiency was in the central district, 1.95 inches; and the southwest district had the only district excess, 0.92 inch. The greatest deficiency at any station was 3.42 inches at Perry, and the greatest excess was 3.57 inches at Storm Lake. The greatest amount at a single station was 6.71 inches at Storm Lake, and the least was 0.48 inches at Washta. The greatest amount in 24 consecutive hours was 2.72 inches at Mason City on the 5th. The average number of days with 0.01 inch or more of precipitation for the state was 8, ranging from 4 days in the northeast district, to 11 days in the southwest district. For individual stations the range was from 2 days at Cedar Falls and Waterloo, to 15 days at Ottumwa and Logan.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡†Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.04	30.33	11	29.71	3	78	44	54	26	18	2,800	3.8	25	nw.	5	70	— 1
Davenport	30.03	30.31	12	29.75	3	72	46	51	28	1	3,940	5.3	38	nw.	9	56	—14
Des Moines	30.01	30.30	30	29.69	20	76	46	47	21	1	4,601	6.2	25	s.	31	64	— 6
Dubuque	30.03	30.32	11	29.70	3	78	46	50	23	27	2,778	3.7	27	nw.	5	68	+ 4
Keokuk	30.04	30.29	11	29.82	3	70	41	47	21	26	3,350	4.5	18	sw.	3	66	— 7
Sioux City	29.99	30.30	21	29.61	2	76	51	53	24	10	5,929	8.0	27	s.	31	57	—13
Omaha, Neb.	29.98	30.28	11	29.63	2	75	52	59	24	2	3,306	4.4	35	nw.	30	53	—18
Means and extremes	30.02	.....	.....	.....	.....	75	49	52	.....	.....	.....	5.1	.....	.....	.....	62	— 8
	.....	30.33	11	29.61	2	--	--	--	21	1*	.....	.....	38	nw.	9	--	----
Normals and records	29.97	.....	24th	.....	10th	82	--	61	----	5th	.....	.....	.....	.....	6th	70	----
	.....	§30.43	1919	§29.40	1874	--	--	--	¶19	1918	.....	.....	¶57	sw.	1916	--	----

‡Local mean time. *Also at Keokuk on 26th. §Sioux City. ¶Omaha. †Des Moines.
‡†January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

Miscellaneous Phenomena. Aurora: 10th, 21st. Coronas, (lunar): 2d, 13th. Dews, heavy: 6th, 8th, 15th, 23d, 24th, 25th, 26th, 28th. Fog, dense: 6th, 7th, 8th, 11th, 14th, 15th, 21st, 22d, 23d, 24th, 25th, 26th, 28th, 30th. Fog, light: 14th, 15th, 23d, 25th, 26th, 27th, 28th. Gales: 3d, 4th, 5th, 6th, 7th, 9th, 30th, 31st. Hail, light: 6th, 9th. Hail, moderate: 6th, 9th. Hail, heavy: 6th, 9th. Halos, Lunar: 1st, 3d, 20th, 21st, 23d, 27th. Haze: 6th, 27th, 31st. Record high temperature: 3d. Thunderstorms: 2d, 3d, 4th, 5th, 6th, 7th, 8th, 9th, 13th, 16th, 17th, 18, 19th, 21st, 27th, 28th, 29th, 30th, 31st. Winds, hot: 2d, 3d, 4th.

Rivers. The lack of moisture was reflected in the interior streams and unusually low stages prevailed with very little fluctuation which resulted in a continuous downward trend. Many of the small streams were completely dry most of the month. The Missouri River had a falling tendency throughout the month, and averaged more than a foot below normal along the Iowa boundary. The Mississippi River fell continuously throughout the entire month, and averaged more than 1.5 feet below normal. Due to a shortage of water power a few of the local industrial plants in the vicinity of Keokuk curtailed operation during the month.

THE SUMMER OF 1930

The state mean temperature for the three summer months, June, July and August was 73.8°, which is 2.2° above the normal and 2.6° above the mean for last year. The summer was characterized by a nearly normal June, the warmest July since 1916, with precipitation 2.34 inches below normal, and August with maximum temperatures equalling or breaking all previous records at many stations, and also the prolonged drouth. Out of 58 summers for which state wide average temperatures are available, 9 have been warmer and 48 have been cooler. The warmest summer of record was 1901, with a mean of 76.2°, and the coolest was 1915, with a mean of 66.8°. The highest temperature this summer was 113° at Sac City on the 3d of August, equaling the state record for all time; and the lowest was 37° at Denison on June 8.

The average monthly precipitation for the state was 3.25 inches, and the average total was 9.74 inches, or 2.03 inches less than the normal. June precipitation averaged 5.83 inches, which was 1.33 inches above normal, July 1.49 inches, or 2.34 inches below normal, and August 2.42 inches, or 1.02 inches below normal.

The average number of days with 0.01 inch of precipitation, was 22, or 2 days less than last summer, and the lowest since 1913 when the number was 18; with the exception of 1916, when exactly the same number, 22 days, was recorded. The average number of clear days was 52, partly cloudy 29, and cloudy 11, as compared with 48 clear days, 28 partly cloudy, and 16 cloudy days during the summer of 1929.

Due to the high average rainfall in June, this summer does not seem unusually dry in comparison. There being 11 summer seasons having less total rainfall. But when only July and August are considered, the months when the most serious damage to crops occurred, the drouthy condition is apparent, there being three similar periods during the last 58 years when less rainfall occurred. For these two months, 1894 was the driest of record, having an average total of 2.21 inches; 1886 was

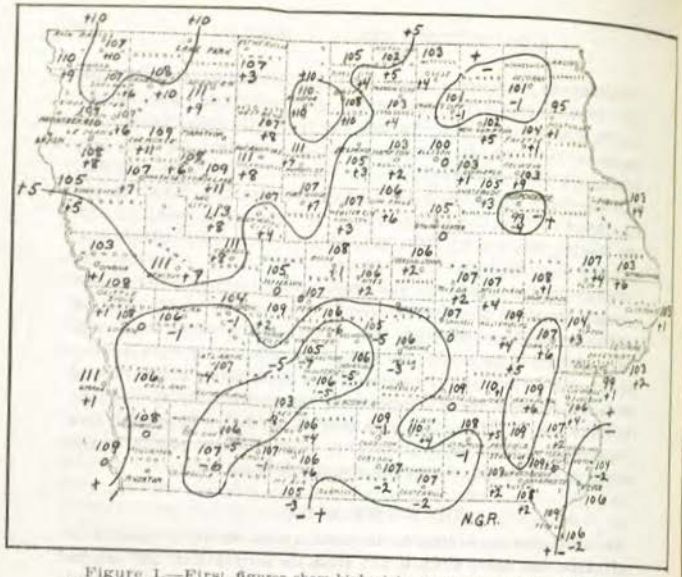


Figure 1.—First figures show highest temperature, August, 1930; second figures and lines, number of degrees higher (plus) or lower (minus) than previous high record for August.

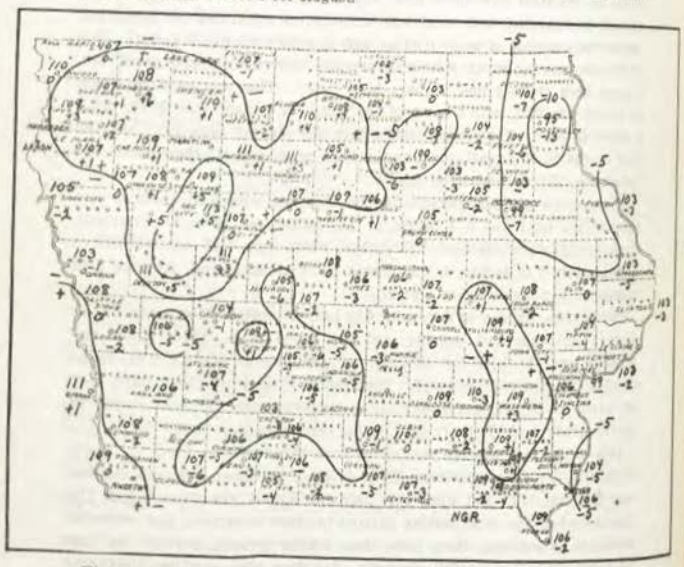


Figure 2.—First figures show highest temperature, August, 1930; second figures and lines, number of degrees higher (plus) or lower (minus) than previous all time high record.

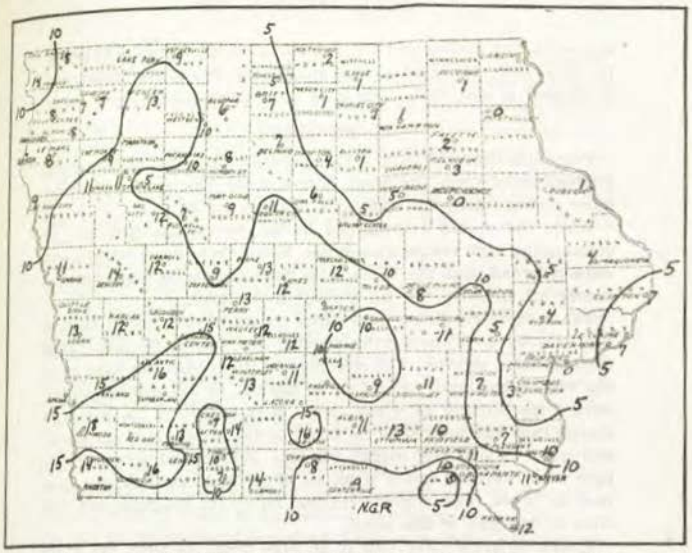


Figure 3.—Number of days in July and August, 1930, with maximum temperature 100° or higher; average number, 8.8 days per station, exceeded only by 1991 with 13.4.

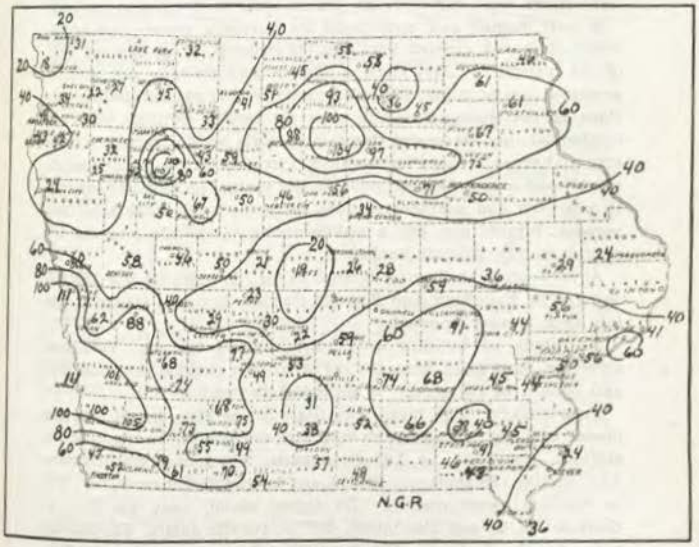


Figure 4.—Rainfall of July and August, 1930, in per cent of normal; average, 53.6%.

next with 2.52 inches, then 1901 with 3.63 inches and 1930 with 3.91 inches. In July 1930, the state average rainfall was 39% of the normal, and in August it was 71%. (See maps on preceding pages.)

SEPTEMBER

The chief characteristics of the weather for September, 1930, were the gradual relief from the drouth in most of the State and the unusually large damage done by windstorms, tornadoes and hail.

While the month averaged two degrees above normal, there were no outstanding high temperature periods. Most of the maximum temperatures were recorded near the middle of the month and the low temperatures at nearly all stations, the last five days of the month.

The moderately heavy rains during the fourth week brought relief to the drouthy conditions which prevailed over most of the State during the last three months. This relief came too late to benefit the major crops, but helped pastures, put the soil in condition for fall plowing, and permitted the seeding of winter grains. Much of the rain ran into great cracks that had opened in the ground as wide as one's hand and several feet deep. Much well digging was done. Pastures that were absolutely bare were showing green at the end of the month and furnishing some feed for stock. Corn ripened and dried rapidly and was mostly safe from frost at the end of the month.

Frosts occurred over most of the State during the latter half of the month. In the northern portions, killing frosts occurred on the last four days, with very little damage. In the central and southern portions only light frosts were reported, and even the tenderest of vegetation survived.

A well defined and concentrated low barometric pressure area which approached and crossed Iowa from the southwest, on the 25th and 26th of the month, the first storm of this type since the latter part of June, produced heavy rains, particularly in the central and southeastern portions of the State. The high winds and tornadic conditions which accompanied this storm did thousands of dollars worth of damage to property and crops. Iowa City received 6.13 inches of rain on the 25th, which established a new 24-hour record for that section. Six tornadoes occurred in southern and southeastern Iowa during the month, which killed two persons, injured one, left a total destructive path 38 miles long, and did approximately $250,000 damage.

A very severe hailstorm occurred on the 7th, which did over $800,000 damage in Woodbury and Plymouth counties. So great a damage at this late date is very unusual.

All kinds of building construction advanced favorably. Road construction progressed normally and several long stretches were completed and opened to the public by the end of the month.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 104 stations, was 66.3°, or 2.0° above normal. The greatest district excess, 3.2°, was in the southeast district, and the least district excess, 0.6°, was in the northwest district. The highest monthly mean was 71.5° at Keokuk No. 2, and the lowest, 60.3° at Postville (near). The absolute range for the State was 76°, from 101° at Bonaparte (near) on the 13th, to 25° at Decorah on the 29th. The average number of days with the maximum temperature 90° or above, was 4, ranging from 9 days at Baxter, Tipton, Williamsburg and Keokuk No. 2, to none at Alton, Estherville, Rock Rapids, Charles City, Northwood, Dubuque and Independence. The average number of days with the minimum temperature 32° or lower was zero. The greatest number of days with the minimum temperature 32° or lower at any one station, was 3, recorded at Postville (near). The greatest daily range in temperature at any one station was 55° at Boone (near) on the 22d.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 120 stations, was 2.31 inches, or 1.36 inches below normal. The greatest district deficiency was in the southwest district, 2.50 inches; and the least district deficiency was in the northwest district, 0.04 inch. The greatest deficiency at any station was 3.66 at Allison and Bedford, the greatest excess was 3.50 at Mason City. The greatest amount at a single station was 6.39 inches at Lake Park (near), and the least was 0.17 inch at Atlantic. The greatest amount in 24 consecutive hours was 6.13 at Iowa City on the 25th. The average number of days with 0.01 inch or more of precipitation for the State was 5, ranging from 3 days in the south-central district, to 7 days in the northwest and north-central districts. The State average number of days with 0.01 inch or more of precipitation this month is the lowest of record since 1908, 3 days being recorded. For individual stations the range was from 2 days at 10 stations, to 11 days at Estherville and Lake Park (near).

Miscellaneous Phenomena. Aurora: 3d, 18th, 19th, 28th, 29th, 30th. Circumzenithal Arc: 15th. Coronas, (lunar): 3d, 5th, 6th, 8th, 30th. Dews (heavy): 2d, 3d, 5th, 11th, 21st, 29th. Dust storm: 18th. Frost

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	1 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	29.96	30.37	30	29.20	26	79	45	57	21	22	3,855	5.2	24	nw.	26	81	+20
Davenport	29.95	30.34	30	29.36	25	76	45	53	20	20	5,604	7.8	30	nw.	26	74	+11
Des Moines	29.96	30.34	30	29.29	26	75	42	48	19	20	5,706	7.9	35	nw.	26	76	+14
Dubuque	29.96	30.36	30	29.29	26	81	45	52	22	20	3,790	5.3	19	s.	26	74	+16
Keokuk	29.97	30.32	30	29.45	25	74	46	51	22	3	4,341	6.0	38	w.	26	82	+19
Sioux City	29.94	30.32	2	29.61	25	77	46	50	25	20	7,008	9.9	39	nw.	26	61	— 4
Omaha, Neb.	29.98	30.34	2	29.47	25	75	49	51	22	20	4,147	5.8	32	nw.	26	74	+12
Means and extremes	29.95	30.37	30	29.20	26	77	45	52	19	20		6.9	139	nw.	26		
Normals and records	30.02	*30.67	25th 1926	¶29.29	29th 1927	83	64		§18	28th 1921			158	w.	7th 1872	62	

*Sioux City. ¶Des Moines. §Omaha. ‖Davenport. ‡Local mean time. †Also Davenport 39 miles from the SW. on the 26th.

‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

(light): 14th, 17th, 18th, 20th, 26th, 27th, 28th, 29th, 30th. Frost (heavy): 27th, 28th, 29th, 30th. Frost (killing): 25th, 28th, 29th, 30th. Fog (dense): 7th, 8th, 10th, 11th, 30th. Fog (light): 3d, 5th, 6th, 7th, 8th, 10th, 11th, 12th, 13th, 30th. Gales: 1st, 14th, 16th, 18th, 22d, 23d, 25th, 26th. Hail (light): 12th, 14th, 19th, 20th, 25th, 26th, 28th, 29th, 30th. Hail (moderate): 7th, 12th, 19th, 25th, 26th, 28th, 29th. Hail (heavy): 7th, 25th, 26th, 28th, 29th. Halos (lunar): 15th, 30th. Halos (solar): 4th, 13th, 15th, 23d, 24th. Haze: 6th, 8th, 9th. Parhelia: 15th. Thunderstorms: 1st, 5th, 6th, 7th, 8th, 12th, 13th, 14th, 18th, 19th, 22d, 24th, 25th, 26th. Tornadoes: 18th, 25th.

Rivers. The prolonged drouth was reflected in all of the interior streams, and unusually low stages prevailed with very little fluctuation. Most of the small streams were completely dry throughout the month.

The Missouri River had a falling tendency throughout the month, and averaged nearly normal along the Iowa boundary.

The Mississippi River stages remained very low throughout the month. At Dubuque the extreme stages were 1.7 feet and 1.0 foot, and the average was 1.3 feet. At Davenport the stage averaged 1.2 feet, or 1.9 feet below normal. At Keokuk the stage averaged lower during the month than any previous September on record as far back as 1860. The stage was continuously below the zero of the gage, except on the last two days, and averaged 0.7 foot below zero of the gage. Naturally, the low stages cut down the output of water power to a considerable extent.

OCTOBER

October weather averaged nearly normal but there were some outstanding temperature abnormalties. The first half of the month was mild. The warmest week centered on the 10th, when the temperature exceeded 90° in nearly all districts and reached 95° at Waterloo on the 12th. This was within two degrees of the State record for October, 97° having been recorded at Bloomfield on October 2, 1909. Only four times since 1873 has the maximum temperature reached a higher reading. At Davenport the maximum temperature of 88° on the 10th was the highest ever recorded so late in the season, while the minimum reading of 23° on the 21st equaled the lowest temperature ever recorded so early in the fall at that station. Two moderately cold periods occurred, 20th-21st, and again the last two days of the month.

Precipitation was below normal with the exception of a few scattered stations in the northwest, south-central and eastern districts, where the rainfall was deficient. The three principal rainy periods were, the first week, the 12th to 16th, and the 29th-30th.

Snow fell about the middle of the month at several stations, and with a few exceptions amounted to only a trace. On the 29th and 30th the snowfall was quite general, the heaviest occurring in the northwest district, and in the northeastern portion of the State between the Iowa and Maquoketa River Valleys.

A tornado struck near Menlo, in Beaver Township, Guthrie County, on the 1st. It left a marked path about 100 feet wide and 1½ miles long, and destroyed approximately $350.00 worth of property. It moved in the usual direction from southwest to northeast. A heavy electrical storm

accompanied by some wind and rain struck Sioux City and the southwest portion of Plymouth County about 2:30 p. m. on the 15th, but did no apparent damage. A light hail storm occurred at Knoxville on the 16th and did very little damage.

From the agricultural standpoint the month opened with the farm and garden season nearly ended. Rains during the first sixteen days soaked the soil, conditioning it quite well for fall plowing, some of which was done. Although the rains temporarily broke the drouth, they came too late to be of much benefit, except to winter wheat, pastures and meadows. The total rainfall was not enough to make a material reduction in the seasonal precipitation deficiency, so well digging and drilling was active in an effort to forestall the water shortage which continued serious. The general frost on the 17th killed all remaining garden truck, but the damage was of no commercial importance, as very little vegetation remained, all staple crops having been harvested or were safe from the frost. Corn husking progressed more rapidly than usual, 51% of the husking being done by the close of the month.

All kinds of building construction advanced favorably. The year's road construction program was either completed or nearly so by the end of the month.

A meteor of more than ordinary brilliancy was observed in the southeast, from Riverton, about 8:43 p. m. on the 2d. It started near the constellation of Pegasus' two south stars, and burned out near the point star B of Cetus, and left a well defined trail of a bluish-red color.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 104 stations, was 50.7°, or 1.1° below normal. There was a deficiency in all of the divisions of the State. The greatest deficiency, 1.7°, was in the northeast district, and the least, 0.1°, in the southwest district. The highest monthly mean was 54.0° at Keokuk, and the lowest was 47.3° at Northwood, Postville (near), and Mason City. The absolute range for the State was 86°, from 9° at Webster City on the 21st, to 95° at Waterloo on the 12th. The average number of days, with the maximum temperature 90° or above, was zero, but 11 stations reported one day with temperature reaching 90° or above. Maximum temperatures of 32° or higher occurred at 15 stations. The average number of days with the minimum temperature 32° or below was 11, ranging from 14 days at 3 stations, to 6 days at Keokuk. The greatest daily range in temperature at any one station was 46° at Washta, on the 24th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 118 stations, was 2.08 inches, or 0.35 inch below normal. The greatest district deficiency was in the west-central district, 1.06 inches, and the east-central district had the greatest district excess, 0.48 inch. The greatest precipitation deficiency, 1.84 inches at any one station, was at Riverton (near). The greatest excess in the State was 1.72 inches at Fairport. The greatest amount at a single station was 4.21 inches at Fairport, and the least was 0.71 inch at Logan. The greatest amount occurring in 24 consecutive hours was 2.18 inches at Sioux Center on the

15th and 16th. The average number of days with 0.01 inch or more of precipitation for the State was 7, ranging from 8 days in the north-central, northeast and central districts, to 6 days in the southeast, northwest and west-central districts. For individual stations the range was from 3 days at Storm Lake and Olin to 12 days at Charles City.

Snowfall. The average snowfall for the State was 0.4 inch, or 0.1 inch below normal. The greatest total snowfall for the month at any one station was 3.0 inches at Northwood, New Hampton and Tipton. There were 57 stations that received only a trace of snow for the month, and 17 stations received none. The greatest snowfall in 24 hours was 3.0 at Northwood, New Hampton and Tipton. The greatest number of days with 0.1 inch or more of snow on the ground at 7:00 p. m. was 2 days at Charles City and Northwood.

Miscellaneous Phenomena. Aurora: 19th. Dew (heavy): 9th, 10th. Fog (light): 3d, 5th, 7th, 14th, 15th, 23d, 24th. Fog (dense): 1st, 6th, 7th, 9th, 14th, 15th, 22d, 31st. Frost (light): 1st, 14th. Frost (heavy): 1st, 17th, 20th, 21st, 23d, 24th, 27th, 31st. Frost (killing): 14th, 16th, 17th, 18th, 19th, 20th, 21st, 22d, 23d, 24th, 28th, 31st. Gales: 11th, 16th, 17th, 18th, 19th, 25th, 27th, 28th, 29th, 30th. Hail: 16th. Halo (lunar): 2d, 11th. Halo (solar): 4th, 6th. Haze: 22d. Meteor: 2d. Sleet: 16th, 29th. Snow: 5th, 15th, 16th, 17th, 22d, 24th, 29th, 30th. Thunderstorms: 1st, 2d, 3d, 4th, 6th, 7th, 12th, 14th, 15th, 16th, 27th. Tornado: 1st.

Rivers. Even though the State average precipitation was nearly normal, the interior rivers and streams had unusually low stages, with very little fluctuation. Many of the small streams were completely dry most of the month.

On the Missouri River nearly normal stages prevailed, with very little change.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.09	30.65	21	29.60	16	84	61	69	38	28	4,508	6.1	23	w.	17	44	—13
Davenport	30.09	30.60	21	29.62	7	82	58	65	33	17	5,671	7.6	34	w.	17	49	—12
Des Moines	30.08	30.62	21	29.58	15	80	56	62	28	28	6,239	8.4	34	w.	17	58	— 5
Dubuque	30.08	30.63	21	29.61	16	84	62	67	39	28	3,648	4.9	18	nw.	16	41	—13
Keokuk	30.11	30.65	21	29.64	16	79	54	64	33	19	4,349	5.8	28	w.	17	63	+ 9
Sioux City	30.06	30.63	21	29.54	15	80	56	66	31	17†	8,583	11.5	42	nw.	17	66	+ 4
Omaha, Neb.	30.07	30.62	21	29.54	15	77	51	53	23	27	4,978	6.7	30	nw.	16	64	+ 1
Means and extremes	30.08	*30.65	21	‡29.54	15	81	57	64	23	27		7.3	42	nw.	17	55	— 5
Normals and records	30.30	*30.69	31st 1913	‡28.96	20th 1876	81	62	¶16		6th 1928			‡49	sw.	16th 1880	69	

*Davenport; Also Sioux City on the 29th, 1928. ‡Omaha. ¶Des Moines. ‖Davenport. †Also Charles City. ‡Local mean time. †And other dates.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

The Mississippi River stages remained very low throughout the month. At Dubuque the extreme stages were 2.7 feet and 1.7 feet, and averaged 2.2 feet. The low stage was the lowest recorded in October since 1925, and the mean stage was the lowest for October since 1923. At Davenport and Keokuk the river continued at very low stages throughout the month.

NOVEMBER

Large wind movement, a protracted mild period, and a large number of heavy rains, were the leading weather features of Novmber, 1930. Nearly three-fourths of the stations reported more than one-half of the monthly total during a single 24-hour period. Sioux City reported the greatest 24-hour rainfall of record for November.

