# The Droughts of 1930, 1934, and 1936 in The Corn Belt and Associated Areas

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The term "drought," as commonly used, refers to periods in which the rainfall is considerably less than the normal. It is the custom of the Weather Bureau to report certain years, or months, as "the driest of record." *Drought* conditions, as affecting vegetation growth and crop yields, involve at least three important factors: (a) the amount of rainfall within the time; (b) the temperature, which with air movement very largely determines the rate of evaporation; and (c) the amount of moisture stored in the soil during the previous periods.

In this paper an effort is made to point out some of the relationships between temperature and precipitation on the one hand and conditions of drought and crop yields on the other during the drought years of 1930, 1934, and 1936. The study is confined to the area of the Corn Belt and some of its associated territory.

In the Corn Belt area, many of the states reported the drought of 1930 the most severe during the period for which records have been kept. In many of those states, essentially the same statements were repeated in 1934 and again in 1936. There have probably been few times since white men have occupied the middle portion of the U. S. that three years out of seven have been years of such intense droughts. The chart (Fig. 1) indicates the monthly variation from normal precipitation and temperature of six important corn-producing states for the years 1930, 1934, and 1936. Fig. 2 shows the per acre yield of corn, wheat, and rye in the same states for the years 1930 to 1936, inclusive. A comparison of the data shown by these charts will indicate something of the inter-relationships between precipitation, temperature, and the crop yields during these years.

## Climatic Conditions of 1930

**Indiana**[1].—Indiana had the lowest rainfall (29.70 in.) for the state as a whole since the beginning of records in 1887. Only two previous years had approached this small amount. Those were the years 1895 and 1901. Every month except January and September showed a deficiency for the state.

In the *Northern Division,* April and September were about equally moist. Approximately half the stations reported precipitation above normal for those months. Otherwise, deficiencies ranged generally from 2.62 in. to 9.29 in. One station reported a deficiency of 12.99 in.

In the *Central Division,* except for the month of September, only 13 stations reported precipitation normal or above at any time from

[1] Climatological Data, Indiana Section, 35:49-52, 1930. The data used in this paper are taken from the climatological reports of the different states and published by the U. S. Dept. of Agriculture, Weather Bureau under the title "Climatological Data."

March to December, inclusive. Deficiencies for the year ranged in this Division from 3.74 in. to 14.51 in.

In the *Southern Division*, except for September, only two stations reported precipitation as normal or above at any time from March to December. Deficiencies for the year ranged from 6.3 in. to 18.61 in.

With the exception of the month of June, at a number of stations in the *Middle* and *Southern Divisions*, nearly all stations reported temperatures above normal from April to September, inclusive. Thirty-four stations reported maximum temperatures of 106° to 113° F.

The average yield of corn per acre was about 10 bu. below the average for 1919-1928, while the yield of wheat was about 3 bu. above the average, and rye production was just about equal to the average. The drought had not yet become severe at the time of the rye and wheat harvest; hence those crops were little affected, but the yield of corn was reduced nearly one-third.

A new record of high temperature was established at 113° F. The year was considered as one of severe drought because of continued high temperatures and a marked deficiency in rainfall. Springs and creeks ran low, and the supply of water became distressingly low in many localities.

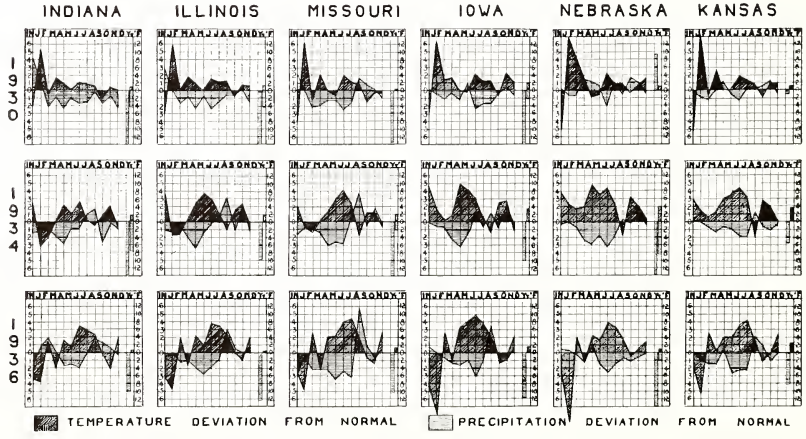


Fig. 1. This figure shows the deviation from normal precipitation and temperature by months for the states of Indiana, Illinois, Missouri, Iowa, Nebraska, and Kansas during the years of 1930, 1934, and 1936.

