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UNITED STATES  
DEPARTMENT OF AGRICULTURE,  
WEATHER BUREAU.

ANNUAL REPORT

OF THE

Iowa Weather and Crop Service

IN CO-OPERATION WITH THE

United States Weather Bureau,  
FOR THE YEAR 1901.

GEO. M. CHAPPEL,  
*Local Forecast Official U. S. Weather Bureau,  
Assistant Director.*

JOHN R. SAGE,  
*Director.*

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STATE OF IOWA  
OFFICE OF THE WEATHER AND CROP SERVICE, }  
DES MOINES, November 1, 1902.

*To His Excellency, Albert B. Cummins, Governor of Iowa:*

SIR,—In accordance with the requirements of the law, we have the honor to submit herewith the twelfth annual report of the Iowa Weather and Crop Service for the year 1901.

We are, sir, very respectfully,  
Your obedient servants,

JOHN R. SAGE,  
*Director.*

GEO. M. CHAPPEL,  
*Local Forecast Official, U. S. Weather Bureau,  
Assistant Director.*



## ANNUAL REPORT, 1901.

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This report has been compiled from the monthly and weekly issues of the Iowa Weather and Crop Service, the special purpose being to present in a condensed form for future reference the salient climatic features of the year, together with carefully tabulated statistics of the staple soil products of the state. The officials in charge of this branch of the public service have received most valuable and indispensable assistance from voluntary meteorological observers and crop reporters, whose uncompensated labors are gratefully recognized.

Through the co-operation of the United States Weather Bureau and the Iowa Weather and Crop Service this state has been well covered with meteorological stations, equipped with standard instruments in charge of intelligent and experienced observers. In this joint service the national government has borne by far the heavier burden of expense, and for a large share of the benefits received the people of Iowa are deeply indebted to the Honorable Secretary of Agriculture and the efficient Chief of the Weather Bureau.

The United States Weather Bureau maintains five fully equipped meteorological stations in Iowa, viz: Des Moines, Davenport, Dubuque, Keokuk and Sioux City; and the monthly reports of the U. S. station at Omaha are also included in the records of this state. Reports are also received with a fair measure of regularity from 134 voluntary meteorological stations. There has been a steady increase in the efficiency of the service, and great care has been exercised in the correction of reports and the elimination of errors from the records.

The Iowa Monthly Review and the weekly Climate and Crop Bulletins issued during the crop season, are widely distributed in answer to the continually increasing public demand for statistical information relative to weather conditions and crop prospects in this foremost agricultural state. The aggregate distri-



bution of the monthly reports has been about 31,000 copies during the year, and the weekly bulletins issued during the crop season amounted to something over 40,000 copies. Weekly summaries were also disseminated through the daily and weekly papers of the state.

#### METEOROLOGICAL SUMMARY FOR THE YEAR 1901.

**Barometer.**—The mean pressure for the year was 30.03 inches. The highest observed pressure was 30.74 inches on December 19th at Des Moines and Sioux City; lowest pressure, 29.18 on April 5th at Keokuk. Range for the state 1.56 inches.

**Temperature.**—The mean temperature for the state was 49°, which is 1.8° above normal. The highest temperature reported was 113° on July 22d at Sigourney, or 3° above any previous official record for Iowa. The lowest temperature reported was 31° below zero, on December 15th, at LeMars. Range for the year, 144°.

**Precipitation.**—The average amount of rain and melted snow for the year was 24.62 inches, which is 5.68 inches below the normal, and 10.98 inches below the average amount recorded in 1900. The greatest amount recorded at any station for the year was 37.69 inches at Fonda; least amount recorded, 16.35 inches at Bonaparte. The greatest monthly rainfall was 13.62 inches at Fonda in September; least amount, a trace at Danville and Emerson in August. The greatest amount in any consecutive 24 hours was 5.49 inches at Plover, September 27th. The average number of days on which .01 inch or more of rain fell was 74.

**Wind and Weather.**—The prevailing direction of wind was northwest. Highest velocity reported, 58 miles an hour in Sioux City, from northwest, on March 3d, average daily wind movement 207 miles. There were 178 clear days, 103 partly cloudy, and 84 cloudy days.

#### MONTHLY SUMMARIES.

##### JANUARY.

The month was unusually mild and pleasant. The mean temperature for the state was 23.7°, or 6.5° above the normal for January. The mean of the corresponding month in 1900 was 1.6° warmer. The mean temperatures by sections were as follows: Northern section, 20.1°; central section, 23.8°; southern section, 27.0°. The highest monthly mean for the state was 30.6°, at Keokuk; lowest mean, 15.3° at Ruthven. Highest temperature reported, 60°, at Keokuk, on the 15th; lowest temperature, 21° below zero, at Elkader, on the 1st. The average monthly maximum was 50.5°; average monthly minimum, 7° below zero. The greatest daily range was 49° at Olin; average greatest daily ranges, 34.1°. The average precipitation, as shown

by records of 134 stations, was .74 of an inch. By sections, the averages were as follows: Northern section, .64 of an inch; central section, .85 of an inch; southern section, .76 of an inch. The largest amount reported was 2.34 inches, at Olin; least amount .04 of an inch, at Murray. The greatest daily rainfall was 1.31 inches, at Ridgeway, on the 9th. Average number of days on which .01 inch or more precipitation was reported, 4. Prevailing direction of wind, northwest; highest velocity reported, 54 miles an hour, from northwest, at Sioux City, on the 8th. Average number of clear days, 14; partly cloudy, 9; cloudy, 8.

##### OBSERVERS' NOTES.

**Alla**—DAVID E. HADDEN: January was mild and pleasant, and ground was bare during larger part of month. Mean temperature was 4.3° warmer than the eleven-year normal, but was 3° colder than in January, 1900.

**Clinton**—DR. LUKE ROBERTS: January, 1901, was remarkably mild and agreeable for a month that usually furnishes the most rigorous weather of the year. The mean temperature was 24.1°, which is 4.1° above the January normal. The maximum was 53°, on the 20th, and the minimum was 7° below zero, on the 1st. Precipitation, 1.35 inches, mostly in form of snow. There were only five storm days, or three less than the January average.

**Columbus Junction**—H. E. SIMPSON: On the 22d, between 8:00 and 9:00 P. M., many flashes of lightning were observed, followed by storm of ice and snow.

**Cresco**—GREGORY MARSHALL: A milder month than usual for January, but 3° colder than the same month in 1900.

##### FEBRUARY.

The monthly mean temperature for the state, as deduced from records of 120 stations, was 17.5°, or about 4° below normal. By sections the means were as follows: Northern section, 15.5°; central section, 17.0°; southern section, 19.9°. The highest mean for the month was 22.9°, at Omaha; lowest mean, 11.2°, at Cresco. The highest temperature reported was 49° at Bedford, on the 17th; lowest temperature reported, 21° below zero at Iowa City, on the 10th. The average monthly maximum 42.1°; average monthly minimum, 9.9° below zero. The greatest daily range was 53° at Audubon; average of greatest daily ranges, 36.2. The average precipitation for the state as shown by records of 137 stations, was 1.01 inches, which is about normal. By sections the averages were as follows: Northern section, 0.76 of an inch; central section, 1.09 inches; southern section, 1.18 inches. The largest amount reported was 3.00 inches at Ruthven; least amount reported for the month, 0.12 of an inch at Murray. The greatest daily amount reported was 2.00 inches at Ruthven, on the 8th; average number of days on which .01 inch of precipitation was reported was 4. Prevailing direction of the wind, northwest; highest velocity reported, 45 miles per hour at Sioux City, on the 17th. The average number of clear days was 15; partly cloudy, 7; cloudy, 6. Though somewhat colder than usual, it was generally an ideal winter month, with no severe storms, sudden changes or extremes of temperature. The weather was generally favorable for feeding stock and for such farming operations as may be carried on in midwinter. The north-



eastern counties were colder than the other portions of the state, and the ground was well covered with snow a considerable portion of the month.

## OBSERVERS' NOTES.

*Bancroft*—E. G. BAILLY: An ideal winter month. Stock has needed but little shelter, and rough feed has been consumed.

*Bonaparte*—B. R. VALE: No severe storms; stock in fields; good month for feeding; roads good.

*Clear Lake*—JOHN COBB: Very mild month; very little snow in spots.

*Clinton*—DR. LUKE ROBERTS: The highest temperature during the month was 39°, occurring on the 17th. This is 12.9° below a February normal. The minimum temperature was 12° below zero, and occurred on the 6th. This is 2.8° above a February normal. The mean temperature of the month was 14.5°, or 7° below normal. The mean temperature of the warmest day, 17th, was 3.5° or 9.1° below normal. The mean of the coldest day, the 5th, was 1.5° below zero, or 3° above normal. There were five storm days, in which was precipitated 14 inches of snow or 1 40 inches of water. The prevailing direction of the wind was from the west. The maximum velocity was 23 miles an hour, occurring on the 3d. Total movement for the month, 3,830 miles, or 857 miles below normal. The number of clear days was 14; cloudy and partly cloudy, 7 each. The clear days were five in excess of normal. Notwithstanding the February just closed was one of the coldest, it was a good month for business, the roads were good, sleighing was good the entire month, and dating back into January five days, gave 33 days of continuous sleighing. It is a rarity in this locality to have such a fine run of sleighing, and not only has everybody utilized it, but it brought much healthful and invigorating enjoyment. It was not really a severe month for man or beast. Stock passed through all right and thrived every day. The ice crop was large.

*Olin*—HON. NATHAN POTTER: An ideal winter month, with good sleighing, no drifts and no severe storms; ten inches of snow at close of month.

*Ridgeway*—ARTHUR BETTS: This month has been 1.8° colder than the average of the three preceding Februaries. A good winter month; 226 hours of sunshine, 234 hours being the greatest possible for this latitude, which is 43° 20'. No extreme cold and but little thaw.

## MARCH.

The monthly mean temperature, as shown by records of 117 stations, was 34.2°,—a daily excess of about 1°. The highest monthly mean was 39° at Burlington, and the lowest monthly mean was 29° at Cresco. By sections the means were as follows: Northern section, 31.8°; central section, 34.3°; southern section, 36.4°. The highest temperature reported in the state was 76° at Atlantic, on the 17th; lowest, 8° below zero at Anson on the 4th. The average monthly maximum was 65.4°; average monthly minimum; 2°. The greatest daily range was 52°, at Larchwood; average of greatest daily ranges, 36.7. The average precipitation for the state, as shown by records of 128 stations, was 2.64 inches, which is .89 of an inch above normal. The averages of the sections were as follows: Northern section, 2.30 inches;

central section, 2.70 inches; southern section, 2.91 inches. The largest amount reported was 5.25 inches, at Red Oak; least amount .70 of an inch at Whitten. The greatest daily precipitation reported was 2.20 inches, at Winterset on the 11th. Average number of days on which .01 or more precipitation was reported, 7. Prevailing direction of wind, northwest; highest velocity reported, 58 miles per hour, from the northwest, at Sioux City, on the 3d. The average number of clear days was 9; partly cloudy, 8, and cloudy 14.

## OBSERVERS' NOTES.

*Ala*—DAVID E. HADDEN: First thunderstorm of season on 24th, light. March was a very changeable month, with frequent heavy snowstorms, and excess of cloudiness; roads very muddy latter part of month.

*Bonaparte*—B. R. VALE: A variable month; no farm work done; plenty of moisture, but not excessive.

*Clarinda*—A. S. VAN SANDT: Many roads impassable for days, on account of drifted snow and mud.

*Clinton*—LUKE ROBERTS: During the month there were seven clear, five partly cloudy and nineteen cloudy days, the cloudiness exceeding the normal eight days. Rainfall, 3.86 inches—1.30 inches above normal. Mean temperature, 34.7°; highest temperature, 65° on the 18th; lowest, 5° above zero on the 5th. The wind movement for month was 6,340 miles, or about 300 miles in excess of normal.

*Columbus Junction*—H. E. SIMPSON: The heavy rains of 19th and 25th, raised waters of Iowa and Cedar rivers so that approach to the Junction bridge was impossible; water was four feet over the wagon road for nearly a week.

*Cresco*—GREGORY MARSHALL: Sleet storm of 19th did much damage to trees and shrubbery. The excess of precipitation mostly ran off the surface and will do but little good. Roads almost impassable.

*Elkader*—CHAS. REINECKE: Ice went out of the Turkey river, March 3d.

*Fayette*—R. Z. LATIMER: Ice went out of the Volga on 17th; many migratory birds were seen on the 17th.

*Fruitland*—R. T. HUMMEL: First southern redbird made its appearance March 1st; blackbirds, larks, and robins on the 18th; on the 27th, sowing oats and wheat on sandy lands.

*Grinnell*—A. O. PRICE: March leaves the farmers with very bad roads and mired feed yards; farm operations yet in the distance.

## APRIL.

The first half of the month was unusually cold; last half much warmer, bringing the mean up to about the normal. The monthly mean, as deduced from records of 113 stations was 49.9°. The highest monthly mean was 52.6° at Council Bluffs and Keosauqua; lowest monthly mean, 46.7° at Ruthven. The highest temperature reported was 92° at Sigourney and Fruitland on the 29th and 30th; lowest reported, 15° at Monticello on the 1st. By sections the monthly means were as follows: Northern section



48.9°; central section, 49.9°; southern section, 50.9°. For the state the average monthly maximum was 86.1°; average monthly minimum, 23.9°; the greatest daily range was 50° at Fruitland; average of greatest daily ranges, 36.8°. The average precipitation for the state, as shown by records of 131 stations, was 1.79 inches, which amount is 1.41 inches below the normal for April. The averages by sections were as follows: Northern section, 1.56 inches; central section, 1.65 inches; southern section, 2.16 inches. The largest amount reported for the month was 3.47 inches at College Springs. The greatest daily rainfall reported was 2 inches at Clarinda, on the 5th; average number of days on which .01 inch or more of precipitation was reported, 5. Prevailing direction of wind southeast; highest velocity reported, 48 miles per hour, from the northwest, on the 5th at Sioux City. Average number of clear days, 14; partly cloudy, 8; cloudy, 8.

## OBSERVERS' NOTES.

*Alla*—DAVID E. HADDEN: During first half of the month the roads were very wet and muddy, warm and dry during the last decade and ground in good condition for farming.

*Bonaparte*—B. R. VALE: First and second decades cold, cloudy and backward; last ten days ideal weather for agriculture and vegetation.

*Britt*—GEO. P. HARDWICK: First half of month unseasonably cold; frost remaining late in ground and little farm work done; last half warmer and more rapid growth of vegetation.

*Clinton*—LUKE ROBERTS: April gave normal temperature but was almost stormless; only one other April during the last twenty-three years gave less rainfall. This year it was .80 of an inch; in 1895 it was only .28 of an inch and that month was 4° higher in temperature. Dust and not mud prevailed at close of this month.

*Cresco*—GREGORY MARSHALL: Seeding began on 8th but work was much retarded by wetness of soil; stand of grain good at close of month; too dry for hay lands.

*Grand Meadow*—F. L. WILLIAMS: Farm work began on the 9th. Ground frozen too hard to be plowed on morning of 18th; last seven days extremely warm.

*Grinnell*—A. O. PRICE: First half of month backward, and all farm work belated; at the close vegetation was nearly up to average and work was well in hand.