The mean temperature averaged 41.3° and this has been exceeded but four times in the last 58 years. Approximately one-half of the stations reported their maxima on the 19th, and a number of stations reported the highest maxima ever recorded so late in the season. The lowest temperature occurred in the last part of the first week and most of the last week. The period, 8th-23d inclusive, was continuously above normal and constituted one of the most unusual periods of mild weather experienced in November. The most severe weather occurred on the 28th in the northeastern quarter of the State where the snow cover was greatest. The minimum of —16° at Decorah was the lowest recorded in Iowa in November since 1898, when a minimum of —17° occurred.

Precipitation averaged approximately 37% above normal, but it was below normal in the central and east-central divisions. There have been but three months of the current year that have had more than normal precipitation, and the combined excess of the three months, January, June and November, have been less than the deficiency of July alone. The principal precipitation periods were 15th-16th, 19th-20th and 29th-30th. In each period heavy rains occurred in some portion of the State. There was practically no rain or snow during the first two weeks.

The month was unusually favorable for corn husking, which progressed rapidly, and by the close of the month only 3% remained unhusked, which is the least since 1913. The rains of October and November replenished the depleted soil moisture and permitted an unusually large amount of plowing, and also benefited winter wheat, pastures and meadows. The water supply in general continued seriously deficient.

The snowfall was about normal in the northeastern half of the State, and much below normal in the rest of the State. The snow cover was greatest where the temperatures were severest, and it is unlikely that winter grains or meadows suffered damage of consequence. Considerable glaze on streets and highways during the last week, in the northeastern portion of the State, constituted a great hazard to auto traffic. Building operations and other outside work were carried on with very little interruption.

Temperature. The mean temperature for the State, derived from the means of 9 districts of nearly equal area, and based on the records of 106 stations, was 41.3°, or 4.7° above normal. There was an excess in all districts. The greatest excess, 5.9°, was in the southwest district, and the least, 3.5°, in the northeast district. The highest monthly mean was

45.0° at Lenox, and the lowest was 36.6° at Lake Park (near). The absolute range for the State was 95°, from 79° at Clinton on the 19th, to —16° at Decorah on the 28th. The average number of days, with the maximum temperature 32° or lower, was 3, ranging from 6 days at Postville, to 1 day at Onawa and Thurman. The average number of days with the minimum temperature 32° or lower was 20, ranging from 27 days at Rock Rapids, to 12 days at Davenport, Burlington and Keokuk. The greatest daily range in temperature at any one station was 46° at Webster City on the 3d and Ottumwa on the 9th. The average number of days with the minimum temperature zero or lower, was 1.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 121 stations, was 2.12 inches, or 0.57 inch above normal. The greatest excess was in the northwest district, 1.20 inches, and the central district had the least excess, 0.03 inch. The greatest precipitation excess at a single station, 3.13 inches, occurred at Centerville, and the greatest deficiency 1.11 inches, at Audubon. The greatest amount at any single station was 4.57 inches at Centerville, and the least was 0.79 inch at Dubuque. The greatest amount occurring in 24 consecutive hours was 2.84 inches at Centerville on the 19th and 20th. The average number of days with 0.01 inch or more of precipitation for the State was 5, ranging from 7 days in the east-central district, to 4 days in the northwest, west-central, central and southwest districts. For individual stations the range was from 8 days at Belmond, Charles City, Clinton, Dubuque and Muscatine, to 2 days at Baxter, Van Meter and Waukee.

Snowfall. The average snowfall for the State was 1.1 inches, or 1.2 inches below normal. The greatest total snowfall at any one station was 5.0 inches at Northwood and Postville (near). There were 32 stations that received only a trace of snow, and Clarinda, Cumberland (near), Guthrie Center, Lacona and Red Oak (near) received none. The greatest snowfall in 24 hours was 4.5 inches at Decorah on the 25th. The greatest number of days with 0.1 inch or more of snow on the ground was 7, at Cedar Falls and Northwood. The greatest depth of snow on the ground at any time was 4.5 inches at Decorah from the 25th to 28th inclusive.

Miscellaneous Phenomena. Cold wave: 26th. Corona (lunar): 3d, 4th. Fog (light): 3d, 4th, 10th, 11th, 12th, 13th, 14th, 15th, 18th, 19th, 29th, 30th. Fog (dense): 3d, 4th, 10th, 11th, 12th, 13th, 14th, 15th, 18th, 19th, 29th. Gales: 13th, 14th, 15th, 16th, 20th, 23d, 24th, 25th. Glaze: 29th, 30th. Hail (light): 20th. Halo (lunar): 3d, 5th, 6th, 9th, 30th. Halo (solar): 1st, 6th, 15th, 24th, 26th, 29th, 30th. Haze: 18th, 19th. Meteor shower: 17th. Parhelia: 26th. Rainbow: 20th. Sleet: 20th, 23d, 24th, 29th. Thunderstorms: 15th, 16th, 19th, 20th. Tornado: 20th, pendent, funnel-shaped cloud, with rotary winds and roaring noise, observed passing over Manilla at 3:30 a. m., did not touch the ground; no damage occurred.

Rivers. Low stages prevailed on all interior streams, with little fluctuation. At Des Moines the extreme stages were 1.1 feet and 0.5 foot, and averaged 0.7 foot, or 2.0 feet below normal.

The Missouri River averaged nearly normal. At Sioux City the highest stages were recorded during the third week, and at the close of the month the river had fallen to a stage of 2.4 feet due to ice gorges, which was the lowest recorded this year. At Omaha only slight fluctuation occurred.

On the Mississippi River the stages remained very low throughout the month, and the fluctuations were of little importance. Navigation on the river at Dubuque was officially closed on the 21st. There was much running ice after the 26th but the channel remained open.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.04	30.65	6	29.03	16	84	59	69	31	6†	5,370	7.5	23	s.	29	63	+16
Davenport	30.08	30.64	7	29.18	16	80	59	62	29	8	7,673	10.7	36	sw.	29	62	+12
Des Moines	30.05	30.61	6	29.06	16	76	52	58	33	26	7,661	10.6	40	nw.	25	70	+16
Dubuque	30.06	30.66	6	29.15	16	82	61	67	35	7	4,737	6.6	23	nw.	24	67	+11
Keokuk	30.11	30.65	7	29.21	16	75	51	57	27	8	5,723	7.9	31	nw.	25	67	+16
Sioux City	30.04	30.70	5	29.20	16	77	58	61	36	4	9,133	12.7	51	nw.	25	68	+16
Omaha, Neb	30.05	30.64	5	29.21	16	70	49	54	29	6	5,684	7.9	41	nw.	25	73	+18
Means and extremes	30.06	------	------	------	------	78	56	61	---	------	------	9.1	------	------	------	66	+15
	------	30.70	5	29.03	16	--	--	--	27	8	------	----	51	nw.	25	--	----
Normals and records	30.07	------	2d	------	28th	81	--	72	---	6th	------	----	------	------	10th	51	----
	------	*30.96	1896	§29.03	1918	--	--	--	¶16	1916	------	----	‡51	sw.	1919	--	----

*Sioux City. §Davenport. ¶Omaha. ‖Keokuk. ‡Local mean time. †And other dates.
‡‡January 1, 1928, 2-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

DECEMBER

December weather was mild and dry. Nearly all of the stations reported their maxima on the 9th. At Des Moines the maximum temperature, 61°, recorded on the 9th, broke all the previous records for that day, 57° being recorded in 1889. At many stations the thermometer did not reach the zero mark. The minimum for the month at Omaha, 13° on the 1st, was the highest December minimum of record for that station.

Precipitation averaged exactly 50% of normal, and was below normal in all of the districts. Albia, Centerville, Maquoketa, Olin, Oskaloosa, Ottumwa and Washington, were the only stations that had precipitation in excess of their normal. The southwest district had the greatest precipitation deficiency for the State.

Snow fell mostly on the 13th, 18th and 20th, and averaged 50% of the normal. It was about normal in the east-central district, and much below normal in the rest of the State. The snow cover was the greatest where the temperatures were the severest, and it is unlikely that winter grains or meadows suffered damage of consequence.

Building operations and other outside work were carried on with very little interruption.

The water supply in general continued seriously deficient.

Temperature. The mean temperature for the State, derived from the

means of 9 districts of nearly equal area, and based on the records of 106 stations, was 26.7°, 2.6° above normal. There was an excess in all districts. The greatest excess, 4.9°, was in the northwest district, and the least, 0.2°, in the east-central district. The highest monthly mean was 31.6° at Keokuk, and the lowest was 21.5° at Northwood. The absolute range for the State was 75°, from 65° at Albia on the 9th, to −10° at Olin on the 16th and 17th. The average number of days with the maximum temperature 32° or lower, was 14, ranging from 25 days at Northwood to 5 days at Fairport and Clarinda. The average number of days with the minimum temperatures 32° or lower was 30, ranging from 31 days at 42 stations, to 25 days at Burlington, Keokuk and Keokuk No. 2. The average number of days with the minimum temperature zero or lower, was 1, ranging from 6 days at Decorah, to none at 79 stations. The greatest daily range in temperature at any one station was 43° at Olin on the 24th.

Precipitation. The average precipitation for the State, derived from the averages of 9 districts of nearly equal area, and based on the records of 121 stations, was 0.57 inch, or 0.57 inch below normal. The greatest deficiency was in the southwest district, 0.78 inch, and the southeast district had the least deficiency, 0.15 inch. The greatest precipitation excess at a single station, 0.32 inch, occurred at Centerville, and the greatest deficiency, 1.06 inches, at Thurman. The greatest amount at a single station was 1.69 inches at Washington, and the least was a trace at Lake Park (near). The greatest amount occurring in 24 consecutive hours was 1.34 inches at Fairfield on the 4th-5th. The average number of days with 0.01 inch or more of precipitation for the State was 4, ranging from 6 days in the east-central district, to 2 days in the northwest district. For individual stations the range was from 9 days at Clinton and Muscatine, to none at Lake Park (near).

Snowfall. The average snowfall for the State was 3.0 inches, or 3.0 inches below normal. The greatest total snowfall at any one station was 9.0 inches at Maquoketa and Olin. Albia and Lake Park (near) received only a trace of snow, which was the least in the State. The greatest snowfall in 24 hours was 5.0 inches at Tipton, on the 13th. The greatest number of days witth 0.1 inch or more of snow on the ground was 23, at Delaware (near) and Dubuque. The greatest depth of snow on the ground at any time was 6.7 inches at Olin on the 22d.

Miscellaneous Phenomena. Aurora: 3d. Cold wave: 1st, 16th, 17th, 30th, 31st. Corona (lunar): 1st, 10th, 23d, 28th, 30th. Dust storm: 29th. Fog (dense): 3d, 4th, 5th, 6th, 7th, 8th, 26th. Fog (light): 3d, 4th, 5th, 6th, 7th, 8th, 16th, 26th. Gales: 11th, 20th, 29th, 31st. Glaze: 4th, 5th. Halo (lunar): 9th, 10th, 24th, 27th, 28th, 30th. Halo (solar): 10th, 12th, 17th, 27th. Haze: 3d. Heavy white frost: 3d, 7th, 8th, 16th, 17th, 23d, 24th, 27th, 28th, 29th, 30th. Hoar frost: 6th, 7th, 8th. Sleet: 4th, 5th, 13th, 18th, 24th, 25th. Smog, dense (mixture of smoke and fog): 2d. Snow: 1st, 3d, 4th, 5th, 11th, 12th, 13th, 14th, 15th, 17th, 18th, 19th, 20th, 21st, 22d, 23d, 25th, 26th, 27th, 28th, 29th, 31st. Sudden rise in temperature: 2d, 24th, 31st. Temperature (record high): 9th.

Rivers. Low stages prevailed on all interior streams, with little fluctuation. At Des Moines the extreme stages were 1.0 foot and 0.3 foot, and averaged 0.6 foot, or 1.8 feet below normal.

The Missouri River averaged 1.5 feet below normal, with very little fluctuation, at both Sioux City and Omaha.

On the Mississippi River the stages remained very low throughout the month. At Dubuque the average stage was 3.4 feet and at Davenport, 1.2 feet. With the exception of 4 days during the month, the river stage readings at Keokuk were below the zero of the gauge.

PRESSURE, RELATIVE HUMIDITY, WIND AND SUNSHINE

Stations	Barometric Pressure, Inches (Sea Level)					Relative Humidity, %					‡‡Wind					Sunshine	
						Mean							Maximum				
	Mean	Highest	Date	Lowest	Date	7 A. M.	12 Noon‡	7 P. M.	Lowest	Date	Total movement	Average hourly velocity	Miles	From	Date	% possible	Departure from normal
Charles City	30.13	30.73	16	29.66	10	87	73	84	44	1	3,895	5.2	29	nw.	29	41	— 3
Davenport	30.13	30.76	16	29.68	10	85	71	78	22	1	6,468	8.7	40	nw.	29	49	— 3
Des Moines	30.13	30.72	16	29.70	10	81	66	73	36	9	6,036	8.1	50	nw.	29	48	— 2
Dubuque	30.11	30.75	15	29.63	10	88	78	85	61	2	2,756	5.0	23	nw.	29	36	— 5
Keokuk	30.16	30.74	16	29.75	10	80	63	68	19	1	5,053	6.8	30	nw.	29	52	+ 5
Sioux City	30.16	30.69	15	29.70	10	84	70	71	25	9	6,860	9.2	31	nw.	20	46	— 3
Omaha, Neb.	30.16	30.68	16	29.75	10	78	65	66	31	1	4,979	6.7	29	nw.	29	49	— 2
Means and extremes	30.14	30.76	16	29.63	10	83	69	75	19	1		7.1	40	nw.	29	44	— 2
Normals and records	30.12	*31.09	29th 1917	§29.00	13th 1920	84	67	77	¶18	12th 1922			*47	nw.	24th 1907	46	

*Sioux City. §Dubuque. ¶Keokuk. ‡Local mean time.
‡‡January 1, 1928, 3-cup anemometers replaced 4-cup instruments. See footnote under similar table at end of January.

COMPARATIVE DATA FOR STATE—Annual

Year	Temperature: Mean annual	Temperature: Highest	Temperature: Date	Temperature: Lowest	Temperature: Date	Precipitation in Inches: Annual	Precipitation in Inches: Greatest annual	Precipitation in Inches: Least annual	Precipitation in Inches: Average snowfall
1873	46.1	102	August 31	—38		33.92	41.04	29.34	----
1874	47.7	101	July 5	—24	January 24	30.76	39.76	25.43	----
1875	43.3	97	July 16	—31	January 14	35.83	48.42	28.55	----
1876	45.9	96	August 24	—28	December 9	36.65	53.57	19.92	----
1877	48.4	100		—31	January 8	35.16	49.83	22.23	----
1878	50.0	104		—13	January 6	34.53	42.08	20.92	----
1879	48.0	102		—35	December 25	28.23	46.71	16.49	----
1880	47.9	104		—25	December 27	30.95	51.10	14.90	----
1881	47.5	104		—40	January 9	44.16	56.81	34.02	----
1882	48.4	98		—23	December 7	33.40	50.30	17.71	----
1883	44.8	100		—38		34.54	46.15	18.00	----
1884	46.0	96		—38	January 5	35.59	46.60	23.35	----
1885	44.7	102	July 30	—42	January 28	32.23	44.89	17.91	----
1886	46.4	103	July 13	—34	February 4	24.71	35.48	15.55	----
1887	46.6	105	July 29	—34	January 7	26.31	38.61	12.30	----
1888	45.3	110	August 2	—43	January 15	31.44	41.17	20.60	----
1889	48.0	104	August 30	—28	February 23	24.95	37.61	13.66	----
1890	47.5	110	July* 13	—27	January 22	29.48	45.45	16.54	----
1891	47.3	106	August 9	—31	February 4	32.90	49.05	23.48	----
1892	46.6	104	July 11	—38	January 19	36.58	48.77	24.78	34.2
1893	45.7	102	July* 13	—36	January 14	27.59	33.27	19.19	27.2
1894	49.7	109	July 26	—37	January 25	21.94	29.81	15.65	19.2
1895	47.2	104	May 28	—33	February 1	26.77	35.25	18.57	26.0
1896	48.6	104	July 3	—20	January 4	37.23	51.60	28.68	22.6
1897	47.8	106	July* 23	—30	January 25	26.96	36.18	20.21	38.8
1898	47.7	103	August 20	—25	December 31	31.34	55.47	19.51	40.3
1899	47.3	104	Sept. 6	—40	February 11	28.68	42.06	21.79	23.4
1900	49.3	103	August 3	—27	February 15	35.05	47.33	25.05	25.8
1901	49.0	113	July 22	—31	December 15	24.41	37.69	16.35	38.5
1902	47.7	98	July 30	—31	January 27	43.82	58.80	30.14	28.0
1903	47.2	101	August 24	—27	December 13	35.29	50.53	26.41	19.4
1904	46.3	100	July 17	—32	January 27	28.51	38.93	19.34	39.2
1905	47.2	104	August 11	—41	February* 2	36.56	52.26	24.66	38.3
1906	48.4	102	July 21	—32	February 10	31.60	44.34	20.63	32.8
1907	47.4	102	July 5	—31	February 5	31.61	43.90	19.98	24.0
1908	49.4	101	August 3	—18	January 29	35.09	49.98	24.11	32.7
1909	47.4	103	August* 15	—26	February* 15	40.01	53.48	37.20	49.0
1910	48.6	108	July 16	—35	January 7	19.87	27.99	12.11	23.4
1911	49.5	111	July* 3	—35	January 3	31.37	46.77	19.74	35.3
1912	46.3	104	Sept. 8	—47	January 12	28.65	33.13	15.55	39.5
1913	49.7	108	July* 16	—25	January 8	29.95	45.18	20.31	25.4
1914	49.1	109	July 12	—31	December 26	31.93	44.11	23.30	27.5
1915	47.8	99	May 14	—32	January 28	39.53	51.15	27.99	31.3
1916	47.2	106	August 4	—34	January 13	28.90	46.34	22.48	29.5
1917	44.8	106	July 30	—40	December 29	27.81	36.00	20.78	32.4
1918	49.2	113	August 4	—36	February 4	32.78	47.53	25.06	33.4
1919	48.6	104	July* 30	—36	December 10	36.76	48.16	26.88	26.6
1920	48.2	102	July 23	—26	January* 4	31.75	44.00	20.95	21.7
1921	52.2	104	July* 11	—22	December 25	32.03	46.47	20.44	30.7
1922	50.2	104	June 23	—29	January 6	29.98	44.29	19.08	13.5
1923	49.0	102	July* 22	—23	February* 3	29.50	37.47	21.36	36.3
1924	46.4	100	August* 21	—36	January 5	31.39	43.85	19.41	37.2
1925	48.8	105	July* 1	—25	December 29	28.24	45.53	13.77	29.5
1926	48.3	109	July* 19	—22	January 28	33.07	48.36	22.35	27.8
1927	48.8	102	July 11	—27	January 15	29.35	47.54	18.75	17.9
1928	49.4	100	August 1	—20	January 2	35.96	47.81	24.67	22.5
1929	46.4	102	August 22	—35	February 20	30.20	44.24	20.57	41.8
1930	50.2	113	August* 3	—37	January 22	26.10	35.65	16.15	23.6
M'n	47.7					31.72			29.6

*And other dates.

MONTHLY STATE DATA FOR 1930

Month	Barometric Pressure Inches (Sea Level): Mean	Barometric Pressure Inches (Sea Level): Highest	Barometric Pressure Inches (Sea Level): Date	Barometric Pressure Inches (Sea Level): Lowest	Barometric Pressure Inches (Sea Level): Date	Temperature Degrees, F.: Mean	Temperature Degrees, F.: Departure from normal	Temperature Degrees, F.: Highest	Temperature Degrees, F.: Date	Temperature Degrees, F.: Lowest	Temperature Degrees, F.: Date	Relative Humidity Per Cent: 7 a. m.*	Relative Humidity Per Cent: 12 noon†	Relative Humidity Per Cent: 7 p. m.*	Relative Humidity Per Cent: Departure from normal‡	Relative Humidity Per Cent: Lowest	Precipitation, Inches: Average	Precipitation, Inches: Departure from normal	Precipitation, Inches: Greatest	Precipitation, Inches: Least	Precipitation, Inches: Snowfall	No. of Days: With .01 inch or more precipitation	No. of Days: Clear	No. of Days: Partly cloudy	No. of Days: Cloudy	Sunshine: Pct. of possible amt.	Sunshine: Departure from normal	Wind: Average hourly velocity	Wind: Prevailing direction
January	30.26	30.84	19	29.40	14	10.5	— 8.0	58	7	84	70	78	68	48	0	26	1.33	+0.26	2.51	0.41	14.7	8	14	11	6	61	+ 9	8.1	nw.
February	29.99	30.64	15	29.34	24	35.5	+12.9	80	34	82	64	68	48	31	4	21	0.67	—.51	2.45	0.06	2.8	5	11	10	7	57	+21	8.2	sw.
March	29.96	30.69	2	29.47	6	37.3	+ 2.7	80	— 4	72	45	49	31	16	6	10	0.89	—.88	2.42	0.04	1.3	9	14	8	9	69	+11	10.7	sw.
April	29.90	30.45	25	29.23	17	52.1	+ 3.2	86	5	72	47	49	25	14	2	10	2.67	—.59	4.59	1.06	0.3	10	7	7	6	63	+ 1	8.4	sw.
May	30.01	30.32	8	29.43	13	60.2	+ 0.1	91	26	75	54	54	32	18	4	24	3.72	—.96	7.99	1.61	T.	11	14	10	7	74	+ 5	7.5	sw.
June	29.91	30.24	8	29.62	12	69.0	+ 0.3	91	37	76	54	55	34	18	4	24	6.83	+1.33	13.49	2.48	0	16	21	8	5	80	+ 8	6.3	sw.
July	29.90	30.31	14	29.61	2	77.9	+ 4.2	113	40	78	49	43	23	10	2	21	1.49	—2.34	6.58	T.	0	8	15	11	5	62	+12	5.1	ne.
August	30.02	30.33	11	29.61	3	74.4	+ 2.7	113	41	79	49	52	28	11	3	21	3.42	—1.02	6.71	0.48	0	8	15	7	4	74	+ 7	6.9	sw.
September	29.99	30.37	30	29.39	26	68.3	+ 2.0	101	25	77	45	62	32	19	5	25	2.41	—1.36	6.39	0.17	0	5	7	14	7	55	+15	7.8	nw.
October	29.95	30.37	9	29.39	15	50.7	+ 1.1	96	9	81	57	64	41	27	7	21	2.08	—.55	4.21	0.71	0.4	10	6	7	7	66	+16	9.1	sw.
November	30.08	30.65	21	29.54	16	41.3	+ 4.7	79	—16	78	56	61	37	21	1	27	2.19	+0.37	4.57	0.79	1.1	5	4	6	13	44	— 2	7.1	nw.
December	30.06	30.70	5	29.68	16	30.7	+ 2.6	65	—10	88	69	75	52	33	9	19	0.57	—.57	1.69	T.	3.0	4	12	6					
Means and Extremes	30.02	30.84	10	29.68	16	50.2	+ 2.2	113	—37	77	54	68	46	27	6	26	26.10	—6.05	35.65	T.	30.7	81	121	96	80	64	+ 5	7.8	sw.
Normals and Records	30.02	31.09 Jan. 25 1905	25	28.69 Feb. 28 1902	28	48.0		113	—47	81	66					5	33.15		19.80	0.00		96	166	103	59	98	59			

†Local mean time.
‡Normal central time.
*And other dates.
¶7 A. M. and 7 P. M. observations only.

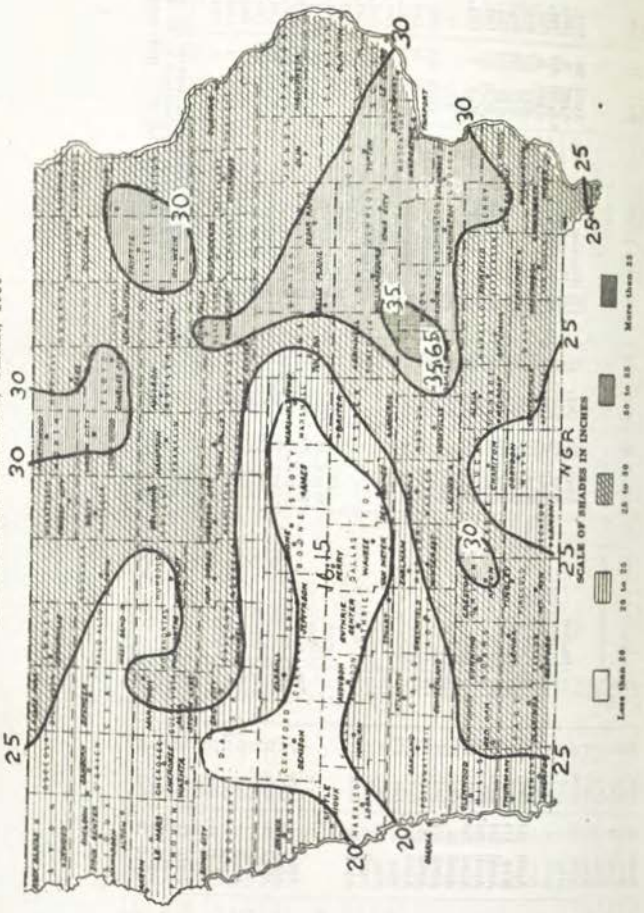
DATES OF KILLING FROST, 1930

Charles City, Davenport, Des Moines, Dubuque, Keokuk, Sioux City, Omaha and Marshalltown, excluded from averages because of city influences.