**Illinois.**—The Annual Summary for 1930 for Illinois states, "Never before, so far as climatological records show, has there been a year of such diverse temperature extremes or with a drought of such severity. January was cold, wet, and snowy, producing a new low record temperature of -35° F. while February was unusually mild."[2] Drought began in March, a month usually too wet for plowing, and permitted early plowing for oats and corn. July and August had numerous days exceeding 100° and reaching 113°, within two degrees of the highest

[2] Climatological Data, Illinois Section, 35:49, 1930.

maximum temperature ever recorded in the state. Drought did not become severe in the Northern Division until July. These conditions are shown clearly in Fig. 1. The Central Division suffered severely and the Southern more. Corn suffered relatively little in the northern part, but in some southern counties the deterioration was as much as 90%. Illinois received only 52% of its normal precipitation of the growing season. Except at two stations, the precipitation was below normal, some stations showing departures as much as 16 to 19 inches below normal for the year.

**Missouri.**—George Reeder, meteorologist, commenting on the weather of 1930, said,[3] "The weather of 1930 in Missouri was noteworthy from almost any standpoint. The year started with one of the coldest Januarys and deepest snow in years. A long, severe drought began in February and ran to the middle of September with only slight relief during June and the middle of August. The 40 days composed of July and the first 9 days of August were among the hottest in the weather records of Missouri. The 62-day period of July and August was the driest 62-day period of record." The spring months received only 59% of their normal precipitation. July was the outstanding driest July of record. The long drought was intensified by the extreme heat. It was in the eastern half of the state that the effects of the drought was felt most.

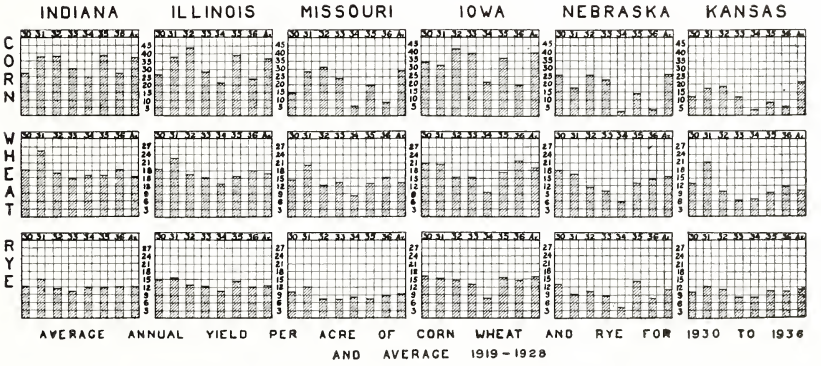


Fig. 2. This figure shows the per acre yield of corn, wheat, and rye for the states of Indiana, Illinois, Missouri, Iowa, Nebraska, and Kansas for the years 1930 to 1936, inclusive. The last bar at right for comparison shows the average per acre yield of these crops in the same states for the ten-year period, 1919-1928.

**Iowa.**[4]—Weather conditions in Iowa in 1930 were characterized by extremes. Only one year in the previous 58 had been warmer. The temperature ranged from –37° F. to 113° F., a range of 150 degrees. January temperature was much below normal, while February was the mildest February on record. Yet a cold wave brought a temperature of –34° F. at Webster City on the 15th. A rapid rise in temperature at

[3] U. S. Dept. of Agri., Weather Bureau, Climatological Data, Missouri Section, 34:49, 1930.

[4] Climatological Data, Iowa Section, 41:99-106, 1930.

the same place brought a maximum of 72° F. on the 24th, an absolute range of 106° in 9 days. The extreme range for the state in February was 114°, the highest range for February on record. A heavy snowfall in January was dissipated by the warmth of February, and the precipitation of February was below normal. March was only slightly warmer than February and was unusually dry, with little snow cover.

A warm April gave early start to the pastures and caused corn to be planted unusually early. Temperature and rainfall of May were nearly normal. Unusual heavy downpours in June brought the state average to 1.33 in. above normal for the month. From the first week of July, precipitation for 12 successive weeks was in general below normal. Sporadic distribution of rain and high temperatures caused severe drought conditions to be felt first in the western part, and spread eastward. The worst portion of the drought extended through a period of 82 days from July 5 to September 24.

All stations in the state reported temperatures above normal throughout July, August, and September except in the Northern Division in September. Temperatures of 100° F. or more were recorded throughout the state on 8.8 days' average in July and August. August 3, with a temperature of 106.36°, was probably the hottest single day in Iowa in a century.

The drought was broken by generous rains on September 25 and 26.

