

STATE OF IOWA,
OFFICE OF THE WEATHER AND CROP SERVICE,
DES MOINES, October 15, 1903.

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 thirteenth annual report of the Iowa Weather and Crop Service, for the year 1902, to which has been added compilations of valuable meteorological data illustrating the characteristic features of the climate of Iowa, for convenience of reference, and for the benefit of students of climatology.

We are, sir, very respectfully,

Your obedient servants,

JOHN R. SAGE,

Director.

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

ANNUAL REPORT, 1902.

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 United States 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.

CLIMATOLOGY OF THE YEAR 1902.

Barometer.—The mean pressure for the year was 30.01 inches. The highest observed pressure was 30.96 inches on January 28th at Dubuque; lowest pressure, 28.67 inches, on February 28th at Davenport. Range for the state 2.29 inches.

Temperature.—The mean temperature for the state was 47.8°, which is 0.06° above normal. The highest temperature reported was 98° on July 30th at Charles City. The lowest temperature reported was 31° below zero on January 27th at Atlantic. Range for the year 129°.

Precipitation.—The average amount of rain and melted snow for the year, as shown by complete records of 99 stations, was 44.31 inches, which is 14.01 inches above the normal and 19.69 inches above the average amount for 1901. The greatest amount recorded at any station for the year was 58.80 inches at Columbus Junction; least amount recorded 20.14 inches at Sioux City. The greatest monthly rainfall was 18.04 inches at Grand Meadow in May; least amount, a trace, at Cresco in March; the

greatest amount in any consecutive 24 hours was 5.96 inches at Allerton, August 25th and 26th. The average number of days on which .61 inch or more of rain fell was 100.

Wind and Weather.—The prevailing direction of wind was northwest. Highest velocity reported, 74 miles an hour, in Sioux City, from the north, on April 25th. Average daily wind movement 211 miles. There were 145 clear days, 109 partly cloudy, and 111 cloudy days.

MONTHLY SUMMARIES.

JANUARY.

The monthly mean temperature for the state, as shown by records at 112 stations, was 22.4°, which is 5.3° above the January normal. By sections the means were as follows: Northern section, 20.40°; central section, 21.9°; southern section, 24.8°. The highest monthly mean was 27.5° at Keokuk; lowest monthly mean, 17.4° at Cresco. The highest temperature reported was 63° at Pella, St. Charles and Thurman on the 7th and 8th; lowest temperature reported, 31° below zero at Atlantic on the 27th. The average monthly maximum was 52.7°; average monthly minimum, 20.9°. The greatest daily range was 56° at Guthrie Center; average of greatest daily ranges, 34.4°. The average precipitation for the state, as shown by records of 129 stations, was 0.88 of an inch, which is 0.34 of an inch below the normal for January. By sections the averages were as follows: Northern section, 0.84 of an inch; central section, 0.98 of an inch; southern section, 0.88 of an inch. The largest amount reported was 2.83 inches, at Ridgeway; least amount, 0.19 of an inch, at Mt. Pleasant. The greatest daily precipitation reported was 1.51 inches, at Ridgeway, on the 20th. The average number of days on which .01 or more precipitation fell was 4. Prevailing direction of wind northwest; highest velocity, 38 miles per hour from northwest at Sioux City on the 2d. Average number of clear days, 17; partly cloudy, 8; cloudy, 6.

OBSERVERS' NOTES.

Alla—DAVID E. HADEN: Ideal weather during first and second decades of the month, but cold and wintry the last decade.

Bonaparte—B. R. VALE: A remarkably mild and pleasant month. Roads fine for January.

Centerville—JAS. S. HAMILTON: An unusually favorable month in everything but stock water which is scarce. Feed high priced; three inches of snow on ground.

Clinton—DR. LUKE ROBERTS: Month over three degrees warmer than January average. Rainfall 1.18 less than normal. Per cent of cloudiness 28, or 22 per cent less than normal. Wind movement 4,240 miles—700 miles below normal. About four inches of snow at close of month.

Columbus Junction—FMR. H. E. SIMPSON: Dry, clear weather characterized the month, there being no precipitation from the 1st to 19th.

Estherville—LESLIE LITTELL: Very warm and dry, except the last week which was coldest of the season.

Grundy Center—E. S. KING: Finest weather possible (st) to 20th; from 20th to 31st very frosty and disagreeable.

Ridgeway—ARTHUR BETTS: Mild month, two and one-half degrees warmer than December. Precipitation heavy and about all came in last decade; 228 hours of sunshine. From 7th to 19th fields were in good working order.

FEBRUARY.

The monthly mean temperature, as shown by records of 110 stations, was 17.6°, which is 4.1° below the February normal for this state. The monthly means by sections were as follows: Northern section, 16.6°; central section, 16.8°; southern section, 19.3°. The highest monthly mean reported was 22.2° at Thurman; lowest mean, 12.8° at New Hampton. The highest temperature reported was 62° at Humboldt on the 27th, lowest reported 2° below zero, at Galva on the 2d. The average monthly maximum was 52.2°; average monthly minimum 14.2° below zero. The greatest daily range was 46° at Elkader; average of greatest daily ranges 32.5°. The average precipitation for the state, as shown by records of 128 stations, was 0.73 of an inch, or 0.33 inch below normal. The averages by sections were as follows: Northern section, 0.69 of an inch; central section, 0.74 of an inch; southern section, 0.75 of an inch. The largest amount reported was 2.39 inches at Belle Plaine; least amount 0.02 of an inch at Thurman. The greatest daily precipitation reported was 1.40 inches at Belle Plaine on the 27th. Average number of days on which 0.1 or more precipitation fell, 4. Prevailing direction of wind, northwest; highest velocity reported 46 miles per hour, from northwest at Sioux City, on the 28th. Average number of clear days 13; partly cloudy 8; cloudy 7.

OBSERVERS' NOTES.

Alla—DAVID E. HADEN: Cold during first decade; much snow on ground until middle of the month; light rain, turning to snow closed the month.

Amana—CONRAD SCHADT: Ground well covered with snow during the cold weather prevailing three-fourths of the month, affording protection to rye, fall wheat and roots of trees and shrubs.

Bonaparte—B. R. VALE: A solid, pleasant and profitable month; good roads, and good weather for feeding stock.

Britt—GEO. P. HARDWICK: A fine winter month; last half very mild. **Centerville**—JAS. S. HAMILTON: Roads good, and fine weather for feeding or hauling, except last two days.

Clinton—DR. LUKE ROBERTS: The temperature of the air did not rise above 31° during first and second decades, and the mean for that period was 10°. The minimum for the month was 11° below zero on the 5th. The coldest day was the 2d, which gave a mean of 4.5° below zero. Prevailing wind from the west; highest velocity 20 miles an hour, on the 4th, total wind movement 3,140 miles, or 1,470 miles below normal. Precipitation 1.18 inches, or .81 of an inch below normal. Up to 27th there had fallen only .23 of an inch of water, mostly in form of snow. Ice harvest large and quality good. The winter season which has just

closed was a fair sample of Iowa winter weather. Those who had out of door work to do could prosecute their business with little interruption, and most of them took advantage of these conditions. The average amount of rainfall for the winter seasons—December, January and February—for the last twenty-three seasons is 5.60 inches. The least amount in any one season was 2.14 inches, occurring in 1898-99. The next least in 1901-02 being 2.69. The greatest seasonable amount was 8.79, occurring in 1885-86. It will be seen that the season just closed was deficient; below normal 2.91 inches. The mean temperature of these 23 winter seasons was 22.1°. The season giving the highest mean temperature was that of 1901-02, being 33.0°, and that of 1899-00, 31°. The lowest mean was in 1884-85, being 11.2°, or a range of 20.8°.

Columbus Junction—H. E. SIMPSON: Another dry month. Fair and cold with excellent sleighing most of the month. Warm and wet at close.

Elkader—CHAS. REINECKE: Ice went out of the Turkey river on 27th.

Estherville—LESLIE LITTELL: First half of the month cold and ground covered with snow; last half warmer. Ducks and geese flying northward at close of month.

Fonda—H. P. BARROW: A very fine winter. First flight of ducks northward on the 26th.

Olin—NATHAN POTTER: Month cold up to 27th; good sleighing and no hard storms prior to 27th; never better for feeding stock.

Ovid—H. C. MILLER: Sleighing good from January 26th to February 17th.

Ridgeway—ARTHUR BETTS: Temperature 1° above normal. Last three days frostless. Sunshine 223 hours. One peal of thunder on 25th at 11:30 p. m. Last week delightful; flies and "crusaders" put in appearance.

MARCH.

The monthly mean temperature for March, as shown by records of 101 stations, was 39.1°, which is 5.9 above normal. The monthly means by sections were as follows: Northern section, 36.9°; central section, 39.3°; southern section, 41°. The highest monthly mean was 44.5° at Thurman; lowest, 34.9° at Larchwood. The highest temperature reported was 79° at Winterset on the 25th; lowest, 12° below zero at Estherville on the 17th. The average monthly maximum was 69.4°; average monthly minimum, 1.5° below zero. The greatest daily range was 46° at Sibley, Monticello and Thurman; average of greatest daily ranges, 34.6°. The average precipitation for the state was 1.45 inches, as shown by records of 121 stations. This amount is .30 inch below normal. The averages by sections were as follows: Northern section, 1.20 inches; central section, 1.73 inches; southern section, 1.42 inches. The largest amount reported was 4.33 inches at Cumberland; least amount, 0.13 of an inch at Algona. The greatest daily amount reported was 3.00 inches at Cumberland on the 10th. The average number of days on which .01 or more precipitation was recorded was 7. Prevailing direction of wind, southeast; highest velocity, 58 miles per hour at Sioux City on the 16th. Average number of clear days, 9; partly cloudy, 11; cloudy, 11.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: March was generally pleasant, with much wind, especially on 14th to 16th. Some seeding of wheat and oats during last week in the month.

Amana—CONRAD SCHADT: On the 14th sowing wheat begun, but was stopped by cold snap beginning on 16th; work resumed on 24th.

Atlantic—J. W. LOVE: Robins appeared on 9th and blue-birds on the 10th. First thunder-storm on 10th.

Bonaparte—B. R. VALE: First half mild, but two severe cold periods in last half. Soil very dry.

Britt—GEO. P. HARDWICK: Snow on first two and last two days, but otherwise the ground was bare. Very high winds the 15th, 16th and 26th. Wheat and oats sown 24th and 27th.

Clinton—DR. LUKE ROBERTS: The month commenced with a typical March day—a genuine infant blizzard. Temperature quite moderate up to 17th, when there was a sudden drop from thirty-five to one above zero. After two days of vigorous winter, the balance was warmer. There were six storm days, with an aggregate of 2.19 inches, or .35 of an inch below normal. The maximum velocity of wind was 26 miles an hour on the 16th; total wind movement 5,680 miles—a little below normal. The mean temperature was 39.5 degrees, or 6.6 above normal. The number of clear days was 6; partly cloudy 7, and cloudy 18.

Columbus Junction—PROF. H. E. SIMPSON: Ice went out from junction of Iowa and Cedar rivers March 6th.

Earlham—GEO. PHILLIPS: A fine month for March; considerable farming done with ground in good condition; some grass in pastures for stock.

Estherville—LESLIE LITTELL: March came in and went out like a lion. Sudden changes from spring days to wintry conditions. There were flowers in the woods and frost flowers on windows.

Fayette—R. Z. LATIMER: Robins came on 10th; seeding was finished on 27th and some gardens were made.

Grand Meadow—F. L. WILLIAMS: Plowing begun on 28th and soil worked fairly well; feed for stock scarce in this section.

Grinnell—A. O. PRICE: A dry March. Sod plowing begun earliest in many years; oats and wheat sown and gardens being made.

Grundy Center—ED. S. KING: Some seeding and sod plowing done; ground dry and rain needed.

Guthrie Center—W. F. BRAIN: Seeding begun about the 26th; fall wheat looks well but not much sown.

Hopeville—M. T. ASHLEY: Most of oats sowed; plowing for corn begun; some gardens made.

Keosauqua—J. H. LANDES: Last week of the month was fine farming weather; oats are all sown.

Olin—NATHAN POTTER: Some plowing and seeding done in March; cold and disagreeable at close of month.

Ovid—H. C. MILLER: Oats about all sown during the last week; some early potatoes planted and gardens made.

Pacific Junction—M. M. MCCARTNEY: On 16th a bright perihelia was observed shortly after sunrise; very brilliant sunrise on 30th.

Ridgeway—ARTHUR BETTS: Warmest March on record here. Seventeen dates frostless; 229 hours of sunshine; anemones almost in bloom on 14th, but the only cold wave about that time checked their growth; many were in bloom on Easter; fifty peals of thunder were heard on the 10th; some plowing and seeding done.

Storm Lake—PROF. M. L. FULLER: Lake cleared of ice in twenty-four hours on the 14th; froze again on 16th, remained till the 21st. A fine month for preparing ground for farming, but little over half the normal precipitation, which is 1.51 inches. Month has been drier but four times in eighteen years.

APRIL.

The mean temperature for the state, as shown by records of 114 stations, was 48.2°, which is about 1.3° below normal for April. The highest monthly mean was 53.1°, at Thurman, and the lowest 44.2° at Estherville. The means by sections were as follows: Northern section, 46.3°; central section, 48.1°; southern section, 50.3°. The highest temperature reported was 96° at Clarinda, on the 20th; lowest, 9°, at Larrabee, on the 7th. The average monthly maximum was 87.5°; average monthly minimum, 18.9°. The greatest daily range was 59°, at Glenwood; average of greatest daily ranges, 39.5°. The average precipitation for the state, as shown by records of 130 stations, was 1.71 inches, or 1.50 inches below normal. The averages by sections were as follows: Northern section, 1.34 inches; central section, 1.60 inches; southern section, 2.19 inches. The largest amount reported was 4.14 inches at Bonaparte, Van Buren county; least amount reported, .40 of an inch at Glenwood. The greatest daily rainfall reported was 2.95 inches, at Sioux Center on the 25th. The average number of days on which .01 inch or more of rain fell was 5. The prevailing direction of the wind was northwest; highest velocity reported 74 miles per hour, from the north at Sioux City on the 25th. The average number of clear days was 14; partly cloudy, 11; cloudy, 5.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: A dry and windy month, with gales and dust on the 11th, 21st and 22nd. On the afternoon of the 25th a gale blew down windmills, trees, etc. Ground in excellent condition for farm work all the month.

Ames—T. S. HUNT, I. A. C.: Highest windstorm occurred on the 22nd; the air being darkened with dust. Considerable seed uncovered.

Bonaparte—B. R. VALE: 4.15 inches of rain fell the last half of the month. From January 1st to April 1st the amount was 2.94 inches; and yet only the surface of the soil is wet. Grass and grain starting.

Britt—GEO. P. HARDWICK: Month dry with high winds and dust storms; vegetation made slight start; ground in fine condition for cultivation; farm stock generally thin in flesh.

Chariton—S. H. MALLORY: Severe electric storm, high wind, rain and hail during the night of the 24th and 25th.

Columbus Junction—PROF. H. E. SIMPSON: A very clear, dry month, until the drouth was broken on the night of the 24th by heaviest rain.

in nearly two years. High winds and dust storm caused much discomfort here and suffering in the regions of Cone and Muscatine Island.