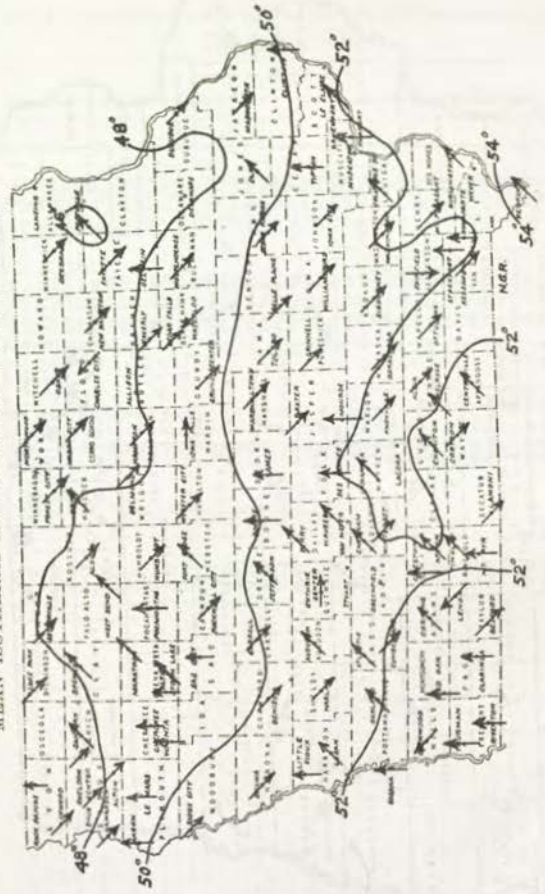
STATIONS	Last in Spring	First in Autumn	Days in growing season
Northwest District			
Alta	May 17	Oct. 16	152
Alton	May 17	Oct. 14	150
Cherokee	May 17	Oct. 17	153
Estherville	May 18	Sept. 28	133
Inwood (near)	May 17	Sept. 27†	133
Lake Park (near)	May 17†	Sept. 28	134
Le Mars	May 17†	Oct. 17	153
Pocahontas	May 17†	Oct. 17†	153
Rock Rapids	May 17	Oct. 17	153
Sanborn	May 17	Oct. 17	153
Sheldon	May 17	Oct. 14	150
Sioux Center	May 17†	Sept. 27	133
Spencer	May 17	Oct. 14	150
Storm Lake	May 17	Oct. 17	153
Washta	May 24	Oct. 17	146
West Bend	May 17	Oct. 17	153
Rural Average	May 18	Oct. 12	147
North Central District			
Algona	May 17†	Oct. 17†	153
Allison (near)	May 17	Sept. 28	134
Belmond	May 17	Sept. 28	134
Britt	April 26†	Sept. 28†	155
Charles City	April 25	Sept. 28	156
Forest City	May 17†	Sept. 28	134
Hampton	May 17	Sept. 30	136
Humboldt	May 17†	Oct. 17†	153
Mason City	May 30	Sept. 28	121
Northwood	May 17†	Sept. 28	134
Osage	May 17†	Sept. 28†	134
Rural Average	May 16	Oct. 2	139
Central District			
Ames	April 25†	Oct. 17†	175
Baxter	April 25†	Oct. 17	175
Boone (near)	May 30†	Sept. 28	121
Des Moines	April 2	Oct. 17	198
Fort Dodge	May 17†	Oct. 17†	153
Grinnell	May 17	Oct. 17†	153
Grundy Center	May 17†	Oct. 17	134
Iowa Falls	May 17†	Sept. 28	134
Marshalltown	April 25	Oct. 17	175
Monroe	April 23†	Oct. 17	177
Perry	April 25	Oct. 17	175
Toledo	April 25	Oct. 17	175
Waukee	April 25†	Oct. 17†	175
Webster City	May 30	Oct. 17	140
Rural Average	May 8	Oct. 14	159
South Central District			
Afton	April 24†	Oct. 17†	176
Albia	April 25†	Oct. 17	175
Centerville	April 25	Oct. 17	175
Chariton (near)	April 25	Oct. 17†	175
Corydon (near)	April 25†	Oct. 17	175
Creston	April 22†	Oct. 17	178
Earlham (near)	April 25†	Oct. 17	175
Indianola	April 24†	Oct. 17†	176
Knoxville	April 25†	Oct. 17	175
Lamoni	April 24†	Oct. 17	176
Mount Ayr	April 24†	Oct. 17	176
Tingley	April 24†	Oct. 17	176
Winterset	April 24	Oct. 17	176
Rural Average	April 24	Oct. 17	176
Northeast District			
Decorah	May 24	Sept. 28	127
Dubuque	April 24	Oct. 17	176
Fayette	May 17	Sept. 28	134
Independence	April 26†	Oct. 17†	174
New Hampton	May 17†	Sept. 28	134
Oelwein	May 17†	Sept. 28†	134
Postville (near)	May 17	Sept. 28	134
Waterloo	April 26†	Sept. 28	155
Waverly	May 17	Sept. 28	134
Rural Average	May 13	Sept. 30	140
East Central District			
Belle Plaine	May 17	Oct. 17†	153
Cedar Rapids	May 17	Oct. 17†	153
Clinton	April 26	Oct. 17	174
Davenport	April 2	Oct. 17	198
Fairport	April 25†	Oct. 17†	175
Iowa City	April 8	Oct. 17	192
Maquoketa (near)	May 17†	Sept. 28†	134
Olin	May 17†	Sept. 28†	134
Tipton (near)	May 24†	Oct. 17†	146
Williamsburg	April 25†	Oct. 17†	175
Rural Average	May 6	Oct. 13	160
Southeast District			
Bonaparte (near)	April 25†	Oct. 17†	175
Burlington	April 2†	Oct. 17†	198
Columbus Junction	April 25†	Oct. 17†	175
Fairfield	April 25	Oct. 17†	175
Keokuk	Mar. 30	Oct. 20	204
Keosauqua	April 25†	Oct. 17†	175
Mt. Pleasant	April 24	Oct. 17	176
Oskaloosa	April 25	Oct. 17	175
Ottumwa	April 25	Oct. 17	175
Sigourney	April 25†	Oct. 17	175
Stockport (near)	April 27†	Oct. 17†	173
Washington	April 25†	Oct. 17†	175
Wever	April 25†	Oct. 17†	175
Rural Average	April 23	Oct. 17	177
State Average, 1930	May 4	Oct. 12	161
State Normal	May 3	Oct. 5	155

†Date of last temperature of 32° or lower in the Spring, or first temperature of 32° in the Autumn (as the case may be) when frost was not reported.

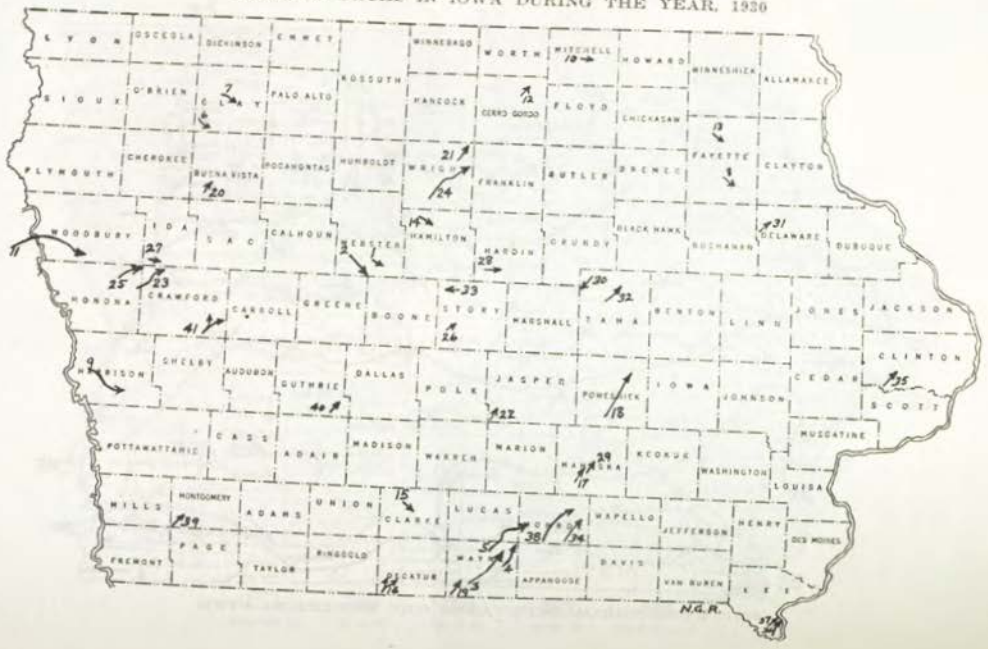
TOTAL PRECIPITATION, YEAR, 1930



MEAN ISOTHERMS AND PREVAILING WINDS, YEAR, 1930



TORNADO PATHS IN IOWA DURING THE YEAR, 1930



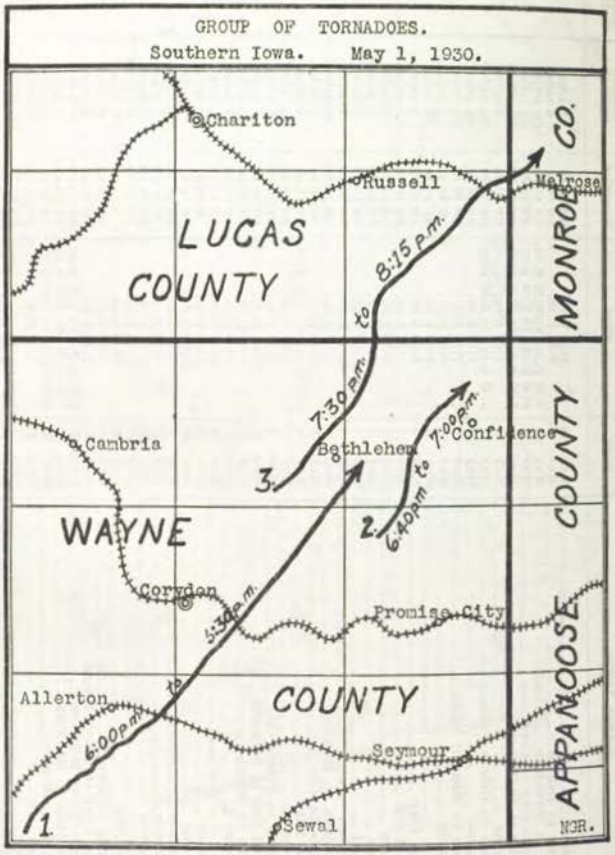
TORNADOES IN IOWA DURING THE YEAR, 1930

Nearest Towns	Date	Time	Direction	Length of Path	Persons Injured	Persons Killed	Estimated Damage
1. Dayton	Mar. 16	7:00 p.m.	nw to se	1 mile	0	0	$ 600
2. Gowrie to Lanyon	Mar. 16	8:00 p.m.	nw to se	6 miles	0	0	3,000
3. Clio to Bethlehem	May 1	6:00 p.m. to 6:30 p.m.	sw to ne	12½ miles	7	0	46,500
4. Promise City to Confidence	May 1	6:40 p.m. to 7:00 p.m.	sw to ne	7½ miles	3	0	8,000
5. Bethlehem to Melrose	May 1	7:30 p.m. to 8:15 p.m.	sw to ne	17½ miles	15	1	89,700
6. Peterson	May 1	5:30 p.m.	nw to se	5 miles	0	0	1,150
7. Spencer to Gillette Grove	May 1	5:40 p.m. to 6:00 p.m.	nw to se	6½ miles	0	0	20,000
8. Arlington	May 1	7:30 p.m.	nw to se	3½ miles	0	0	400
9. Modale to Missouri Valley	May 1	7:15 p.m.	nw to se	8½ miles	0	0	10,000
10. Stacyville	May 1	6:00 p.m.	w to e	1 mile	0	0	100
11. Salix	May 1	5:00 p.m.	nw to se	20 miles	0	0	10,000
12. Mason City	May 1	8:00 p.m.	sw to ne	1 mile	0	0	5,000
13. West Union	May 1	7:30 p.m.	nw to se	.1 mile	0	0	1,000
14. Stonega	May 1	6:30 p.m.	nw to se	½ mile	0	0	800
15. Osceola	May 5	7:30 p.m.	nw to se	3 miles	0	0	3,000
16. Lamoni	May 6	11:00 a.m.	sw to ne	5 miles	0	0	5,000
17. Oskaloosa	May 6	12:25 p.m.	sw to ne	5 miles	0	0	4,000
18. Montezuma to Hartwick	May 6	2:00 p.m.	sw to ne	12 miles	2	0	75,000
19. Lineville to Clio	May 8	5:30 p.m.	sw to ne	4 miles	0	0	200
20. Storm Lake	May 9	2:30 a.m. to 2:40 a.m.	sw to ne	8 miles	1	0	15,000
21. Belmond	May 9	4:00 a.m.	sw to ne	⅓ mile	0	0	1,000
22. Vandalia to Prairie City	June 2	3:00 p.m.	sw to ne	2 miles	0	0	2,000
23. Charter Oak to Schleswig	June 13	10:05 p.m.	sw to ne	8 miles	9	0	15,050
24. Clarion to Rowan	June 13	11:00 p.m.	sw to ne	14 miles	1	0	8,000
25. Mapleton	June 13	11:00 p.m.	sw to ne	7 miles	0	0	6,000
26. Ames	June 14	12:30 a.m.	sw to ne	¾ mile	0	0	2,000
28. Hubbard	June 25	1:30 p.m.	w to e	6 miles	0	0	1,000
27. Schleswig	June 20	10:00 p.m.	w to e	1 mile	0	0	5,000
29. Oskaloosa	July 5	5:00 a.m.	sw to ne	1½ miles	0	0	1,000
30. Gladbrook	July 19	6:00 p.m.	ne to sw	3 miles	0	0	5,000
31. Masonville	July 20	6:00 p.m.	sw to ne	2 miles	0	0	1,200
32. Garwin	July 20	6:00 p.m.	sw to ne	4 miles	0	0	2,000
33. Story City	July 26	9:30 a.m.	e to w	1 mile	0	0	500
34. Moravia to Albia	Sept. 18	3:00 p.m.	sw to ne	8 miles	0	0	6,000
35. Buena Vista to Grand Mound	Sept. 25	5.45 p.m.	sw to ne	4 miles	0	0	51,000
36. Summitville to Montrose	Sept. 25	2:30 p.m. to 4:00 p.m.	sw to ne	6 miles	1	2	18,000
37. Summitville to Mt. Clara	Sept. 25	3:30 p.m. to 4:00 p.m.	sw to ne	2 miles	0	0	2,000
38. Moravia to Fraker	Sept. 25	4:00 p.m. to 4:30 p.m.	sw to ne	14 miles	0	0	17,300
39. Climax	Sept. 25	4:30 p.m.	sw to ne	4 miles	0	0	1,000
40. Menlo	Oct. 1		sw to ne	1½ miles	0	0	350
41. Manilla	Nov. 20	3:30 a.m.	sw to ne		0	0	None
Total				217 7-12 miles	30	3	$ 444,850

GROUP OF TORNADOES

An unusually large number of tornadoes occurred in Iowa on May 1, 1930. Three of these tornadoes had approximately parallel paths from southwest to northeast only about 2 to 4 miles apart, and occurred in succession or relays. They crossed portions of Wayne, Lucas and Monroe counties between 6:00 p. m. and 8:15 p. m.; left destructive paths totaling 37½ miles in length; killed 1 and injured 25 persons; and caused property damage amounting to $144,200.

The accompanying map shows the territory crossed by these tornadoes.



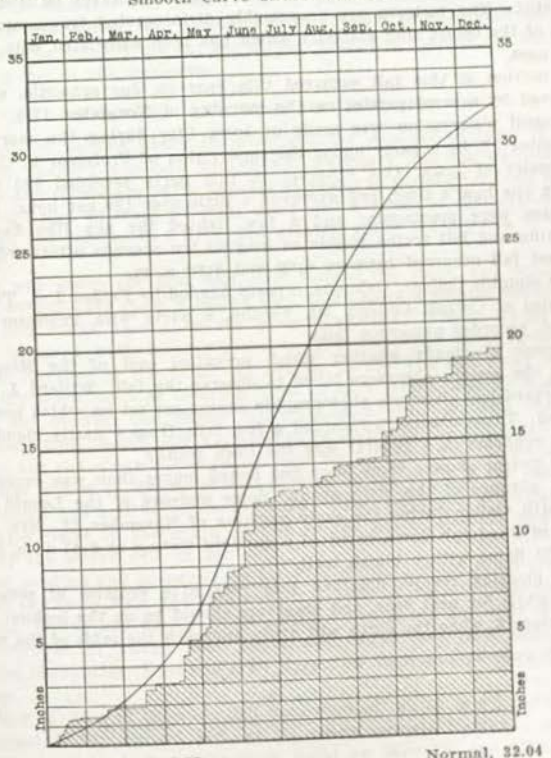
Tornado No. 1 originated in Warren Township, Wayne County, northeast of Clio, at 6:00 p. m. and proceeded in a northeasterly direction, crossing Jackson and Corydon townships, and dissipated at 6:30 p. m. about

½ mile southeast of Bethlehem in Wright Township. The destructive path varied from about 25 to 200 feet in width and was about 12½ miles in length. The estimated amount of damage done was $46,500. No one was killed, but seven persons were injured by flying debris.

About 10 minutes after No. 1 dissipated, tornado No. 2 originated in South Fork Township about 4½ miles to the south of where No. 1 broke up. It moved northeast into Wright Township and continued its destruction for 20 minutes; the path was about 150 feet wide and 7½ miles long. This tornado injured 3 persons and did $8,000 damage.

Tornado No. 3, which was the most severe of the three, began at 7:30 p. m. in Union Township, about 3 miles southwest of Bethlehem, and moved in a sinuous but generally northeastward direction. It passed across Union and Wright Townships of Wayne County, Washington Town-

PRECIPITATION
DES MOINES, IOWA
Line bounding shaded area shows accumulated depth in inches, 1930.
Smooth curve shows normal.



Total for 1930, 19.57 Normal, 32.04

ship of Lucas County, and dissipated at 8:15 p. m. in Jackson Township, Monroe County. The path was from 50 to 200 feet wide and about 17½ miles long. It caused $89,700 damage, killed 1, Mrs. Louis Bishop, and injured 15 persons.

THE LEONID METEORS OF 1930

By Norbert G. Ribble

(Weather Bureau Office, Des Moines, Iowa)

Leonid meteor falls occur approximately every 33 years and were expected this year during the early mornings between November 13th and 18th. The main shower is expected about November 15th between 1932-1934. Heavy showers of this fall occurred in 1799, 1833, 1867 and 1868, but failed to occur or were of little consequence in 1900. In 1833 meteors were reported to have fallen from every space in the sky the size of the moon. The bright flashes of light awakened sleepers, like lightning. The Leonid meteors are associated with the orbit of a comet observed in 1866, known as 1866I. The meteors are presumably disintegrated fragments of the head of the comet, and material which has been associated with it from past ages.

A portion of this fall occurred this year on due schedule, and was observed by several parties on the morning of November 17th. A very successful observation was made at Iowa City during the morning of November 17, by a party under the supervision of Professor C. C. Wylie, University of Iowa. One observer in this party recorded 120 meteors within one hour's time, and averaged a little over 100 per hour. Several of these were spectacular and a few lighted the sky like flashes of lightning and left trains visible as long as ten seconds afterwards. The greatest fall occurred between 4:00 and 6:00 a. m.

At Columbia College, Dubuque, a party headed by Father J. A. Theobald and also at Cornell College, Mt. Vernon, a party with Professor F. M. McGaw, recorded numerous falls.

Because of cloudy weather which prevailed east of the Mississippi River, the eastern observers failed to observe the fall. Willard J. Fisher of Harvard had elaborate photographic equipment set up which could not be used. Texas observers recorded a few falls from a partly cloudy sky, which confirms in a general way the Iowa results.

The meteor shower came later and lasted longer than was expected so far in advance of the main group. Some meteors of the Leonid group were still visible during the early morning of November 22. Mrs. Harry Allely of Randolph, Iowa, reported a daylight meteor at 6:47 a. m. having a bright flame with a bluish trail.

The pleasing results obtained this year give promise of something worth while for next year, and observers should be on the lookout about November 15, when the earth will again approach the orbit of the meteor swarm.

BRILLIANT METEOR OF DECEMBER 8, 1930

By Norbert G. Ribble

(Weather Bureau Office, Des Moines, Iowa)

In cooperation with the Weather Bureau, Dr. C. C. Wylie, Professor in Astronomy at the State University of Iowa, received more than two hundred reports from eight states, on the brilliant meteor which fell about five o'clock Monday evening, December 8.

Reports show that this meteor was observed from Iowa, Illinois, Indiana, Missouri, Arkansas, Mississippi, Tennessee and Kentucky. It fell probably a few miles north of Carlyle, Illinois, and southwest of Vandalia. As is usually the case, the information from the immediate vicinity of the fall was less complete than was desired, but observations from the distance were completely reported. It appears, however, that detonations were heard in the vicinity of the fall, the letters from that vicinity reporting that an explosion was heard about a minute after the fall of the meteor. Unfortunately the point of fall of possible meteorites is covered with brush and timber, and although there appears to be a good chance that something reached the surface of the earth, the chances are against recovering any of the meteorite.

WEATHER AND CROP REVIEW, 1930

Extremes of various kinds characterized the weather of Iowa in the year 1930. January was cold and snowy. February was the warmest in a century and rather dry, with unusual extremes in temperature. In Hamilton, Boone and adjacent counties there was a range of temperature of more than 100 degrees in 9 days, the greatest being 106 degrees at Webster City.

March was warm the first half, cold toward the close, and generally dry and windy. Live stock wintered well, there being a greater abundance of hay and rough feed than for several winters. Winter wheat and grasses wintered well, became green in February, and made growth a month in advance of the usual, up till March 15. The soil dried nicely and spring work, such as clearing fields of corn stalks, manure hauling, disking and plowing sod, made unusually good progress, with the soil in excellent tilth. Some oats were seeded in March in the south and west counties, but the weather turned too cold for germination. Some spring wheat was seeded in the northwest portion of the State, a few potatoes were planted and a little gardening done. Fruit advanced abnormally to the danger point in the south portion of the State. Peaches had been killed by the severe cold in January.

Spring seeding and preparations for corn planting made rapid progress in April and early May, and this work was done at the minimum expense for labor. Sunny and mostly warm weather during the first half of April was favorable for young pigs, lambs and chicks, but fruit buds were advanced too rapidly. Dust and sand storms on April 5 and 6 were notable features.

By May 15, 57% of the corn had been planted, which is 6% more than the normal, and by June 1, 97%, or 3% above normal. Reckoned in days, planting was two days earlier than usual on May 15, and three days

earlier on June 1. Winter wheat and spring grains made excellent progress, and at the close of May oats were beginning to head in localities as far north as Marshall County. Alfalfa had made good growth, and cutting had started in many localities. Frosts were frequent during the last half of May in the northern and east-central portions of the State, but the last killing frost in other portions of the State was general on the 24th or 25th of April. Tornadoes were unusually frequent, there being 19 reported in May, but the total damage was not as great as in some other years.

Violent local wind storms, tornadoes, rain floods, and hail, were unusually prevalent in June, the total damage running into millions of dollars. In spite of this, the general progress of crops and farm work was better than usual. This was due to the fact that there were intervals of several days between storms, which permitted thorough cultivation of corn. Temperatures were slightly cooler than normal in June, which favored the blooming and filling of small grains and timothy.

Scant rains after the first week in July were unusually favorable for haying and harvest. The yield and quality of oats, spring wheat, winter wheat, rye and barley, were exceptionally good. While the hay crop was shortened somewhat by deficient rainfall, the conditions were unusually favorable for setting timothy seed, and some phenomenal yields were reported, running in a few instances as high as 15 to 17 bushels per acre.

The outlook for a corn crop on July 1 was about the usual, but early in July one of the most notable and prolonged drouths in the history of Iowa began, attended by several periods with temperatures of 100 degrees or higher in much of the area of the State, but sandwiched with occasional cool days at intervals of about a week. Over about 15 counties in northwest, north-central and west-central Iowa, and a few counties in the southeast portion of the State, all previous records for high temperature in any month, in any year, were broken. The highest temperature reported was 113 degrees at Sac City, on Sunday, August 3, 1930, which will be long remembered as "the hot Sunday." The average maximum temperature at 102 stations on that date was 106.4 degrees, which is the hottest day in the history of Iowa. Next to the summer of 1901 this heated period was the most persistent. The total number of days with 100 degrees or higher, ranged from 18 at Glenwood, to none at Independence and Postville, the average number being 8.8 days compared with 13.4 days in 1901. In 1901, the heat distribution was fairly uniform over the State, while in 1930 the extreme heat was mostly in the western portion of the State. Areas in the northeastern and east-central counties received timely showers that practically offset all bad effects of the high temperature, while in the southwest counties the showers came soon enough to considerably mitigate the damage, but in a broad belt, extending from the northwest to southeast across the State, the heat and drouth combined, materially reduced the yield of corn.

Apparently the difficulty was most acute in Story County, where, in the months of July and August, there was only 19% of the normal amount of rainfall, and where there were 12 days with temperatures of 100 degrees or higher. In the southeast counties the drouth was most

prolonged and serious, many stations reporting from 20 to 31 consecutive days with less than 0.01 inch of rain. Also, in a limited area covering portions of Sioux and Plymouth counties, there were 20 to 35 consecutive days with less than 0.01 inch.

A feature of the drouth situation is that it extended through the fall months. In the west-central, central, south-central and southeast districts, the average rainfall of the four months, July to October inclusive, is the least in 57 years, being even smaller than in 1886, 1894 and 1901, which were outstanding drouth years. In the three months, July, August and September, the average total rainfall in the central district was only 4.48 inches, and in the southeast district in the same period, only 6.20 inches, which, in both cases, establishes a new record for drouth. For the months of July and August alone, the years 1886 and 1894 still hold the record for most of the State. However, at the Des Moines station, only 1.41 inches of rain occurred in 80 days, beginning July 5, which is the least ever recorded in that number of days in summer and fall.