**Nebraska.**[5]—In contrast with the states farther east, Nebraska in 1930 gave practically no indication of drought. The year as a whole was relatively warm and wet. The months with excess and deficiency in temperature or moisture practically balanced each other as shown in Fig. 1. The rainfall of April-August was 95% of normal in the eastern one-third and 22% above normal in the western two-thirds of the state. The only indications of drought conditions were in a relatively dry winter, extending from December, 1929, through March, 1930, and hot dry weather during the last half of July. The latter did considerable damage to corn and pasture crops. This was partly balanced by ample rains during the last half of August.

**Kansas.**[6]—"In Kansas, 1930 was a year of extremes, yet the precipitation for the state, as a whole, was exactly normal and the average temperature was only one degree above normal." April and May were so wet that planting corn was delayed. A hot and dry spell began the latter part of June and lasted to the middle of August. A temperature of 114°, recorded at a number of places, was only 2 degrees below the maximum recorded temperature of the state.

The precipitation was considerably above normal in the western half of the state but below in the eastern half. The effects of high temperature and the deficient rainfall in the eastern half of the state are reflected in the low yield per acre of corn as shown in Fig. 2. Wheat, rye, barley, and oats, which had matured before the beginning of the excessive temperatures, all gave yields above the 1919-1928 averages.

[5] Climatological Data, Nebraska Section, Vol. 35:73-80, 1930.
[6] Climatological Data, Kansas Section, 44:97, 1930.

**Bordering States.**—In other states bordering those shown on the chart (Fig. 1) similar conditions prevailed. Ohio was reported to have had the driest year on record. The deficiency of rainfall and excess of temperature were more marked in the southern half of the state than in the northern half. Temperatures reached a maximum of 109°. Corn, hay, and pasture crops were greatly reduced, and a general shortage of water for domestic use was felt in the southern half of the state.

In Kentucky, the land received only 51% of its normal precipitation from April to September. The drought began to be noticed there before the end of April, and it steadily expanded and increased in intensity as the season advanced. Heat waves in July broke all records. Growth of crops depended upon short occasional showers which penetrated the soil but slightly. Pastures dried up and farmers were compelled to feed their limited supply of hay or sell their livestock. By August and September large creeks ceased to flow, and springs that had never been known to fail went dry. Many farmers were compelled to haul water long distances for their homes and livestock.

Michigan had less precipitation in 1930 than during any other year since records began in 1887. The drought was confined to the last half of the year. June was a normal month, but less than one inch of rain fell during July and August in much of the southern part of the state.

In Wisconsin, the year was noted for being considerably warmer and much drier than normal. Prolonged periods of drought continued from July 5 to September 25. Of the last 40 years, only 3 have had less precipitation, and temperatures averaged above normal throughout almost the entire year.

In Arkansas, 1930 was a year of extremes in temperature and precipitation. January, with one exception, was the wettest January on record, and May was the wettest May in 40 years. These 2 months furnished for the state as a whole 40% of the total precipitation. The driest June in 40 years was followed by a drier July. Some stations reported only .05 in. of rain for the 2 months and many stations reported under .25 inch. July was the warmest July on record and August recorded a maximum of 114°.

### Summary of the Effect of the Drought of 1930

In the per acre yield of corn, all states were below the average of 1919-1928 although Nebraska and Iowa almost equaled that average. In total bushels produced, Nebraska raised 88% more than her average, and Iowa produced 92% of her average. The per acre yield and total production of all the other important corn states were appreciably below their averages. These yields bear close relationships to the character of the seasons in the different states. Nebraska had no appreciable deficiency of precipitation during the critical period of corn growth except in June. The temperature was not excessively high during that period, and evaporation consequently was low. The situation was similar in Iowa, and there was only a slightly less favorable condition in Kansas. Missouri, Illinois, Indiana, and Ohio had deficiencies in precipitation and temperatures above normal for almost all of the months from February to October. In proportion to these variations from normal, the per acre and total yields of corn decreased.

In the yield of wheat in this same drought year, every state represented in this study showed a per acre and total yield higher than the average for the state. January was unseasonably cold, and February unseasonably warm. Precipitation was above normal in April and May, with June dry and warm. These conditions were favorable for the growth and maturation of the wheat. Hence this drought year was a good year for not only wheat but also rye, oats, and barley.

### Drought Conditions in 1934

**Indiana.**[7]—The year 1934 in Indiana was warm and dry. The precipitation for the year was 9.67 in. below normal, and the total was only 0.02 in. above that of 1930, which was the lowest of record. This shortage of precipitation was more marked in the eastern half of the state, especially in the southeastern part where many stations reported the total precipitation as less than one-half the normal.