Corning—JEROME SMITH: An unprecedented dust storm from 11 a. m. till 8 p. m. on the 22nd. Violent southwest wind on the 25th from 3 to 10 p. m.

Forest City—J. A. PETERS: A very windy month; much of the grain that was sown in March did not come up till after the rain on the 25th and 26th. Ground mostly ready for corn planting at close of month.

Greenfield—J. G. CULVER: Very strong westerly gales 21st and 25th; several barns and cribs and a large brick dry-house destroyed on the 25th; dust storms almost equal to spring of 1880.

Olin—NATHAN POTTER: Precipitation, 1.30 inches; all vegetation backward; some corn planted during last week in April; fruit blooms all right yet.

Ovid—H. C. MILLER: On the 4th solar phenomenon at 7 a. m.; one-fourth circle directly above sun with concave side up in clear sky; on the 22nd dust storm all day; could see but short distance.

Primghar—P. R. BAILEY: On the 25th a very heavy wind and rain; much damage done to small buildings and windmills.

Red Oak—J. S. COLE: On the 21st, 22nd and 25th wind and dust storms; wind very high southwest afternoon of 25th.

Ridgeway—ARTHUR BETTS: The most sunny April on record—317 hours. Dandelions in bloom on the 15th; awful gales on 11th and 22nd, breaking down large trees and blackening an almost cloudless sky with dust; at end of month grass and grain were growing finely.

Storm Lake—PROF. M. L. FULLER: Dust storm on 11th and 22nd, the latter very severe. On the 25th violent gale, damaged light buildings.

Washta—H. D. FELTER: Plum trees partly in bloom on the 30th; terrible gale with rain of 1.50 inches on the 25th.

MAY.

The mean temperature for the state, as shown by records of 107 stations, was 63.8°, which is about 4.0° above normal for May. The highest monthly mean was 67.8°, at Keosauqua, and the lowest 59.0°, at New Hampton. The means by sections were as follows: Northern section, 61.8°; central section, 64.0°; southern section, 65.0°. The highest temperature reported was 97° at Sigourney, on the 20th; lowest, 25°, at Cresco, on the 10th. The average monthly maximum was 88.7°; average monthly minimum, 38.4°. The greatest daily range was 50°, at Pacific Junction; average of greatest daily ranges, 37.7°. The average precipitation for the state, as shown by records of 127 stations, was 5.39 inches, or 1.42 inches above normal. The averages by sections were as follows: Northern section, 6.69 inches; central section, 5.02 inches; southern section, 4.46 inches. The largest amount reported was 18.04 inches, at Grand Meadow, Clayton county; least amount reported, .87 inch at Washta. The greatest daily rainfall reported was 5.45 inches, at Grand Meadow, on the 18th. The average number of days on which .01 inch or more of rain fell was 13. The prevailing

direction of the wind was southeast; highest velocity reported, 50 miles per hour, from the south, at Sioux City, on the 20th. The average number of clear days was 10; partly cloudy, 12; cloudy, 9.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: May was wet and cloudy, with cool nights; light frost noted in low places on morning of 27th; all crops were looking fine at close of month; plums and cherries were injured by heavy rains while in bloom, and yield will be light.

Audubon—FRANK MOTT: The storm of the 19th was quite destructive. On the 17th a small tornado passed about ten miles southwest of this place. Clipping from the *Audubon Republican* gives details of this storm. It was from 100 to 300 yards wide and about three miles in length of track. Property destroyed estimated at \$10,000, and happily no lives were lost. The storm appeared about 5:30 p. m. as a whirlwind of dust. There were two whirling columns visible at the outset, but they soon merged forces and swept everything in their limited range. It was a typical "twister," though small and not longlived. Everything in its pathway was left plastered with mud.

Bonaparte—B. R. VALE: A good month for corn culture and growth of small grain; rains came too late to make good meadows; pastures fair.

Britt—GEO. P. HARDWICK: The storm periods were from 1st to 6th, and from 17th to 24th. Excessive rains occurred in the county. On 2nd hail fell sufficient to whiten the ground. On 24th a small tornado was observed in southwest part of county; amount of damage was slight.

Chester—C. H. MEREDITH: On the 4th, thunderstorms with heavy rain and much damage to crops. On 17th cloudburst one mile north of station, causing high water, and much stock was drowned. Total at station for May, 14.62 inches.

Decorah—The records show for the month 11.63 inches of rainfall, but these figures do not tell the full story of disaster by flood, caused by a sudden downpour amounting to 3.35 inches, on May 21st. Prior to that date the total was far above normal. The soil was saturated, so that the heavy rain of the 21st was all poured into the streams and carried swiftly away. In Decorah the depression known as Dry Run became a raging torrent, causing higher water and greater damage to property than was ever known before in the history of that city. Two lives were lost, adding a tragic element to the sudden and fearful visitation. The damage to property has not been estimated, but it must have amounted to many tens of thousands, judging by the reports published in *Decorah Republican*, of May 22nd.

Lansing—JACOB ACKERMAN: On the 21st the heaviest flood visited this section that has been known in many years.

Larrabee—H. B. STREVER: At end of month vegetation was suffering for rain; light frost on the 27th.

Leon—MILLARD F. STOOKEY: On Thursday evening, May 1st, between 4:30 and 5:00 o'clock, a tornado formed south and west of Van Wert, and moved into Clarke county; much property was destroyed and several persons were injured.

Osage—G. D. PATTENGILL: The rainfall (9.58 inches) has been more than double the normal for May at this station. A record of rainfall in this county, kept continuously since February, 1880, shows but one month that exceeded the present, namely, September, 1881, when a fall of 11.01 inches was recorded.

Ridgeway—ARTHUR BETTS: Temperature average 1.5° above normal. Waterfall excessive; 279 hours of sunshine; thunderstorms on 16 days; last frost on April 24th; violets May 2nd.

Washta—H. L. FELTER: A very dry May in south part of Cherokee county. Total rainfall at this station 0.87 inch.

West Bend—PH. DORWEILER: Month favorable for farmers; corn all planted and mostly coming up. On the 3d and 4th severe windstorms blew over some barns and windmills.

Grand Meadow—F. L. WILLIAMS: Rainfall for the month at this station 18.04 inches. Of that amount 5.45 inches fell on the 18th, the heaviest ever recorded for a single day at this point. About 7:30 p. m. on the 3d a small "cyclone" passed over this section, blowing down fences, roofs and apple trees. Much damage has been done by floods by the greatest rainfall ever known in a single month.

JUNE.

The month was unseasonably cool, especially in the last half. The daily mean temperature, as shown by records of 113 stations, was 65.2°, which is 4.8° below the June normal. The means by sections were as follows: Northern section, 64.0°; central section, 65.4°; southern section, 66.3°. The highest monthly mean was 69.2° at De Soto; lowest, 60.2° at Cresco. The highest temperature reported was 97° at Keosauqua on the 10th; lowest, 32° at Sibley on the 22d. The average monthly maximum was 89.9°; average monthly minimum, 38.4°. The greatest daily range was 42° at Larrabee. Average of greatest daily ranges, 33°. The average precipitation for the state, as shown by records of 120 stations was 7.16 inches, which is 2.90 inches above normal. The averages by sections were as follows: Northern section, 5.54 inches; central section, 8.11 inches; southern section, 7.83 inches. The largest amount reported was 16.04 inches at Grundy Center; least amount reported, 1.46 inches at Sheldon. The greatest daily rainfall reported was 6.60 inches at Buckingham on the 5th. The average number of days on which .01 inch or more of rainfall was reported, 14. Prevailing direction of wind, southeast and northwest; highest velocity reported, 48 miles per hour from the west at Sioux City, on the 15th. The average number of clear days was 8; partly cloudy, 11; cloudy, 11.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: Wind of almost hurricane force occurred shortly after midnight on the morning of the 25th, about four and one-half to five miles north of Alta, breaking trees, moving barns off foundations, etc. June, 1902, was unusually cool, wet and cloudy. Light frost in low places on 21st.

Atlantic—J. W. LOVE: Severe electrical storm, with .70 of an inch of rain in fifteen minutes, on the 21st. Frost on 21st, but did not seem to do any damage. Last half month cool and wet.

Bonaparte—B. R. VALE: Precipitation for month 9.94 inches, and 16.78 inches since April 20th. August, 1898, gave us 10.55 inches—the only month exceeding this in last twelve years. A very cool, cloudy and wet month.

Clinton—DR. LUKE ROBERTS: June, 1902, broke all recorded amounts of rainfall for the last twenty-four years. 9.90 inches of rainfall in this locality in any one month is considered extraordinary. The number of storm days was also excessive, there being 17. This was equaled once in June during the above mentioned period, and that was in 1892, when there was a precipitation of 9.50 inches of water. A normal amount of rainfall for June in this locality is 4.67 inches, so that the last June record was in excess 5.23 inches, which might be considered a very liberal amount for any full month.

The maximum temperature for the month was 94°. The mean temperature for the month was 66.1 degrees, or 3.7° below normal, and the coldest June during the last twenty-four years. The mean temperature of the first decade was 68.5°, second decade 70° and third decade 59.7°.

Grundy Center—E. S. KING: A very wet month with a total of 16.14 inches. Rain fell on twenty-four days; on the 6th and 12th very heavy downpours did much damage; small grain heavy and rusting; corn yellow and weedy; good grass crop.

Ridgeway—ARTHUR BETTS: Coolest June on record here, almost like May; 267 hours of sunshine; on many days the solar rays were apparently devoid of heat; rain on eighteen dates; much of the corn looks yellow.

Sibley—H. G. DOOLITTLE: Frost on 21st on low ground; also on 22d, injuring corn and gardens seriously.

Sioux Center—J. DE RUYTER: Severe windstorm at 1 a. m. on 25th; hundreds of barns were totally destroyed, but only a few dwellings; no loss of life. Loss in town, 20,000; crops damaged by storm; corn very backward.

Stockport—C. L. BESWICK: Severe windstorms on 10th and 11th; unroofed buildings and damaged trees. It began raining on 27th and did not stop until morning of 30th.

Spirit Lake—W. C. DRUMMOND: On morning of the 21st, although the mercury indicated 38°, in some localities it froze corn and garden vegetables. Last ten days cold and disagreeable.

Tipton—GEORGE W. BARCLAY: June was noted for severe thunderstorms, the number of cloudy and rainy days and low average minimum temperature. Rainfall for four months, 19.05 inches.

Villisca—C. E. MATTESON: Small grain damaged by excessive rains.

Whitten—DR. FRANK P. BUTLER: Iowa river the highest it has been for thirty years; could go from Mill to Union in a boat on the 12th.

JULY.

The monthly mean temperature for the state, as shown by records of 108 stations, was 73.1°, which is 0.6° below normal. By sections the mean temperatures were as follows: Northern section 71.9°; central section, 73.3°; southern section, 74.2°. The highest monthly mean was

76.5° at Keokuk; lowest monthly mean 70.2°, at Alta, Fayette, New Hampton and Northwood. The highest temperature reported was 99°, at St. Charles on the 17th; lowest temperature reported, 41°, at Clinton on the 1st. The average monthly maximum was 92.9°; average monthly minimum, 50.9°. Greatest daily range, 43° at Plover; average of greatest daily ranges 30.4°. Average precipitation for the state, as shown by records of 125 stations, was 8.67 inches, which is 4.99 inches above normal. The averages by sections were as follows: Northern section, 8.35 inches; central section, 8.48 inches; southern section, 8.82 inches. The largest amount reported was 13.57 inches, at Odebolt; least rainfall reported 4.87 inches, at Keokuk. The greatest daily rainfall reported was 6.25 inches, at Ovid on the 17th and 18th. Average number of days on which .01 of an inch or more was reported, 13. Prevailing direction of the wind, southwest; highest velocity reported, 47 miles per hour, from the south, at Sioux City, on the 5th. Average number of clear days, 14; partly cloudy, 10; cloudy, 7.

OBSERVERS' NOTES.

Amana—CONRAD SCHADT: The Iowa river rose again very high this month, doing damage by inundating crops. A very destructive windstorm passed from west to east at 3.45 p. m. on the 8th of July. It was a straight blow or squall, about one and a half miles wide, with one or more small "twisters" within its limits. A barn belonging to Wenzel Jerusha was demolished, and a man who had taken refuge therein was killed. It is reported that thirteen barns and one house were destroyed in the pathway of the storm, within a distance of sixteen miles. Tapering clouds were observed and roaring heard with terrific thunder. Many trees were uprooted or broken in groves and orchards. The last decade was favorable for harvesting.

Audubon—FRANK MOTT: Destructive flood in the valley of the Nishnabotna. Oats are badly down.

Bonaparte—B. R. VALE: Rain 8.06 inches, following June with 9.94 making a total of 18.00 inches for the two months. This exceeds the record of 1898—the wet year—by about 6 inches.

Clinton—DR. LUKE ROBERTS: The meteorological conditions of July, 1902, were in marked contrast with those of 1901; the former being over wet and cool, and the latter over dry and hot. The number of days on which a measurable amount of rain fell was 16. This beats any July record, but the last preceding June went one better. Total precipitation was 7.79 inches. This amount of rainfall has been exceeded but once in any July preceding, and that was in 1879, when there was 8.07 inches, being in excess of July, 1902, rainfall by only .28 of an inch, but the rainfall of 1879 only covered seven days, thus averaging over an inch for each day. The normal July rainfall is 4.12 inches.

Hampton—E. C. GRENELLE: The heaviest rainfall for July since government records were begun here, in June, 1888.

Harlan—C. A. REYNOLDS: The Nishnabotna valley was overflowed and bridges washed out, and access to the city almost impossible on the 8th, 9th and 10th.

Humboldt—H. S. WELLS: Rain 8.81 inches. Much hay to make at close of the month.

Logan—MRS. M. B. STERN: Heavy rains caused much damage by overflowing meadows and corn fields on low ground.

Monticello—C. E. HEISEY: Lots of hay ruined by frequent rains; oats in some fields hardly worth cutting, corn on high ground never looked better.

Mt. Pleasant—FRANK S. STEVENS: Great damage to crops by high water; Skunk river reached the highest mark since 1851.

Ridgeway—ARTHUR BETTS: A warm, wet month; only exceeded in temperature by July, 1901, and August, 1900, and in rainfall by last May. Thunderstorms on 14 days; sunshine 392 hours, or 65 per cent; at close of the month farmers are reaping an abundant harvest.

Stockport—C. L. BESWICK: Severe electrical storm and heavy rainfall on 14th between midnight and 4:30 a. m.; 4.40 inches of rain; lightning killed several head of stock and struck several buildings.

Storm Lake—PROF. M. L. FULLER: Precipitation 10.49 inches, which has been equaled but once in 18 years, viz: in June, 1891, when 14.70 inches fell. On the 8th to 9th 4.80 inches fell, and this has been equaled but once at this station, viz: on June 24, 1891, on which day 7.78 inches fell.

Tipton—GEO. W. BARCLAY: The first and second decades of July were very wet. Prospect good for a "bumper" corn crop; oats and hay above average.

Villisca—C. E. MATTESON: A month of heavy rainfall and difficult harvest, but a fine prospect for corn except on low lands.

West Bend—PH. DORWEDER: Wettest month on record here. Much hay and grain spoiled.