Through all this trying situation corn showed a marvelous ability to endure punishment. In fields throughout the western and southern portions of the State, there was not only the usual firing near the ground, but nearly every corn plant showed leaves or tassels burned white with the intense heat. From an estimated average of 39 bushels July 1, the yield was cut to 32.5 bushels in the final estimate, or a total reduction due to unfavorable weather of at least 72,150,000 bushels worth $41,847,000 at the December 1 price. Of course, the price would have been lower, but for the reduction in the crop. Actually the reduction in the crop by heat and drouth was nearly 100,000,000 bushels, but the excellent fall weather resulted in saving about 2.5 bushels more per acre that is usually lost between maturity and husking time. Our correspondents on September 1, made allowance for the usual weather wastage, which did not occur, so the later estimates came up by that amount. There was no general killing frost till October 17, except in the north-central and northeast counties, and even there the corn was well out of danger before frost came.

In recent years there has been much weather wastage of corn between maturity and husking time, due to frequent heavy rains, wind storms, and snows; but this year, starting with 95% of the crop escaping frost damage, the fall was almost ideal for husking, the moisture content early became low enough for safe cribbing, 51% of the husking was done by November 1, and 97% by December 1, which is the greatest amount on that date since 1913.

The Iowa crop is 16% smaller than last year, while the total value of the crop is 30% less, which is an unusual spectacle and is due to the great national surplus of wheat and oats and the general business depression. The corn shortage for the nation as a whole is much greater than in Iowa, which makes the low price the more remarkable. For the second time in history, Nebraska stands second or next to Iowa in corn production. Timely rains fell in most of Nebraska.

Careful moisture tests of corn were again made this year from a still larger number of well distributed samples. On October 11 the average

moisture content was 23.35%, or 4.79% drier than last year; and on November 20 it was 18.06% or 3.14% drier than last year. With an estimated yield of 32.5 bushels per acre, obtained from our correspondents, and a moisture content of 18.06%, the yield per acre on a No. 2 contract grade basis would be about 31.5 bushels per acre.

Though the oats crop was the second largest in the history of the State, its value was the lowest since 1921. With an abundance of hay and oats the feed situation in Iowa is excellent and no sacrifice of live stock is necessary, but of export grains there is very little surplus, which would result in a material rise in corn prices if it were not for depressed business conditions.

The total value of Iowa crops of 1930, at December 1 prices, is estimated at $427,433,000, which is $143,664,000, or 25% less than last year and the least since the deflation of 1921. No attempt is made to estimate the value of the principal crops when fed to livestock. All of the major crops showed losses in value. Corn showed the largest loss, approximately $92,000,000, while oats lost $15,000,000 and tame hay lost $14,000,000. The only crops showing slight gains are flax seed, timothy seed, soy beans, sweet corn and pop corn, but these are minor crops.

Bulletin No. 1, April 8, 1930—

The outstanding features of the preceding winter were that December was nearly normal; January cold and snowy; February the warmest in a century and rather dry; March warm the first half; cold toward close, and generally dry and windy. Livestock wintered well; hay and rough feed more abundant than for several winters. Winter wheat and grasses wintered well, became green in February and made growth a month in advance of the usual up to March 15, but wheat began to show the effects of the shortage of moisture in the southeast counties toward the close of March. The soil dried nicely and spring work, such as clearing fields of cornstalks, manure hauling, disking and plowing sod, made unusually good progress, with the soil in excellent tilth. Some oats were seeded in the south and west counties, but the weather turned too cold for germination. Some spring wheat was seeded in the northwest portion of the State; a few potatoes were planted and a little gardening done. Fruit advanced abnormally and in danger in the south portion. Peaches were killed by severe cold in January. Good rains occurred in some northeast counties on March 31.

The past week was warm and dry with strong winds on the 5th, that lifted the dry surface soil high in the air in much of the State, constituting a dust storm sufficient to obscure the sun, pile the soil in drifts and stop field work in places. There was also considerable dust in some localities on the 4th and between sunset and midnight of the 6th. The warmth was not nearly so great as in the corresponding week last year.

Oats seeding made rapid progress and ranges from practically completed in the south to more than half done in the extreme north. It is feared that the dust storm has blown considerable seed out of the ground. The earliest seeded oats in the southeast counties are coming up slowly and unevenly, due to the drouth. In some northern counties seeding was delayed by frozen surface soil.

Preparations for corn planting have made unusual progress, with few weather handicaps to add to the expense. So far, the soil and weather conditions have closely resembled those preceding the great corn year of 1925. Reports from 658 crop correspondents of the combined Federal-State crop reporting service, show that only 88% of the seed corn is testing strong as compared with 92% last year. The poorest seed corn is in the southwest district, where it tests only 78% strong, and the poorest county is Taylor, with 66%.

While winter wheat and grasses would be benefited by a good rain, they are not suffering seriously, except that wheat is becoming a little spotted in some south-central and southeast counties, and several localities report soil blown away from roots. Grasses got an unusually early start but have not gained much recently. More clover has been seeded than usual.

Considerable gardening and potato planting has been done. Early gardens are up in the southern counties. Fruits are too far advanced for safety.

The dry, sunny and mostly warm weather has been favorable for young pigs, lambs and chicks, though adverse reports have been received from some localities.

Bulletin No. 2, April 15, 1930—

With the temperature averaging 62.3° or 14.9° above normal, the past week was farther above normal than any other week in many crop seasons except the week ending April 9, 1929. On Thursday, 10th, afternoon temperatures in the 90's were general except in the extreme northwest counties. At many stations in the southern half of the State previous high temperature records for April for more than half a century were equalled or exceeded. The highest reportd was 96° at Clarinda. The heat was severe on horses working in the fields. Drouth continued till the close of the week when scattered showers began in most of the State, became general, and are continuing this (Tuesday) morning, giving general relief.

Seldom does Iowa have such favorable spring seeding conditions. Fields were dry and firm so that manure spreading was completed early and easily. The barnyards are cleaner than for several years at this season.

Oats seeding is practically finished, except a little in the extreme north, with the best seed bed in several years. Though germination has been a little spotted, due to the drouth, fields are showing green in much of the State, and the recent rains will bring them along with a rush. Winter wheat, grasses, clovers and new seedings, have been greatly benefited by the rains.

Preparations for corn planting have proceeded rapidly to completion over much of the intended acreage, with the minimum of work and expense. A start has been made in planting in many counties as far north as Hamilton and Marshall, the earliest in many years. The bulk of the planting will be done by the calendar this year rather than by the condition of the soil and the weather. In many recent years, soil and weather have not been as favorable any time in May as they have been the past week. Severe frosts have occurred as late as the latter part of May following such an abnormally early spring.

Plums, pears and early apples burst into bloom during the week in most of the southern and western counties. Apple blooms are already too far advanced for the best results from first spray in some southeast counties. Currants are in full bloom. Strawberries are making excellent growth.

Gardening advanced rapidly and many potatoes were planted.

The warm, dry, sunny spring has been exceedingly favorably for young pigs, lambs and chicks except that on the 10th it was too hot for chicks.

Bulletin No. 3, April 22, 1930—

Cool, rainy weather prevailed during the past week. The rains were well distributed, exceeding one inch in all sections, except the southwest districts, and exceeding three inches at Albia and Dubuque. All moisture needs have been provided for. Frost and ice were general on the morning of the 19th.

Oats were brought up to a good stand by the rains except those recently seeded in the extreme north. Growth was retarded by the coolness, but most fields are green. In general, this crop is gettng a better start than normal.

Barley seeding is about finished and the early seeded is up and showing

green. Spring wheat is doing well. Winter wheat is making a good growth and was greatly benefited by the rains.

Pastures, meadows, alfalfa and sweet clover, were benefited by the rains and are doing well. Livestock is on pasture in much of the State somewhat earlier than usual. Most of the corn ground is ready for the planter, but only a little planting was reported in a few southern counties. Farmers are generally awaiting a safe date.

Conditions were not so favorable for young pigs and chicks.

Plums, apples and currants are in full bloom in the south half of the State, or in the extreme southern counties they are a little past the blooming stage, and cherries are opening. Some apples and cherries were damaged by the freeze. Strawberry buds were nipped back rather seriously in places by the freeze on the morning of the 19th.

Many potatoes have been planted and the earliest were up in time to be nipped by frost on the 19th. Gardening is farther advanced than usual. Rhubarb is plentiful.

Bulletin No. 4, April 29, 1930—

Cool weather with light showers toward the close of the week, was favorable for completing preparations for corn planting. The coolness made it easy for horses at work in the fields. Frosts or freezing on three or four nights in most of the State retarded the growth of vegetation and injured plums, cherries, apples, strawberries and potatoes, in spots and streaks, depending on the state of advancement of the blossoms, the topography and areas of protecting clouds. It now looks as though some favored localities would have a good fruit crop while others near by would have failures.

Corn planting was confined mostly to the extreme southern counties, where a few localities report 25% of the planting done. The ground is mostly ready and in fine tilth, with about the right amount of moisture, but too cold for germination. The corn planted two weeks ago is not up yet and will probably have to be replanted. A few warm, sunny days would bring planting on with a rush.

Oats made slow progress due to the frequent heavy frosts and freezes, and the color is generally rather pale. Spring wheat and barley are doing fairly well, and winter wheat looks good generally.

Pastures are growing slowly and not yet able to entirely sustain livestock. Hay prospects were much improved by the heavy rains of last week. New seedings are showing up nicely.

Young animals did not thrive so well during the last two weeks. The early growth of pastures increased the milk flow somewhat.

Bulletin No. 5, May 6, 1930—

The past week was warm with ample moisture in most of the State and plenty of sunshine. Tornadoes occurred in Wayne and Lucas counties 6 p. m. to 8 p. m. on May 1. Three distinct funnel shaped clouds were seen. Buildings on at least 14 farms were almost totally destroyed and the damage will exceed $100,000. Two persons were killed and eight badly injured. Another tornado in Harrison county, about the same time, damaged buildings on three farms. About 5:30 p. m. of the same date a tornado passed through the north part of Gillett Grove township in Clay county, causing $10,000 damage. Violent wind squalls, with some hail, were reported from many other localities, but not much damage.

Corn planting is well started in most of the State. In some central counties one-fourth of the planting is done and farther south the work is even more advanced. There was slight delay from the rains of the 1st, 3d and 4th. Early planted corn is up and germination mostly good, though some replanting will be necessary.

Oats, spring wheat, barley and winter wheat, are making good growth generally, though more rain would be beneficial in the southwest counties. Grass is beginning to make good growth again after the setback from cool, dry weather in April. Alfalfa is making excellent growth.

Fruit trees are in full bloom in the northern counties. Gardens are more advanced than usual. Potato planting was active during the past week. Early potatoes are up and making good growth, though some were cut back by frost toward the close of April. Canning factories have begun canning asparagus.

Bulletin No. 6, May 13, 1930—

Rains were frequent throughout the State during the past week and very heavy in the northwest but light in the southeast districts. The soil was in a receptive condition and most of the rainfall was absorbed. There was considerable erosion of cultivated fields. Numerous local damaging wind and hail storms occurred mostly on the 6th and 9th. In the vicinity of Akron and Hawarden along the Big Sioux River, hail stones ranging in size from hen's eggs to as much as 12 inches in circumference were reported. Damage amounting to many thousands of dollars for the State as a whole was done to windows, roofs, fruit trees, automobile tops, greenhouses and growing crops, though the latter were not far enough advanced for much permanent damage. Some livestock was killed or injured. Temperatures of the week were generally above normal. There was much general wind movement, aside from the squalls. The warmth and moisture caused a rapid growth of all vegetation, including the weeds. The season is about 10 days ahead of the usual.

Corn planting was brought nearly to a standstill by the frequent, heavy rains, except in the southeast counties, where the rains were lighter. As much as 85% of the planting has been done in some southeast counties, while in some northern counties as little as 10% has been done. For the State as a whole, probably more than one-third of the planting has been done, which is about the normal amount. The warmth and moisture brought the planted corn up quickly to a good stand. It also brought up the weeds in the unplanted fields so an extra disking and harrowing will be necessary. Early planted corn is being cultivated in the southern counties and rows may be seen in occasional fields in much of the State. Many cornfields were damaged by erosion.

Winter wheat has made good growth and some is as much as 15 inches high. Rye has also made a vigorous growth and begun to head in localities. Oats are making a satisfactory growth and the stand is thickening up well, though in some localities the color is still a little pale. Barley and spring wheat are doing well.

Hay crops made an excellent growth. Alfalfa is a foot or more high generally, and will soon be ready to cut.

Gardens and potatoes are growing well. Strawberries are loaded with bloom. Early potatoes are several inches high. Sugar beets are coming up nicely. The canning factories are about to begin packing spinach.

Bulletin No. 7, May 20, 1930—

Cold, cloudy, showery weather made the past week very unfavorable for agriculture and most other human pursuits. The average temperature, 48.3°, was 12.3° below normal and would have been more appropriate a month ago. The temperature of the first half of April averaged 8° higher than the past week. Frost occurred on the morning of May 17 over most of the northern half of the State and as far south as Des Moines, followed by traces of sleet and snow in the afternoon.

Corn planting made good progress in spite of the unfavorable weather. About 73% of the planting of the State has been done, which is 12% more than the usual. The soil was too cool for good germination so there is considerable complaint of rotting, wireworms, grubs and squirrels, and considerable replanting will have to be done. In the western districts thousands of acres submerged by the downpours of last week are still too wet to plant. Scarcely a good beginning has been made in planting in portions of Fremont and Taylor counties, and only 10% to 20% has been done in portions of Buena Vista, Cherokee, Woodbury and Monona counties. Much of the early corn that was up in the northern part of the State was cut down by frost on the 17th. With the present outlook for warmth and sunshine this will mostly recover and will not have to be re-

planted but will be set back 10 days or more in growth. Cultivation of the early corn is progressing as far north as Hamilton county, and there is a royal battle with the weeds, which seem to have thrived on the recent weather. Early corn looks yellow and sickly as a result of the low temperature, lack of sunshine and excess of moisture.

All small grains, grasses and vegetation, need sunshine and warmth to give a better color and thrifty growth, though the cool, moist weather has helped the grains to stool and thereby thicken the stand. Rye is heading generally. New seedings are doing well. Alfalfa continued good growth and some has been cut in Story county. Fruit has dropped badly as a result of the recent unfavorable weather and frost. Gardens made slow progress.

Young animals and chicks are not doing so well. The Eastern Iowa Veterinary Association reports some serious outbreaks of hog cholera and advises that now is the time to immunize pigs by vaccination while they are small and easily handled, and before cholera begins to ravage the herds.

Bulletin No. 8, May 27, 1930—

General rains occurred on the afternoon and night of the 22d and in some localities in the southwest and northeast portions of the State the rains were heavy to excessive. Considerable damage is reported from floods and erosion in the northeast counties. Temperatures averaged nearly normal, but ranged from around the 90° mark at some stations on the afternoon of the 21st to 31° at Webster City, and 32° at Boone, Decorah and Tipton on the morning of the 24th, with frost ranging from light to heavy in northern Iowa and as far south as Des Moines, but no serious damage.

Corn planting made good progress except the delay due to the rains of the 22d. When the reports left the farms from Saturday to Monday, with an average date of about May 25, 94% of the first planting had been completed, which is 11% more than the normal for that date and equivalent to about a week earlier than usual. However, there is much complaint of slow germination, resulting in damage by grubs, weevils and squirrels to seed corn in the ground, and damage by pheasants, cutworms and other pests after the corn is up. Considerable replanting will therefore be necessary, amounting to as much as 50% in a few localities. The abundant sunshine of the past week gave corn a better color. Weeds have made a rapid growth and many cornfields look green. First cultivation and blind plowing is under way.

Soybean planting was active and about three-fourths of the acreage has been planted. Cucumber seed for 45 acres has been distributed in Wright county.

Early alfalfa cutting is becoming general and other hay crops are doing well, though the hay outlook is not as good as last year. Winter wheat is growing nicely and is two feet high in Wapello county. Oats and other grains are stooling and improving generally.

Low prices for poultry and eggs during the last few months are making people cautious about the number of chickens raised. Hatcheries shut down earlier than usual for they were having trouble in marketing the hatch.

Bulletin No. 9, June 3, 1930—

Rain is needed in most of the State. Showers of the past week were mostly light, though there were a few heavy local downpours in the northwest district on the night of June 2d-3d, the heaviest reported being 2.80 inches at Estherville. Steady, strong winds evaporated the soil moisture rapidly. Temperatures were below normal till toward the close of the week. Frosts with temperatures at or near the freezing point, occurred in most of the northern half of the State on May 29 and 30th, and there were scattered reports of light frost on lowlands as far south as the southern tier of counties. Damage was confined almost wholly to tender garden truck. Commercial tomato plants were nipped a little; also strawberries.

Corn planting is practically finished except considerable replanting in localities, due mostly to grubs, wireworms and cutworms. There are numerous complaints of corn pulled by pheasants in northern Iowa. Some corn cannot break through the encrusted soil till a rain comes. Growth has been slow on account of the low temperature. The color has improved. Cultivation is general, and a good deal of "blind plowing" is being done. Some has been cultivated twice. Early planted corn is 8 to 10 inches high in southern Iowa.

Winter wheat is heading in the southern counties, shooting in the central counties, and looks well generally. Oats are beginning to head north as far as Marshall county and mostly doing well but need rain. Hay crops are needing rain rather seriously, though alfalfa has made good growth and is being cut in many localities.

Strawberries are needing rain. In a few localities they were nipped by frost. Early home grown berries are beginning to appear on the market.

Bulletin No. 10, June 10, 1930—

Heavy rains early in the week or at the close of last week in much of the State, relieved the encrusted condition of the soil and benefited crops generally but suspended field work. However, some relatively small areas remain dry in the extreme southeast and southwest counties. In many northern counties the soil is saturated as shown by the flow of drain tile. Destructive hail occurred in a few localities but as usual the damaged areas are small. Temperatures were low, with scattered light frosts on low and peaty ground on the mornings of the 6th, 7th and 8th.

Corn cultivation made very little progress till the fields became drier toward the close of the week. Weeds got a good start in at least half of the fields. Growth was mostly slow because of the low temperature. In some localities the color is yellow from either too much or too little moisture. There was some planting and considerable replanting during the week on account of squirrels, mice, wireworms, grubs and flooding. Considerable areas, mostly in the northwest that have been repeatedly flooded, will not dry out in time to raise a crop this season. The advancement of the crop varies from just planted to a foot high in some southern counties, and averages about normal for the season, having lost about all of the unusually early start.

Winter wheat is well headed and looking good. Oats and barley made good progress as a result of the cool, moist weather. Those that were headed short in the heretofore dry eastern counties, show considerable improvement.

First cutting of alfalfa was finished in the drier areas, but was considerably delayed by rains in other sections. Red clover is in bloom in much of the State. Hay crops other than alfalfa, were greatly benefited by the rains.

Peas for commercial canneries were favored by the cool, moist weather, and a good crop is in prospect. Strawberries also were much benefited by the rains. Many good home grown berries are on the market. Gardens made fair growth. Grapes are doing well. Apples and plums are only fair. Cherries are beginning to turn.

Bulletin No. 11, June 17, 1930—

Unprecedented local downpours of rain in many sections of the State caused much damage by erosion and flooding; railway embankments were swept away; trains delayed; highway bridges and culverts were destroyed; and three persons and considerable livestock were drowned. At Sioux City 2.73 inches of rain occurred in 30 minutes in the early morning of the 13th, which is the greatest ever recorded in Iowa and probably in the middle west in such a short period. Damage in the city amounts to $300,000. Elsewhere in Woodbury County flood and hail damage was serious, amounting to more than $116,000 in Grant Township. At Daven-

port on the night of the 14th-15th the rainfall was the most intense in 25 years. The largest amount of rain reported was 9.63 inches at Washington, in Washington county, but the ground was so receptive that little damage occurred. The weekly average rainfall for the State was 2.1 inches, which was more than twice the normal. High southerly winds prevailed on the 12th and 13th. In the drier areas before the rain came, dust and sand storms damaged corn. However, the wind aided in curing alfalfa that had been cut. Temperature and sunshine were about normal.

Thousands of acres of corn have been washed out, buried or drowned. Before preparations can be made, it will be too late to replant except for fodder. Some quick maturing varieties have been used in replanting during the past week. In some cases fields have been planted the third time. The earliest corn is knee high in scattered localities as far north as Marshall county, while considerable replanted corn is not up yet. Practically all that is up has been cultivated once, much twice, and a little the third time. The condition and progress of the crop is unusually variable, considering the excellent start it had. All of the early advantage has been lost and the crop now averages a little poorer than usual for the time of year.

Oats are heading in most of the State but the crop suffered much from being beaten down by the heavy rains. Barley, winter wheat and spring wheat also suffered. Winter wheat has been seriously attacked by Hessian fly in several counties, and particularly in Monona county, which is the principal winter wheat county in the State. A considerable acreage has been plowed up and planted to corn. Much alfalfa hay had been cut just prior to the rains, which kept it drenched for several days and caused much damage. At the same time strong winds helped to cure that which is in the drier areas.

Commercial pea canning is in progress in the central counties. The peas are of good yield and quality. Spinach canning is progressing rapidly in Fremont county. Strawberries were generally benefited by the rains, but the late frosts cut the crop short.

Bulletin No. 12, June 24, 1930—

Little or no rain occurred during the past week, except in a few north central, northeast and east-central counties. The heaviest reported was 3.92 inches at Charles City. The week began cool but became very warm toward the close, with afternoon temperatures between 90° and 100° in most of the State on the 21st, 22d and 23d, but turned cooler again on the 24th. Sunshine was above normal. High southerly winds, high temperatures and much sunshine towards the close of the week, evaporated soil moisture very rapidly.

It was an excellent week generally for weed killing. Corn cultivation made good progress in most of the State and fields are generally clean. The increased warmth, with ample moisture in the soil, caused corn to make excellent growth, except some recently planted and not yet deeply rooted. Occasional fields of knee-high corn can be seen as far north as the northern tier of counties, though the average height in those counties is only about six inches. A little in the southern counties is waist high and about to be "laid by" unusually early. The color of the crop has improved, but rain is now needed in a few counties where the soil is beginning to bake. In the southeast counties that were flooded last week, little field work was possible till toward the close of this week. Where the corn was ruined, a considerable acreage of soy beans is being planted for forage or hay. There are some reports that corn is recovering and others that the damage is worse than was first reported. In general, corn caught up and recovered from some of the setback it received in the preceding weeks, and now averages about normal though unusually variable. Some localities report a shortage of old corn. The price is remarkably low, considering the very small stock of corn in farmers' hands and the comparatively small "visible" stock in elevators. Oats prices are also exceptionally low, much lower than at harvest time, which is unusual.

Winter wheat is turning and will soon be ready for harvest in the southern counties. There are reports of heads breaking over, probably due to Hessian fly larvae working in the stems. Oats are mostly headed except in a few northern counties. The recent cool, moist weather has been favorable, and oats straw has lengthened appreciably. Barley is heading throughout the State.

Alfalfa haying progressed under favorable conditions, except in the northeast counties. The yields are about one ton to the acre. That which was cut early has made a second growth of about a foot already. Some red clover has been cut. Timothy shows improvement. In general, the hay crop will be lighter than last year.

The season has been generally favorable for potatoes. The earliest have set good sized tubers and will soon be ready to use. The strawberry harvest is nearing the end in the northern counties, with a rather small crop. Cherries and most other fruits are disappointing. The drop of apples has been very heavy, due, it is said, to the late frosts. Linden trees are in bloom and bees are busy.

Bulletin No. 13, July 1, 1930—

Seasonable temperatures with some warm nights, mostly well distributed rains, ample moisture and abundant sunshine, made the past week exceptionally favorable for all farm interests. There was some hail damage on June 24th and 29th, rather heavy in widely scattered small areas.

Corn made excellent progress. It now averages about knee high, but varies from third planting six inches high to occasional fields as high as the fence posts. Early fields have been laid by in many counties. The color is good and the average condition of the crop is better than usual on July 1. Poor stands are reported in some southeast counties and considerable acreage along the streams and on low ground has been permanently damaged by floods and excess moisture. As usual small areas have been seriously damaged by hail. Conditions have been good for cultivation and weed killing and fields are generally clean.

Winter wheat is ripening fast and harvest has begun in some southern and west-central counties. It is filling well but there is more complaint of Hessian fly damage than for several years. This will reduce the yield. Oats are filling well and turning generally and will soon be ready to cut in the southern counties. The straw has lengthened considerably. Some oats are showing smut. High winds and heavy rains lodged oats in places, particularly in the northwest counties.

Gardens and potatoes are doing well and early potatoes are being used in places and the size and quality are good. Shallow rooted garden truck needs rain in a belt of dry counties from Pottawattamie to Jones. Recent strong winds dried out the surface soil. Raspberries are plentiful and on the market in large quantities.

Pastures and hay crops are doing well. Second growth of early cut alfalfa averages a foot high and will soon be ready for another cutting. Much red clover was cut the past week. Conditions were mostly favorable for haying. The milk flow is being reduced by attacks of flies. Numerous outbreaks of hog cholera are reported in eastern Iowa. Much low lying pasture land has recently been overflowed. The Eastern Iowa Veterinary Association has issued a warning that cattle on such pasture are subject to attacks of black leg.

Bulletin No. 14, July 8, 1930—

Cool weather at the beginning of the week was followed by warm nights and afternoon temperatures high in the 90's in most of the State. The highest temperature reported was 100° at Chariton and Glenwood. Good rains occurred from Carroll county to the northeast and southeast corners of the State, and the rains were rather heavy in some eastern counties. The heaviest rain reported was 1.71 inches at Waterloo. In some southwest and west-central counties, rain is needed rather seriously. Sunshine was below normal in the eastern and above normal in the western counties.

Corn made rapid growth, being favored by the hot, humid weather. The earliest is beginning to show tassels. Late replanted corn, amounting to between 5 and 10 per cent of the acreage, is short, some only 6 inches. About three-fourths of the crop is "laid by" or too tall to cultivate. Conditions have been generally favorable for cultivation and fields are mostly clean.