The 1934 drought in Indiana really began in June of 1933. A shortage in precipitation which began in that month continued through the last half of the year. The precipitation of the three winter months was 3.94 in. below normal for those months and that of the three spring months was 5.47 in. below normal. The total precipitation for the seven months, November to May inclusive, was only 52% of the normal. May had only 1.14 in. of rain, the lowest ever recorded for that month. All stations in the state, except 5 stations for December and 3 for March, reported deficiencies in precipitation for every month from December to May inclusive.

A shortage of soil moisture was apparent at seeding time in the spring. Low precipitation in June and July tended to emphasize the seriousness of the deficiency, especially in the central and northern portions of the state. This deficiency was made more serious by abnormally high temperatures. The average temperature of the summer months, 77.4° F., was the highest on official record. The maximum temperature of 113° equaled the all-time high temperature of 1930. The monthly high temperature records of May, June, and July were equaled. The period of July 20-25 inclusive, when practically all stations in the state reported maximum temperatures of 100° to 113°, established a new record for continuous extreme heat. Though heavy rains occurred during August and September when practically all stations reported amounts above normal, the year ended with a record of precipitation 25% below normal and an appreciable shortage in subsoil moisture.

Corn, wheat, and rye yields per acre were slightly lower than those of 1930. The oat crop, sown in the spring and subjected to the extreme heat, suffered most. The yield, both per acre and total, was only about one-third that of the 1930 drought year crop.

**Illinois.**[8]—The drought in Illinois, like that in Indiana, began the previous year. All Illinois stations in November, 1933, reported precipitation below normal. All stations, except 5, did the same for Decem-

[7] Climatological Data, Indiana Section, 39:49-52, 1934.
[8] Climatological Data, Illinois Section, 30:39-52, 1934.

ber. During the first 5 months of 1934, except a few stations in March and 3 in April, all stations reported a deficiency each of those months. June and July were both notable for a number of heavy rains. August averaged 0.41 in. above normal rainfall, and in September all stations reported precipitation well above normal.

The year was one of the four warmest years of record for the state. Unusually high temperatures began in May and reached a maximum of 100°. July came within one degree of reaching the all-time high record for the state. August reached the highest temperatures recorded for that month. The number of days with maximum temperatures of 100° or more was two times the number in any previous year of the 55 years of record.

Rainfall occurred in scattered localities in June and over larger areas in July and August. September was one of the wettest of record and tended to increase the yield of corn. The effects, however, of a shortage of soil moisture in the spring, excessive temperatures of summer, and the attacks of pests and insects brought the average yield per acre about 15 bu. below the average for 1919-1928 period. The total yield for the state was a little less than one-half the average. The yield of oats, both per acre and total, was less than one-third that of the average of 1919-1928. The yield of wheat was about 70% of the normal crop.

**Missouri.**[9]—A dry November and December were the forerunners of the drought in Missouri in 1934. These dry months were followed by 6 other dry months with a precipitation of only 57% of the normal for those months. May was characterized by high temperatures and only 40% of normal precipitation. Drought conditions began to be rather severe by the last of the month. June was the warmest June of record for the state. The deficiency of rain for the previous 8 months and the high temperatures made it one of the hardest months on crops. The oat crop was almost a failure, wheat deteriorated rapidly just before maturity, and corn began to suffer by the end of the month. The hottest June was followed by the hottest July, and a new maximum temperature record of 117° was established. Temperatures were more severe in the northern and western counties than in those of the southeastern part. Precipitation of the month was the second lightest of record of July.

**Iowa.**[10]—The year in Iowa was the third warmest in 62 years. All months except September and December were warmer than normal. May was the hottest and driest of record. Three days near the end of the month had temperatures of 100° or more and reached a maximum of 111°, which was within 2 degrees of the state's previous all-time high temperature record. The average number of days with temperatures of 100° or higher was 21, which was about two times the number in any previous year. At least 1 station had 42 days with temperatures reaching 100° or more, and a new high-temperature record of 118° was established.

[9] Climatological Data, Missouri Section, 38:62-67, 1934.
[10] Climatological Data, Iowa Section, 45:97-104, 1934.

Precipitation was deficient for 9 successive months, ending with June. July, September, and November were the only months with precipitation above normal. April was the second driest April of record, having only 39% of its normal precipitation. The rainfall of May was only 25% of the normal for the month. The months of June, July, and August, 1934, have had less rainfall than during 17 other summers of the 62 years of record. Good crops have been raised in other years of less rainfall but with lower temperatures. The precipitation of July was slightly above normal but the hot sun and wind evaporated it so rapidly that it had but little value to the crops. The evaporation station at Ames showed an evaporation of 12.11 in. in May, 12.36 in. in June, 10.75 in. in July, and 8.58 in. in August. Crop production ranged from complete failure in some southwestern counties to luxuriant crops in some northeastern counties. The chief cause of crop failure was in the excessive temperature rather than in the amount of rainfall.