AUGUST.

The monthly mean temperature for the state, as shown by records of 169 stations, was 69.1°, which is 2.0° below normal. By sections the mean temperatures were as follows: Northern section, 67.4°; central section, 69.2°; southern section, 70.6°. The highest monthly mean was 72.8° at Council Bluffs; lowest monthly mean, 65.2° at Dows. The highest temperature reported was 98°, at Perry, on the 19th; lowest temperature reported, 37°, at Sibley, on the 11th. The average monthly maximum was 91.2°; average monthly minimum, 45.0°. Greatest daily range, 46°, at Toledo; average of greatest daily ranges, 29.9°. Average precipitation for the state, as shown by records of 123 stations, was 6.58 inches, which is 3.51 inches above normal. The averages by sections were as follows: Northern section, 5.45 inches; central section, 6.76 inches; southern section, 7.53 inches. The largest amount reported was 15.47 inches at Columbus Junction; least amount reported, 1.57 inches at Dubuque. The greatest daily rainfall reported was 6.96 inches at Albion on the 25th and 26th. Average number of days on which .01 of an inch or more was reported, 11. Prevailing direction of the wind, southeast; highest velocity reported, 44 miles per hour, from the north-west, at Des Moines, on the 19th. Average number of clear days, 11; partly cloudy, 11; cloudy, 9.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: August was unusually cloudy, cool and wet. The rainfall exceeded the twelve years' normal by 2.68 inches. The daily mean temperature was less than 1° below average for same period.

Amos—C. SCHMIDT: Cool, wet and unfavorable for the main work of the farmer, stacking and threshing. Much grain was spoiled. With favorable weather corn promises a bountiful crop.

Audubon—FRANK MOTT: Highest water of the season on the 25th in the Nishnabotna river; grain in shock much injured.

Bonaparte—B. R. VALE: Rain 8.12 inches, with 18 for July, and 33 inches since April 20th; corn continues green and growing.

Brill—GEO. P. HANOWICK: A rainy month, delaying harvesting, threshing and haymaking; grain badly grown in shock; potatoes rotting; corn uneven and late; too wet for plowing.

Chilton—DR. LUKE ROBERTS: Ninety-one degrees marked the maximum temperature for August, 1902, and 46° was the minimum; the former was 5° below normal and the latter just normal.

The mean temperature for the month was 68.4°, being 2.1° below normal. There were only three Augusts during the last twenty-four years that gave a lower monthly mean, and they were consecutive, occurring in 1882, 1884 and 1885.

The per cent of cloudiness was 47, being 13 per cent above normal. This high percentage has not been exceeded, in August, during the last twenty-four years, but was just equaled twice—in 1882 and 1891. There were nine storm days during the month, the aggregate precipitation being 4.08 inches, which is in excess of normal, 1.14 inches. The greatest precipitation during any twenty-four hours was 1.33 inches, occurring on the evening of the 19th, between the hours of 6 and 11, the principal part of which fell between 8.45 and 10 o'clock.

Earlham—GEO. PHILLIPS: A very cloudy, wet August. Oats and timothy in shock nearly ruined. A brilliant electric storm on night of 14th.

Grand Meadow—F. L. WILLIAMS: Month was very wet for so light amount of rainfall. Stacking unfinished and little threshing done. Corn needs four weeks to ripen.

Greenfield—J. G. CULVER: Light frost reported on 11th; rains damaged wheat and oats in shock materially.

Grinnell—A. O. PRICE: Over 28 inches rain during three summer months; aftermath never better.

Grundy Center—E. S. KING: A rainy and bad month for harvesting. One fourth threshing done, one fourth grain in stack, and balance in shock and damaged badly; heavy aftermath in meadows.

Pacific Junction—H. H. MCCARTNEY: On night of 2d, 11:30 p. m. to 1 a. m., continuous fall of rain with hail falling throughout the shower. Extremes sometimes meet, but they appear to be a year apart; note last year's record, mean temperature 75.5°, and rainfall, 1.26.

Ridgeway—ARTHUR BETTS: Coolest August on record; 297 hours of sunshine.

West Bend—PH. DORWEILER: Much damage by wet weather to grain in shock; corn backward; roads bad and streams high.

SEPTEMBER.

The monthly mean temperature for the state, as shown by records of 103 stations, was 59.1°, which is 5.2° below normal. By sections the mean temperatures were as follows: Northern section, 57.9°; central section, 59.3°; southern section, 60.2°. The highest monthly mean was 62.6° at Burlington; lowest monthly mean, 55.0° at New Hampton. The highest temperature reported was 88°, at Denison; Sibley, Sigourney and Council Bluffs on the 2d and 7th; lowest temperature reported, 23° at Galva on the 11th. The average monthly maximum was 82.5°; average monthly minimum, 31.7°. Greatest daily range, 50° at Galva; average of greatest daily ranges, 37.0°. Average precipitation for the state, as shown by records of 118 stations, was 4.35 inches, which is 1.36 inches above normal. The averages by sections were as follows: Northern section, 3.63 inches; central section, 4.49 inches; southern section, 4.93 inches. The largest amount reported was 10.41 inches at Ottumwa; least amount reported, 1.65, at Clear Lake. The greatest daily rainfall reported was 4.31 inches at Chariton on the 30th. Average number of days on which .01 of an inch or more was reported, 9. Prevailing direction of the wind, northwest; highest velocity reported, 41 miles per hour, from the northwest, at Sioux City, on the 8th. Average number of clear days, 15; partly cloudy 6; cloudy 9.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: First killing frost on 12th; blue sunlight on 14th.

Atlantic—J. W. LOVE: September was very cool, with much rain the last ten days. Ice on 12th and 13th.

Audubon—FRANK MOTT: Rain of 23d caused streams to overflow.

Bonaparte—B. R. VALE: Rain, 3.51, keeping fields wet and practically no plowing done; corn maturing slowly; pastures excellent.

Britt—Geo. P. HARDWICK: The corn being late in maturing the frost of 12th and 13th cut short both corn and fodder; will be about half an average yield.

Clinton—DR. LUKE ROBERTS: The mean temperature for September, 1902, was 58.8°, being 3.1° below normal. During the last twenty-four years there were five Septembers which gave a lower mean temperature, namely: 1879, 56.8°; 1883, 57.4°; 1888, 57.0°; 1890, 58.5°; and 1896, 58.2°. The rainfall was 3.79 inches or .67 of an inch above normal.

Corning—JEROME SMITH: Heavy frost on 12th but no damage done except on low ground.

Forest City—J. A. PETERS: Eighty-five per cent of corn is soft and much of it worthless; too wet for fall plowing.

Guthrie Center—W. F. BRANN: Frost and rain damaged corn 25 per cent; not much corn in shock; no fall wheat sown.

Logan—MRS. M. B. STERN: The month has been unusually cold; frost did much damage to late corn.

Ridgeway—ARTHUR BUTTS: Temperature 2.5° below normal; 233 hours of sunshine. This place has not had killing frost yet, and delicate vegetation is green and beautiful. Corn slowly ripening; pastures fine.

OCTOBER.

The monthly mean temperature for the state, as shown by records of 112 stations, was 53.8° which is about 3° above normal. By sections the mean temperatures were as follows: Northern section, 51.4°; central section, 53.5°; southern section, 55.7°. The highest monthly mean was 58.4 at Winterset; lowest monthly mean, 47.2° at Plover. The highest temperature reported was 83°, at Ida Grove and Council Bluffs on the 10th and 22nd; lowest temperature reported, 20°, at Plover, on the 14th. The average monthly maximum was 77.5°; average monthly minimum, 27.2°. Greatest daily range, 46° at Sibley; average of greatest daily ranges, 35.7°. Average precipitation for the state, as shown by records of 139 stations, was 2.54 inches, which is 0.26 of an inch above normal. The averages by sections were as follows: Northern section, 1.24 inches; central section, 2.69 inches; southern section, 3.78 inches. The largest amount reported was 6.66 inches at Newton; least amount reported, 0.28 of an inch at Sioux Center. The greatest daily rainfall reported was 3.71 inches at Newton on the 17th. Average number of days on which .01 of an inch or more was reported, 5. Prevailing direction of the wind, northwest; highest velocity reported, 42 miles per hour, from the southwest, at Des Moines on the 25th. Average number of clear days, 16; partly cloudy, 8; cloudy, 7.

OBSERVERS' NOTES.

Alta—DAVID E. HADDEN: An ideal October, with Indian summer weather most of the time. An energetic electric storm in early morning of 21st.

Amasa—CONRAD SCHARF: Many tender plants still green at close of month; pastures fine and hay making still going on.

Atlantic—J. W. LOVE: Light snow on 13th; thunderstorm on 23d with no rain.

Bonaparte—B. R. VALE: Precipitation for six months—April 20th to October 19th—49.41 inches. Last two weeks settled weather; corn hardly fit to crib; no fall plowing.

Britt—Geo. P. HARDWICK: Pleasant month, with but little frost; vegetation unusually green, except corn; insect life plentiful; farm work retarded by wet soil.

Clinton—DR. LUKE ROBERTS: October, 1902, was marked by no abnormal weather conditions, but was a fair October average, and a happy contrast to the four or five months preceding. The mean temperature, 52°, was 2° above normal. Ten Octobers during the last 24 years gave higher mean temperature, the highest of which was 57.8°, occurring in 1900. The lowest mean temperature for the same period was 44.2°, occurring in 1887 and 1895. The warmest day was the 25th, which gave a mean temperature of 66.5°, being 1.2° below normal, while the coldest day, the 28th, gave a mean

of 3.7° above normal. Light frosts on the 6th, 20th, 28th and 31st and a killing frost on the 14th. Even this was harmless, as it interfered in no way with fall pasturage, and crops were past injury. Apparently grass was as green and fresh at the close of the month as during the last two preceding months. There were 5 days on which a measurable amount of rain fell. A copious precipitation occurred on the 17th, commencing at 4:30 p. m. and ending at 7 a. m. on the 18th, the principal downpour occurring between 9 and 10:30 p. m. of the 17th. Total amount 1.45 inches, being nearly one-half of the month's precipitation, which was 3.15 inches. This amount was .73 of an inch above October normal. There were 8 cloudy days, 8 partly cloudy and 15 clear. The per cent of cloudiness was 44, being 4 per cent above normal. The movement of the wind was 3,680 miles, being slightly above normal.

Fertile—Geo. W. PASCHEN: Corn cutting finished about the 5th with larger average than usual; corn husking begun the 20th.

Forest City—J. A. PETERS: Pastures extra at close of month; very little plowing done; corn too soft to crib; hog cholera bad.

Grand Meadow—F. L. WILLIAMS: Very favorable month for farm work; corn very soft; oats light.

Grinnell—A. O. PERCE: Month pleasant; threshing finished; fall feed never more plentiful.

Guthrie Center—E. S. KINO: A remarkably fine month for fall work and for drying out corn; potatoes yield 100 to 150 bushels per acre; second crop grain on stubble fields heading out.

Alta—NATHAN PORTER: Month favorable for drying corn, and it is now in fairly good condition to crib; 40 per cent more or less hurt by frost.

Ridgeway—ARTHUR BETTS: A lovely October; temperature normal; first killing frost here since April 24th on October 14th; corn half a crop.

NOVEMBER.

The monthly mean temperature for the state, as shown by records of 108 stations, was 41.2°, which is 8.4° above normal. By sections the mean temperatures were as follows: Northern section, 38.1°; central section, 41.8°; southern section, 43.7°. The highest monthly mean was 48.2°, at Keokuk; lowest monthly mean, 35.4°, at Sidney. The highest temperature reported was 79°, at Carroll, on the 1st; lowest temperature reported, 4°, at Chester, on the 30th. The average monthly maximum was, 69.5°; average monthly minimum, 16.0°. Greatest daily range, 46°, at Denison; average of greatest daily ranges, 31.4°. Average precipitation for the state, as shown by records of 127 stations, was 2.13 inches, which is .71 of an inch above normal. The averages by sections were as follows: Northern section, 2.08 inches; central section, 1.94 inches; southern section, 2.37 inches. The largest amount reported was 4.19 inches, at Stockport, least amount reported, .16 of an inch, at Sioux City. The greatest daily rainfall reported was 2.20 inches, at Charles City, on the 14th. Average number of days on which .01 of an inch or more was reported, 7. Prevailing direction of the wind, northwest; highest velocity reported, 42 miles per hour, from

the south, at Sioux City, on the 7th. Average number of clear days, 9; partly cloudy, 7; cloudy, 14.

OBSERVERS' NOTES.

Alta—DAVID E. HADEN: November, 1902, was generally cloudy, wet and warm. First snowstorm on the 25th.

Aufusa—FRANK MOTT: Corn about two-thirds in crib.

Baxter—W. T. THORPE: About three-fourths of corn gathered, and 50 per cent merchantable.

Bonaparte—B. R. VALE: Only 3.18 inches of rain fell in November, but the soil is too wet to plow; corn gathering much hindered; first snow on 29th; stock still on pasture.

Britt—Geo. P. HADWICK: A damp, cloudy month, especially the second decade; unfavorable for cribbing corn; lung disease fatal to hogs.

Clinton—DR. LUKE ROBERTS: Cloudiness for the month was 66 per cent. The number of cloudy days was 16; partly cloudy, 6; clear, 8. Mean temperature 43.8°, or about 8.9° above normal; rainfall 2.51 inches—about .59 of an inch above normal.

Earlham—Geo. PHILLIPS: About 20 per cent of corn in the fields.

Grand Meadow—F. L. WILLIAMS: Month very cloudy but favorable for fall work; much plowing done and corn generally gathered.

Legan—MRS. M. B. STEEN: Month remarkable for damp and cloudy weather; bad for soft corn.

Ridgeway—ARTHUR BETTS: A green November, and extremely mild. Only 111 hours of sunshine; from 9th to 16th no sun appeared; first snow on ground 26th; ripe pumpkins unharmed in fields up to 25th; observer ate an excellent watermelon fresh from the field on the 17th and picked flowers from snowdrifts December 1st.

Waukegan—E. J. LEONARD: Weather unusually mild; on majority of the mornings there was no visible white frost.

DECEMBER.

The monthly mean temperature for the state, as shown by records of 169 stations, was 29.1°, which is 3.5° below normal. By sections the mean temperatures were as follows: Northern section, 17.4°; central section, 20.4°; southern section, 22.4°. The highest monthly mean was 27.0°, at Keokuk; lowest monthly mean, 14.6°, at Alta and Estherville. The highest temperature reported, 20°, at Estherville, on the 26th. The average monthly maximum was 47.2°; average monthly minimum, 19.9°. Greatest daily range, 41°, at Charles City and Sheldon; average of greatest daily ranges, 30.8°. Average precipitation for the state, as shown by records of 123 stations, was 2.23 inches, which is 0.85 of an inch above normal. The averages by sections were as follows: Northern section, 2.32 inches; central section, 2.13 inches; southern section, 2.24 inches. The largest amount reported was 5.51 inches, at Ridgeway; least amount reported, .67 inch, at Ottumwa. The greatest daily rainfall reported was 2.15 inches, at LeMars, on the 20th. Average number of days on which .01 of an inch or more was reported, 8. Prevailing direction of the wind, northwest; highest velocity reported, 50 miles per hour, from the northwest, at Sioux City, on the 24th. Average number of clear days, 9; partly cloudy, 6; cloudy, 16.