Recent hot days were unfavorable for the best filling of oats heads, and ripening has been hastened too rapidly. The earliest oats are nearly ready to cut and a little cutting has started in Mahaska county. Recent rains and local wind squalls lodged some of the oats. The humid weather has developed considerable red rust in both oats and wheat.

Winter wheat harvest is progressing and is about finished in Fremont county, but no threshing is reported. Good yields are indicated except where Hessian fly larvae are working. There are more complaints of Hessian fly damage than for several years. Barley and spring wheat are turning and filling well and will soon be ready for harvest. Clover and alfalfa haying made good progress till stopped in the central and eastern counties by rains over the 4th-5th. Timothy or mixed clover and timothy haying is beginning.

Flies of all kinds have come on in large numbers earlier than usual and are annoying farm animals. The milk supply is being considerably reduced as a result of the flies and the seasonal decline in pasture. Biting flies are known to carry hog cholera, so outbreaks of that disease may be expected soon.

A good crop of raspberries is being harvested. New home grown potatoes are being used freely. A little home grown sweet corn is on the market. Truck crops are needing rain in the western counties.

Bulletin No. 15, July 15, 1930—

Five days of intolerably hot weather, July 7th-11th, in the Missouri River counties, with maximum temperatures of 100° or higher each day, and ranging down to a less severe and protracted heat wave of only one day with 100° maximum from the west part of Worth county southeast to Clinton county, made the past week the most scorching since the first week in August, 1918. The highest temperature reported from an official thermometer under standard conditions, was 105° at Guthrie Center and Chariton on the 10th. Much cooler weather followed on the 13th and 14th.

It is estimated that 10,000 horses died from the heat. At Jefferson, Greene county, 124 horses were handled at the local rendering plant, though there was but one day at that place with a temperature of 100°. Veterinarians were very busy ministering to heat stroke of horses. Many fat swine, cattle and other animals also died of heat. Scores of persons were prostrated and several died. Farm work was necessarily suspended except in the early forenoon and late afternoon, and in many cases farmers worked by moonlight or artificial light.

Damage to crops from heat waves like the one just past depends largely upon the amount of rain recently fallen or stored in the soil. In this case, as usual, only limited areas had rain of importance just prior to the high temperatures, and the heated period was not terminated by showers. The eastern and north-central counties, Page and Lyon counties, and a few other localities, had rain during the last four weeks, ranging from a large excess to enough to avert serious damage, but from Polk and Warren counties west to the Missouri river the rainfall of the last four weeks is only from 5% of the normal at Atlantic, to 16% at Des Moines and 11% at Creston. In this area subsoil moisture was the only salvation from the extreme heat. Judged by similar conditions in the past, the yield of corn in this area of 10 or 12 counties must have been reduced at least a bushel per acre for every day with 100°, or about 4 bushels per acre on about 1,600,000 acres, or a total reduction of 6,400,000 bushels. In addition to this, many other counties reported serious curling or rolling of the corn leaves, from which, if rain comes soon, there will appear to be much recovery, but experience has shown that nevertheless there is a reduction of 2 or 3 bushels per acre.

On date of July 1, reports from 928 well distributed crop correspondents of the Federal-State Crop Reporting Service, indicated an average yield per acre of 39 bushels for the State. It is probable that the recent heat wave has reduced this to 37 bushels, or a total reduction of slightly more than 20,000,000 bushels. Such a loss, evenly distributed, would probably be an economic advantage, but unfortunately such losses are usually localized and cause hardship in the sections hardest hit. Most all of the corn, except the late replanted, has been laid by and tassels are showing in all portions of the State.

Early oats, winter wheat, rye and barley, are mostly in shock under favorable conditions, mostly ripened before the heat came, though men and horses risked their lives in the heat to do the work. Late oats were in the dough stage and are said to have been "cooked by the heat." Undoubtedly the yield has been reduced. Some winter wheat threshing has been done in the southern counties, with good to excellent yields where not bothered by Hessian fly. Exceptional fields yielded up to 26 and 35 bushels per acre.

Gardens, potatoes, blackberries, grapes and truck generally were injured by the heat and drouth. Pastures are brown in most of the State and milk flow seriously cut.

Bulletin No. 16, July 22, 1930—

Though beginning and ending cool, the past week had a middle period of extreme heat in most of the State, equaling or exceeding that of the preceding week, with no rain till Sunday night and Monday, when mostly light and inadequate showers and a cooler change afforded temporary relief. A few stations in the extreme northeast and north reported maximum temperatures slightly under the 100° mark, but 95% of the area of the State had from one to five days with 100° or higher, the highest reported being 107° at Audubon, Guthrie Center, Glenwood and Omaha, with several stations in that area yet to report.

From Fremont and Monona counties, northeast and east to Marshall County, the rainfall from April 1 to June 30 was from 60% to 80% of the normal. This was also the case in Decatur, Lucas, Wayne and portions of Clay, Palo Alto, Pocahontas and Plymouth counties. From July 1st to 20th, the rainfall was generally less than 20% of normal in the southwest one-half of the State, and in more than 25 counties in this area the rainfall was a fraction of 1% of normal. Not a place in the State had rainfall up to normal in these 20 days, the nearest normal being a small area around Waterloo, with 96%. At Dubuque it was only 8%. Where the July drouth overlapped the areas of earlier seasonal deficiency, the subsoil moisture was insufficient to sustain crops, particularly corn, pastures, truck and fruit, through the scorching ordeal of the last two weeks. In the driest areas temperatures of 100° or higher occurred on from 6 to 10 days out of 14. As measured by rain gage and thermometer, conditions are worst in the vicinity of Atlantic, Cass County, where the rainfall, April 1 to June 30, was 67% of normal, and July 1st to 20th, 0.02 of 1% of normal, with 10 days of nearly continuous temperatures of 100° or higher, and a peak temperature of 105°.

Correspondents in the worst counties estimate the reduction in corn yield at from 5 to 15 bushels per acre over an area of about one-fourth of the State, in a territory where the acreage of corn is relatively large. There has also been some damage in most of the rest of the southwest one-half of the State. For the State as a whole, about one-third of the corn acreage has reached the critical tasseling stage. Many of the tassels that have so far appeared have been promptly seared white by the scorching, hot, strong, southerly wind. Where silks have appeared, they have been scorched and made unreceptive of pollen. The leaves of the corn day after day have been curled and turned to an ashy, grayish, green color, with some top leaves turned white, all of which means a cessation of growth and a general weakening of the vitality of the plants. It is rec-

ognized that had the adversity come 10 days later at the height of the tasseling and silking period, the damage would have been calamitous in the worst areas. The first four days of August, 1918, with similar moisture conditions, reduced the yield to less than 25 bushels per acre in the southwest one-fourth of the State, and to 12.0 bushels in Cass, 12.3 in Adair, 13.9 in Montgomery and 16.7 in Adams counties, according to enumerations made by assessors the following winter.

While the present condition is not nearly so serious as in 1894, 1901, 1918 and some other years, it is believed that at a conservative estimate the yield per acre for the State as a whole has been reduced 4 or possibly more bushels per acre from the estimate of 39 bushels per acre made by hundreds of crop reporters July 1. On an acreage of 11,100,000, this is an approximate reduction of about 45,000,000 bushels, but it still leaves Iowa with a crop of 288,000,000 bushels, which is ample for all internal needs except in a few counties hardest hit.

The rains Sunday night and Monday afforded considerable relief in limited areas, mostly in the western counties, but in only 4 or 5 counties can it be said that the drouth is broken, and in not more than one-third of the State was the amount large enough to be of importance. The best that can be said is that further damage has been halted.

Harvest was generally completed in the south half of the State, and far advanced in the north half. Late oats have been seriously damaged in the hotter, drier areas. Winter wheat threshing is progressing, with mostly good to excellent yields. A few early oats have been threshed and the yield and quality are good.

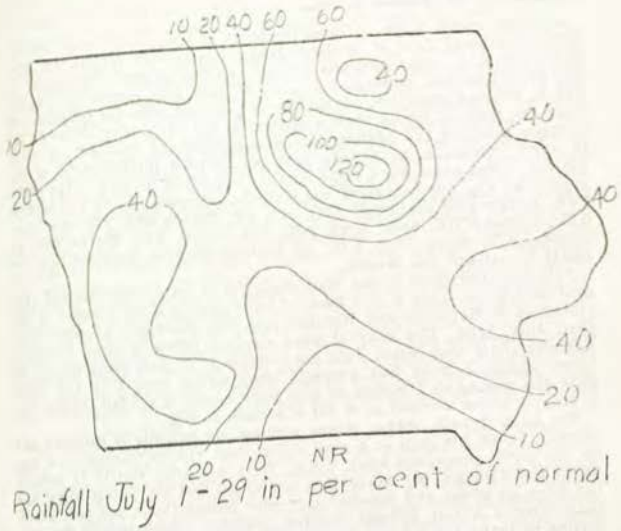
Pastures have failed and were brown and dry enough to burn in much of the State before the showers came. Cows are on winter feed and the milk flow has been greatly curtailed. Flies are unusually bad. Loss of horses was not so great the past week, due to the fact that harvest was nearly over in large areas and the weaker horses had largely died in the first hot spell.

Bulletin No. 17, July 29, 1930—

Warm weather continued till Monday, with the average temperature nearly the same as last week, but only two days with temperatures of 100° or higher at most stations. At a few stations in the extreme northeast, temperatures did not quite reach 100°, but this was offset by a large number of stations in a wide belt from northwest to southeast across the State, breaking or equaling all past records for high temperatures. The highest reported was 112° at a station known as Keokuk No. 2 in the suburban residence section in the north part of Keokuk. This is within 1° of the highest temperature ever recorded in Iowa. Heavy rains occurred in three or four counties in the vicinities of Hampton and Waterloo. Hampton had 3.89 inches Saturday and Sunday. Good showers occurred in very small areas around Creston and Davenport. At least 90% of the area of the State had no rain or rain so light as to be of no agricultural importance.

Summing up the first 29 days of July, the average temperature is 78.7°, which is not exceptional were it not for the large number of days with temperatures of 100° or higher, which range from 12 in the southwest to none in the extreme northeast, and for the large number of heat records broken. The average number of days with temperatures of 100° or higher for the State is 6.8. The rainfall averages 1.22, or 34% of normal, and ranges from less than 5% of normal in many northwest and south-central counties to 120% of normal in the vicinity of Waterloo. (See map below.)

Corn suffered further damage in most of the southern and western counties, not so much because the past week was as extreme as the two preceding weeks, but because corn has advanced further into the critical tasseling and silking period. Reports from widely scattered portions of the State in a special inquiry not published in the remarks of correspondents, show that many fields are 75% silked. Many leaves at the top and at least half of the early tassels have been burned white and more or less firing at the bottom is general except on bottom lands and favored locations.



In comparing with other similar years, care must be taken to note the condition of the crop at the beginning of the heat and drouth period. For example, in 1911, the condition on July 1 was reported as 102%, which at that time pointed to a yield of about 42 bushels per acre. With an average of 4.2 days with 100° or higher in July, and an average rainfall of 1.54 inches in the first 27 days, the final yield was reduced more than 5 bushels per acre, though good rains came toward the close of July. In 1901, the condition on July 1 of 90% then indicated a yield per acre of about 36 bushels. With an average of 13.3 days with temperatures of 100° or higher, and an average rainfall of 1.10 inches in the first 27 days, the final yield was reduced about 10 bushels per acre, though good rains in this case also followed toward the close of July. This year, 1930, no general drouth breaking rain has yet occurred, and while a cooler change has temporarily arrested damage, the end of the drouth and heat damage is not in sight. As there will be a general survey made by nearly 1,000 crop reporters of the combined Federal-State crop reporting service, within a few days, it seems best to reserve exact estimates of damage till these reports can be received and tabulated.

Harvest has been finished and threshing far advanced in the south half of the State, and nearly completed in many localities. Yield reports of winter wheat, early oats and barley continued good, but late oats are rather small and light, though the shocks on the ground would seem to indicate large yields.

Pastures have utterly failed in much of the State. Spring pigs and other hogs are not gaining for lack of pasture. Milk flow is cut in half. Alfalfa is making a mighty battle but shows the effects of the weather. Sweet clover has failed as a hay crop. Timothy for seed is mostly in shock, with indications of a small yield. Bees have not made enough honey to sustain them in recent weeks. Old corn, already short, is disappearing rapidly, as animals are being put on winter feed.

Bulletin No. 18, August 5, 1930—

Another warm week included the fourth of a series of heated periods, with occasional days of moderate temperature between periods. On Sunday, August 3, many stations not only exceeded the high temperature of the preceding hot Sunday, but established new heat records for August, and in several localities, particularly in northwest Iowa, the temperatures were the highest for at least a century. At Sac City a temperature of 113 degrees equalled the highest heretofore recorded any time and any place in Iowa. Showers were very light and scattered till the night of the 4th-5th, when some good rains came to 15 or 20% of the area of the State, mostly in the north-central and northeast. Dubuque reports 1.44 inches; Fort Dodge and Rockwell City, each 1.37; Charles City, 0.78; Waterloo, 0.65; Forest City, 0.65; Iowa Falls, 0.50; Carroll, 0.50. The showers at Omaha, 0.26, Sioux City, 0.12, and scattered localities elsewhere, are too small to relieve the drouth.

July was the third driest State average in 58 years. Only 1886 and 1894 averaged drier. Had it not been for heavy rains in a few counties in the vicinities of Hampton and Waterloo, July, 1930, would have averaged drier than July, 1894. The general water supply is failing in many localities. Records show that when July has averaged 4° or more above normal in temperature, August has averaged above normal every time and when July has averaged 2 inches or more below normal in rainfall, August has averaged below normal in 4 out of 5 cases, or 80%.

The heat, drouth, rather strong wind and low humidity of Saturday and Sunday, 2d-3d, hit corn at a most critical stage with its resistance low due to the three preceding heat waves. There is a great variety of opinion as to the damage. By some it is pointed out that the bottom firing has not been as great and general as in other famous drouth and heat years, indicating a better subsoil moisture condition. Others believe that the killing of many top leaves and tassels is a really serious matter. Some say that with most of the corn in tassel and the pollen expended and a large delay or actual shortage of ears shooting, there can be no satisfactory pollination even if rains come and ears shoot later. Early corn is already in the roasting ear stage but the ears have few kernels on the cob. The heat of Sunday spread to the northeast limits of the State, which had heretofore largely escaped. The cooler change which is spreading over the State as this is being written, the rains in the north-central and northeast counties, and light showers in some other localities, will arrest further damage for a time at least, but will not repair the permanent damage already done. As a whole, conditions are probably not yet as bad as in 1901, though in that year some fairly good rains came toward the close of July. Some localities in the southwest counties report conditions nearly as bad as in 1894. One of these reporters was reporting to this service at that time. Sweet corn has been damaged seriously in much of the State. However, the cannery in Fremont County is expected to start on sweet corn and tomatoes in about 10 days. Canneries in the northeast counties are looking forward to a good pack.

Threshing proceeded rapidly, with continued reports of excellent yield and quality of winter wheat and early oats, and fair yields of late oats and barley.

Bulletin No. 19, August 12, 1930—

Hot weather continued till near the end of the week. Temperatures of 100° or higher occurred at many stations in the southern and western counties on the 5th, 6th or 9th. Showers occurred in all sections of the State except the northwest district and the northern counties of the west-central district, where almost none fell. The southwest and south-central districts and Wapello County, had good rains, generally exceeding an inch, but only in portions of Mills, Montgomery, Adams, Monroe and Wapello counties, and a few other limited localities were the rains sufficient to say that the drouth is broken, and even there the rains came too late to save some of the corn. Some of the larger rainfalls of the week were: Glenwood, 1.79; Red Oak, 2.89; Corning, 3.86; Cumberland, 1.68; Atlantic, 1.43; Creston, 1.36; Chariton, 1.53; Albia, 2.01; Ottumwa, 1.92. Such rains three weeks ago would have saved more of the corn in those counties.

Corn continued to deteriorate in at least half of the State, mostly in the western counties, till the cool weather came at the close of the week. The rains in the southern counties came in time to help only about half of the corn. The rest will make only fodder. The report of the Crop Reporting Board in Washington, D. C., relative to the condition of Iowa corn on August 1, was released late on the 11th. Contributions to this report were made by the Weather Bureau and the Iowa Department of Agriculture. It indicated on August 1, a yield per acre of 34 bushels and a total production of 377,400,000 bushels, compared with a total production of 429,658,000 bushels reported for the 1929 crop by assessors. This is a reduction of 55,500,000 bushels since July 1. Since August 1 unbroken drouth in much of the State, with temperatures of 100° or higher on an average of 2.61 days, has caused a further decline, which is difficult to estimate. The drouth has been more prolonged in half of the area of the State than in 1901, but not as general. Up to this time there has been an average of 8.88 days with temperatures of 100° or higher, compared with 13.3 days in 1901. The average yield of 1901 was 26.2 bushels per acre. No doubt the assessors' enumerations next winter will show townships in the favored sections of northeast Iowa averaging as high as 60 bushels per acre, while in the seriously damaged areas in southern and western Iowa, whole townships will average 15 bushels per acre or less, with practically no corn on some farms.

The earliest corn is now in hard roasting ears. There are further reports of many unfilled tips of ears or scattered kernels on the cobs. In some cases suckers are putting out belated tassels that will afford a supply of pollen, and there are reports of ears putting out a second crop of silks, which is unusual, but there is no doubt that the delay, the stunted growth, the barren stalks and the poorly filled ears in the aggregate, go to make up a large amount of irreparable damage, however favorable future weather may be. There is slight consolation in the knowledge that little if any corn is caught by frost in such a year.

Sweet corn and pop corn, not being so robust and not so deeply rooted as field corn, have probably suffered more. Canneries in central, southern and western Iowa will generally have a small pack, while in the northeast the pack will be good.

Garden truck and fruit for household canning is scarce. Late potatoes are nearly a failure in most of the State. Pastures are mostly brown and bare. Water supply is a serious matter on many farms. Water in creeks and ponds is unfit for live stock. Well digging is active.

Recent threshing reports show much larger yields of timothy seed than expected. The acreage harvested is probably smaller than last year. New seedings of timothy and clover have had a hard struggle, and there will be need for much seed. The dry weather is believed to be favorable for setting much seed in the clover heads, though a good rain in July would have been more favorable.

Bulletin No. 20, August 19, 1930—

After nine weeks, in each of which temperatures averaged above normal, the past week averaged slightly below normal.

Heavy rains in scattered areas brought the average rainfall of the State for this week up to normal, following six weeks of continued deficiency. But the apparently normal rainfall of the past week was made up largely from heavy rains in small areas. In only about one-fourth of the State has the precipitation been normal or above since August 1, and only in a very few counties has it been sufficient to make up the deficiency of July. Moreover, since August 1, the drouth has spread into some areas that had previously fared well. For example, at Waterloo, the rainfall since August 1 is only 0.75 inch, which is 37% of normal. At Marshalltown it is 24%; Boone, 12%, and Estherville 10%. At Marshalltown the rainfall

since July 1 has been only 30% of normal; Boone, 21%; Des Moines, 25%; Burlington, 23%; Sioux City, 23%; Inwood, 18%; Estherville, 7%.

With a serious deficiency in rainfall continuing in three-fourths of the State, and with about half of the corn too far gone to be benefited much in the areas where rains have broken the drouth, the outlook for marketable ears of corn is no better, and in some areas not as good as a week ago. However, the rainfall is helping to make a better growth of stalks and leaves, which will improve the feed situation. Frequent, generous, well distributed rains, would help to mature such ears as have been able to survive, but unless these come immediately, further deterioration in at least half the crop will occur. The earliest corn is beginning to dent in much of the State and the bulk is in the hard roasting ear or dough stage.

Threshing is nearing completion in the northern counties. Later threshing reports have shown excellent yields of oats and winter wheat, and the quality and weight per bushel are much above the average.

In localities, the ground is moist enough to plow; and delayed plowing has begun with the weather cool enough to reduce the risk of injury to horses. Preparations for winter wheat seeding have begun but the ground is mostly too dry and turns up too cloddy.

Considerable second crop clover has been cut for hay, as the heads were not well filled with seed. Soy beans have stood the drouth to the extent of producing a large growth of stems and leaves, but the blossoms have fallen off and few beans have set, so the yield of beans will probably be disappointing.

Bulletin No. 21, August 26, 1930—

Rainless weather in 25 or 30 southern and northeastern counties, with normal rainfall in only a few west-central and northwest counties, made the past week generally unfavorable for corn and other late season crops. Temperatures averaged appreciably below normal. Some of our crop reporters regard this as favorable and others unfavorable. If the soil could be thoroughly soaked once, higher temperatures would no doubt be favorable.

Corn ranges in development from ears just shooting with no possible chance to mature, to a little early planted safe from frost. In some localities the drouth and heat delayed the corn so that fears are expressed that it will be caught by frost, but the records show that in such years very little has been frosted. The bulk of the corn is in the glaze stage and much is beginning to dent. The husks are beginning to dry on upland corn, and silos are being filled with this corn in a good many localities. From more than three-fourths of the State there are complaints of poorly filled ears and barren stalks. Much corn is now being cut and thrown over the fence to live stock to supplement the bare, brown pastures. Some new seed corn has been saved and in the poorest areas seed is being selected from the cribs of old corn as they are being shelled for market. The kernels of new corn are so irregular in size it will be difficult to adjust the planters to secure a uniform stand.

The other drouth-stricken States are looking to Iowa for rough feed as well as corn. Harvest and threshing has been done with the minimum amount of damage to straw from rain. Considerable oats straw is being baled and every bit of it should be carefully saved for the large demand that will come from other States before another crop can be raised. Ordinarily Iowa does not sell much hay outside its borders, but outside buyers are taking hay out of Iowa at a rapid rate at this time. Fortunately, the carry over of old hay is considerably larger than usual, and in much of the State the first crop of hay was ready for cutting before the drouth became serious. Corn fodder will be unusually valuable this winter. Alfalfa has stood the drouth well but in some cases the third cutting will be light or in many cases omitted.

The ground is generally too hard to plow even with tractors. Much less than the usual amount of plowing has been done. In much of the State it has been impossible to prepare the ground for seeding alfalfa and too

dry for seeding timothy and clover. Much spring seeding of all three has been killed by the drouth. Unless rains come soon, seeding of winter wheat will be delayed or impossible.

Apples have dropped badly and grapes are drying up instead of ripening. Some of the commercial canneries have started to pack sweet corn, with only about half a crop in sight. Tomatoes have suffered much. Cucumber pickles have survived the drouth much better than expected.

Bulletin No. 22, September 2, 1930—

Warm weather the past week is regarded as favorable in localities where moisture was sufficient, but in three-fourths of the State the rainfall of the week was too light to be of agricultural importance. The average rainfall of the State for the months of July and August for the 26 stations available on September 2, is 3.3 inches, or 45% of the normal and drier than in 1901. The driest areas are in the northwest, central and southeast counties. Some of the lower per cents of normal are: Inwood, 18; Sioux City, 24; Boone, 21; Des Moines, 22; Marshalltown, 26, and Burlington, 24. The rainfall of August averaged 2.0 inches, or 59% of normal, but came mainly after the middle of the month, too late to do the most good. The deficient August rainfall followed the usual rule that when July is two inches or more deficient in rainfall, August will be deficient. There are now 5 out of 6 cases in the last 58 years. Also, August temperatures averaged about 2.5° warmer than normal and followed the rule that when July temperature is 4° or more above normal, August has always been above normal. There are now 5 cases in 58 years, all of which followed the rule.

Corn made good progress toward maturity. Where rainfall of the week was deficient, the corn matured or dried too fast. Considerable is prematurely dying. About 22% is already safe from frost. There is much variability in the state of advancement in different portions of the State, and even in the same fields. The bulk of the crop in the State is denting, yet in some counties the bulk is still in the milk, with none safe from frost. Deficient precipitation in August has reduced the yield where the corn was best, but in several northeast counties the yield will still be better than the average of the past 10 years. Probably the high spot of corn production for the United States this year is in these favored northeast counties. Earlier reports are abundantly confirmed that over a broad belt extending from northwest to southeast across the State and in some other localities there will be not more than half a crop, with some localities very hard hit. Silo filling has been active the past week. Some trench silos have been constructed. Some corn has been cut for fodder, and more than the usual amount will be cut to offset the large shipments of forage that are going to other States. Much oats straw is being baled and shipped.

Plowing and preparations for winter wheat seeding have been delayed because of insufficient moisture to soften the baked soil. In places where plowing has been attempted, plow shares only last two days.

Pastures are beginning to revive in localities, but in much of the State they are too dry to afford much feed for live stock. Feeding of new corn fodder and soy beans is steadily increasing. Some third crop alfalfa is being cut but the yield is generally light. Clover hulling is in progress, but the yields are generally light, much lighter than last year.

Hog cholera is serious in some northwest counties, while in others it seems to have run its course.

Bulletin No. 23, September 9, 1930—

Temperatures averaging slightly above normal, with little or no rain, except in 8 or 10 extreme west and northwest counties, pushed corn rapidly forward toward maturity—too rapidly it is believed in some localities. As of date of September 1, nearly 900 reporters of the combined Federal-State crop reporting service, estimated that with normal weather, 43% of the corn would be safe from frost by September 15; 73%, September 30, and

if frost holds off, 89%, October 15. About half of the corn is now safe from frost in the northern half of the State, while as little as 10% is safe in the extreme south, with a little not yet dented. Silo filling and fodder cutting are in full swing, and more of the crop will be saved that way than usual. However, silos are relatively few in the southern counties. Field count and weight of ears per hundred hills are reported as "disappointing" in some localities that were thought to have a fair crop. A very destructive rain, hail and wind storms occurred in Woodbury and Plymouth counties on Sunday, 7th. Preliminary estimates place the damage at more than $500,000, mostly to corn.