## MAY.

The monthly mean temperature for the state, as deduced from records of 114 stations, was 60.7°, which is about 1° above normal. The highest monthly mean was 63.4°, at Fruitland; lowest, 57.8, at Larrabee. By sections the means were as follows: Northern section, 59.8°; central section, 60.7°; southern section, 61.5°. The highest temperature reported was 95°, at Clear Lake on the 2d and 17th; lowest temperature reported 28° at Larrabee, on the 12th. The average monthly maximum was 89°; average monthly minimum, 34°. The greatest daily range was 49°, at Clear Lake, Sheldon and Moorar; average of greatest daily ranges was 38.2°. The average precipitation for the state, as shown by records of 130 stations, was 2.35

inches, which is about 1.62 inches below the normal for May. By sections the averages were as follows: Northern section, 2.64 inches; central section, 2.24 inches; southern section, 2.18 inches. The largest monthly amount reported was 4.57 inches, at Belle Plaine; least amount, .72 of an inch, at Belknap. The greatest daily rainfall reported was 2.95 inches, at Fort Dodge, on the 6th. Average number of days on which .01 or more precipitation was reported, 7.—Prevailing direction of wind northeast; highest velocity, 48 miles per hour, from northwest at Sioux City, on the 10th. Average number of clear days, 16; partly cloudy, 9; cloudy, 6.

## OBSERVERS' NOTES.

*Bonaparte*—B. R. VALE: A cold dry month; less than half the normal rainfall since January 1st.

*Britt*—GEO. P. HARDWICK: Month began warm, but temperature ranged lower during latter half, with much northeast wind; no severe storms.

*Clinton*—DR. LUKE ROBERTS: The mean temperature for the month was 0.7 degrees above normal. The greatest departure from normal was in the deficiency of rainfall, and all vegetation was checked in growth thereby. Frosts did but slight damage; planting corn was belated; oats do not promise well.

*Fonda*—H. P. BARRON: Ice formed on 11th, 12th, and 25th, but did not damage anything. Corn planting completed by the close of month, with good stand.

*Grand Meadow*—F. L. WILLIAMS: Plum blossoms were noted May 1st, and apple bloom the 3d. Chinch-bugs were flying May 17th.

*Grinnell*—A. O. PRICE: Month favorable for farm work; all crops up to an average.

*Grundy Center*—E. S. KING: Month very cool; pastures and meadows short; corn a good stand.

*Osida*—H. C. MILLER: Apple, cherry, plum and quince trees were in full bloom on the 1st.

*Ridgeway*—ARTHUR BETTS: Month half a degree above normal. A delightful month, with 343 hours of sunshine. Past two months have been notable for prevailing northeast wind. Last light frost, April 22d; last killing frost, April 21st.

*Storm Lake*—PROF. M. L. FULLER: Plums were in bloom by 2d; apples in bloom on 6th; frost on 11th, 12th, 13th, and 25th, but not killing.

## JUNE.

The monthly mean temperature for the state as deduced from records of 110 stations, was 72.3°; which is about 2.3° above the normal. The highest mean temperature reported was 77.7° at Scranton; lowest mean, 68.4° at Sibley. The highest temperature reported was 106° at Wapello, on the 30th; lowest temperature reported, 30° at Larrabee, on the 7th. By sections the means were as follows: Northern section, 70.3°; central section, 72.6°; southern section, 73.9°. For the state the average monthly maximum was 98.2°; average monthly minimum, 38.7°. The greatest daily range was 46° at Guthrie Center; average of greatest daily ranges, 35.6°. The average



precipitation for the state, as shown by records of 130 stations, was 3.71 inches, which is .55 of an inch below the June normal. The average by sections was as follows: Northern section, 3.19 inches; central section, 3.77 inches; southern section, 4.16 inches. The largest amount was 7.84 inches at Logan; least amount, 1.05 inches at Columbus Junction. The greatest daily rainfall reported was 2.95 inches at Iowa Falls on the 27th. The average number of days on which .01 of an inch or more rainfall was reported, 9. Prevailing direction of wind, south; highest velocity reported, 48 miles per hour, from northwest on the 21st at Sioux City. Average number of clear days, 15; partly cloudy, 11; cloudy, 4.

## OBSERVERS' NOTES.

*Alla*—DAVID E. HADDEN: Cool nights first decade of month, with light frost on morning of 7th; frequent showers, with total of 3.20 inches; last week very hot; as a whole month was very favorable for most of the crops.

*Cresco*—GREGORY MARSHALL: A very dry month; hay only half a crop; pastures brown and cattle turned into meadows.

*Fayette*—R. Z. LATIMER: Frost on mornings of 7th and 8th doing light damage to low ground.

*Grand Meadow*—F. L. WILLIAMS: Month closed hot and dry; hay two-thirds of crop; pastures good but growing short.

*Grinnell*—A. O. PRICE: Rainfall 4.72 inches; corn made rapid growth last part of month and fields well tilled; growth about up to July 1st standard.

*Ridgeway*—ARTHUR BETTS: Warmest June recorded here, being 2° excess of heat; 372 hours of sunshine, and nearly 2.00 inches deficiency in rainfall, but showers were well distributed.

*Storm Lake*—PROF. M. L. FULLER: Every month but March has been short on rainfall; total deficiency January 1st to July 1st, 5.34 inches.

*Keosauqua*—J. H. LANDES: Last part of month was a record breaker for heat, so far as my observation extends.

## JULY.

The monthly mean temperature for the state, as deduced from records of 108 stations, was 82.4°, which is 8.7° above the normal, and 6° above the highest mean temperature in any previous July record, which was in 1894. For the sections the monthly means were as follows: Northern section, 81.1°; central section, 82.2°; southern section, 83.8°. The highest temperature recorded in the state was 113°, at Sigourney, on the 22nd; lowest recorded, 46°, at Maquoketa, on the 8th. The average monthly maximum was 106.8°; average monthly minimum, 53.8°. The greatest daily range was 48°, at Guthrie Center; average of greatest daily ranges, 38.1°. The average rainfall for the state, as shown by records of 127 stations, was 2.34 inches, which is 1.34 inches below normal. By sections the averages were as follows: Northern section, 2.61 inches; central section, 1.89 inches; southern section, 2.53 inches. The distribution of moisture was about as usual, the west central district receiving less than the average of other dis-

districts. The largest amount reported at any station was 5.97 inches, at Ridgeway; least amount reported, 0.22 of an inch, at Denison. The greatest daily rainfall reported, was 4.83 inches, at Ridgeway, on the 4th. The average number of days on which .01 inch or more precipitation was reported, 5. Prevailing direction of wind, southwest; highest velocity reported, 39 miles per hour from the northwest, on the 4th, at Dubuque. Average number of clear days, 21; partly cloudy, 9; cloudy, 1.

For reference and comparison there is given below a table showing the monthly mean temperatures, and average rainfall, for the state in the month of July, for the 12 years, from 1890 to 1901, inclusive:

YEARS.	MEAN TEMPERATURE.	AVERAGE RAINFALL.
1890	75.6°	1.98 inches
1891	68.6°	4.22 inches
1892	73.0°	5.29 inches
1893	75.0°	3.33 inches
1894	76.4°	0.63 inches
1895	72.1°	3.40 inches
1896	73.6°	0.90 inches
1897	75.6°	3.26 inches
1898	73.4°	2.98 inches
1899	73.1°	3.07 inches
1900	73.4°	0.15 inches
1901	82.4°	2.34 inches

## OBSERVERS' NOTES.

*Alla*—DAVID E. HADDEN: Mean temperature 9° in excess of normal; rainfall 2.61 inches below the eleven years' average.

*Amara*—CONRAD SCHALT: July, 1901, may perhaps excel the record of the century in respect to high temperatures. During ten days, seven of which were continuous, the mercury rose above 100°; no dew was visible in the mornings for about two weeks. Corn, potatoes, apples and garden truck suffered intensely. Rye, barley, wheat and oats yielded good crops.

*Belknap*—A. W. RANKIN: Hottest month ever known here; not half a crop of anything.

*Bonaparte*—B. R. VALE: The driest and warmest July on record; seventeen days 100° or over, and on the 22d the mercury rose to 112°; average maximum, 100°. The rainfall record to date shows 2.30 inches less than in 1894, following a drier year:

*Britt*—GEO. P. HARDWICK: Very hot and dry till 28th; potatoes almost a failure; corn on dry soils fired.

*Clinton*—DR. LUKE ROBERTS: For extreme heat, mean daily temperature, number of hot days, consecutive or otherwise, all former records have been broken by July, 1901. There was rain at each end of the month, with twenty-one rainless days between, and yet crops are not ruined. The precipitation for the month was 4.26 inches, being three-tenths of an inch above normal.

*Columbus Junction*—H. E. SIMPSON: Crops and fruit seriously damaged by local hailstorm six miles south and west of station on the 12th. Drouth broken by heavy rain on 28th.



*Cresco*—GREGORY MARSHALL: The great heat and lack of rainfall have been very hurtful to crops; corn and potatoes suffered most heavily.

*Grand Meadow*—F. L. WILLIAMS: Highest temperature ever recorded here; on the 13th 102°, on the 23d 104°, and on the 21st 108°.

*Greenfield*—J. G. CULVER: The warmest month, with greatest percentage of sunshine ever recorded here. Greater part of county had 3 inches of rain since the 27th, but it continues dry at Greenfield.

*Grinnell*—A. O. PRICE: Temperature on twenty-five days over 90°, and eleven days 100° or over. Hottest month on record; corn not so much injured by lack of moisture as by hot winds.

*Kosauqua*—J. H. LANDES: Abnormal and persistent heat, with drouth and hot winds, made the month a record breaker.

*Larrabee*—H. B. STRUBER: July, 1901, has made a record in high temperatures for the new century.

*Logan*—MRS. M. B. STERN: My husband and myself have kept the weather record here for thirty seven years, but never recorded so many days with the mercury at 100° and above. There were twenty days with the maximum at or above 100°, and the highest was 110°, on the 24th. Rainfall, .71 of an inch.

*Ovid*—H. C. MILLER: Eighteen days the mercury was 100° or above, the range for seventeen days being from 101° to 112°; average maximum for seventeen days, 105.2°.

*Ridgeway*—ARTHUR BETTS: Temperature 8° in excess of normal; rainfall 2.58 in excess; tremendous downpour nearly all day the 4th. In nineteen years have never recorded so hot a month. Sunshine, 86 per cent. On the 21st and 24th a thermometer in the sun went up to 127° and matches touched to a stone would ignite without friction.

*Toledo*—LULU G. BOOKWALTER: Hottest month within memory of the oldest settlers. For seventeen days thermometer registered 100° or over, recording 109° on the 21st and 24th.

*Vilisca*—C. E. MATTHEWSON: Eighteen consecutive days recorded maximum temperature 100° or above. Corn withstood the drouth well and was damaged not more than one-third.

*West Bend*—PIE DORWEILER: Hottest month for fifty years; grain below average; corn probably half a crop.

## AUGUST.

The monthly mean temperature as deduced from records of 115 stations was 73.8°, which is about 2.7° above normal. By sections the means were as follows: Northern section, 72.6°; central section, 73.6°; southern section, 75.3°. The highest temperature reported was 105° at Pacific Junction, on the 1st; lowest, 40° at Forest City and Washington, on the 10th and 31st. The average monthly maximum was 95.1°; average monthly minimum, 50°. The greatest daily range was 48° at Ames; average of greatest daily ranges, 36.8°. The average rainfall for the state, as determined from records of 132 stations, was 1.29 inches, or 1.78 below normal. The averages by sections were as follows: Northern section, 2.10 inches; central section, 1.14 inches;

southern section, .64 of an inch. The largest amount reported was 4.46 inches at Sioux Center; least amount reported, a trace, at Danville and Emerson. The greatest daily rainfall reported was 2.40 inches, at Sioux Center, on the 13th; average number of days on which .01 of an inch or more of rainfall was reported, 5. Prevailing direction of wind, south, southeast, and northeast; highest velocity reported, 30 miles per hour, at Sioux City, on the 9th. Average number of clear days, 20; partly cloudy, 9; cloudy, 2.

## OBSERVERS' NOTES.

*Alton*—N. W. ROWELL: Less precipitation than in any August in last seven years; have never seen pastures so poor as now, and I have been in this county forty-three years.

*Atlantic*—J. W. LOVE: A peculiar August—hot days, cool nights, little rain and very little dew; with the least amount of lightning I have known in any August.

*Bonaparte*—B. R. VALE: Rain 0.31. We are 3.60 inches short of 1894 to date; 24 days gave a maximum average of 90° or more; farm work possible, only feeding and watering stock.

*Clinton*—DR. LUKE ROBERTS: Lightest rainfall for August in 23 years. Mean temperature 0.8° above normal.

*Cresco*—GREGORY MARSHALL: Very warm and dry with absence of usual number of thunderstorms and slight variation in barometer. Corn half a crop and potatoes a failure.

*Estherville*—LESLIE LITTELL: On the 22nd the M. E. church was struck by lightning, and on the 25th the Lutheran church was struck.

*Fayette*—R. Z. LATIMER: The storm on the 14th was very heavy, the rainfall 1.50 inches in forty-five minutes, extending over an area six miles wide and fifteen long.

*Forest City*—J. A. PETERS: The rains kept pastures in good condition. Corn will be up to the average.

*Grand Meadow*—F. L. WILLIAMS: Month very dry, but not extremely warm; pastures bare, and farmers feeding stock.

*Grinnell*—A. O. PRICE: Weather of month perfect for threshing, and grain secured in fine order, of excellent quality and yield.

*Grundy Center*—E. S. KING: Month dry and hard on potatoes and fall feed; corn withstood drouth much better than farmers expected.

*Hopeville*—M. T. ASHLEY: A hard month on pastures and meadows; stock water scarce and pastures brown.

*Logan*—MRS. M. B. STERN: The warmest and driest time we have any record of in Harrison county.

*Olin*—NATHAN POTTER: Very dry and dusty; most all stock being fed green corn, which is giving good results, and cheaper feed to those who hire pasture.

*Ovid*—H. C. MILLER: Pastures bare and ground too hard to plow; late potatoes a failure; fall grain not sowed yet; old corn selling at sixty cents; cattle and hogs going out of country as fast as possible.



*Ridgeway*—ARTHUR BETTS: Temperature normal; rainfall half of normal; twenty-one days, or 389 hours of sunshine, or ninety per cent; full weather.

*Toledo*—LULU G. BOOKWALTER: Corn has improved beyond expectation; pastures not much improved; potatoes light in yield.

*West Bend*—P. H. DORWILLER: A fine month; corn has been improving and corn is an average yield; pastures poor and wells low.

## SEPTEMBER.

Monthly mean temperature as deduced from reports of ninety-one stations was 63.3°, or 1° above normal. The highest monthly mean was 67.6° at Burlington; lowest monthly mean, 58° at Estherville. The highest temperature reported was 102° at Sigourney, on the 7th; lowest, 26° at Atlantic and Logan on 18th. The average monthly maximum was 91.6°; average monthly minimum, 31.9°. The greatest daily range was 51° at Elkader; average of greatest daily ranges, 34.5°. By sections the monthly means were as follows: Northern section, 60.8°; central section, 63.4°; southern section, 65.6°. The average precipitation for the state was 4.77. By sections the averages were as follows: Northern section, 7.07; central section, 4.24 inches; southern section, 2.99 inches. The largest amount reported was 13.62 inches at Fonda; least amount, 1.71 inches at Amana. The greatest daily rainfall reported was 5.49 inches at Plover on the 27th. Average number of days on which .01 inch or more of rain was reported, 9 days. Prevailing direction of wind, south. Highest velocity reported, 50 miles per hour, from southwest at Sioux City on the 11th. Average number of clear days, 13; partly cloudy, 9; cloudy, 8.

## OBSERVERS' NOTES.

*Albia*—R. MOORE: No killing frost during month; vegetation green and growing.

*Alla*—DAVID E. HADDEN: First light frost on 17th; killing frost on 20th, but slight damage resulted; grass green and growing well.