OBSERVERS' NOTES.

Bonaparte—B. R. VALE: Ground not frozen till latter part of month. Precipitation for the year, 47.61 inches; 1898 gave us 54.45 inches, but it was more seasonable and gave us better crops except corn.

Britt—GEO. P. HARDWICK: There was snow sufficient for sleighing through the month; some unhusked corn yet in fields; much ice on level ground.

Carroll—MOSES SIMON: Finest sleighing for years.

Chester—C. H. MEREDITH: Severe blizzard on December 3d. Precipitation for month, 4.37 inches.

Columbus Junction—H. E. SIMPSON: The cyclonic storm periods of the month have been exceptionally well marked. Rain turning to sleet and to snow, followed by high northwest winds and brief intervals of clear, cold weather, have been characteristic of each nine day period.

Earlham—GEO. PHILLIPS: A cold, cloudy month; considerable corn still afield at close of month.

Elkader—CHAS. REINECKE: Total precipitation for 1902, 50.10 inches; highest temperature, 95°, July 30th; lowest temperature 30°, below zero, January 28th.

Forest City—J. A. PETERS: Considerable corn in fields yet; sleighing good during month.

Grand Meadow—F. L. WILLIAMS: The month was cold and ground covered with snow; roads drifted; stock doing well.

Grinnell—A. O. PRICE: A good many acres of corn in fields at close of month.

Humboldt—H. S. WELLS: Melted snow 1.57 inches; snowfall, 15.7 inches; rainfall for year, 40 inches.

Logan—MRS. M. B. STERN: Month has been cloudy and wet; lack of sunshine the worst feature.

Olin—NATHAN POTTER: December was remarkable for excessive cloudiness; most of snow melted at close of month.

Oskaloosa—JOS. BOYD: Month was noted for cloudy weather and fog. No frost in ground up to the 25th.

Red Oak—J. S. COLE: Total precipitation during the year, 47.26 inches; snowfall, 32.9 inches.

Ridgeway—ARTHUR BETTS: December temperature normal; precipitation remarkably heavy, 5.51 inches; 111 hours of sunshine; dug parsnips December 2d, just as winter was setting in; ground began to freeze 4th; all thawed out on 21st; tremendous rain on 20th.

Ridgeway data for 1902—Snowfall, 44.1 inches; melted snow, 7.93 inches; rainfall, 40.61 inches; total precipitation, 48.54 inches; mean temperature for the year 47.4; hours of sunshine, 2,843, which is 118 less than normal. First 4 months averaged 8.4 hours per day; next 4 months 9.3 hours per day, and last 4 months 5.8 hours per day. We have had years with less sunshine. Thunderstorms on 67 dates. The year was noted for big storms: January 20th, 1.51 inches; February 27th, 1.20 inches; May 4th, 1.41 inches; May 17th, 2.38 inches; May 21st, 1.57 inches; June 12th, 1.05 inches; June 25th, 2.22 inches; July 2d, 1.47

inches; July 20th, 2.43 inches; July 22d, 1.00 inches; July 25th, 1.06 inches; July 30th, 1.01 inches; September 5th, 1.18 inches; November 14th, 1.16 inches; December 2d, 1.82 inches; December 15th, 1.28; December 20th, 1.52 inches.

Stockport—C. L. BESWICK: Total precipitation for 1902, 50.74 inches.

Villisca—C. E. MATTESON: Total precipitation for 1902, 51.17 inches.

Rivers overflowed banks 7 times during the year.

Wapello—G. W. SCHOFIELD: Precipitation for the year 1902 was 48.73 inches. In 1901 the total was 17.03 inches; in 1900, 30.98 inches; in 1899, 22.34 inches.

Waukeg—E. J. LEONARD: Very little frost in ground until about Christmas; much corn yet in fields.

THE WEATHER AT CLINTON—1902.

BY DR. LUKE ROBERTS.

TEMPERATURE.

Highest temperature, 95°, 17th of July.

Lowest temperature, 15° below zero, January 27th and 28th.

Extreme range of temperature, 110°.

Mean daily range of temperature, 21.6°.

Greatest mean monthly range, 27.3°, April.

Lowest mean monthly range, 14.7°, December.

Greatest daily range, 39°, April 10th and 17th and October 1st.

Least daily range, 3°, December 21st.

normal.

Mean temperature for the year, 48°, or 0.7 of a degree above 24-year

Warmest month, July; mean, 73.4°.

Coldest month, February; mean, 16.4°.

Warmest day, 80.7°, July 5th.

Coldest day, 7.3° below zero, January 27th.

Total number of days with maximum temperature of 90° or above.

18—2 in May, 3 in June, 12 in July and one in August.

Total number of days with maximum temperature at 32° or below.

53; 14 in January, 20 in February, 3 in March and 16 in December.

Total number of days with the minimum temperature at or below

32°, 135; 31 in January, 26 in February, 17 in March, 15 in April, 3 in October, 13 in November and 29 in December.

CLOUDINESS.

Mean cloudiness, 51 per cent of the surface of the sky.

Month with greatest per cent of cloudiness, December, 69 per cent.

Month with least per cent of cloudiness, January, 28 per cent.

Total number of clear days, 111. "Clear days" is not to be understood as cloudless days. If the sky averages one-fourth cloudy, it is recorded as clear.

Total number of cloudy days, 136.

- Month with the greatest number of cloudy days, December 29.
 Month with the least number of cloudy days, July and August, 7 each.
 Month with the greatest number of clear days, January, 16; October, 15.
 Month with the least number of clear days, March and June, 5 each.

PRECIPITATION.

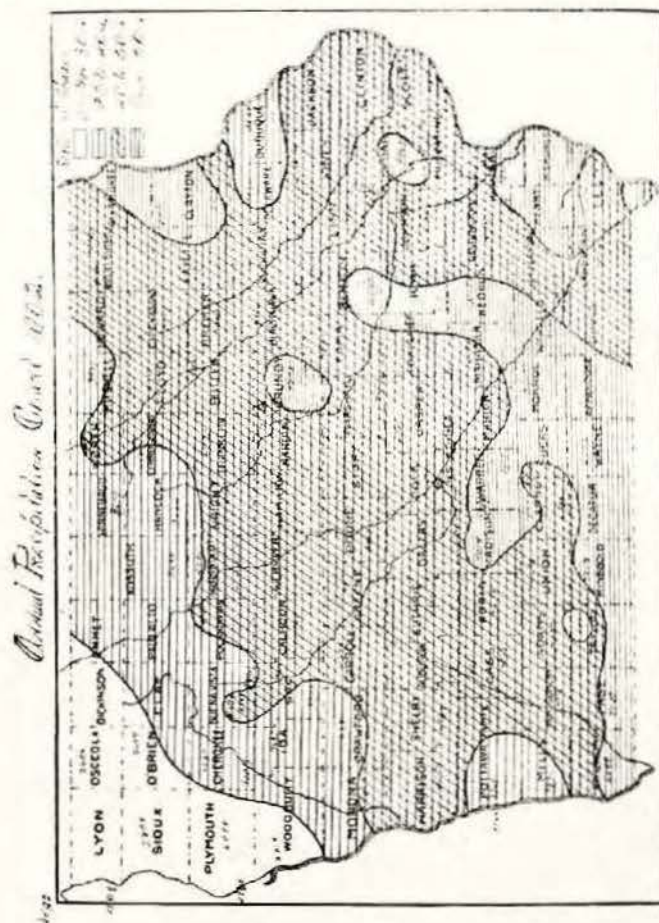
- Total depth of snowfall, 21 inches.
 Greatest fall of snow at any one storm, 5 inches, December 3d.
 Total precipitation, rain and melted snow, 14.80 inches. A 24-year normal is 34.82 inches, making the precipitation of 1902 9.98 inches in excess of normal.
 Greatest rainfall at any one storm, 3.41 inches, July 17th and 18th.
 Month with the greatest precipitation, June, 9.96 inches.
 Month with the least precipitation, January, .63 of an inch.
 Month with the greatest number of storm days, May, June and July, each had 16.
 Month with the least number of storm days, January, 4.
 Total number of storm days, 122.

THE WIND.

- Total movement of wind, 44,879 miles.
 Greatest monthly movement, 5,680 miles, March.
 Least monthly movement, 2,046 miles, July.
 Prevailing direction, west.
 Maximum velocity per hour, 39 miles, in July.
 Observations taken at 7 a. m., 2 p. m. and 9 p. m., show the movement of the wind to have blown from the north 55 times, from the north-east 129 times, from the east 123 times, from the southeast 96 times, from the south 139 times, from the southwest 175 times, from the west 188 times, from the northwest 173 times.
 The maximum velocity for January was 23 miles, for February 20 miles, for March 26 miles, for April 32 miles, for May 19 miles, for June 13 miles, for July 39 miles, for August 13 miles, for September 14 miles, for October 14 miles, for November 20 miles, for December 23 miles.

SNOW AND FROST.

- Last snowfall in spring was on the 1st day of March.
 The first snow of autumn fell on the 26th of November.
 Last heavy frost in spring was April 24th.
 First frost in autumn was October 14th.
 Number of consecutive days without damaging frost, 173, and light frost, 138.
 The temperature of the air was at freezing point or below for the last time in the spring, April 24th. The first in autumn, October 14th.
 Number of days with thunder and lightning, 38. None in January, February, November and December.
 Number of solar halos observed, 4; number of Lunar halos observed, 6.



REVIEW OF THE CROP SEASON, 1902.

January, 1902, was warmer than usual, the daily mean temperature being about 5° above normal, and the average precipitation for the state was below normal. February temperature averaged about 4° below normal, and the precipitation was less than the normal amount, the larger part coming about the close of the month. The winter as a whole was about as moderate and favorable as the average in this section.

March was warmer than usual, the mean temperature ranging from 4 to 7° above normal. Winter weather of considerable severity prevailed from the 1st to the 4th and from the 15th to the 19th, but the balance of the month was mostly springlike and unusually favorable for early farm operations. The soil was in excellent condition for plowing, and seeding of spring wheat and oats was well advanced before the close of the month. The season opened from ten days to two weeks earlier than the average in this section. The cold wave and high wind, prevalent from the 16th to the 18th, caused some damage to winter wheat in the southern and central counties, and delayed spring seeding in all parts of the state. The average precipitation was below normal, but there was ample moisture to facilitate plowing and for germination of grain.

April was slightly cooler and drier than usual, the abnormal condition prevailing for the most part through the first and second decades. The last decade was seasonably warm, and copious showers relieved apprehensions of a serious drouth. The worst features of the month were the frequent dust storms and strong gales, which caused considerable damage to windmills, trees and light structures, and wrought some injury to newly seeded grain crops in exposed localities, by uncovering the grain or blowing the loose soil into drifts. The conditions, however, were generally favorable for field work, and more than usual progress was made in seeding and preparing the ground for planting corn. In southern localities the planters were started about the 28th to 30th of April. The germination of small grain was retarded by the cold and dry weather in the first half of the month, but there was considerable moisture below the dry surface to quicken growth when the soil became warmer during the last decade. At the close of the month the grain crops were making a fair stand and the outlook was generally promising. The foliage and bloom on fruit trees appeared very near the normal period. There was a fair prospect for apples, plums and cherries, but peach buds were not in evidence, and the smaller fruits did not give promise of full average crops. Pastures and meadows were late in starting, but the growth was fairly good at close of April.

In marked contrast with the preceding month, May was warm and showery. The daily excess in temperature was about 4°. The average rainfall for the state was 5.39 inches, which is 1.42 inches above normal. There was great inequality in the distribution of rainfall, ranging from .87 of an inch at Washta, Cherokee county, to 18.04 inches at Grand Meadow, Clayton county. The area of the marked deficiency was limited

to a small portion of the northwest district. The northern section received the heaviest rainfall, and the eastern half of that section the bulk of that amount. But the soil was very dry, and in excellent condition to absorb and retain a goodly portion of the copious moisture; and despite the interruption of frequent rainy days the work of planting corn progressed rapidly between showers, so that before the close of the month the corn area was practically planted. The seed was generally good, and a fair stand of corn was secured, with not more than the usual amount of replanting. Cultivation was begun early, and in portions of the state where the rainfall was about normal, or less than normal, the crop was most thoroughly cleaned and made most satisfactory progress. Generally corn was rated in high condition on June 1st. The copious rains, though not so favorable for corn planting and cultivating, were highly favorable to grass in pastures and meadows, and caused a heavy growth of all small grain crops. Except in portions of the northwest district spring wheat, oats and barley showed a tendency to rankness, causing apprehension of danger by lodging and rust. The potato crop was generally very promising at close of the month, and garden truck was seldom in better condition at the corresponding date.

June was an abnormal month in respect to temperature, amount of rainfall and excess of cloudiness. The daily average temperature for the state was about 5° below normal, and the daily average of the last decade was about 11° colder than the first decade of the month—a reversal of usual conditions. At the central station the records show only 49 per cent of sunshine for the month, and about 75 per cent of mean relative humidity. On the mornings of the 21st and 22d frost was observed at numerous stations, with some damaging results in the northwest district. The average rainfall was 7.16 inches, which is 2.90 inches above normal. The heaviest amounts were recorded in the central district, and the lowest in several counties of the northwest district. One striking feature was the fact that showers fell in some portions of the state every day in the month. The average number of clear days for all stations of record was only eight, as against an average of twenty-two cloudy or partly cloudy days. As a result of these abnormal weather conditions farming operations were greatly retarded, and in the wettest portions field work was wholly impracticable except at short intervals between showers. On the river bottoms in the central counties many thousand acres of corn, small grain and meadows were flooded and the crop practically ruined. But despite all the drawbacks fully three-fourths of the corn acreage had been fairly well cultivated, and the average condition of early planted fields was promising at close of the month. The oats crop grew unusually rank on rich lands in all sections where the rainfall was at or above normal and there was a tendency to rust. At close of the month oats and spring wheat were filling well, and were standing up remarkably well though bulky in straw. Winter wheat, rye and clover harvest was begun, but the wet weather was unfavorable for securing hay and grain. Potatoes, pastures and garden vegetables made great advancement. The wet weather was very favorable for new seeding of grasses.

In respect to temperature, July was about normal, the average for the state being 73 degrees; but the month broke all records as to amount and distribution of rainfall, frequency of showers, severe wind squalls and extent of overflow of the principal rivers of the state. The average precipitation was 8.67 inches, or about 5 inches above normal, and the reports of all stations of record showed an excess. As in the preceding month of June, the records showed a measurable amount of rainfall every day during the month, at one or more stations. These adverse conditions greatly retarded the cultivation of late corn, and harvesting the matured crops of hay and small grain. The saturated grain fields were rendered too soft for operation of harvesting machinery. The heavy storms of rain and wind caused lodgment of oats, wheat, barley and grass to a much greater extent than was ever known in previous years, and this added greatly to the labor and difficulty in securing the heavy burdens of grain and hay. There was, therefore, a much larger percentage of loss of acreage and damage to quality of these crops than was ever known in this state in recent years. But despite these unusual drawbacks, by strenuous labor between showers, the farmers secured a considerable amount of hay in fair condition, and the small grain crops were put in shock or stack. Corn in upland fields that had been well tilled was in fair condition, being bulky and heavily eared. Potatoes exceeded all recent records. All kinds of garden truck made heavy growth. Apples suffered materially from windstorms.