Fall plowing and preparations for seeding winter wheat, rye, alfalfa, clover and timothy, have been greatly delayed and made next to impossible by the continued drouth and hard baked and cracked soil. A little delay in winter wheat seeding is desirable to combat hessian flies, which appeared in large numbers this season, and will prove very destructive next season if due precaution is not observed as advised by the State entomologist.

Outbreaks of hog cholera are becoming serious in many northern and western counties. Pastures are recovering very slowly in limited areas where rain has been sufficient, but in most of the State they would burn most any afternoon if a match were applied. Baling and shipping oats straw and hay to drouth stricken States is active. All roughage will be scarce and valuable before pastures become available in 1931.

Streams are the lowest in years and reduced to stagnant pools or entirely dry in some cases. The Des Moines River at Des Moines is the lowest since guage readings began in 1893. Water supply for live stock is becoming very serious. Fish of all kinds and sizes are dying in large numbers.

Bulletin No. 24, September 16, 1930—

Warm weather, with afternoon temperatures in the 90's, prevailed till toward the close of the week, when it became cooler. Drouth continues except in a few extreme northern and extreme southern counties. In the central portion of the State the drouth breaks all records for summer drouth. At Des Moines only 1.41 inches of rain have occurred in 72 days, ending September 15, compared with 3.17 inches in the same number of days in 1886, which has heretofore held the record. The Des Moines River at Des Moines reached a stage of 0.19 foot above low water mark on September 11, which is the lowest since guage readings began in 1893. Factories and power plants depending upon water in streams are having great difficulty. The sugar beet factory at Belmond cannot start till good rains come.

Corn advanced rapidly to maturity. About 80% is now safe from frost in the extreme north to about 50% in the extreme south. A few fields on low ground are scarcely dented, while some is dry enough to crib. Silo filling is nearing completion and fodder cutting is active. Considerable seed corn was saved this week.

Plowing is impossible in most of the State because of the dry, hard soil. It now looks as though the winter wheat acreage would be reduced as it is impossible to prepare a seed bed in much of the usual winter wheat area. Pastures continued to deteriorate. Much live stock is being fed corn fodder. A few late cuttings of alfalfa are being made but the yield is generally light. Stock water is scarce and wells are failing. Serious attacks of hog cholera are reported.

Bulletin No. 25, September 23, 1930—

While the average temperature of the past week was considerably above normal, with warm afternoons well up in the 90's, the mornings of the 17th and 20th were cool, with light frost on low ground in the central and northwest portions of the State, but no appreciable damage. Little or no rain occurred anywhere in the State, and severe, record breaking drouth continues over a very large central area. Water is being hauled from the larger streams and from towns to the farms for live stock.

Corn matured rapidly. About 83% is now safe from an ordinary frost as compared with 60% that our correspondents estimated on September 1 would be safe by this date. This is due to unusually favorable ripening weather. A good many localities report practically all safe. Much new corn is being fed. A little has been cribbed but as yet the moisture content is too high for safe cribbing. If present weather continues considerable cribbing will begin within a week.

The ground continues too dry and hard to plow, even with tractors, in much of the State. In some favored localities it has been possible to prepare a seed bed for winter wheat and a little has been seeded but lies ungerminated in the dry soil. It is still too early to seed with safety from the Hessian fly in most of the principal winter wheat area.

Pastures continue in bad condition generally. New corn and corn fodder are the main reliance for feed for live stock. Winter feeding is becoming quite general about two months earlier than usual, which means a shortage of feed before spring. In some localities all the wheat raised will be fed to live stock.

Potato digging is under way, with generally poor yields. Sugar beet lifting has begun and the Belmond factory has been able to start with water in the Iowa River, which has come from rains farther north. Soy bean harvest is in progress. Also clover seed hulling, with fair yields reported.

Bulletin No. 26, September 30, 1930—

An energetic storm moved across the State from southwest to northeast on the 25th-26th, attended by the first general rain in months. The rainfall of the week averages 1.8 inches, which is the greatest since the week ending June 17. In about 12 west-central and southwest counties the rain was insufficient to help the drouth much, yet in some of these counties good rains occurred earlier. In about two-thirds of the State the rains will afford only temporary relief and should be followed by others soon for best results. At Iowa City, 6.13 inches of rain fell in 24 hours, exceeding all records at that station. Much of the rain ran into the great cracks that had opened in the ground as wide as one's hand and several feet deep, so that very little reached the streams. It will take several such rains to bring the State back to normal moisture conditions. In some localities the soil was thoroughly moistened to a depth of one foot while in considerable areas to a depth of only two or three inches.

The storm was not without misfortune. High, shifting winds prostrated or leaned and tangled much of the corn and blew off many ears, so that husking machines cannot be used successfully. A tornado in Lee County caused $20,000 damage, and hail stones as large as goose eggs damaged buildings and automobile tops. There was much damage to buildings in other portions of the State by wind and lightning.

Corn continued good progress toward maturity. About 95% is now safe from frost. Frosts ranging from light on the highlands to killing on the lowlands occurred in large areas on two or three nights, but the only damage was to tomato, melon and pumpkin vines and other tender vegetation. A little corn has been cribbed at an unusually early date. Yields so far reported run from 5 bushels to 45 bushels per acre. Much corn has been put in temporary silos.

Plowing and seeding winter wheat and rye have gone forward rapidly since the rains. In Monona, the principal winter wheat county, three-fourths of the winter wheat seeding has been done. Much timothy, clover and other young seeding that was killed by drouth will have to be reseeded.

Sugar beet lifting was greatly helped by the rain. Potato digging reveals a great potato shortage. Many potatoes are being shipped into areas in the State that usually produce a surplus.

CROP SEASON WEATHER, 1930, BY WEEKS

Average rainfall, mean temperature and mean sunshine, with departures from the normal, as derived from records of selected stations.

Week Ending	Rainfall (Inches)		Temperature (Deg. F.)		Sunshine	
	State Average	Departure	Mean	Departure	Per Cent	Departure
April 8	T	−0.6	50.5	+6.1	66	+38
April 15	0.7	+0.1	62.3	+14.9	76	+19
April 22	1.6	+0.9	46.3	−4.1	34	−24
April 29	0.2	−0.6	47.4	−5.7	56	− 2
May 6	0.7	−0.1	67.4	+11.7	68	+ 8
May 13	2.2	+1.2	63.9	+5.6	54	− 7
May 20	0.3	−0.7	48.3	−12.3	27	−35
May 27	0.7	−0.5	63.5	+0.8	53	+20
June 3	0.3	−0.8	62.1	−2.9	82	+19
June 10	1.4	+0.2	63.1	−3.9	61	− 3
June 17	2.3	+1.2	69.2	+0.3	66	0
June 24	0.4	−0.6	72.4	+2.0	76	+ 7
July 1	1.0	+0.1	72.0	+0.1	81	+ 9
July 8	0.5	−0.4	74.3	+1.3	73	0
July 15	†	−0.9	78.8	+4.8	82	+ 8
July 22	0.3	−0.5	80.9	+6.8	81	+ 7
July 29	0.3	−0.5	80.6	+6.6	83	+10
August 5	0.3	−0.5	80.6	+6.6	78	+ 6
August 12	0.5	−0.3	75.7	+2.8	55	−17
August 19	0.8	0	71.5	−0.2	46	−24
August 26	0.2	−0.6	68.7	−1.7	71	+ 3
September 2	0.4	−0.4	74.0	+5.1	64	− 1
September 9	0.2	−0.7	68.8	+1.7	68	+ 5
September 16	0.4	−0.6	71.2	+6.1	68	+ 6
September 23	†	−0.9	66.9	+3.8	91	+30
September 30	1.8	+1.0	59.4	−1.3	61	0
For the season	17.5	−5.5	66.9	+2.1	68	+ 3

†Not more than 0.05 inch.

WEEKLY NOTES ON WEATHER AND CROPS IN IOWA

Week Ending October 7, 1930—

Corn continued to ripen and dry nicely till about the middle of the week when the weather became cloudy, with frequent showers in much of the State, which made the corn too moist to crib safely, so not much husking was done except to feed live stock. Practically all corn is safe from frost for commercial purposes, though the moisture content is still too high for seed if a severe freeze should come.

Fall plowing has made good progress in much of the State and winter wheat seeding has gone ahead rapidly. Sugar beet lifting was slightly delayed by rains. Beets are yielding 12 to 18 tons per acre, with a sugar content of 14.5% to 16%, which is very good.

Pastures and meadows are improving where not killed by over grazing. Soy bean harvest is nearing completion and threshing is under way, with yields running from 6 bushels to 20 bushels per acre. Canneries are about to start on pumpkins.

Week Ending October 14, 1930—

Abnormally warm, sunny weather prevailed till rains came near the close of the week. Corn dried fairly well and husking got a good start in most of the State. The high temperature, averaging 11.7 degrees above normal, had a tendency to make the corn heat in the crib so it had to be moved about and heated ears sorted out. A hard freeze would now be welcomed by most farmers. A few farmers in the northwest counties have finished husking. Yield and quality are unusually variable. Husking machines are being used in spite of the tangled condition of the corn.

Soy bean combining and threshing continues in the southern counties, with yields of beans running from 6 to 25 bushels per acre. Tomatoes have taken on new life with the recent warmth and moisture. The yields of the past week were the best of the season, and commercial canneries were busy. Sugar beet lifting proceeded rapidly and railroad yards are congested with loaded cars of beets in the principal producing area. Recent weather has been favorable for a large sugar content in the beets.

Winter wheat and rye is up to a good stand. Nearly all of the seeding has been done. Pastures and meadows are greening up and affording some feed for live stock. As yet rains have not been sufficient to replenish the water supply. Deep well drilling is active in an effort to supersede the failing surface wells.

Week Ending October 21, 1930—

The week was warm and wet until the 16th. The rain was mostly light to moderate but exceeded one inch at many stations. The soil is now generally in good condition for plowing but the rain has not been sufficient to start stream flow or replenish water supply.

The first general freeze occurred on the 17th and freezing temperatures occurred daily thereafter. A few stations in the northeast portion reported temperatures as low, or lower, as heretofore recorded this early in the season. The mean temperature for the week averaged 11.9 degrees below normal. There was practically no damage to the corn crop and the freeze will make corn picking easier. There was a great deal of late truck ruined, though a great deal was saved due to the timely advice of the approaching freeze. There will be considerable damage to apples remaining on trees. Corn picking was interrupted by rain during the first part of the week, but good progress was made in a large portion of the State. The high wind during the latter part of the week blew down considerable corn and picking will be difficult. Yields as low as six bushels per acre are reported in the south-central section, to more than sixty bushels in fields in the northeast portion.

Beet lifting progressed favorably and the work will be completed within a week. There was some plowing and seeding during the early part of the week, but this work was stopped as the soil is frozen to a depth of four or more inches over a large portion of the State.

Winter grains that were sown early are looking well and the recent rains have greatly helped pastures. Over a few areas pastures were the best they have been this year, but are being eaten down close by too many cattle. Corn can now be safely cribbed though some early picked began to heat and sprout during the warm weather.

Week Ending October 28, 1930—

The weather was unusually cold at the beginning of the week with temperatures of 11 degrees at several stations in northern Iowa and 20 to 25 in southern Iowa on the morning of the 21st. Toward the close of the week the temperature rose to considerably above normal. The ground froze several inches deep in the northern counties but at the close of the week most of the frost had left the ground. There was practically no rain till showers occurred toward the close of the week in the extreme eastern counties.

The dry, freezing, windy weather, with much sunshine, dried the corn and favored husking, which made good progress, better than the average in recent seasons. The moisture content is considerably lower than last year, and about the same as two years ago. An unusually large number of new husking machines of both the one-row and two-row types, have been purchased and used in the north half of the State. In the vicinity of Belmond 23 new machines were purchased. About half the reports received indicate poorer yields than expected, while the others indicate yields better than expected. The yields are unusually variable, ranging from 5 to 50 bushels in the same locality. One reporter notes that the corn is yielding better on the north slopes; and another that the poorer yields

are on lands heavily manured or phosphated, and that late planted corn is better than early planted. One reports that seed gathered from the field since the freeze shows strong and perfect germination, while another reports 10 per cent reduction even in well saved seed corn and 40 per cent damage to moist field samples. The quality of the seed depends much upon the moisture content at the time of low temperature.

Feeder lambs and cattle are moving into the surplus feed localities of the State in large numbers. Pastures have revived and have furnished considerable late grazing. Wells are still very low and the water supply is a serious matter on many farms.

Considerable plowing was done the past week and a little late winter wheat seeding was done. The later seeded wheat has not showed much above ground but the last few days have been warm enough for germination.

Sugar beet lifting is nearing completion. Potatoes that were still in the ground were considerably damaged by the severe freezes. Apple picking is progressing. The damage to apples by the freeze was not extensive.

Week Ending November 4, 1930—

Excepting light rains or snows in the central and east portions of the State on Wednesday and Thursday, the weather has been favorable for corn husking, which made rapid progress and is now four-fifths done in the extreme northern counties to almost half done in the extreme southern counties. On November 1, last year, only 27% of the husking had been finished. The cold, frosty mornings, with temperature as low as 10 or 12 on Friday morning, with sunny afternoons, made husking easy and cribbing safe. Some shelling and marketing was done. The corn shelled easy and graded as high as No. 4.

Reports of yields continue spotted and variable, ranging from as low as five to as much as 60 bushels per acre.

Live stock is grazing in the corn stalk fields, gleaning after the husking machines that cannot pick up the ears blown off by the wind. The ground is generally dry, which is favorable for both the machines and the gleaning. On a good many farms the stalks or stubble are already being plowed under.

Considerable hog flu is reported by our correspondents and also by the Eastern Iowa Veterinary Association.

Week Ending November 11, 1930—

Dry and mostly sunny weather prevailed the past week, with rather cold at beginning and warm Indian summer weather at the close. Corn husking made rapid progress, something like it did in the dry autumns of a generation ago. Not for many years has so much of the husking been done by the 10th of November. Not more than five per cent of the corn remains to be husked in the extreme northern counties, and from one-half to three-fourths of the crop has been husked in the southern counties. The corn is so dry in localities that it shells badly in handling, and husking machines and combines knock off more than the usual number of ears. However, the dry weather is favorable for live stock to graze in the stalk fields and save the ears that are on the ground; and animals may be seen working industriously in the fields everywhere. Corn shredding is active in many localities. An unusual acreage of corn stalks has already been disposed of and the ground plowed. As a rule, not much corn stalk ground is plowed till the following spring.

The general and continued deficiency in rainfall is making the water supply situation more and more serious. Pastures, meadows and winter grains are needing rain.

Week Ending November 18, 1930—

Exceptionally warm weather for mid-November prevailed during the past week, with general showers to good rains on the 15th-16th.

Corn husking proceeded rapidly with ideal conditions. The usual weather wastage due to high winds blowing ears off into the mud, or to heavy snows burying the down corn, has been absent this year. Husking returns are showing slightly higher yields than earlier estimates, which always include discounts for weather wastage, which did not occur this year. However, the yield on a good many large fields has been only 4, 5 or 6 bushels per acre. Elevators in the worst sections are reporting the lightest run of corn to market in years. The price of corn to the farmer is about 53 cents per bushel, which is the lowest since 1921 and much below the cost of production generally.

Winter grains, pastures and meadows were greatly benefited by the rains. The surface soil is generally moist and mellow and much plowing was done the past week. The subsoil is very dry and hard. More and more farm wells are failing. Streams and ponds are drying up and the water shortage for live stock is growing more serious. Considerable hog flu is reported.

Good preparation for winter on the farms has been and is being made. Odd jobs such as repairing buildings and fences, hauling manure, shredding corn, well digging, etc., have been favored by the long continued Indian summer weather.

Week Ending November 25, 1930—

Warm weather continued till the 23d-24th, when it turned much colder, with general snow flurries, but no heavy snow. On the 19th-20th heavy rains covered most of the State. They were the heaviest since June in many localities, and in some places the heaviest November rains of record. They fell gently for a long period and soaked into the soil without running off. Streams were not affected much, but the general water supply was improved.

Only a remnant of corn husking remains to be done. Most of the unhusked corn is in the extreme southwest counties. Completion of corn husking before Thanksgiving will be generally accomplished and this traditional goal will be reached for the first time in several years. In much of the State the usual piles of corn on the ground and in temporary cribs in excess of storage facilities are noticeably absent.

Much plowing of corn stalk fields was done the past week and much more than the usual amount of this work has been done this fall, which will lighten the work of spring seeding and planting preparations materially.

MONTHLY PERCENTAGE CONDITIONS OF CROPS AND YIELD PER ACRE, 1930

Crops	April 1	May 1	June 1	July 1	Aug. 1	Sept. 1	Oct. 1	Yield Per Acre
Corn			85	86	73	61	69	32.5 bu.
			92	90	90	91		39.0 bu.
Oats			89	88				22.5 bu.
	89	90	90	89	85	82		17.5 bu.
Winter wheat			91	92	90	87		31.0 bu.
Spring wheat				89				18.0 bu.
Barley	90	89	89	90	86	80	88	12.0 bu.
Rye			88	91	70	65	60	70.0 bu.
Flax seed			87	84	83	79		1.62 tons
Potatoes		84	88	84	80			1.15 tons
Tame hay			93	90	84	74		2.70 tons
Wild hay			89	89	64	49	49	
Alfalfa hay	87	83						
Pastures								

FINAL CROP SUMMARY, DECEMBER 1, 1930

Iowa stood as one of the favored sections throughout the entire crop season of 1930 in spite of the deficiency of rainfall during the crop growing period and the unusually long period of above normal temperatures. A decline in production, as compared with the harvest in 1929, was experienced but the loss of crops because of the long sustained drouth was not so serious as to bring about suffering and distress as in a number of southern states.

The combined production of 15 important crops in 1930 was about 20 million tons, or about 8.0 per cent smaller than the average total of 21.8 million tons for the five-year period (1925-1929). These same 15 crops in their aggregate production were 14.0 per cent smaller than the production in 1929. Corn production fell short of the five-year average production by 17.0 per cent but the important small grain crops were above the average by the following percentages: Winter wheat 14.0 per cent, spring wheat 4.0 per cent, oats 11.0 per cent, barley 14.0 per cent, flax 87.0 per cent, and tame hay 4.0 per cent.

While the total production of these crops show only a small decrease in relation to the average, the value fell off about 95 million dollars, or 21.0 per cent below the average, due to the lower farm prices as based upon December 1 reports. Although the weather conditions of the year were not adverse in the extreme to the Iowa farmer, the markets toward the close of the year took some additional and disappointing toll.

Corn: Iowa corn production from 11,100,000 acres is estimated at 360,750,000 bushels as compared with 429,878,000 bushels harvested in 1929 from 10,883,000 acres. As to the utilization of the 1930 crop, it is estimated that 9,620,000 acres were harvested for grain, 239,000 acres for silage, and 1,024,000 acres hogged down or grazed off by live stock. On the basis of 58 cents per bushel, as the average farm price of corn on December 1, the total value of the corn crop is $209,235,000, while last year's crop, although 16.0 per cent larger, was valued at $300,915,000.

Oats: The oats crop was larger than that of 1929 by about 11.0 per cent, due to both more acres harvested and larger average yields per acre. Total production was rated at 239,655,000 bushels or 23,763,000 bushels more than in 1929. The average yield per acre for the state was reported at 39.0 bushels, which was an out-turn of 3.0 bushels more to the acre than a year ago. Average farm prices for oats on December 1, 1930, were reported at 28 cents per bushel, in comparison with 39 cents per bushel last year.

Winter Wheat: The winter wheat acreage in 1930 was 370,000 from which was produced a total of 8,325,000 bushels, while 379,000 acres in 1929 produced 7,466,000 bushels. Average farm prices per bushel on December 1 were 65 cents this season, and $1.06 last year.

Barley: A decline is shown for barley from last year in both the acreage and total production. The acreage for the two years was 527,000 acres in 1930, and 592,000 acres in 1929. Total production for these two years is placed at 16,337,000 bushels and 17,168,000 bushels respectively. The average price of 41 cents per bushel on December 1 was 21 per cent lower than a year ago.

Tame Hay: Production of tame hay declined 23 per cent from the tonnage cut in 1929. Some of the decline is due to the reduced acreage this season by about 7.0 per cent, while some is due to a reduction of average yield per acre of 18.0 per cent as compared with average yields of the 1929 hay crop. A total production of 4,986,000 tons is recorded for the current season, and 6,474,000 tons in 1929. The average price on December 1 is given as $11.50 per ton, which is 50 cents per ton above the farm price a year ago.

The acreage and production of the different varieties of hay are as follows: Alfalfa 437,000 acres, 1,180,000 tons; sweet clover 40,000 acres, 78,000 tons; red and alsike clover 692,000 acres, 942,000 tons; timothy 358,000 acres, 526,000 tons; clover and timothy mixed 1,413,000 acres, 2,049,000 tons; grains cut green for hay 18,000 acres, 31,000 tons; legume hay (mostly soybeans) 42,000 acres, 74,000 tons; and other miscellaneous hay crops 70,000 acres, 105,000 tons.

IOWA CROPS 1929 AND 1930 COMPARED
Acreage, Average and Total Yield, Average and Total Value

Crop	1929 Final Revision					December 1, 1930, Estimates*					
	Acres	Average Yield	Total Yield	Average Price Dec. 1	Total Value	Acres	Average Yield	Total Yield	Average Price Dec. 1	Gross Value Per Acre	Total Value
Corn	10,883,000	39.5 bu.	429,878,000	$ 0.70	$300,915,000	11,100,000	32.5 bu.	360,750,000	$ 0.58	$ 18.85	$209,235,000
Oats	5,997,000	36.0 "	215,892,000	0.39	84,198,000	6,145,000	39.0 "	239,655,000	0.28	10.92	67,103,000
Winter wheat	379,000	19.7 "	7,466,000	1.06	7,914,000	370,000	22.5 "	8,325,000	0.65	14.62	5,411,000
Spring wheat	37,000	16.5 "	610,000	1.05	640,000	35,000	17.5 "	612,000	0.63	11.02	386,000
Barley	592,000	29.0 "	17,168,000	0.52	8,927,000	527,000	31.0 "	16,337,000	0.41	12.71	6,698,000
Rye	44,000	16.0 "	704,000	0.85	598,000	35,000	18.0 "	630,000	0.48	8.64	302,000
Flax seed	13,000	10.0 "	130,000	2.75	358,000	26,000	12.0 "	312,000	1.55	18.60	484,000
Timothy seed	147,000	3.6 "	529,200	2.20	1,164,000	145,000	5.0 "	725,000	2.80	14.00	2,030,000
Clover seed (red and alsike)	249,000	1.20 "	298,800	11.00	3,287,000	75,000	1.25 "	93,800	12.50	15.62	1,172,000
Soy beans (for beans only)	35,000	16.0 "	560,000	1.67	935,000	52,000	15.7 "	816,000	1.35	21.20	1,102,000
Potatoes	65,000	103.0 "	6,695,000	1.40	9,373,000	65,000	70.0 "	4,550,000	1.30	91.00	5,915,000
Hay (tame)	3,294,000	1.97 tons	6,474,000	11.00	71,214,000	3,070,000	1.62 tons	4,986,000	11.50	18.63	57,339,000
Hay (wild)	240,000	1.35 "	324,000	8.70	2,819,000	216,000	1.15 "	248,000	8.75	10.06	2,170,000
Pasture and grazing	9,973,000			6.07	60,537,000	10,000,000			5.14	5.14	51,400,000
Sweet corn (com'l crop)	47,000	2.3 tons	108,000	9.50	1,026,000	55,000	2.0 tons	110,000	10.50	21.00	1,155,000
Pop corn	26,000	1,525 lbs.	40,039,000	0.02¾	1,101,000	50,000	1,080 lbs.	54,000,000	0.02¾	29.70	1,485,000
Buckwheat	8,000	12.0 bu.	96,000	0.95	91,000	4,000	13.0 bu.	52,000	0.89	11.57	46,000
Fruit crop					5,500,000						4,500,000
Garden truck					5,500,000						4,500,000
Miscellaneous					5,000,000						5,000,000
Total value, not including live stock products, for the year 1930											$427,433,000
1929											571,667,000
1928											562,799,000

*Subject to revision when assessors' figures become available.