*Bonaparte*—B. R. VALR: Only 3.71 inches of rain in last three months, and 13.31 inches since January 1st, as against 21.78 in 1894.

*Clinton*—DR. LUKE ROBERTS: September was a fine month; temperature, .4 of a degree above normal; rainfall, .55 inch below normal; temperature uniform, except cold spell the 17th to 21st, inclusive.

*Estherville*—LESLIE LITTELL: An unusual month; the danger period from 17th to 21st was passed without any damage from frost.

*Forest City*—J. A. PETERS: Pastures better than at any time since June. Late corn slightly hurt by frost the 20th.

*Grinnell*—A. O. PRICE: One light frost, with no injury. Fine weather during the month.

*Guthrie Center*—W. F. BROWN: Corn matured in fine shape; little damage by frost; but little fall wheat sown.

*Logan*—MRS. M. B. STERN: The grateful rains came at last, and lawns and pastures are green as in spring.

*Ridgeway*—ARTHUR BETTS: This month was 1 to 3 degrees cooler than normal; rainfall excessive; 7 days without a sun, and 8 days perfect.

*Washita*—H. L. FELTER: Light frost on 17th; killing frost September 20th.

## OCTOBER.

The monthly mean temperature for the state, as shown by records of 106 stations, was 54.2°, which is about 4° above the October normal. The monthly means by sections were as follows: Northern section, 52.1°; central section, 54.2°; southern section, 56.2°. The highest monthly mean was 59°, at Maquoketa; lowest mean, 49.2°, at Estherville. The highest temperature reported was 88° at Elkader on the 23d; lowest temperature reported, 20°, at Dows, on the 3d. The average monthly maximum was 81.3°; average monthly minimum, 27.3°. The greatest daily range was 50°, at Dows, Ames, Ft. Dodge and Atlantic; average of greatest daily ranges, 39.5°. The average precipitation, as shown by records of 125 stations, was 1.98 inches, which is about .30 of an inch below the normal for the state. By sections the averages were as follows: Northern section, 2.04 inches; central section, 1.95 inches; southern section, 1.96 inches. The largest amount of rainfall reported was 4.23 inches, at Thurman; least amount reported, .45 of an inch, at Davenport. The greatest daily rainfall reported was 2.76 inches on 11th and 12th, at Clarinda. The average number of days on which .01 inch or more was reported, 6. Prevailing direction of wind, southwest and northwest; highest velocity reported, 42 miles per hour from the south, at Sioux City, on the 30th. Average number of clear days, 17; partly cloudy, 7; cloudy, 7.

## OBSERVERS' NOTES.

*Alla*—DAVID E. HADDEN: First half of month more or less cloudy and damp; last half typical Indian summer weather; sleet fell on 13th.

*Bonaparte*—B. R. VALR: This is the driest period within the memory of the oldest people. The wells are unusually low and moisture in the subsoil seems to have been exhausted.

*Estherville*—LESLIE LITTELL: A good month for fall work, though rather wet first half.

*Forest City*—J. A. PETERS: Pastures fine at close of October; some farmers finished picking corn; month good for all kinds of farm work.

*Grand Meadow*—F. L. WILLIAMS: First killing frost October 4th; first trace of snow on 16th; month averaged warm and fields were green as in June.

*Clinton*—LUKE ROBERTS: October was deficient in rainfall, the amount being only .81 of an inch, while the normal is 2.39 inches. Mean temperature 2.6° above normal; soil very dry.

## NOVEMBER.

The monthly mean temperature for the state, as deduced from records of 107 stations, was 35.8°, which is 3° above the normal. The highest monthly mean was 43.6° at Belknap, and the lowest 31.2° at Cresco and



Estherville. The monthly means by sections were as follows: Northern section, 33.6°, central section, 35.5°; southern section, 38.4°. The highest temperature reported was 77° at Baxter on the 1st, lowest temperature 2° at Decorah and Elkader on the 5th. The average monthly maximum was 66.9°; average monthly minimum, 9.7°. The greatest daily range was 45° at Decorah, Baxter, Monticello and Sigourney; average of greatest daily ranges, 36.1°. The average precipitation for the state, as deduced from the records of 122 stations, was 0.86 of an inch, which is .56 of an inch below normal. The averages by sections were as follows: Northern section, 0.83 of an inch; central section, 0.84 of an inch; southern section, 0.90 of an inch. The largest amount reported was 2.30 inches at Lenox; least amount, 0.20 of an inch at Murray. The greatest daily rainfall reported was 2.02 inches at Albia on the 2d; the average number of days on which .01 of an inch or more precipitation was reported, 3. The prevailing direction of the wind was northwest; highest velocity reported, 44 miles per hour, at Sioux City, on the 6th. The average number of clear days were 18; partly cloudy, 6; cloudy, 6.

## OBSERVERS' NOTES.

*Bonaparte*—B. R. VALE: Very dry, but mild month, fine for feeding, but much lack of stock water; 15.04 inches of precipitation since January 1, 1901.

*Brill*—GEO. P. HARDWICK: Wintry from 3d to 7th, and first half of month quite changeable; last half mild and ground not frozen to hinder plowing; corn nearly all husked by close of month.

*Clinton*—DR. LUKE ROBERTS: A fine month, but deficient in rainfall, the amount being only .82 of an inch, mean temperature 1.2° below normal; highest velocity of wind 23 miles per hour.

*Columbus Junction*—H. E. SIMPSON: A very clear, dry month. There were 59 meteors observed between 1 and 4 A. M. on night of the 15th, the most of them radiating from Leo. Probably no more than usual November display.

*Cresco*—ANTHONY MARSHALL: Temperature 2.4° above twenty years average; precipitation 1.31 inches below average for twenty years.

*Estherville*—LESLIE LITTELL: Corn husking finished, and farmers ready for winter. The snowstorm at beginning of month caused men to improve the fine weather that followed.

*Grundy Center*—E. S. KING: A fine month for fall work. The freezing weather on the 3d and 4th damaged potatoes badly.

*Olin*—NATHAN POTTER: One of the finest Novembers within remembrance, dating from 1844.

*Ridgeway*—ARTHUR BETTS: A mild November, and ground not yet frozen on December 1st; grass green; wild flowers observed; a large meteor on early morning of 14th lighted up the skies; 220 hours of sunshine.

## DECEMBER.

The monthly mean temperature for the state, as shown by records of 105 stations, was 20.5°, which is 3.1° below normal. By sections the mean temperatures were as follows: Northern section, 18°; central section, 20.8°;

southern section, 22.6°. The highest monthly mean was 27°, at Red Oak; lowest monthly mean, 14.9°, at Estherville. The highest temperature reported was 61°, at Indianola, on the 1st; lowest temperature reported, 31° below zero, at Le Mars, on the 15th. The average monthly maximum was 48.2°; average monthly minimum, 20.6° below zero. Greatest daily range, 50°, at Cedar Rapids and Keokuk, average of greatest daily ranges, 37.4°. Average precipitation for the state, as shown by records of 118 stations, was 0.93 of an inch, which is 0.45 of an inch below normal. The averages by sections were as follows: Northern section, 0.53 of an inch; central section, 0.99 of an inch; southern section, 1.23 inches. The largest amount reported, was 2.75 inches at Belknap; least amount reported 0.05 of an inch, at New Hampton. The greatest daily rainfall reported was 1.95 inches, at Iowa City, on the 12th and 13th. Average number of days on which 0.01 of an inch or more was reported, 6. Prevailing direction of the wind, northwest; highest velocity reported, 44 miles per hour, from northwest, at Sioux City, on the 6th. Average number of clear days, 10; partly cloudy, 9; cloudy 12.

## OBSERVERS' NOTES.

*Alta*—DAVID E. HADDEN: Intensely cold 13th to 20th. The minimum of 26.5° below zero on the 14th was 6.5° colder than any previous December day during eleven years' record at this station.

*Bona arte*—B. R. VALE: A mild month except 14th to 20th, which period was exceptionally cold. Rain for month, 1.30; rain for the full year, 16.34 inches, as against 25.81 in 1894.

*Clinton*—DR. LUKE ROBERTS: Temperature, 2.7° below normal; rainfall 0.97 inch less than normal; ground bare of snow.

*Columbus Junction*—PROF. H. E. SIMPSON: The cold wave commencing December 13th was remarkable for its rapid fall in temperature from 33° with heavy rain to 14° below zero, a fall of 47° in 32 hours. Ice in Iowa river 10 inches thick was reported on 21st.

*Elkader*—CHAS. REINECKE: Mean temperature for the year 1901 was 8°; total precipitation, 20.10 inches; total snow all, 40 inches; highest temperature, 11° on July 24th; lowest temperature, 21° below zero, January 1st and December 14th.

*Estherville*—LESLIE LITTELL: Week beginning 13th and ending 20th was the coldest week in December ever known here.

*Grand Meadow*—F. L. WILLIAMS: A pleasant month but extremely cold from 12th to 20th. For nine days mercury was below zero.

*Grundy Center*—E. S. KING: A drop of 55° from morning of 13th to morning of 14th. Good sleighing from 8th to 29th.

*Olin*—NATHAN POTTER: Mild weather excepting one week, 13th to 20th. A fine month for feeding stock.

*Ridgeway*—ARTHUR BETTS: Two dates, 1st and 24th, frostless; 155 hours of sunshine; very agreeable month. There were dandelions in bloom until the third, then winter set in.







est period ever experienced in this section will stand for comparison in future years, and it may be hoped the new record will remain unbroken during the coming century. The monthly mean for the state, 82.4°, was 8.7° above the normal, and the daily average temperature for the month was 6° higher than in July during the great drouth of 1894. The surprising feature in the crop situation at the close of the month was that so large a percentage of corn and other unmaturing crops survived the fiery ordeal of the solar rays, intensified by the hot winds and low humidity. As compared with conditions in the drouth of 1894, the destructive effects were not so great, because of the fact that the supply of soil moisture was greater at the outset and there was a much larger amount of rainfall in the state at large. The intense heat and hot winds destroyed the higher tassels on the early planted corn, but the greater portion of the crop was planted later than usual, and when the force of the hot wave was broken, about the 27th, there remained sufficient vitality in stalk and tassel to bring forth the promise of a fair yield of sound corn. And there was remaining a crop of fodder of very high quality, much of it being cut up and utilized. The dry weather was favorable for harvesting hay, oats, wheat and barley, which were secured in very excellent condition. The small grain was unusually bright in color, and the straw free from damage by rust or the effects of wet weather in the harvest season. The pastures suffered great injury from effects of the drouth and overfeeding. The late potato crop was exceedingly light. Garden truck, blackberries and raspberries were nearly all destroyed, and apples suffered continual deterioration during the heated period.

August was warmer than usual, with a large excess of sunshine, and less than half the normal amount of rainfall. The average daily excess of temperature was 2.7°, and on the average there were twenty cloudless days and nine partly cloudy. The rainfall was an average of 1.29, and quite unequally distributed, the northern section receiving an average of 2.10 inches, the central section 1.14, the southern section only .64 of an inch, and considerable areas therein only traces of rain. The bulk of the rainfall came in the first decade, leaving the balance extremely dry, especially in the central and southern belts. There was sufficient moisture in the western half of the northern section and portions of the central section to revive pastures and help the potato crop to some extent, but in two thirds of the state it was very dry and feeding stock from the cornfields or other forage was quite general. In the counties touching the Mississippi river, and the larger part of the southern tier, the drouth remained unbroken throughout August, though the temperature was lower than in July. But despite all adverse conditions; in three fourths of the state the corn crop showed remarkable vitality in maintaining its color and in the development and filling out of ears, giving promise of a much larger yield of grain, and a better quality of fodder, than was deemed possible at the beginning of the month. Early corn was rapidly brought to maturity, and binders were at work in the fields about the close of August. The high temperature was beneficial to late corn, but detrimental to pastures, meadows, potatoes, and all late maturing vegetables. The second crop of clover developed much better than was expected, and the yield of clover seed was of extra quality though materially less than in recent years.

September was slightly cooler than usual, the daily mean temperature for the state being about one degree below normal. The general conditions as to sunshine and warmth were quite favorable for the needs of all crops, and for the germination of fall sown grain. The average rainfall for the state was 4.77 inches, or 1.76 above normal. The distribution by sections was unequal, the northern section receiving 7.07 inches; central section 4.24 inches; southern section 2.98 inches. In the northern districts the excessive rainfall hindered threshing, plowing and corn harvesting to some extent, but generally very fair progress was made in all farm operations. Cutting corn with harvesters and by hand, was in progress from the beginning of the month until the necessary amount was secured for fodder, and put in shock in excellent condition. The corn crop was quite generally matured by the middle of the month. The first frost was reported on the morning of the 17th, and was followed by frosts at various localities on the 18th and 20th. Some late corn was at that time green, and in portions of the western districts slight damage resulted from killing the blades. The percentage of damage from September frosts, however, was exceedingly small, and the month, as a whole, was favorable, both in respect to temperature and moisture. There was no killing frost during the month,—that is, frost sufficiently severe to be "destructive to vegetation and the staple crops." The pastures were greatly improved during the month. Good progress was made in plowing. The late potato crop was much benefited by rains, and the output of that useful crop was better than anticipated. The fall sown grain made a ready start and a fair stand. The winter apple crop while generally very light, was better than had been anticipated in the commercial orchards of the southwest district.

October was somewhat warmer than usual, the average temperature being 4° above the normal for the state. The rainfall was slightly below normal, but with copious rains in September the amount of moisture was ample for growth of grass and germination of fall grain, except in some of the southern, southeastern and eastern counties. The skies were clear and weather conditions were well nigh perfect the larger part of the month. During the dry and warm period in the last half of the month good progress was made in cribbing corn, plowing, harvesting potatoes and other fall work. The pastures were green and afforded considerable feed for stock. Except in the limited dry area fall wheat and rye germinated readily and made a vigorous start, and the acreage seeded was somewhat increased as compared with the preceding year. As a whole the output of the season was much greater than was believed possible during the prevalence of the drouth in July and August. This applies especially to corn and the late potato crop. Though all records of temperature were broken, and the period of hot winds was longer than in any previous year, yet the supply of moisture stored in the soil was sufficient to give much better crops than were secured in the relatively cooler season of 1894.



## SEASONABLE NOTES.

PAPER READ BEFORE IOWA HORTICULTURAL SOCIETY, DECEMBER 11, 1901,  
BY J. R. SAGE.

In this initial year of the twentieth century we appear to have entered upon an area of expansion and general uplift of earthly affairs. We note a steady rise in real estate, farm products, mining interests, metals, stocks and bonds; and during the past summer even the usually placid mercury in our thermometers felt the upward tendency and rose to phenomenal heights on the thermal scale. The summer of 1901 has become notable in meteorological annals, breaking all previous records of high temperatures, and scoring mean and maximum figures that are not likely to be overtopped within the next hundred years. So it really seems as if nature set out to signalize the beginning of the new century by striking the century mark of temperature earlier and oftener, and rising to greater altitudes above it, than in any former year of record.

It does not fully describe the eccentric character of the past season to call it abnormal, for all seasons are more or less erratic in respect to some of the elements of climate. The normal line shows somewhat regular seasonal curves, while the records of any season will show irregular or zigzag lines of temperature, humidity, and rainfall, crossing and recrossing the averages above and below; and no two seasons have been exactly parallel from first to last. The past season was more than usually erratic, or as we may say, abnormally abnormal. Therefore, for future reference and comparison we should make a careful study of these recent phenomenal departures from normal weather conditions.