The abnormal features prevalent in June and July continued throughout the larger part of August, the cool, cloudy and showery weather making altogether the wettest and most unfavorable season for cultivating crops and harvesting hay and grain that has been experienced in Iowa during the past thirty-three years. The daily mean temperature for August was 2 degrees below normal, and the average rainfall, 5.58 inches,—3.51 inches above the normal amount. Cool nights, cloudy days, frequent showers, excessive humidity of the air and saturated soil, retarded the ripening of corn and rendered it well nigh impossible to carry on the usual harvest operations. At the close of the month corn was about two weeks later than usual, with rank growth of stalks and very heavily eared. The late planted portion of the crop was green as in June, and its immature condition indicated the need of a full month of warm and dry weather to bring it to the stage to withstand killing frosts. The oats crop suffered greatest damage in shock and stack, and a very large percentage has been ruined. Spring wheat was injured but the total loss was not so great. Barley was discolored and much of it rendered unmarketable. The hay crop was badly damaged, but there was partial compensation in the growth of very heavy aftermath. Potatoes suffered materially by rot and blight of tops.

The month of September was also cold, cloudy and wet. The daily average temperature being 5 degrees below normal and the rainfall, 4.35 inches, was 1.36 inches above the average for that month. The generally saturated condition of the soil retarded field work, and corn and other unripened crops made slow progress toward maturity. The period of low temperature from the 11th to the 13th, with frost and ice in all districts, caused great injury to belated corn, especially on low

ground and in the northern half of the state, where the crop was least advanced. All reports indicated very heavy damage from the untimely frosts and continued prevalence of unseasonable weather.

October was nearly normal in amount of rainfall, though portions of the central and southern sections received a considerable excess. The temperature was about 3 degrees above normal and there was a fair amount of sunshine. In large areas the soil was too wet for plowing, and many corn fields were not dry enough for harvesting the crop. November was warmer than usual, with excess of moisture, humidity and cloudiness. The conditions were measurably unfavorable and at the close of the month fully 25 per cent of the corn crop was still afield and much of it was lying on the ground and covered with snow. The wintry conditions prevalent throughout December afforded but little opportunity to secure the unharvested portion of the crop.

The season generally was very productive in respect to bulk of soil products, but the quality has been much impaired, and a large percentage of small grain and corn was practically destroyed. The final reports show a full average yield of corn in bushels per acre, but fully 55 per cent of it was below the merchantable grade, and its value in the markets was correspondingly low. Pasturage has been unusually heavy though in quality it was below the normal standard. The potato crop, as a whole, was much better than in recent years, though there was some loss from rotting. Apples yielded more abundantly than was anticipated in midsummer.

CLIMATE AND CROP BULLETINS.

SUMMARIES OF BULLETINS ISSUED WEEKLY DURING THE CROP SEASON, 1902.

BULLETIN NO. 1, WEEK ENDING APRIL 14, 1902.

The crop season is at least ten days in advance of the average in this section, with exceptionally favorable conditions for early farm operations; but the germination of seed and growth of vegetation has been retarded by cold and dry weather. March was warmer than usual, but the first two weeks in April have been unseasonably cold, with high winds and very light rainfall. But the soil has been in very fine condition for seeding and plowing, with sufficient moisture near the surface, to start germination when the temperature rises.

Seeding of small grain is practically completed, except in portions of the northern section. Plowing for corn is in progress, and a large area is in readiness for the planter. Grasses made a fair start in March, but growth has been checked, and the present outlook for the hay crop is not flattering. Except in a few localities, winter wheat and rye wintered fairly well. There are some reports of damage to clover meadows. Fruit trees are in good condition, except the peach. The condition of live stock is somewhat below the average in respect to flesh, but there are no reports of loss by disease.

BULLETIN NO. 2, APRIL 21ST.

The week has been unseasonably dry, very light rainfall being reported from all districts. The temperature fell to freezing point several mornings, but it was warmer at close of the week, and the average was nearly normal. The conditions have not been favorable for growth of grass in pastures and meadows, or for germination of spring wheat, oats and barley. but there are no indications as yet of material damage to cereal crops. There are many complaints of scarcity of water for stock, and in some localities forage is nearly exhausted and well preserved corn fodder and ensilage are at a premium. Unusually good progress for the time of year has been made in plowing and preparing ground for planting corn, and the acreage of that great staple is likely to be larger than in recent years. In a few localities the planters have been started, but farmers are generally waiting for warmer weather. The soil is in an ideal condition for planting. The season is quite early in respect to farm work, and about the average as to growth of vegetation. Reports show fair prospects for fruits, except peaches and tender varieties of berries.

BULLETIN NO. 3, APRIL 28TH

During the past week the cyclonic winds and dust storms, which are somewhat characteristic of the season in this portion of the continent, culminated in copious showers, bringing abundant moisture for present needs of the crops in nearly all parts of the state. Some damage was caused by the high winds in numerous localities, and it is likely that seed grain was uncovered, or too deeply covered by drifts of dust in many exposed fields; but the resultant showers brought ample compensation in the form of relief to the suffering crops. The fields are in excellent condition to absorb the moisture without hindrance to farming operations, and in all districts there is a large area ready for the corn planters. A beginning has been made in the southern section, and planting will be general if the weather continues favorable the coming week. Potato planting is now in progress. Grass and grain are making fair growth. Reports indicate that foliage and bloom on fruit trees are coming as early as usual. All farm operations are well advanced.

BULLETIN NO. 4, MAY 5TH.

The past week was warmer than usual, the daily excess of temperature ranging from six to seven degrees. The rainfall was unequally distributed, the heavier amounts being reported at stations in the northern and central sections; but generally the moisture has been sufficient to promote germination of seed and vigorous growth of grass, grain and garden truck. Except where farming operations were delayed by heavy rainfall, the work of preparing ground and planting corn has been in progress. In portions of the southern section a considerable part of the corn area has been planted, and germination in early planted fields has been satisfactory. The pastures and meadows show very marked improvement, and the general crop outlook is now quite promising. Reports received by the Secretary of the Horticultural Society indicate good prospects for apples, plums and cherries, but the condition of small

fruit is below normal. Farm animals are generally healthy, and the spring pig crop is better than the average in recent years.

BULLETIN NO. 5, MAY 12TH.

The average temperature was slightly below normal the past week, with more than usual cloudiness and shower weather. The conditions were very favorable for pastures, meadows and small grain. Planting operations were delayed to some extent, but the work is well advanced in the northern section, the reports indicating an increased acreage of corn in all districts. Germination has been generally satisfactory in early planted fields, showing notable vitality of seed. The fields are in excellent tilth, and the dry subsoil readily absorbs the heavy rainfall, preventing damage from excess of moisture at the surface. The general outlook for field crops has never been better at the middle of May. There are no reports of damage to fruit from effects of low temperature.

BULLETIN NO. 6, MAY 19TH.

The first half of the week was cool and wet, with excess of cloudiness; the last half much warmer, with heavy local showers in northern and central districts. The average temperature was somewhat above the normal. Conditions were highly beneficial to small grain and grass, especially in sections where the rainfall was abundant; but there was considerable delay in corn planting operations. The work however, is well advanced in the larger part of the state, and in early planted fields a fair stand has been secured and cultivation is in progress. The reports show about the usual amount of damage to corn by cut worms and wire worms, and some replanting will be necessitated. The early potato crop is very promising, and garden truck generally is well advanced. The ideal condition of the soil and subsoil is the most encouraging feature of the crop situation, and preparation for seeding and planting has been unusually thorough. The orchard fruits give fair promise.

BULLETIN NO. 7, MAY 26TH.

The week was warm and showery. The average daily excess of temperature was from eight to ten degrees. Fully three-fourths of the state received a very large excess of rainfall, the smallest amounts being reported from stations in the northwestern counties. In numerous localities, showers fell every working day of the week. The heaviest downpour occurred in the northeast district, causing extensive damage to bridges and to crops on slopes and lowlands. The belt of heavy showers extended diagonally across the state from Page to Winneshiek counties. Clarinda reported 4.12 inches; Marshalltown, 4.75; Dubuque, 5.17; Elkader, 6.70; Ridgeway, Winneshiek County, 4.78; Waverly, 2.97; Tipton, 3.50; Waterloo, 3.98; Afton, 3.22. Work in cornfields has been retarded. In the northern district there is a considerable area still unplanted, and much replanting is necessitated, or an abandonment of early planted acreage.

In the larger part of the state the rainfall, though copious, was not damaging, and the crop conditions are very good. Grass and small grain

have made rapid growth. The only fears expressed are that the grain crops may become too rank for best results.

BULLETIN NO. 8, JUNE 2ND.

The average temperature of the past seven days was from two to four degrees below normal, with light rainfall, except in scattering localities. The week closed with higher temperature and showery weather. The conditions were generally favorable for farm work, and the dry weather afforded opportunity to cultivate the cornfields, which were becoming very weedy in all sections where rainfall had been excessive. The northwestern counties need copious rains, but the bulk of the state would be benefited by a week or two of warm dry weather, to facilitate the cultivation of corn and prevent damage to small grain by growing too rank. The corn acreage is practically all planted, and generally a good stand has been secured, with fair prospects, if conditions are favorable for timely and thorough cultivation. Pastures, meadows, potatoes and garden vegetables are making fine growth. There are variable reports as to apples, plums and cherries, but the average is below normal.

BULLETIN NO. 9, JUNE 9TH.

The past week was slightly warmer than the average, and in all districts except the northwest there was an excess of rainfall, amounting to heavy downpours and damaging floods in extensive areas.

Following are among the heaviest amounts reported: Clarinda, 6.60 inches; Bedford, 5.55; Villisca, 3.45; Albia, 3.32; Chariton, 3.18; Council Bluffs, 2.92; Carroll, 4.65; Mt. Vernon, 4.95; Jefferson, 4.10; Grinnell, 4.01; Newton, 3.01; Elkader, 4.93. At Clarinda on the 6th, 4.30 inches fell in about an hour and a half. Such storms were necessarily damaging to crops on slopes and bottoms; and in the confields of the submerged districts the area of well nigh total destruction must be very large. We have no means of estimating the full extent of damage.

In the northwest there is still pressing need of rain, while the larger part of the state needs dry, clear weather. The oats crop is becoming bulky, in many localities. Grass is doing notably well, both in meadows and pastures.

BULLETIN NO. 10, JULY 16TH.

The average temperature of the week ending the 16th was slightly above normal. The rainfall was very unequally distributed, ranging from .10 of an inch to over 6.00 inches.

In the following counties some of the heavier measurements were reported: Grundy, 6.89; Hardin, 6.88; Franklin, 6.54; Humboldt, 5.48; Marshall, 5.28; Pocahontas, 4.58; Cedar, 4.00; Clayton, 3.61; Louisa, 3.39; Washington, 3.69; Muscatine, 3.10; Buena Vista, 3.20; Scott, 3.19. In about two-thirds of the state the amount was above normal; and in portions of the northwest and west central districts the moisture is still below the seasonable average. The week closed with fair weather, with indications of improved conditions in the flooded and saturated sections of the state. The damage to cereal crops has been very heavy in extensive areas, but with restoration of normal weather the outlook for small

grain and corn will be materially brightened. In the relatively dry portions of the state corn is fairly clean and very promising. The hay crop is heavy.

BULLETIN NO. 11, JUNE 23D.

The week was unseasonably cool, the average daily temperature at the central station being 12° below normal. On the mornings of the 21st and 22d, the frost line was reached at numerous places, but no material damage resulted. The rainfall was variable, ranging from a trace to three inches. In considerable portions of the state the soil was dry enough for cultivation of corn, and fair progress has been made in cleaning the fields. In the dryer sections the corn crop is about ready to be laid by in promising condition.

The low temperature has been favorable for small grain, checking the tendency to rust and excessive growth of straw. For maturing and harvesting barley, oats and spring wheat there is need of dry weather and sunshine. Clover cutting is in progress, but conditions have not been favorable for securing the crop. Pastures and potatoes are doing well. Apples are doing fairly well, though the crop as a whole is considerably below the average. All fruits have been measurably disappointing this season, but garden vegetables have made bulky growth.

BULLETIN NO. 12, JUNE 30TH.

Another cold and wet week, with great excess of cloudiness. The daily average temperature was about 12° below normal, and the rainfall was excessive in nearly all portions of the state. Field work has been practicable only on the uplands from two to three days during the week. Crops are holding their own remarkably well under these unfavorable conditions. In the southern districts some of the early planted corn has been laid by in good order, but the bulk of the crop in the state is considerably below the average for July 1st. The normal conditions in the balance of the season the crop may be brought up to the average, despite the loss of acreage in the flooded sections.

The oats crop is standing up fairly well, and in portions of the state promises a good crop. All small grain crops need dry weather and sunshine for filling and ripening. Considerable clover hay has been cut, but not much has been saved. The season has been very favorable thus far for meadows and pastures, and especially new seeding of grasses. Potatoes and all garden truck are doing remarkably well. The apple orchards suffered much damage in the northwest from windstorms. In all sections apples will be light in yield.

BULLETIN NO. 13, JULY 7TH.

The first half of the past week was cool and cloudy; the last half was much warmer with drying winds, and much more favorable for crops, and field work on well drained lands. The rainfall was variable, ranging from less than an inch to over 8.00 inches, about two-thirds of the state receiving much above the normal amount, and extensive areas on the Cedar river and other streams have been flooded, causing damage to crops that cannot at this time be estimated.

In general the crop situation has been improved in the larger part of the state by the few days of dry weather and sunshine. The condition of corn is unusually variable as to size and amount of cultivation, but probably three-fourths of the planted area is fairly clean and up to normal standard.

Dry weather and sunshine are now imperatively needed for ripening and harvesting small grain and securing the bountiful hay crop. Spring wheat in sections where the acreage is largest has been doing well, with moderate damage by rust. Oats badly lodged in the central valleys, but the state average is nearly up to the normal, and the output depends wholly upon seasonable weather in the near future.

The potato crop is very promising, though there are some reports of damage from excessive moisture.

BULLETIN NO. 14, JULY 14TH.

The average temperature of the week was slightly below normal; the first half being cool, cloudy and wet, and the last half fair and warm. On the 8th and 9th heavy rainfall over the central valleys caused damaging floods in all the rivers of the central and western districts. The high water in the Des Moines valleys exceeded all records for the past fifty years. While the aggregate of damage to crops in the flooded valleys is quite heavy, the percentage of total loss for the whole state is not very large. The oats crop is badly lodged in extensive areas, but with seasonable weather for harvesting the total yield may be about an average. Spring wheat has suffered some damage by rust, but its general condition is fairly good. Harvesting operations are well advanced in portions of the northern districts. Condition of the corn crop is exceedingly variable, but with seasonable weather in the future it will be possible to secure a good yield on 75 to 80 per cent of the area planted. With good weather a fair hay crop may be secured, though much has been spoiled that was cut early. There are numerous reports of rot in early potatoes. Apples have suffered from high winds.

BULLETIN NO. 15, JULY 21ST.

The week was seasonably warm, with two or three fair days for haying and harvesting on dry upland. General rains occurred on the 17th to 19th, and severe local windstorms with heavy downpours swept over extensive areas in the southwest, south central, southeast and east central districts, causing damage to small grain, corn and hay crops that cannot as yet be estimated.