AVERAGE FARM PRICE OF IOWA'S PRINCIPAL CROPS, DECEMBER 1, 1930, BY COUNTIES

Districts and Counties	Corn per bushel of 70 lbs. in ear or 56 lbs. shelled	Oats per bushel of 32 lbs.	Winter wheat per bushel of 60 lbs.	Spring wheat per bushel of 60 lbs.	Barley per bushel of 56 lbs.	Rye per bushel of 56 lbs.	Flax seed per bushel of 56 lbs.	Buckwheat per bushel of 48 lbs.	Timothy seed per bushel of 45 lbs.	Clover seed per bushel of 60 lbs.	Pop corn per pound in ear	Soy beans per bushel of 60 lbs.	*Tame hay (loose) per ton of 2,000 lbs.	Wild hay (loose) per ton of 2,000 lbs.	White potatoes (Irish) per bushel of 60 lbs.	Sweet potatoes per bushel of 50 lbs.	Apples per bushel of 48 lbs.	Sorghum sirup, per gallon	Honey (Per Lb.) Comb in sections	Extracted (less cost of container)	In bulk
Northwest—											$ .03	$ 2.46	$14.82	$12.31	$ 1.50		$ 2.26	$ 1.10	$ .14	$ .11	$ .10
Buena Vista	$ .57	$ .25	$ .55	$ .55	$ .41							1.96	15.22	11.88	1.23	$ 2.71	1.45		.14	.10	
Cherokee	.59	.26	.75		.46		$ 1.55				.02		12.97	9.86	1.48		2.07		.15	.10	.10
Clay	.56	.24	.70	.70	.38	$ .48				$11.15		1.46	12.06	8.15	1.34	2.34	1.90		.12	.10	
Dickinson	.53	.24	.55	.45	.36	.31	1.57				.03		12.47	7.98	1.19		1.83	1.08	.12		
Emmet	.56	.26			.39	.37					.06		14.97	10.31	1.38		2.95		.12	.14	.13
Lyon	.54	.24	.60	.55	.38							1.96	14.40	9.86	1.40		1.63	1.50	.14	.12	.18
O'Brien	.55	.26			.41		1.55		$ 2.72	14.15	.04	1.46	13.22	8.18	1.46		1.95	1.00	.11	.08	.09
Osceola	.55	.24	.50	.50	.38	.30	1.55		4.42	12.30	.02		13.82	9.88	1.37		1.25		.11	.13	.12
Palo Alto	.56	.25			.36	.33	1.45			11.15	.05		13.02	11.58	1.23		1.67		.11	.10	.10
Plymouth	.57	.30	.60	.61	.39				2.47		.03		12.10	7.98	1.46		2.30	1.12	.10	.10	.11
Pocahontas	.56	.26	.60	.58	.37	.49	2.35		3.12		.05	2.46	14.78	11.41	1.24		1.47		.12	.10	
Sioux	.59	.27	.55	.63	.42		1.58		4.47	13.82	.04	1.96							.10	.12	
For District	$ .56	$ .25	$ .60	$ .59	$ .39	$ .40	$ 1.60		$ 3.48	$12.67	$ .04	$ 1.96	$13.53	$ 9.94	$ 1.36	$ 2.46	$ 1.83	$ 1.13	$ .12	$ .11	$ .11
North Central—																					
Butler	$ .54	$ .27	$ .64	$ .60	$ .36	$ .38			$ 2.35	$ 9.15	$ .06	$ 1.71	$11.06	$ 7.65	$ 1.34		$ 1.72	$ 1.18	$ .18	$ .12	$ .10
Cerro Gordo	.52	.25			.30		$ 1.30		3.22		.05		12.55	6.98	1.28		0.96		.12	.10	.08
Floyd	.52	.25			.35		1.60		2.82	14.15		1.16	7.72		1.23						
Franklin	.55	.24	.68	.62	.38				3.47	13.75	.05	1.06	10.36	7.98	1.33		1.79	1.12	.14	.13	.11
Hancock	.54	.25	.65		.35	.32	1.45		3.72	13.65	.06		12.43	6.60	1.04		1.68	1.25	.14	.10	.10
Humboldt	.57	.27	.58	.59	.37				2.87	14.15	.04		13.97	7.31	1.40		1.78	1.00	.12	.10	
Kossuth	.56	.26			.45	.62						2.21	11.89	9.98	1.27		1.87		.12	.10	.08
Mitchell	.45	.23	.65	.65	.36	.60	1.55					2.46	11.72	7.98	1.08		1.81	1.25	.15	.09	.09
Winnebago	.55	.25	.65	.60	.38		1.63						11.42	7.79	1.05		1.95		.16	.12	
Worth	.48	.24	.57	.61	.31	.42	1.49	$ .99	2.12	11.15	.10		7.80	7.98	1.06		1.60	1.25	.14	.09	
Wright	.56	.25	.62	.60	.38				2.37	10.15	.05	1.76	12.65	9.31	1.32		1.84	1.04	.15	.16	.17
For District	$ .54	$ .25	$ .63	$ .61	$ .36	$ .45	$ 1.49	$ .99	$ 2.98	$12.65	$ .06	$ 1.72	$11.23	$ 7.57	$ 1.24		$ 1.75	$ 1.13	$ .15	$ .12	$ .11

AVERAGE FARM PRICE OF IOWA'S PRINCIPAL CROPS, DECEMBER 1, 1930, BY COUNTIES—Continued

Districts and Counties	Corn per bushel of 70 lbs. in ear or 56 lbs. shelled	Oats per bushel of 32 lbs.	Winter wheat per bushel of 60 lbs.	Spring wheat per bushel of 60 lbs.	Barley per bushel of 56 lbs.	Rye per bushel of 56 lbs.	Flax seed per bushel of 56 lbs.	Buckwheat per bushel of 48 lbs.	Timothy seed per bushel of 45 lbs.	Clover seed per bushel of 60 lbs.	Pop corn per pound in ear	Soy beans per bushel of 60 lbs.	*Tame hay (loose) per ton of 2,000 lbs.	Wild hay (loose) per ton of 2,000 lbs.	White potatoes (Irish) per bushel of 60 lbs.	Sweet potatoes per bushel of 50 lbs.	Apples per bushel of 48 lbs.	Sorghum syrup, per gallon	Honey (Per Lb.) Comb in sections	Honey (Per Lb.) Extracted (less cost of container)	Honey (Per Lb.) In bulk
Northeast—																					
Allamakee	$ .65	$ .35	.....	$ .60	$ .45	$ .50	.....	.....	$ 3.22	$12.70	.....	.....	$11.02	$ 9.98	$ 1.31	.....	$ 1.70	$ 1.53	$ .16	$ .12	$ .10
Black Hawk	.55	.28	$ .72	.74	.34	.38	.....	.....	1.97	12.65	$ .05	$ 1.49	11.78	9.48	1.09	$ 1.96	1.44	1.00	.18	.17	.14
Bremer	.58	.30	.63	.74	.47	.38	.....	.....	3.47	12.15	.07	2.84	10.93	7.48	1.22	.....	1.33	.....	.20	.....	.....
Buchanan	.52	.27	.63	.63	.36	.39	.....	.....	3.89	11.82	.06	1.65	8.36	6.48	1.17	2.21	1.65	1.25	.17	.10	.08
Chickasaw	.52	.26	.....	.70	.38	.....	.....	.....	2.47	11.15	.05	1.14	9.84	7.48	1.31	.....	1.55	1.20	.15	.10	.....
Clayton	.70	.36	.68	.68	.50	.....	.....	$ .99	2.85	13.35	.....	.....	10.55	.....	1.35	.....	1.94	1.30	.19	.10	.12
Delaware	.62	.32	.80	.80	.49	.55	.....	.74	2.56	12.44	.05	1.21	10.55	6.23	1.31	.....	1.53	1.26	.16	.10	.08
Dubuque	.70	.37	.75	.75	.48	.55	.....	.....	2.89	12.35	.05	.....	10.92	.....	1.53	.....	1.97	1.45	.16	.11	.10
Fayette	.59	.29	.73	.68	.45	.54	$ 1.95	.74	2.95	13.83	.06	1.64	9.47	6.05	1.28	1.96	1.59	1.19	.19	.14	.09
Howard	.58	.21	.....	.....	.36	.....	1.41	.....	3.13	13.15	.06	.....	10.22	5.98	1.23	.....	1.65	1.15	.20	.....	.10
Winneshiek	.58	.28	.72	.73	.44	.60	1.58	.....	3.02	20.82	.....	.....	9.72	10.65	1.54	.....	1.80	1.28	.20	.12	.....
For District	$ .60	$ .30	$ .71	$ .71	$ .44	$ .47	$ 1.54	$ .81	$ 3.04	$13.29	$ .06	$ 1.68	$10.26	$ 7.52	$ 1.31	$ 2.38	$ 1.68	$ 1.27	$ .18	$ .13	$ .11
West Central—																					
Audubon	$ .58	$ .29	$ .70	$ .65	$ .43	.....	.....	.....	$ 2.72	$10.15	$ .05	.....	$12.22	$11.98	$ 1.43	.....	$ 1.70	$ 1.05	$ .20	$ .12	.....
Calhoun	.59	.27	.65	.70	.42	$ .63	.....	.....	3.22	13.15	.06	.....	13.97	0.98	1.35	.....	1.83	1.00	.14	.15	$ .16
Carroll	.59	.27	.71	.70	.43	.....	.....	.....	2.97	15.15	.07	$ 1.46	15.65	.....	1.36	.....	1.75	.....	.16	.....	.....
Crawford	.62	.30	.62	.68	.42	.55	.....	.....	2.09	10.90	.03	.....	11.66	11.90	1.40	.....	1.95	1.30	.11	.12	.07
Greene	.57	.26	.....	.....	.42	.....	.....	.....	2.97	12.35	.06	1.79	13.11	8.98	1.24	.....	1.85	1.17	.11	.10	.08
Guthrie	.56	.27	.60	.60	.42	.....	.....	.....	2.35	11.15	.05	.....	12.42	6.98	1.40	.....	.....	1.06	.14	.10	.....
Harrison	.57	.31	.64	.63	.38	.43	.....	.....	.....	11.15	.....	.....	12.77	10.20	1.26	$ 1.96	2.15	1.19	.13	.08	.06
Ida	.60	.27	.54	.....	.50	.....	.....	.....	1.97	10.15	.02	.....	11.22	8.98	1.24	.....	1.53	.....	.....	.....	.....
Monona	.58	.30	.59	.61	.46	.42	.....	.....	.....	.....	.09	.....	12.55	10.98	1.10	.....	.....	1.00	.16	.15	.12
Sac	.59	.27	.....	.....	.43	.....	.....	.....	2.25	14.15	.02	.....	18.10	15.98	1.50	2.46	2.20	.....	.....	.....	.....
Shelby	.59	.29	.62	.61	.41	.....	.....	.....	2.45	11.75	.....	.....	13.22	11.18	1.34	2.96	1.92	1.33	.16	.15	.10
Woodbury	.58	.27	.59	.55	.36	.38	.....	.....	.....	.....	.....	.....	13.55	7.48	1.28	.....	1.95	1.00	.10	.07	.07
For District	$ .59	$ .28	$ .63	$ .61	$ .42	$ .48	.....	.....	$ 2.63	$12.10	$ .04	$ 1.71	$13.25	$10.34	$ 1.32	$ 2.33	$ 1.88	$ 1.16	$ .14	$ .12	$ .09

Central—																					
Boone	$ .55	$ .26	$ .62	$ .6	.....	.38	.....	.....	.....	$ 3.14	$15.15	$ .06	.....	$14.32	$11.48	$ 1.29	.....	$ 1.90	$ 1.19	$ .14	$ .18	$ .12
Dallas	.56	.26	.70	.6	.....	.....	.....	.....	3.97	12.90	.03	$ 1.96	15.22	12.48	1.33	$ 2.06	1.64	1.25	.13	.09	.09
Grundy	.56	.25	.....	.....	.40	.....	.....	.....	2.69	14.15	.02	1.25	11.84	8.98	1.01	1.46	1.57	.....	.16	.12	.....
Hamilton	.56	.26	.....	.....	.36	$ .55	.....	.....	.....	.....	.....	.....	13.39	.....	1.32	2.36	1.80	1.15	.14	.12	.10
Hardin	.58	.26	.56	.....	.38	.....	.....	.....	3.47	15.65	.04	.....	15.52	14.98	1.30	.....	1.93	1.10	.16	.....	.....
Jasper	.58	.27	.68	.68	.37	.42	.....	.....	2.76	11.65	.06	.....	10.03	8.48	1.41	3.96	1.91	1.10	.17	.13	.11
Marshall	.58	.27	.65	.64	.44	.50	.....	.....	3.89	11.75	.06	.....	8.97	5.98	1.09	1.46	1.96	1.13	.14	.12	.12
Polk	.55	.28	.62	.62	.41	.50	.....	.....	4.17	15.15	.04	1.08	15.40	11.48	1.29	1.46	1.80	1.19	.14	.....	.....
Poweshiek	.54	.27	.62	.....	.50	.....	.....	.....	5.25	14.80	.06	.....	11.55	6.98	1.38	1.46	1.80	1.12	.16	.11	.10
Story	.55	.27	.65	.71	.49	.....	.....	.....	.....	.....	.06	1.11	14.72	.....	1.18	.....	2.18	1.25	.18	.18	.12
Tama	.55	.26	.71	.69	.47	.50	.....	.....	3.68	14.30	.06	.....	11.97	10.08	1.38	.....	.....	1.25	.15	.12	.11
Webster	.56	.26	.64	.64	.47	.48	.....	$ .99	.....	.....	.05	1.21	10.82	9.98	1.44	3.21	1.58	1.17	.14	.12	.15
For District	$ .56	$ .27	$ .65	$ .66	$ .42	$ .50	.....	$ .99	$ 3.50	$13.55	$ .05	$ 1.27	$12.55	$10.19	$ 1.28	$ 2.17	$ 1.82	$ 1.17	$ .15	$ .13	$ .11
East Central—																					
Benton	$ .59	$ .28	$ .70	$ .68	$ .43	$ .38	.....	.....	$ 2.95	$12.85	$ .05	$ 1.94	$10.60	$ 6.65	$ 1.32	$ 2.21	$ 1.50	$ 1.20	$ .18	$ .10	.....
Cedar	.58	.28	.65	.75	.45	.....	.....	.....	2.40	13.40	.04	0.96	10.64	.....	1.29	1.26	2.20	1.12	.15	.....	$ .05
Clinton	.61	.30	.68	.65	.49	.50	.....	.....	2.66	11.85	.03	.....	10.82	7.98	1.33	.....	1.65	1.06	.13	.09	.09
Iowa	.59	.28	.62	.65	.42	.....	.....	.....	2.66	12.65	.....	.....	7.22	.....	1.29	.....	1.55	1.20	.....	.....	.....
Jackson	.67	.34	.77	.78	.52	.60	.....	.....	2.45	12.80	.06	2.46	12.51	14.98	1.30	.....	1.76	1.00	.15	.10	.10
Johnson	.60	.32	.69	.72	.44	.52	.....	.....	2.61	14.15	.06	1.21	12.22	9.98	1.37	1.46	1.72	1.14	.12	.12	.09
Jones	.65	.31	.58	.75	.44	.60	.....	.....	2.72	13.65	.07	.....	9.89	5.98	1.31	1.96	1.88	1.15	.16	.....	.....
Linn	.55	.28	.75	.69	.49	.43	.....	.....	2.63	14.40	.05	1.37	11.72	8.48	1.23	2.46	1.73	1.18	.18	.11	.08
Muscatine	.61	.33	.67	.75	.42	.50	.....	.....	2.74	13.15	.....	1.26	12.05	.....	1.25	1.21	1.64	1.03	.....	.14	.10
Scott	.64	.36	.65	.60	.50	.....	.....	.....	2.62	13.15	.....	1.96	15.51	5.98	1.16	.....	1.27	1.50	.14	.11	.10
For District	$ .61	$ .30	$ .68	$ .69	$ .46	$ .50	.....	.....	$ 2.65	$13.10	$ .05	$ 1.51	$11.47	$ 8.16	$ 1.25	$ 1.76	$ 1.65	$ 1.15	$ .15	$ .11	$ .09
Southwest—																					
Adair	$ .57	$ .29	$ .61	$ .59	$ .43	$ .44	.....	.....	$ 2.55	$11.20	$ .06	$ 1.65	$10.11	$ 5.58	$ 1.56	$ 1.71	$ 2.05	$ 1.10	$ .18	$ .14	$ .11
Adams	.55	.33	.62	.62	.42	.....	.....	.....	2.78	10.75	.05	.....	11.47	7.98	1.36	1.46	1.87	1.00	.14	.11	.10
Cass	.56	.28	.60	.59	.42	.53	.....	.....	2.52	11.20	.06	2.71	11.22	6.98	1.29	.....	1.86	1.25	.13	.07	.10
Fremont	.56	.34	.58	.....	.43	.45	.....	.....	2.72	11.00	.....	.....	12.22	7.98	1.10	1.34	1.95	1.09	.10	.10	.....
Mills	.56	.28	.62	.60	.40	.50	.....	.....	2.85	9.15	.....	.....	11.22	8.65	1.09	1.46	1.70	1.00	.14	.....	.....
Montgomery	.59	.29	.63	.60	.38	.50	.....	.....	2.61	11.10	.06	1.11	10.92	10.98	1.14	1.78	1.56	1.17	.13	.14	.16
Page	.61	.33	.64	.....	.41	.....	.....	.....	2.60	11.15	.06	.....	11.89	.....	1.19	1.29	1.65	1.15	.18	.14	.....
Pottawattamie	.58	.28	.62	.62	.41	.48	.....	.....	2.47	11.25	.05	.....	13.22	10.78	1.24	0.96	1.74	1.17	.15	.12	.10
Taylor	.60	.32	.63	.55	.40	.55	.....	.....	2.30	11.25	.05	1.59	9.84	4.98	1.13	1.71	1.89	1.17	.12	.12	.10
For District	$ .58	$ .30	$ .62	$ .60	$ .41	$ .51	.....	.....	$ 2.58	$11.10	$ .06	$ 1.58	$11.37	$ 8.09	$ 1.23	$ 1.51	$ 1.80	$ 1.12	$ .14	$ .11	$ .11

AVERAGE FARM PRICE OF IOWA'S PRINCIPAL CROPS, DECEMBER 1, 1930, BY COUNTIES—Continued

Districts and Counties	Corn per bushel of 70 lbs. in ear or 56 lbs. shelled	Oats per bushel of 32 lbs.	Winter wheat per bushel of 60 lbs.	Spring wheat per bushel of 60 lbs.	Barley per bushel of 48 lbs.	Rye per bushel of 56 lbs.	Flax seed per bushel of 56 lbs.	Buckwheat per bushel of 48 lbs.	Timothy seed per bushel of 45 lbs.	Clover seed per bushel of 60 lbs.	Pop corn per pound in ear	Soy beans per bushel of 60 lbs.	"Tame hay (loose) per ton of 2,000 lbs.	Wild hay (loose) per ton of 2,000 lbs.	White potatoes (Irish) per bushel of 60 lbs.	Sweet potatoes per bushel of 50 lbs.	Apples per bushel of 48 lbs.	Sorghum sirup, per gallon	Honey (Per Lb.): Comb in sections	Honey (Per Lb.): Extracted (less cost of container)	Honey (Per Lb.): In bulk
South Central—																					
Appanoose	.75	.37	.86	.85	.90	.80	.80														
Clarke	.65	.33	.77	.70	.82	.72															
Decatur	.67	.32	.64		.43																
Lucas	.59	.32	.64		.46																
Madison	.58	.31	.66		.49																
Marion	.61	.33	.65	.68	.49																
Monroe	.61	.32	.64		.46																
Ringgold	.62	.29	.64		.45																
Union	.60	.31	.68	.60	.40	.60															
Warren	.60	.31	.66		.60																
Wayne	.60	.31	.66		.60																
For District	$ .62	$ .31	$ .67	$ .67	$ .47	$ .62		$ 1.04	$ 2.62	$11.60	$ .06	$ 1.22	$10.75	$ 9.19	$ 1.28	$ 1.05	$ 1.82	$ 1.16	$ .17	$ .12	$ .10
Southeast—																					
Davis	.71	.30	.76	.70	.55	.78			3.45	12.00		1.04	9.41	6.68	1.32		1.63	1.04	.17	.15	.12
Des Moines	.62	.30	.67						2.71	11.53	.10	1.08	14.14		1.41	1.46	1.78	1.25	.22		
Henry	.60	.30	.63		.49	.62			2.65	12.55		0.97	10.70		1.17	1.40	1.33	1.21	.14	.12	.11
Jefferson	.70	.30	.70		.49	.60			2.79	11.90	.06	1.11	11.24	7.98	1.31	1.71	1.93	1.07	.18	.11	.10
Keokuk	.63	.31	.75		.48				3.07	12.63	.06	1.39	13.33		1.22	1.70	1.85	1.12	.16	.12	.10
Lee	.65	.35	.70		.55	.56			3.62	13.00	.05	1.34	11.00	7.98	1.40	1.87	1.94	1.06	.17	.14	.10
Louisa	.58	.32	.66	.70	.45	.45			2.66	12.05	.06	1.14	10.10		1.39	1.67	1.69	1.04	.18	.10	.10
Mahaska	.64	.32	.69	.70	.45	.55			2.81	11.90	.05	1.20	11.79	8.60	1.35	1.49	1.84	1.04	.18	.12	.10
Van Buren	.60	.31	.65	.65	.45	.50			2.79	12.60	.05	1.16	10.25		1.33	1.41	1.58	1.15	.14	.12	.10
Wapello	.61	.32	.69		.45	.60															
Washington	.63	.32	.71	.70	.48	.68			2.90	$12.05	.06	1.13	$11.12	7.87	1.37	1.56	1.65	1.12	.15	.12	.10
For District	$ .63	$ .32	$ .71	$ .70	$ .48	$ .68	$ 0.48	$ 1.35	$ 2.80	$12.50	$ 0.05%	$ 1.25	$11.50	$ 8.23	$ 1.39	$ 1.60	$ 1.80	$ 1.13	$ .16	$ .12	$ .10
For State	$ 0.56	$ 0.28	$ 0.65	$ 0.69	$ 0.41	$ 0.48	$ 0.48	$ 1.35	$ 0.80	$ 2.80	$12.50	$ 0.05%	$ 1.25	$11.50	$ 8.23	$ 1.39	$ 1.60	$ 1.13	$ .16	$ .12	$ .10

*Tame hay includes alfalfa.

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Crop and Year	Acreage	Production: Per Acre	Production: Total	Production: Unit	Farm Price Per Unit	Total Farm Value Based on Dec. 1 Farm Price
					Dollars	Dollars
Corn 1929	97,856,000	26.7	2,614,132,000	Bushels	.781	2,042,896,000
1930	100,829,000	20.6	2,081,048,000	"	.663	1,378,874,000
Winter wheat 1929	40,059,000	14.4	576,213,000	"	1.065	613,621,000
1930	38,608,000	15.7	604,337,000	"	.643	388,627,000
Durum wheat (4 states) 1929	5,525,000	9.8	54,190,000	"	.881	47,762,000
1930	4,643,000	12.0	55,665,000	"	.451	25,113,000
Other spring wheat, U. S. 1929	15,880,000	11.3	178,773,000	"	1.016	181,647,000
1930	15,302,000	12.9	196,963,000	"	.543	106,967,000
All wheat 1929	61,464,000	13.2	809,176,000	"	1.042	843,030,000
1930	59,153,000	14.4	850,965,000	"	.608	517,407,000
Oats 1929	49,013,000	30.7	1,328,369,000	"	.435	533,807,000
1930	41,598,000	33.7	1,042,026,000	"	.324	453,973,000
Barley 1929	13,068,000	23.2	262,892,000	"	.550	166,613,000
1930	12,437,000	26.2	325,893,000	"	.396	129,137,000
Rye 1929	3,331,000	12.6	41,911,000	"	.864	36,225,000
1930	3,722,000	13.5	50,234,000	"	.416	20,895,000
Buckwheat 1929	729,000	15.7	11,474,000	"	.977	11,210,000
1930	658,000	13.6	8,975,000	"	.845	7,588,000
Flaxseed 1929	3,059,000	5.6	17,049,000	"	2.842	48,459,000
1930	3,946,000	6.0	23,682,000	"	1.398	33,097,000
Cotton 1929	45,795,000	*155.0	14,828,000	Bales	b.164	1,217,829,000
1930	45,218,000	*150.8	14,243,000	"	b.095	674,044,000
Cottonseed 1929			6,590,000	Tons	50.33	199,881,000
1930			6,328,000	"	21.62	130,789,000
Hay, tame 1929	60,265,000	1.67	100,890,000	"	12.22	1,223,385,000
1930	58,473,000	1.41	82,656,000	"	12.68	1,048,205,000
Hay, wild 1929	12,938,000	.92	12,765,000	"	8.11	103,561,000
1930	14,136,000	.86	12,111,000	"	7.19	87,089,000
All hay 1929	74,703,000	1.53	113,658,000	"	11.76	1,336,946,000
1930	72,609,000	1.31	94,767,000	"	11.98	1,135,294,000
Clover seed, (red and alsike) 1929	1,643,000	1.54	2,523,000	Bushels	10.19	25,718,000
1930	1,017,500	1.43	1,459,600	"	11.89	17,354,000
Sweet clover seed 1929	207,000	4.19	867,700	"	3.65	3,166,000
1930	165,000	3.98	656,400	"	3.54	2,323,000
Alfalfa seed 1929	305,400	2.60	792,700	"	10.98	8,704,000
1930	216,200	2.91	920,200	"	9.85	9,066,000
Timothy seed 1929	391,000	3.70	1,448,400	"	2.23	3,234,000
1930	355,900	4.16	1,479,100	"	2.87	4,243,000
Soy beans* 1929	1,428,000	13.0	18,608,000	"	1.90	35,400,000
1930	1,635,000	12.6	20,539,000	"	1.62	33,300,000
Potatoes 1929	3,338,000	107.6	359,048,000	"	1.309	469,837,000
1930	3,394,000	106.4	361,099,000	"	.904	326,457,000
Sweet potatoes 1929	821,000	102.9	84,521,000	"	.944	79,819,000
1930	538,000	84.9	71,154,000	"	.906	64,480,000
Tobacco 1929	2,040,300	747	1,524,677,000	Pounds	.185	282,764,000
1930	2,110,300	716	1,510,308,000	"	.144	216,896,000
Sugar beets 1929	688,000	10.6	7,318,000	Tons	7.08	51,824,000
1930	799,000	11.5	9,175,000	"	7.15	65,561,000
Sugar cane except for sirup (La.) 1929	169,000	18.7	3,159,000	"	3.81	12,038,000
1930	184,000	16.9	3,108,000	"	3.42	10,625,000
Cane sirup 1929	117,000	180.9	22,114,000	Gallons	.767	16,952,000
1930	116,000	167.5	19,427,000	"	.586	11,390,000
Sorgo sirup 1929	346,000	73.7	25,181,000	"	.922	24,126,000
1930	384,000	62.8	24,122,000	"	.825	19,920,000
Apples, total 1929			142,738,000	Bushels	1.317	187,984,000
1930			163,543,000	"	.933	152,548,000
Apples, com'l 1929			29,004,000	Barrels	3.74	108,327,000
1930			33,723,000	"	2.68	90,466,000
Peaches, total 1929			45,789,000	Bushels	1.357	62,140,000
1930			53,286,000	"	.903	42,340,000
Pears, total 1929			22,063,000	"	1.432	31,588,000
1930			28,702,000	"	.763	19,611,000
Grapes, total* 1929			2,698,547	Tons	26.35	56,337,000
1930			2,268,557	"	18.59	41,721,000

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Crop and Year	Acreage	Production			Farm Price Per Unit	Total Farm Value Based on Dec. 1 Farm Price
		Per Acre	Total	Unit		
					Dollars	Dollars
Cabbage[f] 1929	158,710	7.63	1,116,300	"	18.76	20,941,000
1930	156,310	6.62	1,035,500	"	18.93	19,606,000
Corn, sweet (canning) 1929	357,310	1.57	704,400	"	13.14	9,254,900
1930	375,760	1.76	661,700	"	13.25	8,769,000
Cucumbers[f] 1929	139,710	72	8,629,000	Bushels	1.34	11,557,000
1930	166,160	71	11,740,000	"	.90	10,725,000
Onions 1929	86,850	293	25,470,000	"	.74	18,716,000
1930	82,940	315	26,124,000	"	.56	13,146,000
Strawberries[f] 1929	209,420	1,636	327,975,000	Quarts	.133	43,600,000
1930	175,720	1,305	229,536,000	"	.168	38,648,000
Tomatoes[f] 1929	444,870	4.26	1,896,600	Tons	27.90	52,910,000
1930	528,250	4.04	2,132,400	"	24.84	52,958,000
Watermelons 1929	212,810	327	69,579,000	N'mber	[g]175.00	12,195,000
1930	231,580	322	74,751,000	"	[g]117.00	8,741,000
U. S. total with duplications eliminated 1929	[h]364,322,000					[h]8,675,629,000
1930	[h]366,507,000					[h]8,274,821,000

[a]Pounds. [b]Per pound. [c]Total except hay. [d]Includes some quantities not harvested. Values and prices are for the portion harvested. [e]Production is the total for fresh fruit, juice and raisins. [f]Includes production used for canning or manufacture. [g]Per thousand melons. [h]U. S. totals include several minor crops not shown in the table.