The records of the state show that the maximum of 100°, or over, was registered on seven days in June and twenty-four days in July. The distinctively torrid period in July was from the 9th to the 26th inclusive—or eighteen consecutive days, with very little abatement by day and scarcely any relief at night. During seventeen days the mercury rose to 100 or above, at over ninety-five different stations in this state, and the minimum temperatures ranged from about 70 to 80°. For all the stations the average of the maximum temperatures for July was 106.8°. The monthly mean for the state was 82.4°; which is 8.7° above the July normal, and 6° above the highest average in any previous month of record. And we here note the startling fact that the daily average of the extreme northern belt was only about 2° lower than the average of the southern section; which signifies that the hot wave swept over the state with uniformity, quite regardless of altitude or latitude. The maximum recorded at Spirit Lake was 108° and the same at Keokuk. The mean maximum of the northern section was 106.5, and of the southern section 107.9°. The highest temperature registered was 113° on the twenty-second day of July, and this is likely to stand as the maximum for Iowa for many years to come.

During this torrid period the superheated air was kept moving at a velocity much above the normal, thereby intensifying the effects of the high temperatures. In July for thirteen days the velocity of the wind reached twenty miles or more per hour, during the portion of the day when the temperature was highest. So in respect to the force and persistence of hot winds, as well as extreme temperature, all former records were broken.

The seasons of 1901 and 1894 have some points of resemblance, sufficient to afford a basis for comparison; but a careful review of the records will show quite marked differences in the two seasons. As a general statement it may be said that the summer of 1901 was the hottest season of which we have record, while the summer of 1894 was much drier, but with less intensity of heat. The drouth of 1894 was the most destructive visitation of the kind ever known in this section, especially in its effects upon late maturing crops, plants, and trees; and yet in respect to extreme heat, mean daily temperature, number of hot days, consecutive or otherwise, the past season scored several points above it.

The highest temperature recorded in 1894 was 109° at a single station on July 26th and 27th. The highest in 1901 113° at a single station on July 22d; and numerous stations recorded maximums ranging from 109 to 112°. The average daily temperature of July, 1894, was 76.4° and of July, 1901, was 82.4°, or an excess of 6° daily, as compared with 1894. The total wind movement in July for the two seasons was about the same, but there were thirteen days with a wind velocity of twenty miles or above per hour in 1901, and only seven days with the same velocity in 1894; that is to say, the hot wind period this season was about twice as long in duration, and averaged 6° hotter than in the great drouth season seven years ago.

And yet despite the greater degree of heat and longer duration of the period of hot winds, we find that this season has been far more productive in staple crops, fruit and vegetables, than the relatively cooler season of 1894. The cereal products credited to 1901 are about one hundred million bushels in excess of the yield in '94, and the forage and other crops are much more abundant this season. Last July the common remark was heard: "This breaks all records, it's vastly more destructive than in '94; the corn crop will be totally ruined; look at these corn tassels; no pollen, no ears, no grain;" and the prevalent conditions seemed at that time to justify the discouraging conclusion.

Now how may we account for the fact that the crop output of 1901 so greatly exceeds the yield of soil products in 1894? The solution of the problem is found in the rainfall records of the two seasons. The great drouth that culminated in July 1894, really began a year previous to that time, in the midsummer of 1893. In the last half of 1893 the total rainfall for the state was 4.80 inches below the normal amount, and at the beginning of July, 1894, the deficiency for the twelve months amounted to over ten inches. Conditions were radically different in July, 1901. The rainfall for 1900 amounted to 35.60 inches, or 5.30 above the normal; and 20.30 inches of that amount fell in the last half of the year. It came in such a manner that the most of it was stored in the soil and was made available in the time of need. And, besides, the wet weather of March and the early half of April added materially to the storage of moisture. In matter of fact there was at all times a considerable supply of moisture within reach of the roots of



plants. The hot winds caused the leaves to curl, but the roots drew sustenance to maintain the life of plants.

Again despite the greater degree of heat, there was a higher percentage of mean relative humidity of the air in last July than in the corresponding month in 1894. The records of the afternoon observations at the central station show 29.6 per cent in July of this year. This difference of 10 per cent in favor of this season is not a great amount, but it helped to save the bacon,—or rather the corn crop that makes the bacon. As illustrating the difference between a wet season and a dry season in respect to humidity, the records show the mean relative humidity to have been about 78 per cent in July, 1900, as against about 46 per cent for the same month in 1894. The minimum of humidity was 13 per cent on the afternoon of July 26, 1894; so the air as well as the soil was extremely dry.

Another point involved in this review and comparison, is the fact that improved methods of soil tillage are to be given some measure of credit for the production of better crops in 1901 than were harvested in 1894. We have more tiles in the soil. Better plowing and more thorough cultivation may be noted. The soil is in better condition for storage and retention of moisture; and thousands of acres of bottomlands have been reclaimed from bogs and the beds of ponds and shallow lakes, and these lands are best adapted to retain moisture and withstand drouths. The up-to-date farmers have profited somewhat by the costly lessons of experience in the disastrous season of the last decade. Yes, we have made considerable progress on these lines during the past seven years, incited thereto by the direful experience of 1894, and under the practical instructions of agricultural papers lecturers, scientific experts, and experiment station reports. Our farmers would be very dull scholars indeed if they had failed to profit materially by all these lines upon lines, precepts and examples.

Many object lessons have been noted the past season in cornfields, gardens, orchards and groves, and they should be heeded. Cornfields, favorably located on the leeward side of groves, timber belts and ridges, have yielded the best crops other things being equal. In a single field of forty acres, one portion of which was partially sheltered by a ridge and grove from the southwest wind, and another part exposed to the full force of the hot blast, there was noted a difference of over twenty-five bushels per acre in favor of the protected portion. The tile-drained fields contained more moisture in the soil, and the crops were greener and more productive than similar fields that were undrained. The fields that were kept clean, with the most persistent and long continued stirring of the surface, scarcely showed signs of heat and drouth. A good sized volume could be compiled of all these object lessons of this most phenomenal season.

Within the coming decade we shall probably have about the usual percentage of dry and hot seasons, and years of more than normal moisture. The farmers and fruit growers who hedge against adverse conditions, reap the highest rewards of care and industry by growing products to sell when the supply is short and the prices are high. We need to conserve moisture as well as fertility. Experience shows that when our plants are deeply rooted in rich and moist soil they can withstand the worst blasts of hot air that sweep over these prairies.

All my studies of the climatology of this valley have convinced me that these plains were originally treeless as a direct result of the physiography of the continent, which caused limited rainfall and occasional seasons of extreme heat and drouth. Forests hold their own only where the rainfall is ample and somewhat regular; they are not causes thereof but results. In this prairie region, subjected to conditions which made it treeless, it is only by care and culture that fruit trees, orchards, groves, shrubbery, and small fruits may be produced. The soil conditions must be steadily maintained to conserve moisture, by cultivation or mulching, and the tender trees must be given protection by groups or belts of the hardier varieties.

In my opinion, if these prairies were wholly abandoned by civilized man, and left to the state of nature, the original treeless condition of the plains exposed to the hot winds would be resumed within a century. It is only by continual vigilance and intelligent culture that we may retain what we have planted, and improve our farms, orchards, and home environments.

#### LOSSES BY LIGHTNING IN 1901.

COPY OF PAPER READ BEFORE IOWA MUTUAL INSURANCE CONVENTION, NOVEMBER 20, BY J. R. SAGE.

In accordance with nature's law of compensation there has been less than the usual amount of damage from wind, hail and lightning during the past season in this section. About the normal conditions prevailed in May and June, bringing the average amount of disaster; but in July and August the tremendous forces of nature were mostly expended in the form of record breaking heat and desiccating winds.

We have received 230 detailed reports of losses by lightning, from officials of about one fifth of the farmers' mutual associations of the state. It may be assumed that the statistics given in these reports cover not more than 20 per cent of the actual casualties during the season; but the details are sufficient to give us a fairly clear idea as to the conditions under which the losses occur, and that has been the special object of these inquiries.

There were fifty-eight buildings struck, with damage ranging from very slight to total loss of the structure and contents. The number included sixteen dwelling houses, four churches and thirty-eight barns. Of the barns reported struck nineteen were consumed with their contents, causing a total loss of \$15,087. Not one of the dwellings or churches was consumed, and the damage to that class of buildings was very small. The reports show that only one of the buildings struck was provided with lightning rods. This exceptional case occurred in Lucas county, June 5. It was a frame dwelling house with two copper rods; one of the points off and the other erect. The amount of damage to the house was three dollars. We have no other particulars as to the method of attaching the rods to the building, or whether they were properly grounded to afford protection. It is a significant fact that in a total of fifty-eight buildings struck by lightning only one was provided with even a semblance of a protecting rod.



The reports give details of the killing by lightning of 260 farm animals in the fields, or yards outside of buildings, including sixty-nine horses and 191 head of cattle, of all ages, involving a loss of \$11,467. Twelve of the sixty-nine horses killed were in contact with wire fences. Of the 191 cattle killed, 108 or 57 per cent, were directly in contact with wire fences.

This is but a repetition of the same old story of heavy losses directly chargeable to the account of the deadly wires. It is a heavy penalty to pay for slackness or ignorance.

Some interesting notes have been added to the reports made by the insurance officials. In Keokuk county an electric bolt struck and burned a barn and killed a steer standing near a wire fence in the barnyard, the wires connecting with the barn. In Jasper county two steers were killed by a stroke that was conducted half a mile along the wires. In Taylor county a wire fence attached to a cottonwood tree received an electric charge therefrom of sufficient force to kill stock in contact with the wires ten rods distant. In Clay county nine steers were killed by a stroke that was conducted over the wires 120 rods.

Numerous other facts of similar import might be cited, but these will suffice. The conclusion of the whole matter is that in thunderstorms it is not safe for man or beast to be up against wire fences or under trees. The safest place is under a good roof protected by well grounded rods.

## CLIMATE AND CROP BULLETINS.

### SUMMARIES OF WEEKLY BULLETINS ISSUED DURING THE CROP SEASON, 1901.

#### BULLETIN NO. 1, WEEK ENDING APRIL 8, 1901

The crop season is ten days to two weeks later than usual on account of excessive moisture, and several days of drying weather will be necessary to put the soil in condition for seeding and plowing. Frequent storms of snow, sleet and rain in March, with continued wet and cloudy weather the first week in April, rendered field work practically impossible in all portions of the state, except very limited areas in the northwest district, where a beginning has been made in sowing wheat, oats and clover seed. In some other sections a start has been made during the past week in plowing sod ground. The plowed fields are generally saturated, and the highways are well nigh impassable. Grass wintered in excellent condition, and the season is thus far very favorable for pastures and meadows. Winter rye looks well, and the small acreage of winter wheat appears to be unusually promising.

All reports indicate that farm animals are in good health. The cold and wet weather has been somewhat unfavorable for the early pig crop.

Fruit buds appear to be uninjured in all sections of the state

#### BULLETIN NO. 2, APRIL 15TH.

The past week brought material improvement in weather conditions; but in the larger part of the state the average temperature was below normal, with an excess of cloudiness and light rainfall. Farming operations are now well begun in all districts, and considerable progress has been made in sowing small grain on well drained lands. In some counties in the western districts the reports show that spring wheat seeding is nearly completed; but several days of warm and drying weather are needed to put the soil generally in fit condition for tillage. In the northern section frost is not all out of the ground, and the surface is drying slowly.

The grasses are all in excellent condition, and pasturage is likely to be about as early as usual. The wet spring has been especially favorable for new meadows and fall grain. All reports indicate that fruit trees and vines are healthy and the fruit buds uninjured. This season will afford many object lessons as to the value of tile drainage.

#### BULLETIN NO. 3, APRIL 22D.

The past week was unseasonably cold, the mean temperature ranging from 5° to 8° below normal. Ice formed on several mornings, and at several stations in the northern section minimum temperatures were reported 10° to 12° below freezing. The rainstorm on the 16th and 17th was quite general, and in some localities sufficiently heavy to retard field work two or three days.

But despite adverse conditions fair progress has been made in all districts. Spring wheat seeding is completed, and except in limited areas where the soil is very wet the work of sowing oats and barley is nearly finished. In some localities seeding has been done while the soil was too wet for best results.

The cold weather has retarded germination of seed and growth of grass, but no material injury is reported. Fruit buds are generally believed to be healthy and promising.

#### BULLETIN NO. 4, APRIL 29TH.

The week brought ideal conditions for progress in farm work, and for the growth of vegetation. The temperature was above the normal, the average daily excess ranging from 2° to 8°. There was but little more than a trace of rainfall during the working days of the week, and Saturday evening light showers were reported in various localities in the western and northwestern counties. While there is abundant moisture in the soil for present needs a moderate amount of rainfall would be beneficial to prevent an encrusted surface and to promote germination of seeds and plants.

Reports show that small grain is coming up fairly well, with but little complaint of defective seed. Excellent progress has been made in plowing sod and preparing fall-plowed fields for corn. A beginning has been made in planting corn in the extreme southern counties; and with a continuance of warm weather planters will be started in all districts very near the first of May. Grass is starting fairly well, and pastures will be in condition to support



stock about as early as usual. Foliage has made rapid growth, and fruit trees are coming into bloom with fine prospects.

BULLETIN NO. 5, MAY 6TH.

The past week was unseasonably warm with six days of brisk winds and very dry weather. The average daily temperature ranged from 10° to 14° above normal. The week closed with well distributed showers and cooler weather, affording more favorable conditions to grass and grain and putting the soil in better tilth for planting.

Farming operations have progressed favorably, and preparations for planting corn are now well advanced. Considerable progress has been made in planting in all districts, and reports show more than the usual acreage of corn planted for the first week in May, with prospect of early completion. The work has been done with good conditions of soil, except in fields where the muddy surface was encrusted by drying winds.

The high temperature of the past two weeks has brought the season about up to the average in respect to growth of all forms of vegetation; but general farm work has been retarded, especially in sections where the soil is not naturally dry or thoroughly drained. The general crop outlook is encouraging.

BULLETIN NO. 6, MAY 13TH.

The past week brought much cooler weather, with an ample supply of rainfall in nearly all parts of the state. The mean temperature was 2° to 5° below normal, and light frosts were reported in all districts on mornings of 11th, 12th and 13th. In a few localities thin ice was in evidence, and possibly some damage resulted to small fruits and vegetables. Generally, however, the damage will be slight. The cool and wet weather has been highly beneficial to small grain and grass, and these crops are now in very satisfactory condition.

Some progress has been made in plowing and planting, though field operations were delayed two or three days by wet weather. Reports show that from one-third to one-half the corn area has been planted, with the soil generally in good tilth. From six to ten days of favorable weather will be needed to complete this work in all sections. Germination has been retarded during the week, but early planted corn is coming up fairly well. All reports indicate an increased acreage being prepared for corn. The general crop outlook is encouraging.

BULLETIN NO. 7, MAY 20TH.

The weekend ending May 20th, was somewhat warmer than usual, the mean temperature at the central station being 42 above normal. The rainfall was generally light and unequally distributed, amounting to but little more than a trace in the larger part of the state.

Corn planting is now well advanced in all districts, with prospect of early completion under favorable conditions of soil to insure quick germination. Early planted fields show fairly good stand, and cultivation is in progress in the southern and central districts. There are some complaints of damage

by wire and cut worms in fields recently in grass, and some replanting will be necessary. Rain is much needed in nearly all sections to prevent material damage to oats, barley and spring wheat. Several reports indicate that the oat crop is thin in stand, and likely to be below average in yield. Grass is generally doing fairly well, but rain is needed to insure a good hay crop and maintain full supply of pasturage. Fruit has not been injured materially by frosts. Some reports state that apple, plum and cherry trees did not show usual amount of bloom, and the yield will be light.