The most damaging effects were wrought in the section southeast of a line from Page to Dubuque; but nearly all parts of the state suffered some damage from excessive moisture. The worst feature of the crop situation is noted in the reports from nearly all districts that the grain crops are ready to harvest and the fields are too wet to be entered by harvesters. Oats are badly lodged in one-fourth to one-half of the area seeded. Wheat and oats are generally well filled, and the damage by rust is not very great; but the situation is critical, and normal weather is imperatively needed to save these crops. The reports indicate that corn

has suffered least damage, and the condition of that great staple in well cultivated fields is still quite promising. Much hay is yet uncut, and much has been spoiled after being cut. Pasturage is bulky but not in prime condition for stock in the flooded regions. Apples are badly wind-fallen in many localities.

BULLETIN NO. 16, JULY 28TH.

Four to five days of fairly good weather during the past week were well improved in harvesting hay and grain, wherever the fields were sufficiently dry. The heaviest rainfall occurred in portions of the northeast and north central districts where much hay has been made in cutting the well matured and overripe crops. The percentage of total loss of oats is heavy in extensive areas of the state, but the high average yield on the drier lands may afford partial compensation if future conditions are favorable. The early threshing reports show liberal yield of winter wheats and oats in the southern section. In all districts the reports indicate a promising condition of corn in well tilled upland fields. The condition of spring wheat is best in the section where the acreage is largest.

Potatoes show a tendency to rot in very wet soil, but the crop bids fair to break all records of recent years.

The apple crop, though light, is likely to be much better than last year.

BULLETIN NO. 17, AUGUST 4TH.

The week was warm and clear, with drying winds and conditions generally favorable for haying, harvesting and threshing. In the larger part of the state there was no interruption of work or damage by storms, and excellent progress has been made in securing the matured crops. Small grain is mostly in stack or shock, except in fields that were too wet and soft for use of reapers. Threshing is in progress and reports indicate better yield and quality of grain than was anticipated. The weather has been favorable for the rapid advancement of corn, which in early and well cultivated fields is earing heavily and is very promising. Except in very wet soil, potatoes are doing well. The hay crop is heavy, and a goodly portion has been put up in fair condition. Most of the ripened timothy has been cut for seed. Early apples are quite abundant, but the fall and winter crop will be much below the average.

BULLETIN NO. 18, AUGUST 11TH.

The daily average temperature of the past week was two to three degrees below normal. The amount of sunshine was about normal and the rainfall was light, except heavy local showers in the southern and eastern districts. In the larger part of the state conditions have been favorable for stacking and threshing, and for the advancement of growing crops. Variable reports as to yield of wheat and barley are received, the larger number being fairly satisfactory. Winter wheat is generally much above the average. Spring wheat is showing best yield in northwestern counties. Many returns of exceptionally large yields of oats are offset by reports of shortage in amount and poor quality in sections where damage by floods was greatest.

The corn crop is doing well, and in about three-fourths of the area planted the yield will be heavy if normal weather prevails during the balance of the season.

BULLETIN NO. 19, AUGUST 18TH.

The week ending the morning of the 18th was from three to five degrees colder than normal, and there was a very heavy excess of rainfall in the larger part of the state. Some of the larger amounts reported are as follows: Iowa City, 6.87 inches; Cedar Rapids, 6.12; Iowa Falls, 5.06; Des Moines, 4.56; Ogden, 4.84; Marshalltown, 3.66; Centerville, 4.18; Sibley, 3.18; Storm Lake, 3.01. Numerous streams are again flooding the lowlands. Threshing and field work have been badly retarded. Grain in shock has been very badly damaged, and many reports are received of serious injury to stacks. A large percentage of oats in shock will be practically ruined.

The corn crop is bulky, heavily eared and very green. Reports indicate that with seasonable weather the most advanced corn will be practically safe from harm by ordinary early frost, about the middle of September, and some of it will be ripe enough to cut and bind from the 5th to 10th. A considerable portion of the late planted will need good ripening conditions throughout September, and will be bettered by frostless nights a week or more in October. A large crop of aftermath is about ready to cut. The apple crop is doing fairly well.

BULLETIN NO. 20, AUGUST 25TH.

The temperature of the past week was slightly below normal, with excessive humidity and cloudiness. The rainfall was lighter than during the preceding week, though heavy downpours were reported at several stations, with severe local windstorms. In the more favored districts some threshing was done from stacks. The weather was generally too damp and cloudy to dry out the grain remaining in shocks, and there are numerous reports of oats and wheat sprouting and rotting in the fields. A very large percentage of oats, and considerable wheat, have been exposed to serious damage.

The corn crop was badly blown down in limited areas by severe wind squalls on the night of the 19th. But in the larger part of the state the crop is in fairly good condition, though its progress has been retarded by cool and wet weather. Probably over fifty per cent of the crop may be classed as early corn, with possibility of reaching full maturity during the first half of September. There is imperative need of dry, warm weather very soon to fully mature the bulk of the crop.

BULLETIN NO. 21, SEPTEMBER 1ST.

The average temperature of the past week was slightly below normal. The rainfall was excessive in all parts of the state except the eastern counties. On the night of the 25th phenomenally heavy showers fell in the central part of the south central district, causing damaging floods, and increasing damage to the grain in shocks. There were four to five fair days with seasonable warmth and sunshine, during which threshing

and stacking operations were in progress in the drier sections of the state. All reports indicate very serious injury to small grain, and total loss of a considerable percentage of oats in shock. The quality of all grain recently threshed from shock is very much below the standard grades. Corn is making fair advancement, and reports indicate that it is nearing maturity in portions of the southern section. For the state at large it is ten to fifteen days later than in the average season, and a full month of favorable weather is needed to place the entire crop beyond danger of harm from killing frosts. The minor crops are doing well. A very large second crop of hay is ready to harvest.

BULLETIN NO. 22, SEPTEMBER 8TH.

The daily average temperature for the week was about three degrees below normal, but the days were mostly clear and favorable for threshing and other field work. On the morning of the 4th, light frost was observed in numerous localities, but reports indicate no material damage. Showers on the 5th were widely distributed and generally not excessive.

The corn crop appears to be making fairly good advancement in the larger part of the state, though its progress is not sufficiently rapid to allay anxiety as to its future safety. While about two-thirds of the crop is nearing maturity and may be entirely safe by the 20th, yet there will be an unusually large percentage of soft corn if killing frost comes before October 1st. The extremely wet and cool condition of the soil greatly retards the ripening process.

Some portion of the oats crop that had been left in the shock has been threshed during the week, and the reports indicate that the percentage of loss will be very heavy. Spring wheat is in better condition, the bulk of the crop being grown in the drier districts of the state. Numerous complaints are being received of loss of late potatoes by rotting or blight of the tops. The crop of fall apples is better than was indicated by early reports.

BULLETIN NO. 23, SEPTEMBER 15TH.

The past week was one of the coldest on record for the first half of September. The average daily deficiency was about 7°. The rainfall was very light and widely scattered. The conditions were favorable for threshing, plowing and general farm operations. Frosts were reported at all stations on the mornings of the 12th and 13th, with temperatures below freezing in the northern districts. It was generally killing to tender vegetation in exposed localities. Reports indicate that corn in the northern half of the state, situated on flat or low land, suffered considerable damage, but the full extent of injury cannot as yet be estimated. It is probable that the unseasonable frost will materially increase the amount of soft and light weight corn that will be harvested. With favorable weather in the future, the early planted upland fields give promise of a large output of sound corn. A large portion of the crop in the southern half of the state was too far advanced to be seriously injured.

BULLETIN NO 24, SEPTEMBER 22ND.

The daily mean temperature of the week was 3 to 6° below normal, with light frosts in many localities. The rainfall was generally light, except in some of the northwestern counties. The conditions were favorable for cutting corn, threshing and other farm work. There are numerous reports of damage to late corn from effects of frosts in all districts, but the most serious injury appears to have been wrought in the north central and portions of the central districts. The full extent of loss in quality of the crop may not be ascertained until the corn is gathered. It is certain that there will be an unusually large amount of soft and unmarketable stuff to be disposed of by feeding as early as practicable. The potato harvest is in progress, and the yield promises to be fairly good for the state at large. The harvest of apples reveals a larger output than was expected.

More than half the oats crop has been lost, or rendered practically worthless by excessive rains. Spring wheat and barley suffered much detriment from the same cause. Early planting, timely cultivating, pushing the harvesting, and careful stacking, appear to have been most successful in this season of adverse conditions.

SPECIAL BULLETIN, SEPTEMBER 30TH.

The past week has been abnormally cold and cloudy, with excessive rainfall in the larger part of the state. Plowing, seeding and corn-cutting have been interrupted. The wet weather and cloudiness were unfavorable for all immature or unharvested crops, and the quality of corn fodder has been still further impaired. Special reports received from a large number of crop reporters, producers and business men, seem to indicate that from 40 to 50 per cent of the extra heavy corn crop will at best be below the marketable standard in condition, though it may all possess considerable feeding value for stock, if it can be harvested and secured from further detriment by wet weather and sudden freezing. For the entire crop there is imperative need of a period of normal dry weather. The situation is still somewhat critical, even for the more advanced portion of the crop, and its commercial value will depend upon future weather conditions.

CROP ACREAGE AND CONDITIONS.

JUNE 1ST, CROP REPORT.

Reports of county and township correspondents show the following results as to the number of acres and average condition on June 1st, of staple farm crops at the outset of the crop season of 1902:

Corn.—The total number of acres planted appears to be 9,208,980—an increase of 521,500 acres, or about 6 per cent, as compared with the acreage of 1901. The average condition of corn in respect to stand and vigor of plant on June 1st was rated at 97 per cent, as against 90 per cent on the corresponding date last year. Due consideration should be given

to the fact that since June 1st both the acreage and condition of corn have been materially lowered by the excessive rains in extensive areas of the state, causing damaging erosion of slopes and flooding of bottom lands.

Wheat.—The acreage of winter wheat is shown to be only 48,449 acres, which is very nearly the amount returned by township assessors last year. The number of acres of spring wheat is placed at 1,152,985 acres, which is 14,695 acres above the area seeded in 1901. The condition of winter wheat is rated at 96 per cent, and spring wheat 99 per cent.

Oats.—Acreage, 3,770,620—a decrease of 28,600 acres, compared with last year. The average condition of the crop is placed at 98 per cent, as against 89 per cent at same date last year.

Barley.—Number of acres, 594,670; decrease, 9,490, compared with last year. Condition, 100 per cent, as against 93 in 1901.

Rye.—Number of acres, 53,150—a slight decrease; condition, 99 per cent.

Flax.—Number of acres seeded, 94,760; decrease, as compared with last year, 9,380 acres. Condition of crops, 98 per cent, as against 89 per cent at corresponding date in 1901.

Potatoes.—Acres planted, 138,484—an increase of 2,184 acres. Condition, 103 per cent, as against 95 per cent June 1, 1901.

Meadows.—Number of acres, 2,515,000; decrease since last year, 176,550 acres. Condition June 1st, 96 per cent, as against 90 per cent last year.

Pastures.—Number of acres, 7,820,140 acres, a decrease of 287,300 acres, compared with last year.

Condition of Live Stock.—Cattle, 96 per cent; sheep, 97; hogs, 96; spring pig crop, 92; horses, 97; foals, 98.

Condition of Fruit.—Apples, 70 per cent; plums, 72; cherries, 70; pears, 70; peaches, 40; grapes, 72; strawberries, 80; raspberries, 71; blackberries, 67.

The correspondents estimate an average of about 7 per cent of last year's crop in the hands of the producers.

IOWA CROPS, 1902—NUMBER OF ACRES BY COUNTIES.