IOWA CORN MOISTURE STUDY, 1930
(October)

Districts	Average Date Gathered (Oct.)	Total Number of Samples Tested	Total Number of Fields From Which Samples Were Gathered	Total Number of Ears Used in Samples	Average Moisture Content (Per Ct.)	Weights Used (Per Ct.)
Northwest	10	27	227	2,024	23.3	16
North Central	10	23	173	1,517	23.7	11
Northeast	11	21	158	1,407	24.1	7
West Central	10	28	244	1,651	22.9	17
Central	11	32	258	2,044	22.2	15
East Central	11	23	179	1,326	21.0	9
Southwest	10	21	215	1,563	25.2	11
South Central	11	17	133	894	23.8	7
Southeast	11	20	151	1,466	23.0	7
For State	11	212	1,738	13,842	*23.35	100

*Weighted according to percentage of acreage husked in 1929.

The 212 samples tested for the above summary were obtained from 98 counties and 1,738 fields. The total number of ears used in these samples was 13,842, or 8.0 ears per field, 65.3 ears per sample and 8.2 fields per sample. Thirty-three samples, gathered late, were tested but not used in this summary.

The average per cent of moisture, 23.35, obtained by weighting, is about 4.79 per cent drier than was obtained by a similar test made on the same date in October, 1929, and about 0.08 per cent wetter than on the same date in October, 1928.

The average weight per measured bushel of the samples submitted was about 51 pounds.

IOWA CORN MOISTURE STUDY, 1930
(November)

District	Average date gathered November	Total number of samples tested	Total number of fields or cribs from which samples were gathered	Total number of ears used in samples	Average moisture content (Per cent)	Weight per measured bushel (Lbs.)
Northwest	20	21	145	1,207	18.0	53.6
North Central	20	20	116	1,053	19.0	53.7
Northeast	20	20	108	703	19.0	54.0
West Central	19	20	136	945	17.6	55.3
Central	21	26	174	1,388	17.7	55.3
East Central	20	21	126	949	18.9	53.9
Southwest	19	21	142	1,140	17.7	54.7
South Central	20	21	159	1,112	17.4	55.6
Southeast	20	16	93	830	17.9	55.7
For State	20	186	1,199	9,325	*18.06	*54.6

*State averages weighted according to the percentage of corn husked in each district in 1929, on acreage basis, as reported by assessors.

The 186 samples tested for the above summary were obtained from 95 counties and 1,199 fields or cribs. The total number of ears in the samples was 9,325 or 7.8 ears per field, 50.1 ears per sample and 6.4 fields per sample. Most of the samples were gathered from cribs as practically all of the husking was done at the time the samples were gathered. The average per cent of moisture, 18.1, is about 5.3 per cent drier than on October 11, 1930, is 3.1 per cent drier than on November 20, 1929, and is 1.7 per cent drier than on November 21, 1928, when similar tests were made.

The estimate as of December 1, 1930, showed an average yield of 32.5 bushels per acre, which, according to this study had a moisture content of 18.1 per cent on November 20. To place this on a No. 2 contract grade basis it would be necessary to reduce the moisture content to at least 15.5 per cent which would leave a yield of 31.5 bushels of No. 2 corn per acre.

CORN*, BY STATES

State	Acreage Harvested (Thousands)		Yield Per Acre (Bushels)		Production (Thousand Bus.)		Total Value, Basis Dec. 1 Farm Price (Thousands Dols.)	
	1929	1930	1929	1930	1929	1930	1929	1930
Maine	13	13	40.0	42.0	520	546	624	546
New Hampshire	13	13	41.0	45.0	533	585	586	614
Vermont	67	64	41.0	43.0	2,747	2,752	2,884	2,752
Massachusetts	40	39	39.0	46.0	1,560	1,794	2,106	1,794
Rhode Island	9	9	42.0	42.0	378	378	529	416
Connecticut	53	54	43.0	42.0	2,279	2,268	2,507	2,381
New York	670	657	31.0	30.0	20,837	19,710	21,462	17,739
New Jersey	179	175	36.0	36.0	6,444	6,300	6,508	5,985
Pennsylvania	1,369	1,322	35.5	22.0	46,470	29,084	46,470	27,630
Ohio	3,518	3,483	36.5	25.5	128,407	88,816	109,157	59,507
Indiana	4,124	4,306	32.0	26.2	131,968	110,197	97,656	67,223
Illinois	8,900	9,345	35.0	25.5	311,500	238,298	224,280	147,745
Michigan	1,344	1,384	24.5	20.5	32,928	28,372	29,506	21,840
Wisconsin	1,995	2,035	40.0	39.0	79,800	79,365	66,234	67,545
Minnesota	4,253	4,380	35.0	31.0	148,855	135,780	96,756	71,963
Iowa	**10,883**	**11,100**	**39.5**	**32.5**	**429,878**	**360,750**	**300,915**	**209,235**
Missouri	5,384	5,992	23.5	12.3	126,524	72,841	108,811	54,631
North Dakota	1,057	1,089	15.5	17.5	16,384	19,058	11,141	10,101
South Dakota	4,916	4,965	22.8	15.5	112,085	76,958	69,493	36,170
Nebraska	9,144	9,171	26.0	25.7	237,744	235,695	164,043	120,294
Kansas	6,103	6,347	17.5	12.0	106,802	76,164	79,031	44,937
Delaware	134	138	32.0	20.4	4,288	2,815	3,775	1,562
Maryland	520	530	36.5	14.7	18,980	7,791	16,702	7,346
Virginia	1,522	1,568	29.0	11.5	44,138	18,032	44,138	18,934
West Virginia	441	441	36.0	13.3	15,876	5,865	16,829	6,380
North Carolina	2,259	2,530	22.5	20.5	50,828	51,865	50,828	48,234
South Carolina	1,422	1,635	16.4	16.5	23,321	26,978	23,088	24,530
Georgia	3,656	3,729	13.8	12.2	50,453	45,494	44,399	39,135
Florida	625	625	13.5	12.0	8,438	7,500	7,172	6,750
Kentucky	2,938	2,909	27.3	10.8	80,207	31,417	72,988	29,561
Tennessee	2,944	2,915	25.0	14.1	73,600	41,102	67,712	38,125
Alabama	2,676	2,810	14.0	10.5	37,464	29,505	36,715	28,225
Mississippi	1,765	1,730	20.0	11.5	35,300	19,895	32,929	19,467
Arkansas	1,882	1,788	14.0	4.7	26,348	8,404	25,821	8,065
Louisiana	1,180	1,109	18.2	11.0	21,476	12,199	19,228	11,345
Oklahoma	3,029	3,141	16.0	11.6	48,320	36,436	38,173	23,682
Texas	4,533	4,941	19.0	18.5	86,127	91,408	73,208	66,778
Montana	301	271	12.0	12.0	3,612	3,252	3,654	3,346
Idaho	54	59	36.0	39.0	1,944	2,301	1,827	1,611
Wyoming	157	170	14.0	21.0	2,198	3,570	1,868	2,320
Colorado	1,366	1,516	17.0	24.5	23,222	37,142	17,416	21,085
New Mexico	209	215	20.0	14.0	4,180	3,010	3,720	2,229
Arizona	41	41	28.0	33.0	1,148	1,353	1,492	1,338
Utah	19	20	31.0	31.0	589	620	589	620
Nevada	2	2	28.0	22.0	56	44	67	31
Washington	48	50	38.0	38.0	1,824	1,900	1,879	1,672
Oregon	86	83	35.0	33.0	3,010	2,739	2,950	2,273
California	82	90	31.0	30.0	2,542	2,700	2,847	2,349
United States	97,856	100,829	26.7	20.6	2,614,132	2,081,048	2,042,893	1,378,574

*This table covers corn for all purposes, included hogged and silged corn, and that cut and fed without removing the ears, as well as that husked and snapped for grain. The yield for grain, with an allowance for varying yields of corn for other purposes, is applied to the total acreage to obtain an equivalent production of all corn.

VETERAN WEATHER OBSERVER RETIRES

Mr. R. Z. Latimer, who has been an exceptionally faithful and accurate cooperative weather observer at Fayette, Iowa, resigned, effective October 6, 1930, after 42 years and 3 months of consecutive service. Such a long and excellent record, kept by one individual, is worthy of special remark.

When Mr. Latimer's resignation came to the attention of the Chief of the Weather Bureau at Washington, D. C., he wrote him the following appreciative letter:

"Mr. R. Z. Latimer,
Fayette, Iowa.

My Dear Mr. Latimer:

"Our Section Director for Iowa, at Des Moines, informs me that you have asked to be relieved of the work of cooperative observer at Fayette.

"The records of this office show that for over 42 years you have kept the official records at Fayette without failure, except recently during your brief illness. While two generations in one family often maintain a faithful meteorological record for a long period, it is rare that a single individual makes such a long, continuous and satisfactory record.

"It is regretted that you are no longer to be a member of our corps of weather observers, composed so largely of the best citizens of the many communities represented, but we realize your age will not permit you to longer continue the work.

"I desire to thank you personally for the excellent public service you have rendered without compensation, and for the splendid cooperation maintained with our Des Moines officials.

"Please accept my best wishes for your future health and happiness.

Respectfully,
(Signed) C. F. MARVIN,
Chief of Bureau."

Mr. Latimer also received a letter of commendation from Honorable G. N. Haugen, Representative in Congress for the Fourth District of Iowa.

Though Mr. Latimer experienced a brief period of ill health about two years ago, he is now in good condition and has already gone south to spend the winter. He expects to return to Des Moines for the G. A. R. Encampment next year. He is 85 years old.

Professor W. C. Van Ness, a member of the faculty of Upper Iowa University at Fayette, succeeds Mr. Latimer. In weather observations Professor Van Ness is not a novice. He served as cooperative observer of the Weather Bureau at Denison, Iowa, for 17 years prior to May, 1917.

WIND MOVEMENT AT DES MOINES, IOWA; OLD AND NEW LOCATIONS

During the 12 months ending September 30, 1930, an automatic anemometer record was maintained at the old location on the Federal Building, West Fifth and Court Streets, for comparison with the one at the new observatory on the U. S. Court House, East First and Walnut Streets. Three-cup anemometers were used at both places. The elevation of the anemometer above the street level at the old place is 97 feet and the new place, 99 feet, an inappreciable diference, but a casual inspection shows at the old place the anemometer was much "depressed" below the general level of the tops of the buildings, while at the new place there are no taller buildings within a radius of several blocks and the buildings in the immediate vicinity are generally much lower. In the 12

months the total wind movement at the old place was 57,395 miles and at the new, 78,786 miles, or 37.27 per cent greater.

Each hour the total movement was compared and the comparisons sorted by directions as recorded at the new place, it being impracticable to maintain direction records at both places. As expected, the interference of high buildings that have grown up to the north and west of the old location, is shown by the curves on the following pages, which graphically present the differences in wind movement from the different directions in the two locations. All curves show increases at the new location except at low velocities and from the south above 27 miles per hour. To the south and northeast the exposures are about equally good at both places. With west wind the velocities are the same, 100 per cent, at 2 miles per hour, but as the wind increases the increase is much more rapid at the new location, 9 miles per hour at the old location being equivalent to 16.4 miles at the new. This is an increase of 82 per cent, based on 33 comparisons. The same increase is noted at 6.6 miles per hour in 46 comparisons. These are greater increases than at any other velocity and direction.

A trend calculation made a few years ago showed that wind velocities at Des Moines were decreasing at the rate of 0.07 miles per hour per year. No doubt this was mostly due to the growth of buildings around the old location. However, the year ending September 30, 1930, was windier in Iowa than was the preceding year, except in the southwest portion. In spite of the downward trend in wind movement at nearly all Weather Bureau stations, due mainly to growth of surrounding buildings, the wind velocity of the latter year, expressed in per cent of the preceding year, at Charles City is 100.106 per cent; Davenport (last 9 months), 105.421 per cent; Des Moines (old location), 100.483 per cent; Dubuque, 103.978 per cent; Keokuk, 106.504 per cent; Sioux City, 100.019 per cent; Omaha, 98.783 per cent.

It was impracticable to compare maximum velocities for 5-minute periods of each day for they are rarely simultaneous or nearly simultaneous. However, the monthly maximum velocities were noted on the graphs and those that were within an hour or so of being simultaneous were circled. The greatest number of simultaneous hourly comparisons for any velocity and direction was 134, showing 4.6 miles from the south at the old, equivalent to 5.0 miles at the new place. Also, 132 comparisons from the north showed 3.6 miles at the old, equivalent to 5.0 at the new.

Low velocities generally and moderate to rather high velocities occasionally, were higher at the old than at the new place. This reversal of form occurred on the average with north winds at 1.8 miles per hour; northeast, 4.3; east, 1.3; southeast, 1.6; south, 1.8; southwest, 2.2; west, 1.8; and northwest, 1.7. Below these velocities there was a well defined tendency to greater wind movement at the old than at the new place. At the new location it was generally calm when the movment at the old location averaged 0.7 mile or less from the north; 0.3 northeast; 0.8 east; 0.1 southeast; 0.2 south; 0.1 southwest; 0.3 west; and 0.5 northwest.

Most of the reversals were in hours of darkness when velocities are generally low and also when the wind was from the south, sometimes at

rather high velocities. At the old place near the business center of the city more artificial heat is liberated during the "heating season" than in the comparatively unheated area of parks, river, widely separated civic buildings and unoccupied buildings and lots around the new place. Also relatively more paved and built over areas at the old location store up more heat in daytime and release it at night during the warm months, than at the new location. So there is probably more convectional air circulation (up and down currents) at night at the old place, in all seasons, and the "down currents" bring with them something of the more rapid movement of the wind aloft. Wind velocities below 1,000 feet altitude are nearly always greater in daytime than at night, and the higher velocities have a tendency to sweep aside local differences due to artificial heating or radiation, but bring out the contrast between the protected old exposure and the open new exposure. With both exposures almost equally good from the south, the chances of occasional higher velocities at the old place are increased from that direction. For example, on June 13, 1930, from 5 to 6 p. m., 26 miles from the south were recorded at the new place and 30 at the old, probably due to a local convectional increase at the old place, as indicated by cumulus clouds that were passing over.

For the period compared, the table below shows for all directions, the velocities at one location in terms of the other. These values were read from the curves. Ten or more years ago, before the higher buildings were constructed, the table would not have applied very well; and ten years hence it will not apply if the 25-story buildings contemplated are constructed.

WIND VELOCITY CONVERSION TABLE

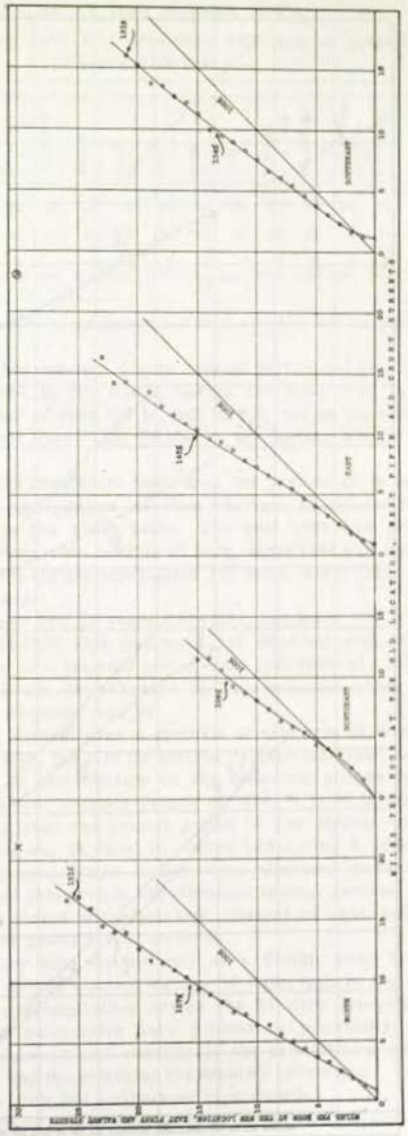
DES MOINES, IOWA

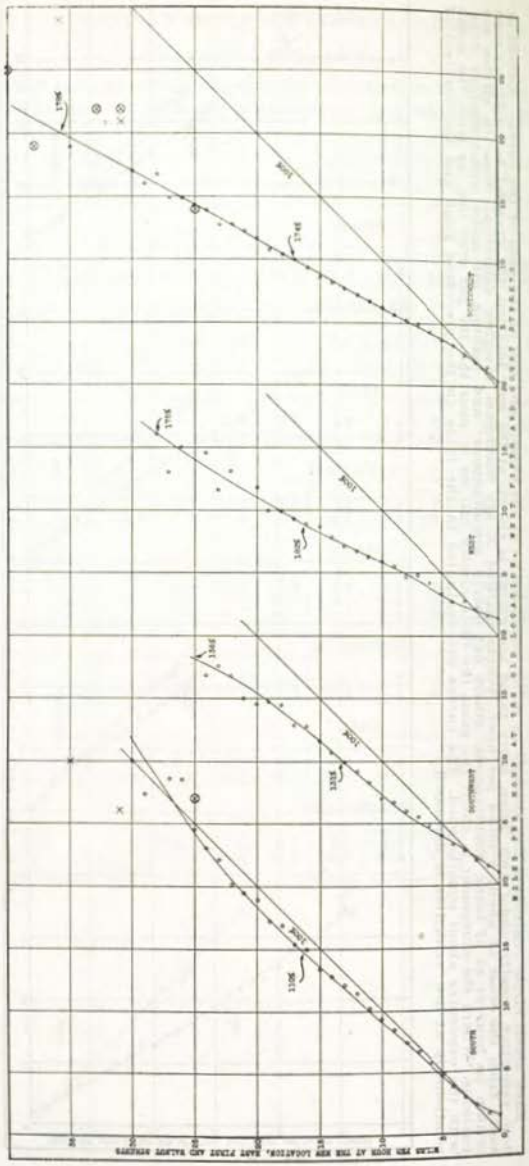
Figures at top and left of table are the movement at W. Fifth and Court.
Figures in body of table are simultaneous movement at E. First and Walnut.

	0	1	2	3	4	5	6	7	8	9
NORTH										
0		0.5	2.2	3.9	5.6	7.4	9.1	10.9	12.6	14.1
10	15.7	17.2	18.6	20.1	21.5	22.9	24.3	25.7	27.0	
NORTHEAST										
0		0.6	1.4	2.5	3.8	5.3	7.0	8.5	9.9	11.2
10	12.6	13.8	15.1							
EAST										
0		0.5	2.2	3.6	4.9	6.3	7.8	9.4	11.2	12.9
10	14.4	15.9	17.5	19.0	20.4	21.9	23.3			
SOUTHEAST										
0		0.0	2.6	3.9	5.2	6.5	7.9	9.3	10.7	12.0
10	13.4	14.7	16.0	17.2	18.5	19.8	21.0			
SOUTH										
0		0.0	2.0	3.2	4.3	5.5	6.5	7.6	8.7	9.7
10	10.8	11.9	13.0	14.2	15.3	16.4	17.5	18.5	19.5	20.6
20	21.5	22.4	23.2	24.0	24.7	25.5	26.2	26.9	27.6	28.3
SOUTHWEST										
0		0.4	1.8	3.4	5.2	6.8	8.3	9.7	10.8	12.0
10	13.1	14.3	15.5	16.7	17.9	19.3	20.7	22.4	24.5	
WEST										
0		0.0	2.2	4.5	6.2	8.1	10.5	12.7	14.6	16.4
10	18.2	19.9	21.7	23.3	24.9	26.4	27.9			
NORTHWEST										
0		0.7	2.9	3.7	5.6	7.6	9.6	11.8	13.8	15.6
10	17.4	19.1	20.8	22.6	24.5	26.3	28.2	30.0	31.9	33.8
20	35.6	37.4								

WIND VELOCITIES AT DES MOINES, IOWA; OLD AND NEW LOCATIONS COMPARED

Each small circle represents the average of many comparisons at the middle and few at the ends of the curves. Except at low velocities, mostly under two miles, more rapid movement is shown at the new location, the greatest being 82 per cent more from the west at about 9 miles per hour. Points marked X are maximum monthly velocities; those in circles are within an hour or so of being simultaneous; others not nearly simultaneous; and maxima all make unsatisfactory comparisons. Where the movement is about the same the little circles fall on or near the 100 per cent line, as from the south with the exposures about equally good. The curves are evaluated in the table on the preceding page and the reversal of relationship at low velocities is discussed.





DROUTHS AT DES MOINES, IOWA

Periods of 10 or more days with less than 0.01 inch of precipitation, 52 years, 1879-1930.

	January	February	March	April	May	June	July	August	September	October	November	December	Period
Total number	34	24	28	11	12	19	18	17	22	39	32	32	288
Maximum duration (days)*	28	29	27	18	16	16	22	20	25	30	34	29	34
Number of traces in maximum period	4	4	2	4	4	4	2	2	1	3	13	6	13
Year of maximum	1919	1890	1910	1893	1887	1911	1886	1913	1908	1908	1900	1912	1903

*Mostly in the month shown in the heading but often extending into the preceding or following month.

In compiling the table, where a drouth covered portions of two months, the period was entered in the month having the most days involved. Where an equal number of days fell in each month, the period was given to the first month. This shows that October is the leading drouth month, with 39 periods.

In the 52 years, 1879-1930, there have been 288 periods of 10 or more consecutive days with precipitation less than 0.01 inch, distributed through the year as shown in the above table. The year 1884 had the least number of drouth periods, two, totaling 33 days, while 1894 had the greatest number, 10, but the 10 periods totaled 123 days, while 1910, with 9 periods, totaled 129 days.

Drouth periods in the first 26 years, 1879-1904, numbered 137, while in the last 26 years, 1905-1930, they numbered 151. Starting with 1881, the number of drouths in each ten-year period were 1881-1890, 51; 1891-1900, 59; 1901-1910, 56; 1911-1920, 52; 1921-1930, 62. This indicates rather clearly a tendency to more frequent drouths.

The longest period without even a sprinkle of rain was 24 days, August 25-September 17, 1893, too late for serious damage that year, but with a marked deficiency in precipitation in the following months laid the foundation for the serious summer drouth of 1894. It is of interest, but unimportant, to know that the longest period at Des Moines with less than 0.01 inch of rain, was 34 days, November 5-December 8, 1903. Subsoil moisture and general water supply were abundant from deluges earlier in the year, and this drouth was desirable in corn husking. There were 13 days in the period with sprinkles (traces) of rain, and in 76 days only 0.25 inch of precipitation occurred.

Several factors enter into the severity of a drouth aside from the minimum amount of rain in a stated number of days, such as the amount and character of the precipitation during the 30 days preceding; the maximum number of consecutive days without or practically without precipitation; the frequency and quantity of the precipitation by which the drouth is broken, and the season of the drouth's occurrence. Temperature has much to do with the seriousness of a drouth.

Summer drouths are of great importance in the vicinity of Des Moines,

while winter drouths are not so important. Prolonged summer drouths are troublesome for months afterward in the failing water supply on farms in wells, ponds and streams for livestock, and even for domestic use. Power plants depending upon streams for condensing engines, lose efficiency, and sometimes have to shut down entirely when drouths are serious.

In 1930, the 80-day period, July 5-September 22, with only 1.41 inches of rain, and 15 consecutive days without appreciable rain, compares to 1886 with 4.44 inches and 32 consecutive days with only traces; 1893 with 1.73 inches, and 24 days with not even a sprinkle; 1894 with 6.49 inches and 15 consecutive days with only sprinkles; and 1901 with 3.82 inches and 22 consecutive days with only traces.

The 1901 period is the hottest, and 1930 next. There were 12 days in 1901 with maximum temperatures 100° or higher, and the highest 109°, while in 1930 there were also 12 days with 100° or higher and the highest was 106.

Deficient rainfall in 30 days preceding the principal drouth period contributed to the drouth of 1886, there being only 1.51 inches. Next is 1894 with 1.68 inches, while 1901 had 3.24 and 1930, 3.01.

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