BULLETIN NO. 8, MAY 27TH.

Cooler weather with fairly well distributed showers and a large percentage of cloudiness were the more important features of the week. The daily average temperature was 4° to 6° below normal, and at the close of the week light frosts were noted at numerous stations, but no material damage resulted. The showers were highly beneficial to all crops, though somewhat less than the present needs in portions of the southern and central sections. The moisture, cool weather and excessive cloudiness were especially favorable to meadows, pastures and small grain; but the conditions were not so good for growth of corn, and planting was somewhat retarded, though nearly completed in all districts. Nearly all reports indicate that corn is making good stands, with not more than the usual necessity of replanting on account of defective seed and damage by worms. The work of cultivation is in progress, under improved conditions of soil. Meadows, pastures and grain fields show decided improvement in larger part of the state. Reports as to fruit are generally favorable, but the apple crop will be lighter than usual in portions of the southern and central districts.

BULLETIN NO. 9, JUNE 3D.

The daily average temperature of the past week was about normal in the western half of the state, and from 1° to 6° below normal in the eastern half. The nights were unusually cool for the time of the year in all sections; and the days generally clear with a prevalence of cool easterly winds. There were a few very light and widely scattered showers, but much the larger portion of the state received no rainfall during the week.

All reports indicate some adverse effects of continued cool and dry weather. Late planted corn needs rain and greater warmth to quicken germination, and early planted corn needs warmer weather to stimulate growth and give it better color. The dry weather has been favorable for cultivation; and the early planted fields are generally clean and in good tilth. In the southern districts considerable replanting has been necessitated on account of damage by worms, which have been very destructive in the extreme southeastern counties. The oats crop has been more seriously checked in growth by the drought than any other cereal, but spring wheat and barley are greatly in need of moisture. Pastures and meadows are also showing some ill effects of continued dry weather so closely following the saturated condition in early spring. Copious showers followed by seasonable warmth, would greatly brighten the crop outlook. Gardens and small fruit also need more moisture.



## BULLETIN NO. 10, JUNE 10TH.

The week brought a favorable change in the condition of all crops, though the temperature averaged from 1° to 3° below normal. Showers on the 4th, 5th and 6th were fairly well distributed, and in some localities quite heavy. Again on the 9th, and early morning of the 10th, copious showers afforded ample moisture for present needs in nearly all sections of the state. The rainfall and cool weather have been beneficial to small grain, pastures and meadows. The hay crop, however, will be generally light, except in meadows consisting mainly of clover, which has made a fine stand. Good progress has been made cultivating corn, and the fields are generally quite clean. The growth has been retarded by cold nights and the stand is much impaired in extensive areas by cut worms, which have been unusually destructive.

## BULLETIN NO. 11, JUNE 17TH.

The past week was about all that could be desired as to temperature, which was above the normal except in the upper Missouri valley. The rainfall was unequally distributed, but nearly all districts received some benefit from showers at the beginning or close of the week. At numerous stations the amount was heavy and ample for present needs. All reports indicate marked improvement in the condition and color of corn, which has been well cultivated and is fairly promising, though smaller than usual at the middle of June. Oats, barley and spring wheat have been improved, and in some localities are heading out; but all small grain crops are somewhat below the average in condition. Pastures are improved, and meadows received benefit from the rains; but the hay crop will generally be below an average. The clover harvest is in progress in some localities, and the yield will be fairly good. Strawberries are being picked, and the yield is quite variable. The apple crop is much below an average.

## BULLETIN NO. 12, JUNE 24TH.

The past week was warmer than usual, with numerous showers affording an ample supply of rainfall, except in portions of the east and northeast districts. In some localities in the north central and western districts the rainfall was excessive, retarding cultivation of corn and damaging clover hay. In general it was very favorable for the growth of vegetation, and especially beneficial to pastures, timothy and blue grass meadows, small grain, potatoes, garden truck and small fruit. Corn has made rapid growth, and has been well cultivated except in sections where field work was hindered by heavy showers. Oats, barley and spring wheat are headed out, with condition improved, though still below the average. Berries are yielding abundantly. All reports indicate a light yield of apples, especially the late-keeping varieties.

## BULLETIN NO. 13, JULY 1ST.

The past week was unseasonably warm with prevalence of high winds, causing rapid evaporation of moisture and a withering effect upon tender

vegetation. Some relief was afforded by local showers and cooling winds on the nights of the 27th and 28th. The heaviest rainfall occurred in the central and north central districts; Iowa Falls reporting 3.39 and Charles City 1.43 inches on night of the 27th. In the larger portion of the state there was practically no rain of sufficient amount to be of substantial benefit to crops. Pastures, potatoes, garden truck and berries suffered the worst effects of the hot winds, especially in localities where there had been less than normal rainfall during the past month. Conditions were highly favorable for killing weeds, and the time has been well improved in the corn fields, which are now unusually clean. Corn has made rapid progress, and has not as yet suffered material damage from hot winds, though nearing the danger line in some sections. The crop is variable, ranging from ten to thirty inches in height. Some early planted fields have been laid by, and the bulk of the crop will be laid by within the coming week. As a whole it is about a week later than last year, promising about an average crop. Haying is in progress, small grain is well headed, but shorter than usual. Early apples promise about 60 to 80 per cent, and winter apples less than half a crop. Cherries yielding abundantly.

## BULLETIN NO. 14, JULY 8TH.

The weather was exceedingly hot from the 1st to the 5th, the heated period culminating in maximum temperatures from 100° to 104° at numerous stations on the 4th inst. The intensity of the heat was relieved to some extent by local thunderstorms and wind squalls, from the 1st to 4th, and numerous stations in the southwestern and northern districts report more than the normal amount of rainfall. Probably three-fourths of the state received a fair amount of moisture, but the intense heat and high winds caused rapid evaporation, and the effects of dry weather are noted in the pastures, gardens and grain fields. In some sections the oats crop has been prematurely ripened, and it is probable that the quality of spring wheat and barley has been somewhat impaired by excessive heat. Good progress has been made in haying and the conditions have been favorable for securing an excellent quality of hay. Oats and barley are being cut, and spring wheat is about ready for the harvest. The corn crop is generally in good condition, and the bulk of it has been laid by, with clean fields and fair prospects. In limited portions of the southeast district the reports state that corn has already suffered some damage from heat and drought; and these reports may be taken to signify that it is near the danger line, but may be restored by timely rainfall. The pastures, early potatoes, garden truck, and berries have thus far suffered the worst effects of the hot winds. The apple crop has declined in condition as the result of intense heat.

## BULLETIN NO. 15, JULY 15TH.

Another week of intense heat and severe drought must be added to the record of this exceptional season. The maximum temperatures have ranged from 100° to 103°, on four or five days in numerous localities, and the general excess has been 7° to 8° in the daily means. The air has been excessively dry as well as hot, with occasional brisk winds adding to the intensity



of the drought. On the evening of the 12th a portion of the southeastern quarter of the state was favored by refreshing showers, which brought temporary relief in the driest part of the state.

The hay crop has been saved in the best condition. Harvesting has been quite general in the prematurely ripened grain fields, with variable results as to quality of the crop; but generally the small grain crops will be below standard weight and less than average yield. Potatoes, pastures, and garden truck of all kinds have suffered greatest damage. Reports as to the corn crop indicate that it has suffered some injury within quite limited areas, and on light, sandy or hard-pan soils; but the bulk of the crop, in at least four-fifths of the state, is stoutly holding its own with promise of a fair output. But the result is contingent upon relief in the near future. Raspberries, blackberries and apples have been materially injured.

BULLETIN NO. 16, JULY 22.

The week afforded no relief from the excessive heat prevalent the preceding week and larger part of the month. The past two weeks have broken all previous records of sustained high temperatures for so long a period in this state. The mean at the central station has been 86°, and the average of maximum temperatures about 100° for the fourteen days. Numerous stations report 107° on the 20th and 21st, and one station 109° on the 21st. During the several days brisk to high winds blew, but the hot winds have not been so high and destructive as in July, 1894. Some mitigation of the torrid conditions was afforded by scattered showers in portions of the eastern and north central districts, but the drouth has not been broken. The reports indicate that early corn in the tasseling stage has suffered material damage in all parts of the state and especially in the southern and eastern districts. Late planted corn on deep, rich soil, is showing much less injury, and copious rains within a week would brighten the outlook for about three-fourths of the crop. The extent of actual loss cannot be estimated at this time. Harvesting small grain crops is nearly completed, and threshing is in progress. Pastures, potatoes, apples and garden truck show continued deterioration.

BULLETIN NO. 17, JULY 29.

The period of unprecedented heat terminated on the 27th, and the drouth was broken by copious and well distributed rains on the night of the 27th and during the day and night of the 28th. The high temperatures registered on the 22d and 23d broke all previous records over so large portions of the state. It seems marvelous that any kind of vegetation survived that protracted period of intense heat. The relief was brought by showers and much lower temperature, with but little violence of wind or storm. Following are some of the heavier amounts of rainfall for the week: Forest City, 3.54 inches; Osceola, 2.54; Waterloo, 1.59; Charles City, 1.85; Cedar Rapids, 1.46; Maquoketa, 1.90; Marshalltown, 1.21; Ogden, 1.39; Dubuque, 2.06; Ft. Dodge, 4.00; Britt, 3.43.

The extent of damage to the corn crop cannot be determined until the effects of moisture and moderate temperature are made apparent. The reports were generally mailed on the 27th, before the drouth was broken,

and the estimates as to the amount of damage are exceedingly variable, as viewed from different standpoints. Generally it may be said the conditions have been more favorable in the northern than in the southern districts. Early threshing returns show better yield and quality of small grain than had been anticipated. Conditions are now more favorable for saving a portion of the late potato crop: and the pastures are likely to revive.

BULLETIN NO. 18, AUGUST 5TH.

The week ending August 5th, averaged 1° to 5° daily above normal, though as compared with the preceding week there was a fall of about 12° in the daily mean temperature. The cooler weather increased humidity, and the copious rains of July 27th and 28th broke the drouth effectually except in quite limited areas where the rainfall was very light.

The reports generally indicate fair improvement in the condition and prospects of the corn crop, though in a considerable portion of the early planted area it is damaged beyond recovery except for fodder. Much of the late planted corn is earing, with healthy show of tassels, and the yield of sound ears will depend upon favorable weather for the balance of the season without frosts to the end of September. With normal conditions it may yet bring forth more merchantable grain than has been estimated, and if the fodder is all saved the value of the entire crop will fall but little, if any, below the amount realized from the grain alone in some recent seasons. At this stage of growth and condition no one can make an estimate of the output of merchantable corn, for the whole state, that is worthy of much consideration. There is a very wide divergence in the guesses, even of the experts, and much depends upon the point of view.

Threshing returns are generally quite encouraging. Some improvement has been noted in pastures and immature field crops. More rain is needed.

BULLETIN NO. 19, AUGUST 12TH.

The temperature of the past week was about normal, with increased humidity of the air, and fairly well distributed showers that came in a manner to be very beneficial to all growing crops. Drouthy conditions of some severity still prevail in a number of counties in the southeastern and east central districts, but in the larger part of the state the supply of moisture has been ample to cause considerable improvement in pastures, late corn, potatoes, and gardens. Reports indicate that late corn has eared sufficiently to give promise of a better yield than has been anticipated, if September is normally fair and frostless. The early planted portion of the crop is greatly damaged, and the ears generally show defective fertilization. The crop as a whole will be very valuable in quality of the fodder and grain that matures, and much more than the usual acreage will be harvested with binders.

BULLETIN NO. 20, AUGUST 19TH.

The past week was warmer than usual, the average daily excess in temperature ranging from 2° to 4°. The nights were cool, however, with considerable benefit from dews. Except in a portion of the northwest district the rainfall was very light, and drouthy conditions are still prevalent in four fifths of the state.



All immature crops need rain, especially late corn, potatoes and grass. The pastures are so scant that stock are being fed, more or less, in all sections of the state. Material improvement in the general condition and prospects of the corn crop has been noted in nearly all districts. Both early and late corn are now more promising in extensive areas than was deemed possible on the first of the month. But the future yield of sound corn is contingent on favorable weather conditions throughout the larger part of September. Copious rains are needed very soon for filling out the abundant ears developed in late planted cornfields. With normal rainfall the yield of late potatoes will be much better than expected. A fair start has been made in fall plowing, but generally the soil is too dry and hard.

## BULLETIN NO. 20, AUGUST 26TH.

The daily average temperature for the past week was from 4° to 7° above normal. Dr uthy conditions still prevail over the larger part of the state, mitigated by cool nights, and scattered local showers on the 21st, 22d and 25th. The most copious showers were reported on the latter date, in the west central and north central districts. For the week Estherville reported 2.77 inches; Forest City 1.06; Iowa Falls 1.01; Charles City .55; Marshalltown .40; Ogden .52; Maquoketa .43; Clear Lake .60; Hampton .74; Palo Alto 1.17; Cherokee 1.14; Spencer .72; Onawa 1.17; Carroll .93.

Except portions of the northeast district, the northern half of the state has received considerable benefit from rainfall during the month. In the southern section the drouth appears to have wrought the greatest amount of damage; and yet considerable portions of the southwest report fair yield of small grain, and prospects of much better output of corn than appeared possible about the first of August.

The corn crop as a whole has made very rapid progress toward maturity; early planted fields are now about ready for the binders, and a beginning has been made in cutting. Late corn is in all stages of growth, with variable prospects, the output of grain depending upon the amount of moisture received. It is holding its own notably well, and developing fairly well filled ears in the larger part of the state.

## BULLETIN NO. 21, SEPTEMBER 2D.

The past week was somewhat warmer than usual, the average daily excess being from 2° to 4°. Light showers were reported on the 29th and 30th, the heaviest amount being about half an inch in portions of the north central district. The drouth is still holding full sway, with continued detriment to potatoes and pastures and hindrance to plowing. The corn crop is nearing maturity in all sections, and harvesting with binders is now in progress in early planted fields, with prospect that a very large percentage of the crop will be in shock before the 20th of September. With normal temperature, and usual conditions for ripening, there will be but little corn to be damaged by frost after the 20th, though reports indicate that some fields will need till October 1st to mature perfectly. Rain is much needed for grass and potatoes, but corn is generally beyond need of help from additional moisture. With timely harvesting the value of the corn fodder this year will be well nigh inestimable.

## BULLETIN NO 22, SEPTEMBER 9TH.

The week was dry and warm, closing with lower temperature and widely distributed showers Saturday night and Sunday, the largest amounts of rainfall being reported from stations in the central and northern districts. The rain was greatly needed, and will be beneficial to potatoes, pastures, late garden truck and to facilitate plowing and fall seeding.

Late corn has been making unusually rapid progress toward maturity, and with continued favorable weather the bulk of the crop will be in shock or beyond danger of harm by moderate frosts by the 20th. In portions of the southern and eastern districts about one-half the corn acreage has been cut and shocked, and the work of cutting is in progress in all sections.

Except in favored portions of the northern sections pastures are very dry and short, and stock feeding is quite general. Reports indicate a considerable yield of clover seed, though much less than in former years.

## BULLETIN NO. 23, SEPTEMBER 16TH.

The past week was cooler than usual, with numerous showers and abundant moisture in all portions of the state, effectually breaking the protracted drouth. The heaviest amounts are reported in the northwest and west central districts, but all districts received sufficient rainfall to revive pastures, benefit late potatoes, and put the soil in good condition for plowing and fall seeding. Corn harvesting operations have been retarded by showery weather, but the work is being pushed rapidly as possible in all sections, and a very large amount of forage of the best quality will be secured in the cornfields. The bulk of the crop is now beyond danger of injury by frost, and practically all of it will be well matured with a few more days of warm and dry weather. The crop as a whole is likely to exceed any official estimate yet put forth for this state. The pastures are much benefited, and the potato crop will probably receive some help from the rainfall.