COUNTIES.	Winter wheat—acres.	Spring wheat—acres.	Corn—acres.	Oats—acres.	Rye—acres.	Barley—acres.	Meadows—acres.	Pastures—acres.	Flax—acres.	Potatoes—acres.
Adair	173	12,425	100,070	30,169	30	625	31,923	95,040		1,740
Adams	100	5,380	71,680	17,875	190	650	25,553	73,740		825
Adams	1,190	5,220	34,800	38,800	1,300	5,800	22,900	94,200		1,200
Appanoose	320		50,300	6,830	820		22,720	102,200	500	550
Arden		22,810	102,680	33,430	00	2,550	21,540	62,620		1,000
Bellevue	50	2,800	124,800	60,000	80	15,570	22,740	103,600		1,400
Black Hawk	15	800	95,100	55,300	970	8,900	26,900	79,150	50	1,710
Bloomington	60	7,300	117,000	46,130	430	800	19,600	74,750		1,400
Bremmer	50	800	62,150	51,850	310	1,700	19,920	75,250	1,400	1,500
Buchanan	13	600	115,800	45,110	150	7,100	30,900	87,570	270	2,000
Buena Vista		10,570	110,340	72,610	1,010	2,920	18,780	67,600		1,400
Butler		12,320	118,880	57,500	210	4,050	11,460	66,880	800	1,255
Calhoun		25,120	121,180	54,750	155	3,270	19,430	71,730	90	2,050
Carroll		20,850	113,550	35,250	145	1,000	25,870	77,610		2,300
Cass	320	970	117,700	40,110	580	10,470	36,290	84,270	3,450	1,280
Corro Gordo		2,810	105,120	72,150	500	6,000	21,750	67,380		1,150
Cherokee		2,810	119,970	47,780	700	7,000	20,400	71,240		1,675
Chickasaw		2,070	64,820	30,110	190	5,520	21,700	65,710		1,150
Clarke	210	90	57,400	15,690	125	350	30,650	80,510		1,470
Clay	350	8,100	99,700	40,580	770	25,890	17,000	67,600	1,560	1,170
Clayton	750	6,000	88,500	64,320	1,150	6,430	37,280	135,110	310	2,160
Clinton	100	2,730	123,440	42,420	1,350	4,010	29,400	103,510		1,410
Crawford		45,170	122,940	38,800	50	3,300	30,150	106,190		1,720
Dallas	230	6,400	102,770	32,800	240	800	32,800	85,000		1,170
Davis	630		55,480	18,940	1,490		43,650	114,600		1,020
Decatur	930		63,310	17,820	300	40	37,320	103,090		610
Delaware	25	1,210	100,320	41,390	40	5,470	37,830	106,910	50	1,320
Des Moines	2,000	240	68,440	29,000	2,310	120	19,010	61,580		1,320
Dickinson		16,930	42,640	31,280	200	21,650	6,970	33,070	5,150	500
Dubuque		3,180	67,440	47,900	920	2,060	34,170	91,200		2,250
Emmet		15,760	54,570	25,650	150	17,500	9,300	37,230	2,570	2,400
Fayette	105	2,620	90,470	63,880	350	6,800	50,170	14,510	2,300	2,180
Floyd	19	1,950	87,410	65,610	550	8,110	21,050	69,200	4,110	2,700
Franklin		6,200	10,180	75,000	420	4,000	18,930	64,620	1,200	1,150
Greene	3,900	4,810	121,510	14,400	640	810	21,730	12,400		1,000
Grundy	120	5,000	106,310	48,850	100	2,880	18,730	65,800	100	1,120
Guthrie	73	8,630	103,000	52,300	90	13,310	21,880	66,020	140	1,900
Hamilton	30	1,840	81,540	35,740	105	1,410	25,640	72,840		1,000
Hancock		8,180	103,170	54,290	90	1,120	17,070	73,400	240	1,020
Hardin		12,380	84,500	60,720	410	5,800	16,520	51,430	4,190	920
Harrison		13,890	98,470	54,430	85	2,630	19,410	79,570	250	1,200
Henry	40	41,550	123,240	13,840	190	570	7,570	88,100		1,770
Howard	1,490	100	70,820	25,640	1,940	400	24,180	84,800		710
Humboldt	24	1,800	52,650	38,530	60	5,150	28,910	55,200	7,100	1,100
Ia		17,000	63,120	31,200	40	2,270	12,290	48,110	1,600	700
Iowa	250	2,000	99,630	36,640	225	6,280	29,370	62,810		1,310
Jackson	100	3,120	81,010	39,020	1,730	3,240	40,010	122,500		1,300
Jefferson	50	11,420	100,000	40,920	220	600	25,050	91,200		2,700
Johnson	1,060	270	78,690	21,710	2,070	1,110	23,940	100,800		750
Jones	520	1,050	116,120	58,940	1,680	3,530	38,950	103,570		1,500
Keokuk		1,150	84,520	22,210	500	4,010	38,410	103,760		1,000
Kossuth	600	1,840	108,000	40,000	2,030	1,950	31,290	98,150		1,160
Lee		28,690	129,800	82,820	470	17,460	31,500	122,500	4,780	1,600
Linn	9,970	50,620	23,000	2,610			21,500	92,290		1,600
Louis	50	1,550	106,510	47,820	120	1,850	45,270	116,950		1,940
Lucas	2,020	510	74,940	24,290	2,510	300	14,200	62,770		800
Lyons	350	210	50,720	13,000	800	220	38,380	84,500		510
Madison		61,670	77,290	27,130		47,320	5,690	38,630	910	1,320
Mahaska	200	6,350	96,100	25,540	290	1,320	37,130	104,910		1,290
Marion	520	2,400	103,180	32,050	50	820	28,230	83,030		1,420
Marshall	425	4,810	105,250	29,820	720	920	1,010	112,400		1,100
Mills		15,400	115,540	45,740	70	2,100	28,300	77,630	90	1,400
Mitchell	450	12,870	104,000	11,880	820	240	16,670	67,500		1,160
Monroe		2,980	64,920	43,190	300	11,940	30,000	50,520	7,510	1,070
Montgomery		34,340	119,380	13,590	550	4,110	3,890	90,800	270	1,840
Muscatine	300	6,350	46,010	10,110	100	320	30,880	60,570		510
Muscatine		15,940	85,900	12,350	100	2,000	29,340	64,770		1,000
Muscatine	300	2,180	72,290	21,050	1,400	6,200	21,810	68,420		1,000
O'Brien		20,000	107,630	41,000	90	29,350	15,170	97,230	1,910	1,240
Osceola		25,310	50,540	28,540		30,170	10,270	27,020	2,000	810
Page	6,920	7,450	191,650	21,970	570	1,340	15,300	85,010		1,070
Palo Alto		8,210	157,650	47,730	470	10,280	7,580	60,940	2,800	1,210
Plymouth		18,410	157,220	42,800	210	8,100	13,510	82,830	650	1,310
Pocahontas		7,750	106,020	51,800	430	7,750	10,300	71,190	2,480	1,300
Polk		11,600	112,900	22,580	130		20,440	75,430		2,350
Pottawattamie	485	46,820	218,730	28,690	540		30,810	122,590		1,400
Poweshiek		2,970	14,000	44,250	115	3,720	37,500	111,910		1,400
Ringgold	810	54	88,740	22,070	290	320	51,200	107,530		760
Sac	100	13,010	136,000	41,580	85	8,400	22,190	72,400	200	1,170

COUNTIES.	Winter wheat—acres.	Spring wheat—acres.	Corn—acres.	Oats—acres.	Rye—acres.	Barley—acres.	Meadows—acres.	Pastures—acres.	Flax—acres.	Potatoes—acres.
Scott.	4.5	8,200	8,730	23,100	720	28,200	22,000	62,220	685	4,870
Shelby.	5.0	20,250	119,950	24,400	70	28,210	24,220	72,010		1,610
Sioux.		82,400	135,730	41,600		28,270	10,570	25,160		1,470
Story.		4,430	110,010	43,100	510	28,270	21,310	61,220		1,000
Tama.		10,900	118,140	45,120	1.0	28,270	21,310	61,220		1,300
Taylor.		4.0	85,080	18,120	530	1,130	23,570	90,220		1,180
Union.		610	83,140	18,130	130	1,380	23,570	78,030		1,120
Van Buren.			50,190	15,230	1,530	350	24,630	108,330		1,440
Wapello.		170	60,850	18,020	1,110	1,110	24,630	89,780		1,330
Warren.		6,910	64,690	21,870	330	1,020	24,630	93,440		1,330
Washington.		335	73,070	28,970	1,100	2,020	24,630	93,440		1,330
Wayne.			111,210	36,110	130	2,020	24,630	81,820		1,330
Webster.		12,430	48,870	33,920	400	4,070	11,110	42,260	320	1,330
Winnebago.		20,750	48,870	33,920	400	4,070	11,110	42,260	320	1,330
Winebago.		7,620	12,770	68,400	200	1,730	33,040	83,810	8,430	1,330
Woodbury.		58,780	143,032	25,250	140	2,520	11,030	72,110	500	1,480
Worth.		5,500	58,880	40,280	130	2,520	11,030	61,040	10,410	1,500
Wright.		11,540	53,060	53,450	130	4,420	15,270	64,010	1,100	1,030
Total for state.	48,449	1,132,185	9,206,080	3,770,624	59,150	304,073	2,515,020	7,830,100	94,707	188,484

CROP REPORT, JULY 1, 1902.

A revised estimate of the corn acreage, making due allowance for reduction of acreage as the result of excessive storms and floods since planting, showed an aggregate of 8,693,900 acres—504,780 less than the estimates of the preceding month.

Condition of Crops.—Corn 92 per cent, a decline of 5 points since June 1st; winter wheat, 96; spring wheat, 97; oats, 95; rye, 98; barley, 97; flax, 99; potatoes, 108; hay crop, 99; pastures, 107; apples, 65; plums, 50; grapes, 65.

At the corresponding date in 1901, the averages were as follows: Corn, 90 per cent; winter wheat, 98; spring wheat, 93; oats, 85; rye, 95; flax, 94; barley, 93; potatoes, 92; hay crop, 76; pastures, 80; apples, 51; plums, 70; grapes, 90.

CROP REPORT, AUGUST 1, 1902.

Reports of crop correspondents of the Iowa Weather and Crop Service show the following average condition of the staple farm crops, August 1st:

Corn, 93 per cent; spring wheat, 84; oats, 83; barley, 89; flax, 91; hay, 100; potatoes, 107; apples, 66; plums, 51.

In 1901 at the corresponding date, the averages were as follows: Corn, 55 per cent; spring wheat, 84; oats, 75; barley, 83; flax, 74; hay, 70; potatoes, 34; apples, 35; plums, 40.

IOWA CROPS—FINAL REPORT, 1902.

AVERAGE YIELD PER ACRE, TOTALS FOR THE STATE AND AVERAGE PRICES DECEMBER 1, 1902.

Following is a summary of crop reports received from the correspondents of the Iowa Weather and Crop Service, showing the average yield per acre and totals for the state of staple farm products for the past season, and the average prices at the farms or nearest stations December 1, 1902. As the larger portion of the season's output will be consumed on the farms, and marketed in the form of beef, pork, mutton, horses, dairy and poultry products, etc., the actual value of the crops is materially higher than is shown by the figures representing the local prices obtainable at this time.

The Corn Crop.—In bulk, expressed in bushels, the corn crop is reported to be a little above the ten-year average, the yield per acre being about 34 bushels, and the total for the state grown on an area of about 8,700,000 acres, is 296,950,230 bushels.

On account of the unfavorable character of the crop season, and the unusually variable condition of the corn crop a special report was called for in answer to inquiries as to the average yield of hard and soft corn, the percentage that is sound and merchantable, the local price of sound corn and the feeding value of the softer portion of the crop. The tabulated reports show the following results of this investigation: Dividing

the state into three sections, or belts three counties wide crossing east to west, we find that in the northern section (thirty counties) the sound corn is estimated at 29 per cent; in the central section (thirty-eight counties) it is 48 per cent; and in the southern section (thirty-one counties) the average is 64 per cent. For the state as a whole the average condition appears to be 47 per cent sound and merchantable, and 53 per cent graded as soft, chaffy or unmerchantable. The total yield by sections is as follows: Northern section, in round numbers, 73,000,000 bushels; central section, 129,000,000 bushels; southern section, 94,000,000 bushels.

The average local price of the sound corn is reported to be 35 cents per bushel, and the average feeding value of the softer portion is estimated at 22 cents per bushel.

This serves as a basis for estimating the total value of the corn crop this year in round numbers at \$83,000,000. Last year the yield was 227,000,000 bushels and the value \$113,000,000. In 1900 the total yield was 345,000,000 bushels, and the value, at the current prices, \$93,000,000.

Wheat.—The acreage of winter wheat is small, and the total yield appears to be only 825,045 bushels, an average of eighteen bushels per acre. In spring wheat the yield is thirteen bushels per acre and a total of 12,680,800. The total yield of both winter and spring wheat is 13,532,845. The quality of wheat is generally poor, on account of the very wet harvest, and the price of winter wheat is reported to be 55 cents, and spring wheat 52 cents. The total value of the crop appears to be \$7,002,640. Last year the yield was 18,295,000 bushels and the value was \$10,976,000.

Oats.—This crop suffered greater damage than any other cereal from the effects of excessive rains, and it has been impracticable to secure reports as to the extent of total loss, and the quality of the grain that was secured in condition to repay the cost of threshing. The returns from correspondents indicate an average yield of 31 bushels per acre from the portion of the crop that was secured and threshed. Making a liberal deduction from the acreage planted in each county we have a total of 92,907,969 bushels, as against 114,000,000 bushels last year, and 138,000,000 bushels in 1900. The average local value of this year's product appears to be 24 cents per bushel and the total \$22,297,910. Last year's oats crop was valued at \$40,209,000.

Barley.—Estimated yield per acre, 25 bushels, and total yield, 15,380,940, valued at 33 cents per bushel, or a total of \$5,075,710. Last year's crop was 14,654,000 bushels, worth \$6,447,000.

Rye.—Average per acre, 17 bushels; yield, 882,830 bushels; worth 40 cents per bushel, and the total, \$353,132. Last year's crop, 859,630 bushels, valued at \$411,762.

Flax.—Product, 725,350 bushels; yield per acre, 8 bushels. Value about \$1.00 per bushel. Last year's crop, 916,880, worth \$1,182,000.

Potatoes.—Product 91 bushels per acre; total yield, 12,051,670 bushels. Price 31 cents; total value, \$4,097,567. Last year's product, 5,098,000 bushels, valued at \$4,588,000. In 1900 the crop was 10,850,000 bushels, worth \$4,340,000.

Hay (TAME).—Product 4,439,040 tons—an average of 1.8 per acre. Value \$6.80 per ton; total value, \$30,171,592. Last year's output, 3,711 tons, valued at \$30,721.00.

Hay (WILD).—Average yield \$30,171,592. Last year's output, 3,711 tons, valued at 1.3 tons per acre; total yield, 1,202,860 tons, worth \$5.50 per tons; total value, \$6,615,730. Last year's product was 1,268,700 tons, worth \$7,992,000.

The estimated value of sweet potatoes is about \$320,000. Sorghum, \$250,000; broom corn, \$40,000. Timothy seed is estimated at \$750,000; clover seed unknown and not ascertainable as to value.

Corn fodder in shock and fields probably worth half as much as last year, or about \$10,000,000.

Pasturage bulky early and late and worth at least \$35,000,000.

Fruits and vegetables are estimated at \$9,500,000, which is a conservative figure.

TABULATED CROP SUMMARY.

CROPS.	TOTAL PRODUCTS, BUSHELS.	FARM VALUE, DEC 1, 1902.
Corn.....	206,970,230	\$ 83,432,708
Wheat.....	13,572,845	7,082,640
Oats.....	92,907,900	22,297,910
Barley.....	15,380,940	5,075,710
Rye.....	882,830	353,132
Flax.....	725,350	725,350
Potatoes.....	12,051,670	4,097,567
Hay (tame).....	*4,439,040	30,171,592
Hay (wild).....	*1,202,860	6,615,730
Sweet potatoes.....		320,000
Sorghum.....		250,000
Broom corn.....		40,000
Timothy seed.....		750,000
Corn fodder.....		10,000,000
Pasturage.....		35,000,000
Fruits and vegetables.....		9,500,000
Total soil products.....		\$215,722,389

*Tons.

As to the corn crop, it is proper to add that a considerable percentage is still ungathered and subjected to the vicissitudes of the weather, which at this time is unfavorable for securing the full product. The figures as to all the crops are submitted as the best that can be secured at this time, under exceptional conditions.

The grand total for last year was \$274,000,000, and in 1900 it was in round numbers \$229,000,000.

FINAL CROP REPORT, 1902.

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AVERAGE PER ACRE AND TOTALS BY COUNTIES.