## SPECIAL BULLETIN, SEPTEMBER 23D.

The past week was unseasonably cold, the daily mean temperature ranging from 8° to 12° below normal. Frosts occurred in all districts, reported as "heavy" or "killing" in the western counties, and "light" in the balance of the state. The damage resulting from the frosts in the state as a whole appears to be relatively light. The percentage of unmaturing corn was small, and the damage to that portion of the crop has been mainly in killing a portion of the leaves, thereby impairing the value of the fodder. The general effect upon the quality of the grain will not be appreciable, as the bulk of the crop had been cut up, or was beyond danger of harm from frost. The recent heavy rains have been very beneficial to pastures and meadows, and in some sections late potatoes are giving promise of a better yield than has been expected. The soil is in fine condition for plowing and fall seeding.



JUNE CROP REPORT, 1901.

The first report of the season, giving an estimate of the condition of staple crops and live stock, as compared with the average, has been received from the crop correspondents of the Iowa section. Following are the averages for the state: Corn, 90 per cent; winter wheat, 97; spring wheat, 93; oats, 89; rye 95; barley, 93; flax, 89; meadows, 90; pastures, 93; potatoes, 95

*Condition of live stock*—Cattle 1 0 per cent; sheep, 99; hogs, 97; pig crop, 85; horses, 98; foals, 96.

*Fruit*—According to figures tabulated by Secretary Greene of the State Horticultural Society, the condition of fruit is about as follows: Apples, 52 per cent; American plums, 72; domestic plums, 53; Japanese plums, 63; cherries, 82; currants, 77; peaches, 85; grapes; 84; red raspberries, 60; black raspberries, 77; blackberries, 84; strawberries, 76.

JULY CROP REPORT, 1901.

NUMBER OF ACRES PLANTED AND AVERAGE CONDITION OF THE STAPLE FARM CROPS.

Reports of county and township correspondents show the following results as to the number of acres planted and the estimated condition of staple farm crops in this state. The acreage estimates are based on returns of township assessors, as made under the law requiring a complete census of crop acreage to be made in odd-numbered years, when real estate is listed for taxation.

*Corn*.—The total number of acres planted appears to be 8,687,480, which is an increase of 68,820 acres over the number credited to the state last year. The figures are made on very conservative lines, and it is believed that they do not exaggerate the actual acreage planted.

*Wheat*.—Winter wheat acreage 49,060; spring wheat, 1,138,290 acres, a decline of 305,280 acres compared with last year.

*Oats*.—Number of acres, 3,799,220,—a decrease of 192,470 acres since 1900.

*Barley*.—Number of acres, 604,160,—increase 102,420 acres.

*Rye*.—Acres 54,390,—decrease 48,290 acres.

*Flax*.—Acres seeded, 104,140,—decrease 4,710

*Potatoes*.—Acres planted, 136,300,—increase 27,450 acres.

*Meadows*.—Number of acres, 2,691,550,—increase 142,640 acres.

*Prairie Hay*.—Number of acres, 1,018,010.

*Pastures*.—Numbers of acres, 8,107,442.

*Condition of Crops July 1st*. Corn, 90 per cent.; winter wheat, 98; spring wheat, 93; oats, 85; barley, 93; rye, 95; flax, 94; potatoes, 92;

IOWA CROPS, 1901—NUMBER OF ACRES BY COUNTIES.

Page	5,339	110,860	21,120	1,152	7,970	60,340
Adair	8,730	74,410	45,840	1,152	7,970	82,850
Adams	98,410	131,070	43,840	1,152	7,970	71,050
Albion	12,850	106,510	31,280	2,470	16,535	11,870
Archer	36	1,060	2,090	2,310	21,540	14,855
Ashtabula	26	1,060	2,090	2,310	21,540	14,855
Benton	48,770	106,130	28,690	3,280	3,570	13,760
Bettendorf	5,130	44,715	1,430	1,430	1,430	1,430
Bloomington	85,710	44,715	1,430	1,430	1,430	1,430
Boone	60	8,710	4,410	750	1,410	17,610
Butler	14,310	14,800	390	1,750	1,750	17,610
Calhoun	40,270	15,060	22,000	1,750	2,060	15,830
Cass	100	14,800	25,790	1,750	2,060	15,830
Cedar	430	14,800	25,790	1,750	2,060	15,830
Chickasaw	50	14,800	25,790	1,750	2,060	15,830
Clarke	4,060	18,930	47,220	1,430	22,370	24,820
Clay	10,720	12,520	25,120	1,430	22,370	24,820
Clinton	490	19,080	130	1,430	22,370	24,820
Crawford	2,875	61,820	130	1,430	22,370	24,820
Decatur	300	40,480	1,440	1,410	38,810	1,710
Delaware	3,730	60,250	1,170	1,130	38,810	1,710
Dubuque	170	18,020	1,170	1,130	38,810	1,710
Emmet	7,010	87,810	32,540	1,130	37,320	68,510
Franklin	310	97,720	15,130	1,130	37,320	68,510
Fremont	100	108,050	66,110	880	65,140	109,130
Fulton	100	108,050	66,110	880	65,140	109,130
Gallia	21,170	40,550	2,320	1,130	11,300	81,510
Grant	7,050	60,050	4,070	1,130	11,300	81,510
Grundy	93,200	141,110	20	1,810	42,130	13,460
Harrison	6,310	38,120	27,140	1,810	42,130	13,460
Hawley	12,410	80,010	210	1,310	47,560	72,110
Hempstead	12,410	80,010	210	1,310	47,560	72,110
Howard	40,068	1,138,290	3,799,220	136,300	2,691,550	1,018,010
Iowa	8,687,480	8,687,480	8,687,480	136,300	2,691,550	1,018,010

grapes, 90.

of crops, ton of corn estimates depends therefore this time, needs under state to be al output of corn, 55 per ; potatoes,

OR 1, 1901.

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meadows, 76; pastures, 80; millet 93; apples, 51; plums, 70; grapes, 90; peaches, 98.

#### AUGUST CROP REPORT.

Following are the averages of estimates as to the condition of crops, made by correspondents of this service August 1st. The condition of corn is unusually variable in different sections of the state, as shown by estimates ranging from 20 to 90 per cent, and the final output of this crop depends upon future contingencies as to moisture and early or late frosts; therefore the average estimate of condition for the state at large, made at this time, must be taken with due allowance for the unusual circumstances under which it has been put forth. No man at this time is sufficiently well informed as to the actual condition of the crop in all parts of the state to be able to formulate anything better than a guess relative to the final output of merchantable corn. Estimates of condition are as follows: Corn, 55 per cent; spring wheat, 84; oats, 75; barley, 83; flax, 74; millet, 62; potatoes, 34; pastures, 45; apples, 35; grapes, 70.

#### PRELIMINARY ESTIMATE OF THE CORN CROP OCTOBER 1, 1901.

The crop correspondents of the Iowa Weather and Crop Service have made a preliminary estimate of the yield of corn for the season, expressed in bushels per acre, instead of percentages as during the past month. It is understood, of course, that this estimate is subject to revision in the final report of the season, after the crop has been harvested. The average for the state appears to be about twenty-six bushels per acre, which would indicate a total output of 225,570,000 bushels. The shortage caused by the hot winds and drouth, as compared with the yield of last year, is over 100,000,000 bushels; and the product this year is about 35,000,000 bushels below the state average for the past twelve seasons.

#### FINAL CROP REPORT.

##### AVERAGE YIELD PER ACRE, TOTAL PRODUCTS AND AVERAGE FARM PRICES, DECEMBER 1, 1901.

Final reports for the past season have been received from crop correspondents of this service and the figures are given herewith showing the average yield of staple farm products and the average prices obtainable at the farms on December 1st. This general summary of the total output of the soil will show that, despite the extreme heat and drouth of the midsummer period, the harvests have amply rewarded the farmers of this state.

*Wheat.*—The area of winter wheat was 49,068 acres, and the total yield 865,770 bushels, or an average of 17.6 bushels per acre. Spring wheat yield is 17,420,230 bushels—an average of 15.3 bushels per acre. Total wheat



product 18,295,000 bushels—a loss of 2,983,350 bushels compared with last year on account of decreased acreage. The average farm price is about 60 cents per bushel.

**Corn.**—The reports show unusual variability in the averages of the corn crop in the different counties, ranging from 18 to 38 bushels per acre, as the result of unequal distribution of rainfall in the critical stage of growth. The general state average is 23.2 bushels per acre, and the total product 227,908,850 bushels, harvested from 8,687,480 acres. The total corn output of 1901 is about 65 per cent. compared with the crop of 1900, and about 85 per cent. compared with the average product of the past twelve seasons. The average farm price of corn for the state is about 50 cents per bushel, as against 27 cents on December 1, 1900. The cash value of the crop in the markets is about \$113,000,000.00, or \$20,000,000.00 in excess of the value of the crop last year on the basis of prices obtainable December 1st. In this estimate no account is made of the increment in value resulting from feeding corn on the farms where it is produced.

**Oats.**—The area of oats harvested this year was 3,799,220 acres, which is 192,470 acres less than the acreage in 1900, the decrease resulting from unfavorable weather at the time of seeding; and the average yield per acre is about two bushels below the output last year, but the quality is generally superior. The total product is 114,883,530 bushels—an average of 32.1 bushels per acre. Though the total is 23,948,000 bushels less than the product last year, it is very close to the twelve-year average for this state. The average farm price is 35 cents per bushel, as against 20 cents last year.

**Barley.**—The barley output this year is 14,654,410 bushels, harvested from 604,610 acres; the average yield being 24 bushels per acre. The returns show an increase of 1,959,210 bushels compared with last year, and the quality is much superior as a result of the dry weather at the time of harvesting and thrashing. The average farm price is 44 cents per bushel as against 33 cents last year.

**Rye.**—The total yield of rye is 859,630 bushels—an average of 15.8 bushels per acre. The average price is 48 cents per bushel.

**Total Cereal Yield.**—The above figures show a total output of corn and small grain amounting to 356,601,420 bushels, which is 43,450,000 less than the average of the preceding eleven years. The cereal output was less than this season in 1890, 1892, 1893 and 1894, and greater in the other years of the decade.

**Flax.**—Total yield of flax seed, 916,890 bushels on an area of 104,140 acres. Current farm price, \$1.29 per bushel.

**Potatoes.**—The potato crop suffered the worst effects of the drouth, the average yield per acre being only 37.4 bushels, and the total output, 5,098,460 bushels, or less than half the amount harvested last year. Average price, 90 cents per bushel.

**Hay.**—The average yield of cultivated hay was about 1.4 tons per acre, and the total 3,711,680 tons, which is 102,670 tons in excess of last year's crop; and the quality is vastly superior. The current market price averages about \$8.25 per ton for the state.

**Wild Hay.**—Total yield, 1,268,700 tons, an average of 1.2 tons per acre. Average value, \$6.30 per ton.

**Buckwheat.**—Average unknown and variable; estimated value of crop, based on census reports, is about \$175,000.

**Sweet Potatoes.**—Estimated value, \$325,000.

**Sorghum.**—Estimated value, \$225,000.

**Broom Corn.**—Estimated value, \$45,000.

**Timothy Seed.**—Estimated value, \$950,000.

**Glover Seed.**—Estimated value, \$375,000.

**Corn Fodder.**—In shock and fields, worth \$20,000,000.

**Straw and Other Forage.**—Worth \$4,000,000.

**Pasturage.**—Worth \$25,000,000.

**Fruits and Vegetables.**—Estimated value, \$6,500,000.

The reports show that the average price of cows is about \$30 and of horses \$75. The total average crops of the state, including corn fodder, exceed in value the output of any preceding season.

TABULATED CROP SUMMARY.

CROPS.	Yield per acre.	Total product.	Farm value, December 1, 1901.
Winter wheat	17.6 bushels	885,770 bu.	\$ 519,462
Spring wheat	15.8 bushels	17,429,230 bu.	10,457,538
Corn	26.2 bushels	227,908,850 bu.	113,954,425
Oats	32.1 bushels	114,883,530 bu.	40,209,285
Barley	24.2 bushels	14,654,410 bu.	6,447,940
Rye	15.8 bushels	859,630 bu.	411,762
Flax	8.8 bushels	916,890 bu.	1,182,788
Potatoes	37.4 bushels	5,098,460 bu.	4,588,614
Hay (tame)	1.4 tons	3,711,680 tons	30,721,800
Hay (wild)	1.2 tons	1,268,700 tons	7,992,810
Buckwheat			175,000
Sweet potatoes			325,000
Sorghum			225,000
Broom corn			45,000
Timothy seed			950,000
Clover seed			375,000
Corn fodder			20,000,000
Straw, etc.			4,000,000
Pasturage			25,000,000
Fruits and vegetables			6,500,000
Total soil products			\$ 274,080,004

From the above conservative estimate it appears that the soil products of this state, at current farm prices, in this drouthy season, are worth over \$274,000,000, which sum is about \$44,000,000 in excess of the aggregate valuation at the corresponding date in any previous year. In this estimate no account is made of the profits derived from consumption of soil products in the dairy and live stock industry.



TABLE No. 3—FINAL CROP REPORT, 1901.

AVERAGE PER ACRE AND TOTALS BY COUNTIES

COUNTIES.	WINTER WHEAT		SPRING WHEAT		CORN.		OATS.		RYE.		BARLEY.		FLAX SEED		POTATOS.		HAY ( tame ).		HAY ( wild ).	
	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Tons per acre.	Total yield.	Tons per acre.	Total yield.
Adair	18	3,110	14	189,700	23	2,259,750	20	581,070	20	600					22	34,766	1.2	11,350	1.0	1,060
Adams	22	37,100	16	60,950	20	1,775,000	16	756,640	20	2,200	22	15,840			20	10,420	1.5	42,640	1.2	2,580
Allamakee	15	19,800	12	62,640	22	2,404,850	30	1,225,200	15	21,300	25	154,250		5,490	30	50,800	1.2	40,270	1.0	1,820
Appanoose	18	6,840			18	915,450	20	145,000	13	10,660					30	15,300	0.6	24,330	0.9	11,880
Audubon			15	304,050	25	2,200,250	28	685,320	18	1,260	28	88,700			32	21,120	1.6	45,680	1.0	6,020
Benton	22	1,100	15	47,700	30	3,061,800	20	1,950,800	19	9,700	15	1,350	25	128,500	35	51,800	1.4	50,610	1.2	1,580
Black Hawk	20	300	18	16,380	24	2,234,040	33	1,843,380	14	16,900	20	169,800			37	11,420	1.5	42,470	1.5	16,060
Boone			12	93,300	20	2,700,020	26	1,191,350	14	6,100	20	16,200			21	22,840	1.5	28,060	1.6	20,040
Bremr			13	13,350	20	1,109,000	32	1,109,200	12	2,840	28	58,300	8	11,020	30	40,400	0.8	16,990	1.0	15,120
Buchanan	16		17	10,710	21	1,658,200	26	1,323,000	10	1,650	25	70,750	8	1,020	30	42,600	1.0	52,120	1.2	16,280
Buena Vista			15	158,550	21	2,212,500	37	2,076,070	12	1,800	28	129,300	8	4,880	55	90,550	1.2	21,140	1.0	20,130
Butler			11	35,480	24	2,547,580	30	2,178,300	13	14,500	22	90,640	9	7,200	45	63,450	1.1	21,070	1.0	11,110
Calhoun			14	185,580	24	2,691,600	24	1,063,410	18	3,780	30	1,400,700	9	2,940	25	30,750	1.5	18,910	1.4	35,330
Carroll			14	241,180	22	2,580,140	25	1,368,750	15	2,250	24	51,840			23	49,680	1.4	27,200	1.2	19,400
Cass	16	2,360	14	307,180	28	2,800,440	31	2,187,610	15	2,100	25	26,000			20	49,000	1.5	43,980	0.8	3,340
Cedar	27	8,910	19	19,360	31	3,348,860	30	1,337,040	17	10,370	25	275,500			55	72,000	1.4	59,020	1.5	1,585
Cerro Gordo			18	45,780	27	2,400,240	28	2,400,240	15	790	22	134,800	8	27,600	49	21,650	1.4	32,350	1.5	20,110
Cherokee			13	54,780	22	2,359,640	38	1,945,720							45	68,050	1.3	28,210	1.5	20,470
Chickasaw			20	20,190	19	1,031,320	28	1,085,000	14	1,400	22	134,800	9	50,760	42	40,580	1.1	26,630	0.8	9,750
Clarke	24	5,040	10	307,180	20	1,220,450	20	453,180	10	2,000					25	10,750	1.2	46,910	1.8	1,090
Clay			10	101,200	23	2,084,720	32	1,125,210	12	9,720	25	660,500	7	15,030	48	71,400	1.2	20,650	1.5	36,630
Clayton	10	13,280	10	101,920	22	1,854,380	34	2,186,880	15	20,750	27	186,570	8	2,480	40	101,700	1.4	50,720	1.2	5,500
Clinton	15	2,550	11	30,030	28	3,291,000	27	1,205,550	20	28,400	27	120,150			37	54,170	2.0	55,620	1.5	7,500
Crawford			15	647,550	22	2,606,680	30	1,164,000	15	1,450	20	67,000			35	41,250	1.2	62,300	1.5	15,400
Dallas	10	11,040	14	99,540	27	2,708,210	33	1,277,430	12	3,000					22	20,020	1.4	15,150	1.5	15,900
Davies			19	1,121,380	21	1,121,380	21	408,540	12	18,640					20	12,200	0.8	30,440	1.0	900
Decatur	31	31,030	23	1,323,880	27	1,323,880	27	481,140	20	6,000					24	16,500	1.2	48,140	1.0	900
Delaware	15	300	15	10,300	25	2,283,000	30	1,220,400	15	5,850	23	125,810			50	74,000	0.9	33,050	0.8	7,880
Des Moines	10	46,240			22	1,434,840	32	774,520	20	42,000	25	3,000			50	27,000	1.0	21,180	1.2	940
Dickinson			21	206,910	28	1,165,720	32	665,280	12	2,420	26	628,420	8	45,760	45	26,550	1.0	6,970	0.8	15,450
Dubuque	19	950	18	59,040	25	1,605,750	30	1,057,500	20	18,400	28	63,420			40	85,600	1.2	41,410	0.9	3,180
Emmet			12	215,040	25	1,736,350	35	2,871,850	19	1,800	22	426,220	9	27,270	45	22,050	1.7	14,220	1.0	57,050
Fayette	18	2,970	15	307,300	25	2,367,000	30	616,600	15	5,150	25	171,500			40	25,000	1.0	50,170	1.0	14,210

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Floyd	12	21,660	30	1,060,000	28	1,136,050	14	8,120	21	207,240	8	32,880			48	60,720	0.6	13,200	0.8	6,200
Franklin	14	16,320	20	1,317,000	11	518,850	18	8,250	28	134,680	11	22,130			18	73,660	1.2	23,940	1.0	14,010
Fremont	20	69,400	12	61,920	20	2,893,250	30	469,500	20	13,400					20	21,060	0.8	47,730	1.0	7,040
Greene			13	66,820	20	2,025,000	28	1,440,600	13	1,430	22	70,180			25	29,500	1.1	20,400	1.0	19,870
Grundy	15	1,050	13	124,070	37	3,841,200	30	1,581,600	18	1,620	22	295,080	11	4,240	65	117,650	1.8	40,170	1.2	14,360
Guthrie	18	1,980	12	147,960	22	1,738,220	26	606,080	15	1,950	22	35,220			30	10,200	1.5	37,170	1.3	9,100
Hamilton			17	166,950	30	2,947,800	32	1,720,000	15	1,350	21	25,830			30	39,900	1.4	15,070	1.2	29,610
Hancock			16	211,840	30	3,659,240	40	1,686,500	20	8,200	34	147,740	8	31,840	45	41,490	1.4	23,120	1.2	26,800
Harrison	25	870	15	214,800	32	3,036,080	31	1,057,700	15	3,350	20	45,600	9	2,880	35	66,250	1.4	29,790	1.2	21,500
Harrison	25	870	15	655,160	22	2,068,260	33	506,200	20	3,800	30	12,000			50	87,000	1.8	14,200	1.5	24,900
Harry	21	320	14	2,240	28	1,808,000	34	997,380	18	35,460	31	11,160			30	10,800	1.3	33,080	1.0	600
Howard	17	320	14	28,420	24	1,215,120	23	1,210,510	17	1,020	23	125,580	8	63,520	40	42,800	1.2	40,600	1.0	10,020
Humboldt			15	266,650	32	1,923,840	38	1,262,800	18	720	28	67,500	11	19,250	40	30,900	1.0	19,650	1.2	21,440
Iowa			14	344,540	26	2,202,400	33	994,290	18	540	32	128,730			28	28,500	1.4	29,550	1.5	5,770
Jackson	20	8,700	20	27,800	23	2,210,450	32	1,274,500	20	600	25	128,750			28	35,750	2.0	81,190	1.2	7,440
Jackson	19	3,420	15	18,100	25	1,811,250	20	1,007,700	16	4,200	26	98,130			18	49,680	1.4	88,950	1.5	3,010
Jasper	18	1,010	15	182,100	30	2,923,200	33	1,351,350	15	3,000	28	17,250			45	152,800	1.0	43,240	1.5	2,010
Jefferson	21	25,360	15	3,600	28	2,014,120	30	688,500	19	41,370	21	25,540			45	29,250	1.2	32,200	1.6	2,410
Johnson	25	14,250	20	20,200	25	2,013,750	30	1,168,200	19	32,490	26	83,460			28	39,480	1.8	84,120	1.0	2,860
Jones			15	17,250	26	2,154,620	32	1,030,720	18	12,600	29	110,290			45	41,400	1.5	64,120	1.0	2,110
Keokuk	18	12,420	12	11,100	23	2,184,410	22	771,700	10	16,000	20	62,800			20	23,200	1.8	67,900	1.0	480
Kossuth			15	495,000	35	4,206,050	30	2,300,700	15	7,450	27	470,010	8	41,120	30	46,800	1.0	10,130	1.0	88,710
Lee	13	135,370			25	1,380,250	23	330,610	10	24,800					47	72,750	0.9	33,290	1.0	210
Lincoln	15	2,180	15	21,800	28	2,754,500	30	1,518,000	17	7,000	28	61,800			38	68,400	1.5	28,170	1.2	6,820
Louis	20	44,800	12	6,120	25	1,784,500	30	1,097,300	17	48,070	20	7,200			35	102,800	1.2	49,140	1.0	1,130
Lucas	14	5,180	12	2,520	22	1,183,280	25	339,250	12	10,680					40	9,600	1.2	48,980	1.2	520
Lyon			13	90,760	33	2,118,580	35	1,032,250			22	973,060	8	7,280	60	81,000	1.5	8,810	2.0	21,020
Madison	23	5,280	14	62,120	23	1,880,930	28	691,100	15	4,350	25	74,000			30	36,300	2.0	74,200	1.5	4,210
Mahaska	16	8,100	12	30,020	25	2,433,500	25	804,500	15	750	26	10,400			25	37,250	1.2	34,210	1.0	1,210
Marion	16	3,900	8	45,180	20	1,881,400	20	811,900	15	10,800	21	19,530			42	42,840	1.8	51,160	1.0	1,330
Marshall	20	1,180	15	243,150	33	3,469,320	30	1,578,910	15	8,000	25	54,000			37	61,480	1.5	28,170	1.2	6,820
Mills	22	11,660	15	212,500																



TABLE No. 3—FINAL CROP REPORT, 1900—CONTINUED

COUNTIES.	WINTER WHEAT.		SPRING WHEAT.		CORN.		OATS.		RYE.		BARLEY.		FLAX SEED.		POTATOES.		HAY ( tame ).		HAY ( wild ).		
	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Bushels per acre.	Total yield.	Tons per acre.	Total yield.	Tons per acre.	Total yield.	
Sioux	23	1,980	13	1,204,066	30	3,558,300	25	1,037,500	17	6,208	25	790,750	9	8,190	40	16,000	1.2	13,070	1.2	25,210	
Story	23	1,980	15	69,900	25	2,723,250	30	1,410,000	17	6,208	32	27,840	45	47,250	1.0	12,400	1.2	22,050	1.0	2,500	
Tama	25	66,870	15	190,500	33	3,713,164	30	1,224,530	20	2,600	21	624,450	.....	.....	45	72,750	4.0	58,100	1.0	1,570	
Taylor	25	66,870	15	190,500	28	2,468,104	28	503,610	18	10,980	24	23,500	.....	.....	25	31,000	2.0	75,100	1.0	1,570	
Union	10	1,260	12	0,720	30	1,854,000	27	1,554,000	14	1,840	.....	.....	.....	.....	14	21,250	1.8	69,000	1.2	1,050	
Van Buren	14	42,430	.....	.....	21	1,060,040	25	450,250	12	17,280	.....	.....	.....	.....	28	13,440	1.3	50,450	1.2	2,050	
Wapello	15	10,950	12	2,040	25	1,516,250	22	390,440	13	15,210	20	7,000	.....	.....	30	42,900	1.4	45,510	1.0	320	
Warren	22	1,950	12	84,124	25	2,261,760	25	563,500	12	4,080	20	23,000	.....	.....	10	26,000	1.2	64,440	1.2	300	
Washington	20	14,840	12	3,720	24	2,349,280	20	693,480	20	24,000	25	81,750	.....	.....	20	17,600	1.2	42,280	1.0	200	
Wayne	15	1,340	.....	.....	22	1,511,860	25	378,300	12	6,000	.....	.....	.....	.....	20	15,000	1.0	97,150	1.0	370	
Webster	.....	.....	15	312,850	20	2,808,300	20	2,044,400	12	2,280	.....	.....	8	49,400	.....	.....	.....	.....	.....	.....	.....
Winnebago	.....	.....	12	354,040	27	1,856,840	28	900,080	.....	.....	28	101,750	11	38,060	45	55,600	1.8	25,900	1.5	51,760	
Winneshiek	15	2,400	15	115,350	30	1,852,480	30	2,013,000	15	3,150	25	297,750	10	92,400	60	71,800	1.2	13,960	1.1	57,810	
Woodbury	.....	.....	14	884,800	24	3,386,640	30	814,200	18	2,880	30	93,600	7	4,800	10	18,880	1.8	31,340	1.2	14,590	
Worth	.....	.....	15	93,150	20	762,400	30	1,388,400	15	3,300	22	108,220	10	62,100	20	35,750	1.2	20,000	1.1	14,240	
Wright	.....	.....	10	198,590	20	2,990,640	33	1,948,380	15	2,250	25	130,750	11	20,510	40	42,800	1.4	22,730	1.2	24,100	
Total for state.	.....	865,770	.....	17,429,230	.....	227,908,850	.....	114,888,530	.....	850,630	.....	14,654,410	.....	910,890	.....	5,098,400	.....	3,711,080	.....	1,268,700	
Average per acre.	17.6	.....	15.3	.....	26.2	.....	32.1	.....	15.8	.....	24.2	.....	8.8	.....	27.4	.....	1.4	.....	1.7	.....	

ANNUAL REPORT OF THE

IOWA MEAN TEMPERATURES.

Average monthly and annual mean temperatures at various Iowa stations, for period of years named.

STATIONS.	MONTHS.												Mean Annual.	No. Years.	Record broken by this date.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Afton	21.3	22.3	31.5	51.5	62.7	72.2	76.3	71.3	65.0	53.8	35.0	25.2	49.8	7	1891-1901
Algona	12.0	17.42	27.5	46.3	59.8	70.0	73.9	71.2	61.0	48.1	32.1	19.8	45.1	11	1891-1901
Alta	16.5	16.0	28.7	47.8	58.3	69.0	72.9	71.1	63.8	50.7	34.0	21.3	45.6	11	1891-1901
Amama	15.5	20.1	31.2	48.7	59.8	69.0	74.0	70.8	62.2	50.9	32.8	22.0	46.4	25	1879-1901
Ames	16.0	21.9	32.1	49.1	59.4	70.1	75.2	72.4	63.0	50.9	32.9	22.0	47.2	20	1879-1901
Atlantic	20.1	21.0	32.0	49.3	59.7	70.0	73.8	71.0	64.1	51.0	34.0	24.0	47.3	11	1891-1901
Audubon	19.4	29.2	32.0	50.0	59.9	69.3	75.0	72.1	61.0	50.0	33.0	23.4	47.3	8	1891-1901
Bancroft	13.3	14.7	26.5	41.0	55.0	68.0	71.8	69.5	61.0	48.8	31.2	23.8	44.1	8	1891-1901
Belknap	25.4	22.0	35.0	53.2	62.6	71.8	75.8	74.0	67.8	55.7	39.6	25.9	51.0	7	1895-1901
Belle Plaine	18.3	20.8	32.0	45.6	59.0	70.3	73.0	70.8	64.1	50.4	33.7	24.3	46.9	12	1891-1901
Blakeville	13.7	23.0	30.0	47.5	55.8	71.2	74.5	71.5	61.3	52.3	34.3	24.5	47.0	4	1891-1901
Bonaparte	23.5	23.3	39.9	51.9	62.9	72.9	76.0	73.3	68.0	55.7	37.6	26.1	54.0	10	1891-1901
Britt	17.3	17.2	27.3	45.0	58.5	68.5	73.0	70.4	62.5	52.0	32.3	17.1	43.1	3	1895-1901
Brookside	21.7	19.9	29.1	45.1	59.0	68.7	73.4	69.0	61.0	46.6	31.4	23.6	44.5	17	1891-1901
Carroll	19.4	19.0	30.7	49.0	59.1	69.0	74.0	71.3	63.4	51.1	32.8	25.4	46.9	11	1891-1901
Cedar Falls	16.3	18.7	31.5	46.4	59.1	71.0	73.4	71.7	65.0	50.5	31.1	23.4	46.8	8	1891-1901
Cedar Rapids	18.1	20.8	32.4	50.1	59.7	70.9	75.1	72.0	63.8	51.3	35.3	25.1	48.0	19	1887-1901
Centerville	24.3	20.8	37.4	53.2	63.1	71.0	77.4	74.5	66.0	52.8	39.9	30.1	51.3	7	1891-1901
Chariton	25.6	22.7	35.0	52.1	62.3	71.1	75.3	74.2	66.5	54.7	37.8	26.0	50.0	7	1895-1901
Charles City	15.5	15.9	29.3	47.1	58.3	68.7	73.8	71.4	63.1	50.5	30.7	20.1	45.5	11	1891-1901
Charlton	22.5	23.3	34.0	52.0	61.3	72.2	76.4	74.0	67.2	54.1	37.0	26.9	50.2	12	1891-1901
Clinton	19.1	22.1	32.6	44.7	59.0	69.9	73.8	71.3	63.3	50.4	35.1	23.3	47.4	14	1879-1901
College Springs	24.0	23.8	30.1	50.9	61.4	71.5	75.4	74.4	68.1	54.7	37.9	25.4	50.0	10	1891-1901
Corning	22.3	22.8	35.4	51.0	60.6	70.9	74.6	73.0	65.8	54.1	36.8	25.9	49.6	10	1891-1901
Council Bluffs	22.2	22.6	34.8	52.0	62.7	72.7	76.5	74.4	68.1	56.8	38.2	24.1	57.3	3	1871-1901
Cresco	19.9	15.1	28.4	44.7	59.7	69.5	71.1	69.0	59.7	47.0	29.7	18.2	45.9	10	1871-1901
Davenport	21.0	21.9	35.0	53.0	64.0	71.0	75.0	73.0	65.0	52.0	37.0	28.0	49.4	11	1871-1901
Decorah	14.4	15.0	29.5	49.0	58.9	68.7	72.8	71.0	62.1	50.6	31.5	24.6	45.4	8	1891-1901
Delaware	15.4	16.4	29.7	46.0	58.4	68.0	72.7	70.1	61.8	48.8	31.2	21.4	45.1	11	1891-1901
Denison	21.1	18.6	31.9	49.3	60.6	68.9	73.8	72.1	63.4	50.5	33.8	22.4	47.2	8	1891-1901
Des Moines	20.0	22.0	35.0	51.0	61.0	71.0	76.0	73.0	65.0	53.0	37.0	26.0	49.1	11	1878-1901

IOWA WEATHER AND CROP SERVICE.