COUNTIES.	CORN.		WINTER WHEAT.		SPRING WHEAT.		OATS.		RYE.		BARLEY.		FLAX SEED.		POTATOES.		TAME HAY.		WILD HAY.	
	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, bushels.	Yield per acre.	Total yield, tons.	Yield per acre.	Total yield, tons.
Adair	30	3,053,560	25	4,320	10	91,650	30	601,820	30	15,600	120	203,800	1.5	47,830	1.0	1,050				
Adams	33	2,739,600	19	13,800	11	61,340	35	531,450	18	2,880	25	10,200	150	127,900	1.5	38,380	1.0	1,720		
Allamakee	27	1,074,603	12	14,239	9	40,980	25	800,000	15	19,000	25	140,500	80	97,300	1.5	48,430	1.5	2,400		
Appanoose	35	1,902,100	15	4,900			30	159,800	10	8,210			100	59,000	1.5	51,530	1.0	1,080		
Audubon	33	2,752,862			13	233,530	30	669,600	20	1,200	30	85,500	100	93,000	1.5	32,400	1.2	7,250		
Benton	35	4,016,050			12	33,600	30	1,203,300	25	366,500			90	134,100	1.5	48,810	1.0	1,080		
Black Hawk	23	2,416,680	15	225	15	10,200	30	915,000	15	14,550	25	165,000	105	179,550	2.0	53,820	1.5	14,120		
Boone	28	2,907,620	13	2,089	12	74,850	33	1,026,250	16	5,530	23	11,730	85	96,900	1.5	39,530	1.0	16,140		
Bremer	25	1,523,750			13	8,450	30	95,520	18	5,280	20	30,410	8	10,320	2.0	39,840	1.5	16,530		
Buchanan	30	2,451,300	16	190	15	8,000	32	1,057,540	20	2,200	31	11,430	8	2,160	2.0	61,920	1.5	15,270		
Buena Vista	30	3,354,700			8	84,560	33	1,422,630	15	2,250	30	213,000	70	124,000	1.5	25,380	1.0	20,180		
Butler	24	2,180,630			9	25,650	30	1,742,730	15	13,650	25	90,500	90	140,600	2.0	37,500	1.5	18,210		
Calhoun	35	3,48,700			8	68,560	27	1,033,500	18	3,780	20	76,200	90	112,500	2.0	23,720	1.5	29,350		
Carroll	33	3,965,940			12	253,610	31	1,155,440	20	2,800	20	65,400	92	188,600	1.8	34,900	1.5	21,700		
Cass	35	3,594,640	18	3,870	12	321,720	30	843,300	23	2,700	21	21,160	55	196,200	1.5	38,850	2.0	10,320		
Cedar	40	4,103,800	14	4,480	14	13,580	27	806,970	15	8,700	26	246,220	52	66,560	2.0	72,120	1.0	900		
Cerro Gordo	33	2,874,960			10	38,100	30	1,436,540	12	6,360	21	109,840	7	24,150	2.0	43,500	1.5	19,320		
Cherokee	35	4,198,950			9	259,200	30	1,146,900			30	183,600	7	2,170	110	172,600	1.8	35,860	1.5	18,210
Chickasaw	30	1,536,300			14	28,080	32	1,507,500	18	1,340	25	133,000	7	45,500	60	67,260	1.8	39,210	2.0	19,529
Clarke	35	1,982,350	22	4,620	20	1,800	32	391,320	20	2,750	23	4,370	115	54,000	1.5	54,910	1.0	620		
Clay	26	2,525,900	18	6,900	10	81,000	30	1,042,560	18	13,800	30	692,400	5	9,750	60	70,200	1.5	25,160	1.5	31,200
Clayton	32	2,554,500	15	11,250	10	54,600	33	1,350,250	18	34,590	30	192,900	80	172,800	1.5	55,910	1.0	4,120		
Clinton	33	3,808,530			10	27,300	22	772,640	6	21,000	20	80,260	75	107,750	1.5	59,100	1.5	6,560		
Crawford	30	3,459,300			11	474,870	26	837,400	14	1,200	23	76,130	70	123,900	1.5	45,220	1.0	12,210		
Dallas	39	3,353,530	20	4,600	15	97,350	31	871,720	20	4,800	25	101,250	70	80,500	2.0	47,720	1.0	10,210		
Davis	40	2,135,200	23	12,600			32	509,120	16	23,860			110	73,700	1.5	61,870				
Decatur	33	2,088,850	18	16,740			35	5,305,000	16	4,640			130	83,200	1.4	52,240				
Delaware	30	2,763,600	20	500	17	20,570	32	1,095,840	18	7,080	30	164,100	120	15,400	2.0	75,660	1.5	12,150		
Des Moines	30	2,223,940	20	53,200			31	685,720	20	46,100			100	152,000	1.5	28,510	1.0	1,020		
Dickinson	28	1,189,910			9	152,270	36	661,680	20	3,200	28	690,200	8	41,200	60	33,600	1.8	12,540	1.5	24,110
Dubuque	40	2,483,400	17	7,100	16	50,800	35	1,337,850	19	17,480	32	65,945	102	231,290	1.8	61,600	1.2	4,280		
Emmett	30	1,540,230			11	145,869	33	747,450	12	1,680	32	465,040	8	20,560	120	78,200	2.0	18,420	1.5	42,250

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Fayette	32	2,862,300	20	3,300	20	52,400	31	1,491,720	15	5,250	30	205,800	7	16,170	70	151,200	2.0	96,340	1.5	15,230
Floyd	36	3,076,920			12	21,840	35	1,837,150	20	10,200	25	202,750	10	41,100	90	138,000	1.8	37,890	1.5	12,250
Franklin	33	3,134,960			16	99,240	31	1,832,630	15	0,800	22	83,980	8	9,840	4	55,200	1.0	37,890	1.0	13,910
Freemont	38	4,415,980	20	64,600	17	81,770	35	504,000	22	14,080					150	136,500	2.0	43,400	2.0	10,240
Greene	31	3,166,050	10	1,200	12	6,080	27	921,240			25	72,000			70	78,409	2.0	37,410	1.5	15,120
Grundy	33	3,138,960			10	85,110	31	1,247,750	12	960	26	294,060			110	188,100	2.0	43,760	1.5	16,210
Guthrie	35	2,803,420	20	2,140	10	14,400	30	862,200	20	2,100	25	37,350			105	101,300	1.5	35,460	1.0	11,120
Hamilton	30	2,793,600			9	65,800	23	1,124,480			22	25,740	8	1,840	90	105,310	2.0	34,040	1.8	24,110
Hancock	31	2,425,750			10	102,100	32	1,038,040	21	8,600	25	145,000	5	20,910	60	57,950	1.8	24,710	1.5	23,230
Hardin	32	2,896,720			11	130,790	30	1,220,300	20	1,640	21	48,720	8	1,840	90	110,400	1.7	32,990	1.2	20,110
Harrison	32	3,591,630	25	800	15	578,250	32	441,880	6	3,045	25	14,250			140	247,800	2.0	15,640	2.0	23,200
Henry	40	2,432,800	20	33,600	18	2,830	25	641,000	14	27,080	20	8,000			10	75,200	2.0	48,860	1.0	290
Howard	31	1,539,150	14	440	15	28,350	30	1,263,600	8	1,080	28	145,320	12	80,280	55	59,950	1.5	54,300	1.5	14,110
Humboldt	33	1,957,930			12	205,080	32	772,480	18	720	20	52,200	7	11,620	50	30,520	1.8	22,660	1.6	22,800
Ida	35	2,981,200	15	450	12	254,520	33	735,900	20	600	35	140,300			90	91,800	1.3	3,620	1.9	5,080
Iowa	30	2,853,600	9	2,250	15	31,250	16	774,640	20	4,500	25	157,000			68	89,080	2.0	78,740	1.2	2,140
Jackson	36	2,824,360	17	2,720	15	46,800	24	843,350	18	30,140	30	97,200			60	83,000	1.8	72,000	1.0	2,910
Jasper	37	3,571,240	17	850	12	137,040	20	851,600	18	4,140	28	18,480			53	141,690	1.8	49,700	1.1	1,820
Jefferson	40	3,061,600	17	18,500	11	2,890	30	548,300	15	31,350	31	35,340			120	90,240	1.8	4,040	1.0	1,000
Johnson	40	4,832,300	19	9,830	17	17,850	30	923,200	19	31,820	27	9,980			115	181,700	1.8	70,110	1.0	1,550
Jones	40	3,481,320			12	13,800	33	947,930	18	10,030	34	130,880			112	115,900	2.0	76,900	1.5	3,240
Kewokuk	40	4,235,700	19	12,440	15	12,600	25	701,500	20	40,600	21	64,460			102	118,340	1.8	61,700	1.2	590
Kossuth	28	3,225,830			9	253,200	34	1,008,080	21	9,870	23	350,980	7	29,260	70	98,700	1.5	26,100	1.0	49,620
Lee	43	2,615,400	16	159,520			42	978,000	17	44,370					30	2,500	1.8	62,900	1.0	240
Linn	28	2,927,120			15	23,250	31	1,245,820	18	5,700	24	41,400			112	217,280	1.8	81,480	1.5	7,510
Louisa	35	2,422,580	17	34,340	15	7,600	34	634,840	15	37,650	20	7,220			90	90,100	1.7	24,410	2.0	2,200
Lucas	31	1,923,480	20	7,040	12	2,520	13	434,210	17	12,000					92	46,920	1.7	65,000	2.0	1,120
Lyon	34	2,323,400			15	826,950	35	927,850			32	1,283,520	11	10,010	90	129,600	1.5	57,940	1.0	14,230
Madison	34	2,555,200	20	4,600	13	68,250	31	636,810	15	4,200	25	18,750			80	113,500	1.8	66,830	1.6	2,810
Mahaska	35	3,140,910	18	9,300	14	34,410	26	705,000	16	800	22	18,260			90	134,900	1.6	41,960	1.2	1,620
Marion	36	3,557,520	22	9,250	11	52,900	25	610,500	14	10,080	30	27,900			78	92,820	2.0	42,020	1.2	1,230
Marshall	33	3,580,830			14	169,540	32	1,127,630	20	1,400	25	653,750			58	95,200	1.5	42,450	1.2	3,700
Mills	40	3,978,400	16	7,200	12	151,410	30	354,400	19	6,080	22	6,200			110	127,000	2.0	33,340	1.5	7,120
Mitchell	32	1,959,040			12	35,760	32	1,221,500	23	5,700	35	273,250	8	60,080	60	100,200	1.3	39,780	1.0	3,620
Monona	34	3,732,920			14	452,900	35	474,600	17	4,250	33	135,630			12	166,800	2.0	7,720	1.5	29,120
Monroe	40	1,839,490	18	5,490	16	1,760	35	351,550	18	17,100	25	7,750			125	55,450	2.0	61,700	1.0	590
Montgomery	38	3,612,410	22	15,180	10	150,100	30	311,400	15	2,400					100	90,500	1.8	30,540	1.2	2,010
Muscataine	42	3,006,020	20	7,800	18	38,810	35	701,050	10	17,840	30	101,700			70	200,900	2.0	43,620	1.5	2,510
O'Brien	33	3,485,790			12	389,080	38	1,567,080	23	1,800	28	7,820	12	22,920	60	74,400	1.5	22,750	2.0	26,240
Osceola	50	1,683,600			9	216,900	29	769,600	15	450	22	817,740	8	18,810	50	40,500	1.0	13,350	1.1	17,120
Page	32	3,892,800	15	163,900	11	81,950	25	537,500	15	8,800	23	30,130			120	128,400	1.8	27,640	1.5	5,120
Palo Alto	34	2,626,000			10	81,100	38	1,343,070	15	7,030	35	353,800	8	17,120	60	72,000	1.5	11,390	1.0	34,160
Plymouth	39	5,155,680			12	1,144,920	35	1,833,850	20	4,800	36	291,600	10	6,560	72	248,200	2.0	27,000	1.5	45,370
Pocahontas	30	2,973,600			8	57,410	33	1,327,910	15	6,450	31	240,560	4	9,920	45	58,590	2.0	20,600	1.0	41,200
Polk	40	4,536,820	29	17,980	13	1,127,000	33	795,900	20	2,000					7	167,300	1.8	4,330	1.2	11,240
Pottawattamie	40	8,289,200	22	10,610	12	561,840	35	1,209,450	20	9,000	26	14,040			1	378,000	2.0	61,900	1.0	16,210
Poweshiek	38	4,189,882	24	560	12	35,640	30	1,053,100	20	2,350	25	93,000			73	102,200	1.5	54,250	1.0	1,060
Ringgold	38	3,451,162	14	4,340		640	31	623,720	13	3,610					105	79,800	1.8	81,200	1.2	1,020
Sac	35	4,204,550	14	1,400	12	156,120	32	1,108,560	20	1,700	25	203,730	8	1,600	92	116,840	2.0	42,340	1.5	21,250
Scott	34	2,720,080	20	8,900	15	123,000	30	601,810	18	12,960	25	630,250			100	487,000	1.5	34,590	1.5	7,120

COUNTIES.	CORN.		WINTER WHEAT.		SPRING WHEAT.		OATS.		RYE.		BARLEY.		FLAX SEED.		POTATOES.		TAMAR HAY.		WILD HAY.	
	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.	Yield per acre.	Total bushels.
Shelby	30	3,254,500	...	396,520	57	580,530	15	1,055	82	60,000	...	4,828	40	72	115,000	1.4	52,330	1.4	13,900	
Sioux	36	4,304,300	...	965,000	53	1,007,500	17	1,875	94	230,375	...	5,330	80	72	180,000	1.4	18,790	1.4	13,900	
Story	32	3,432,000	...	125,000	52	1,025,500	12	1,825	84	530,360	...	5,330	80	72	147,870	1.4	19,075	1.4	6,000	
Tanna	33	3,511,000	...	5,330	55	433,000	13	1,54	84	27,120	...	...	...	72	181	141,000	1.4	81,100	1.4	3,130
Taylor	34	3,272,000	...	7,310	55	524,530	16	630	85	7,250	...	...	...	72	110	121,200	1.4	12,200	1.4	1,500
Union	35	2,735,170	...	40	730,000	20	31,000	81	600	...	...	...	...	72	100	221,500	1.4	22,200	1.4	1,500
van Buren	33	3,195,250	...	2,210	59	493,550	19	1,875	82	...	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Wapello	38	3,445,000	...	8,320	58	1,012,300	13	1,875	83	...	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Warren	40	3,843,000	...	1,035	35	358,550	18	2,000	82	110,500	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Wayne	38	3,850,000	...	145,850	33	1,521,030	14	2,000	82	45,000	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Webster	39	1,490,000	...	224,520	40	910,400	20	5,820	87	293,370	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Winnebago	33	2,778,870	...	114,300	32	1,983,500	15	1,700	88	64,400	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Winnechick	33	3,740,000	...	85,800	36	1,080,750	15	1,700	88	64,400	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Woodbury	25	1,970,500	...	84,320	30	1,368,500	13	1,600	85	115,100	...	...	...	72	100	120,000	1.4	45,000	1.4	250
Worth	...	290,500,220	...	12,080,800	...	92,007,900	...	882,830	...	15,380,000	...	...	...	...	12,031,870	...	1,430,140	...	1,550,800	
Total for state	31	...	13	...	31	...	17	...	25	...	...	...	8	...	9	...	1.8	...	1.3	...
Average per acre.																				

APPENDIX.

IOWA CLIMATE AND CROPS.

CLIMATIC DATA COMPILED FROM ALL AVAILABLE RECORDS, AND
STATISTICS OF THE SOIL PRODUCTS OF THE STATE.

PREFATORY NOTES.

In response to a constantly increasing public demand for climatic data and statistics of farm products, the following pages have been appended to this report. In this age of intensive scientific investigation and far-reaching statistical inquiry the matter herein presented is of vital interest to students of climatology, producers and consumers of foodstuffs, and men of affairs who direct the operations of our complex industrial and commercial system.

Meteorological records have been made at stations of observation well distributed throughout the state, and cover sufficient periods of time to illustrate fairly the general characteristics and permanent conditions of the climate of Iowa, and the statistics of farm crops afford ample proof of the marvelous productivity of its soil. To answer questions being the special purpose of this compilation of data, the tables of climatic means and crop averages and totals have been placed in convenient form for reference and comparison.

In the systematic collection of climatic data the medical department of the United States army took the initiative in the early part of the last century. The surgeons or hospital stewards at all military posts were directed to keep a diary of the weather, and to note everything of importance relating to the climate. And the records made in pursuance of this general order afford all the accurate knowledge we have of the climate of the northwest in the years antedating the general settlement of the country. Observations were made and recorded at Council Bluffs military post in 1820-25; at Fort Armstrong (Rock Island), in 1824-35; at Fort Des Moines in 1843-46; at Fort Atkinson in 1844-46; and at Fort Dodge in 1851-53. These somewhat fragmentary records have a special value as evidence of the fact that the climate of this region has been practically permanent for more than three-quarters of the past century.

To the late Prof. Theodore S. Parvin belongs the honor of being the pioneer voluntary meteorological observer of this state. His service in that