IOWA PRECIPITATION AVERAGES.

Average Monthly and Annual Precipitation (rain or melted snow) at various Iowa Stations for the Period of Years named.

Table with columns for Stations, months (January-December), Annual, No. years, and Record included between dates below. Lists stations like Afton, Albion, Algona, etc., with their respective precipitation averages.

Continuation of the precipitation table, listing stations from Denison\* to Mt. Ayr with monthly and annual precipitation data.

\* Normals including all data to September, 1901.



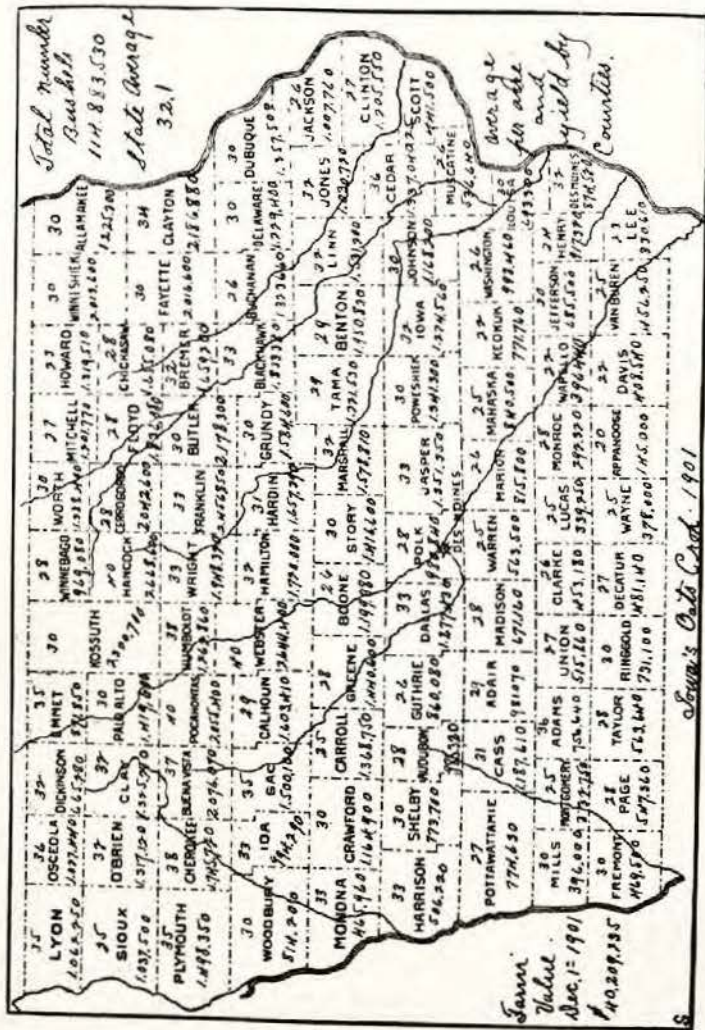
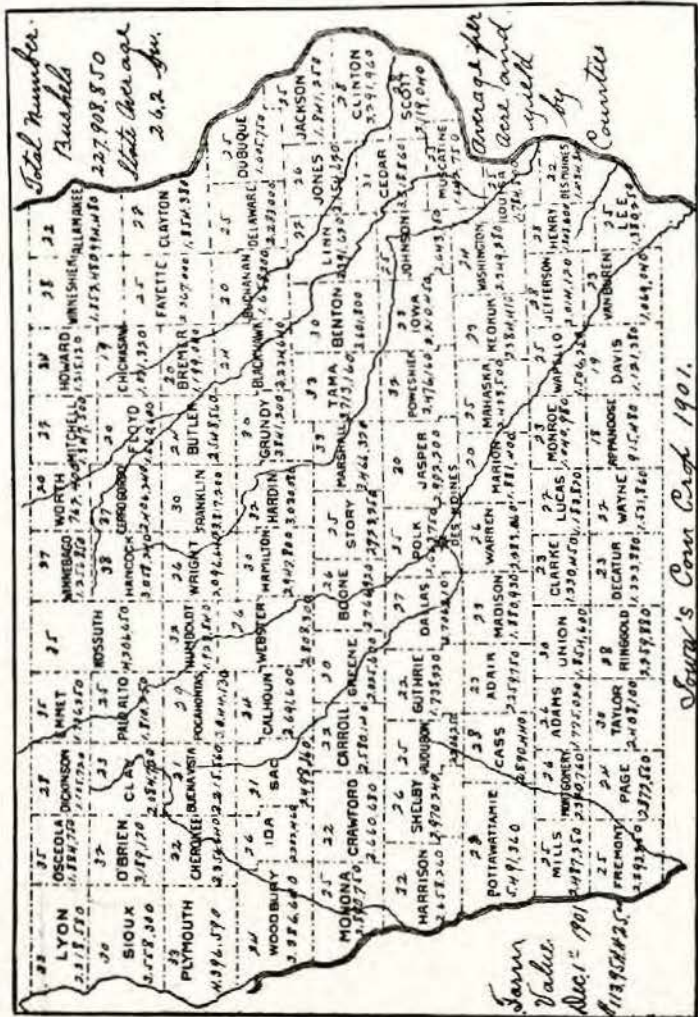
IOWA PRECIPITATION AVERAGES—CONTINUED.

STATIONS	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.	No. years.	Record in-cluded between dates below
Mt. Pleasant	1.35	1.06	1.38	3.02	4.42	3.31	3.12	2.89	3.17	1.76	1.91	1.22	29.29	8	1894-1901
Mt. Vernon	1.45	1.16	1.23	3.32	4.68	4.05	3.18	2.48	2.97	1.76	1.31	1.22	31.13	6	1892-1901
Muscatine	1.81	1.08	1.79	3.41	4.38	4.36	3.91	2.58	3.51	1.94	1.31	1.22	36.06	46	1829-1891
Nashua	1.54	1.23	1.76	2.07	4.19	5.35	6.06	3.83	3.51	1.94	1.31	1.22	44.23	11	1878-1888
Newton	1.89	1.04	1.54	3.42	4.46	4.45	3.59	3.64	3.11	1.76	1.31	1.22	32.00	14	1874-1901
Northwood	1.82	1.25	1.99	2.71	2.77	4.31	5.12	3.69	3.15	1.94	1.31	1.22	39.07	6	1897-1901
Odebolt*	.51	.65	1.47	3.20	4.95	5.52	3.69	3.09	3.00	1.76	1.31	1.22	30.89	5	1897-1902
Ogden	.73	.72	1.44	3.06	4.14	5.31	4.63	3.28	2.92	1.76	1.31	1.22	33.29	8	1894-1901
Omaha*	.91	1.20	1.40	2.78	3.85	4.84	3.14	4.40	3.72	2.07	1.31	1.22	31.06	6	1890-1901
Osage	1.26	1.08	1.88	3.84	3.35	4.01	3.84	3.06	3.02	1.76	1.31	1.22	28.71	21	1875-1901
Osceola	1.71	1.08	1.94	2.33	3.55	4.21	3.91	3.31	3.51	2.07	1.31	1.22	31.46	5	1894-1902
Oskaloosa	1.71	1.08	2.09	3.08	4.95	4.01	3.91	3.31	3.51	2.07	1.31	1.22	30.17	8	1894-1901
Ottumwa	1.58	1.46	1.19	3.32	3.87	4.14	3.00	3.50	3.44	2.07	1.31	1.22	32.79	9	1893-1901
Ovid	.39	.55	1.29	4.08	4.09	3.83	4.56	4.13	2.77	2.07	1.31	1.22	30.24	6	1891-1906
Panama	.49	.66	1.55	1.65	2.08	3.59	4.32	3.00	4.01	2.07	1.31	1.22	27.14	6	1896-1901
Plover	.42	.45	2.31	3.01	3.19	4.73	5.09	3.82	2.22	1.88	.57	.42	26.88	6	1895-1901
Pringlar	.63	.74	1.59	3.75	3.33	3.74	2.52	2.83	2.93	2.22	1.31	1.22	33.17	6	1893-1898
Rock Rapids	.51	.56	2.45	2.54	3.88	4.23	3.14	3.50	3.31	2.22	1.31	1.22	31.72	1	1894-1901
Rockwell City	1.02	.67	2.18	3.09	5.15	3.14	3.50	3.31	2.22	1.31	1.22	31.72	27	1870-1902	
Sac City*	1.45	1.06	1.21	3.65	3.11	4.40	3.46	4.49	4.07	1.61	1.81	1.99	31.21	5	1893-1897
Seymour	.57	.48	1.26	2.83	3.44	4.35	3.73	2.58	3.06	1.99	.91	.75	35.79	8	1891-1901
Sibley	1.38	1.43	2.03	3.59	3.94	2.71	3.40	3.11	2.84	2.70	1.34	1.25	38.92	6	1890-1901
Sigourney	.58	.54	1.16	2.84	3.62	3.83	3.40	2.77	3.37	1.70	1.82	.85	31.50	13	1880-1902
Sloux City*	.54	.45	.49	2.09	2.30	4.52	2.96	2.77	3.84	1.76	1.71	.65	24.41	9	1870-1887
Smithland	.70	.75	1.38	3.21	4.5	3.88	4.24	3.92	3.62	1.68	.82	.86	35.01	14	1884-1902
Storm Lake*	.59	.57	1.65	3.11	4.5	3.92	4.47	2.75	1.86	1.98	.88	.73	24.42	5	1890-1901
Stuart	.81	.69	1.75	3.17	3.71	3.69	3.23	3.15	2.94	1.99	1.41	1.09	37.51	1	1890-1901
Toledo	.72	1.05	2.34	3.59	4.13	4.70	4.43	3.82	2.98	2.71	1.61	1.19	32.00	8	1891-1901
Villisca	1.17	1.00	1.80	3.00	3.41	3.12	2.95	2.16	2.75	2.47	1.10	1.19	36.13	11	1880-1901
Vinton	1.00	1.09	2.11	2.12	3.51	2.98	3.53	2.39	2.38	1.52	1.10	1.19	36.13	12	1880-1901
Washington	.10	1.14	1.63	2.38	3.74	3.16	4.28	3.47	4.14	2.31	1.33	1.35	39.13	11	1880-1901
Waterloo	1.50	1.39	2.21	3.38	3.74	3.16	4.28	3.47	4.14	2.31	1.33	1.35	31.42	20	1874-1902
Waukon	.94	1.08	1.84	3.31	3.81	4.89	4.30	3.43	4.41	2.97	1.77	1.74	34.36	13	1875-1888
Waverly	1.14	1.05	2.13	3.3	3.30	3.13	3.46	2.70	2.70	2.40	1.20	1.31	37.55	6	1890-1901
Webster City	1.14	1.03	1.42	2.30	3.30	4.74	3.30	2.79	3.32	2.17	1.19	2.16	39.29	12	1870-1901
Westley	.61	.83	1.82	2.81	2.89	3.73	3.34	3.19	3.21	1.80	1.33	.87	36.36	8	1890-1901
West Bend	1.46	1.46	2.72	2.98	4.55	2.57	4.82	3.74	3.07	2.17	1.38	1.38	31.86	7	1890-1901
Wilton Junction	.91	.93	2.14	3.89	4.52	5.75	5.47	3.11	3.13	2.15	1.11	1.33	34.43	11	1891-1901
Winterset															
MEANS	1.06	1.09	1.91	3.01	4.01	4.38	3.99	3.91	3.90	2.44	1.37	1.29	30.91		

\*Normals including all data to September, 1902



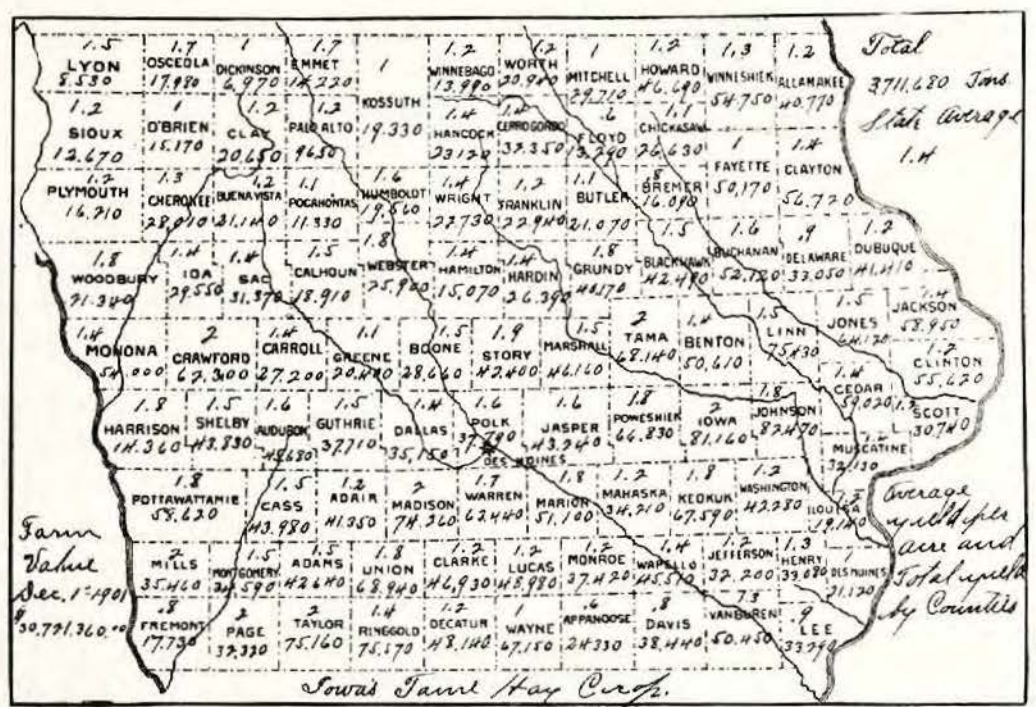












# Iowa Weather and Crop Service.

## ANNUAL REPORT FOR 1902.

### APPENDIX

### CLIMATE AND CROPS OF IOWA.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

U. S. DEPARTMENT OF AGRICULTURE,  
WEATHER BUREAU.

IN CO-OPERATION WITH THE

WITH AN

CONTAINING A COMPILATION OF DATA  
RELATIVE TO THE

GEO. M. CHAPPEL,  
Lead Forecaster, Asst Director.

JONH R. SAIG,  
Section Director.

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