**Nebraska.**[11]—The year 1934 in Nebraska was the warmest and next to the driest on record. The total rainfall was only 14.44 in., which was only 47% of the normal. During the crop season, April to August inclusive, temperatures were unprecedentedly high and the rainfall was low. The temperature averaged over 6% above normal and the precipitation of 7.45 in. was only 47% of normal. The lowest previous record of rainfall for these months was 8.4 in. in 1894. April was warm and had only 22% of normal precipitation. May was the hottest on record, except 1894, and had but 30% of its normal precipitation. June was the third warmest June but had 80% of its normal precipitation. July was a month of uninterrupted heat and drought, the warmest month and driest July on record. There were 15 to 18 days with maximum temperatures of 100° or more. A new absolute maximum of 118° was set at 7 different stations. The rainfall of July, for the state as a whole, was only 35% of the normal, and in some of the southern counties it was only 10% of the normal. "The combination of heat and drought was devastating."[12]

**Kansas.**[13]—"Record-breaking heat and pronounced shortage of moisture made this one of the most disastrous years for crops ever known in Kansas. It also established a new record for the number of deaths due to excessive heat." The average temperature for the year was the highest since records began, and July was the hottest month ever known in the state. High temperatures, ever increasing in intensity, lasted from about the 19th of June until the middle of August. During the period, temperatures well above 100° were common. New all-time high temperatures were established for both July and August. A temperature of 119° at Lincoln exceeded all previous high temperatures by 3 degrees.

For 5 successive years, Kansas had had deficiencies in precipitation, each year's deficiency being greater than the previous one. In the western part of the state the precipitation was scarcely one-half the normal. This, coupled with the excessively high temperatures, pro-

[11] Climatological Data, Nebraska Section, 39:73-77, 1934.
[12] Ibid., p. 73, 1934.
[13] Climatological Data, Kansas Section, 48:97-103, 1934.

duced devastating conditions on the crops. High temperatures in May caused wheat and oats to head and ripen immaturely. The continued heat and dryness during the remainder of the summer made for a great shortage in the corn crop and brought almost destruction to the pastures and the hay crop. September rains brought relief to the eastern portion of the state, but the western portion continued through the rest of the year with drought and dust storm condition. "Such great deterioration of the corn crop in one month was never known in Missouri. The crop was practically ruined except in some of the southeastern counties and in favored valley locations."[14] Extreme heat and drought continued into the middle of August. Long-standing high temperature records of August were broken in the first 10 days of the month. The second half of the month was cooler and more moist than normal, but the rains came too late to help the corn crop although they aided fall pasture.

**Bordering States.**—Although 1934 in Ohio was the fifth successive year with precipitation below the 52 year average and the temperature above the average, the per acre yield of wheat was above the 1919-1928 average, and the rye yield was equal to that average. The yield of oats and corn was considerably below the average. These per acre yields reflect the weather conditions of the state. May was dry and hot, and June was the warmest June of record as was also July the hottest month in 52 years. The hot spells were followed in many districts by heavy and destructive storms. These rains brought up the average production of corn but came too late to be of any benefit to the oat crop. This year was one of greater drought in Ohio than was 1930.

In Kentucky, January, February, April, and May had only about one-half their normal precipitation. Rains which came in March and July relieved the situation in some areas of the state. Other rains in July aided the crops but left about one-third of the state in a condition of drought. The drought areas were relieved by other rains in August. Corn and oat yields were about the average, but wheat and rye yields were slightly above the average.

In Arkansas the summer was noted for its high temperature and the long continuation of the heat. The mean temperatures of July and August were the highest in 44 years and the maximum temperature of 116° equaled the all-time high temperature record of 1901. The precipitation from April to October inclusive was 73% of normal for the period, but it was much below normal during June, July, and August. Crops deteriorated noticeably during June and July. It was the intense temperatures rather than the deficiency of moisture which caused the low yields. Streams reached new low-water levels, and stock water became scarce.

The year in Michigan was noted for having all the months of the year below normal in precipitation. The amount of rainfall for the first 8 months was less than for any corresponding period in the history of the state. Drought conditions developed in May and continued through June in most sections. Temperatures of 107° and 108° broke the high temperature records for several stations. The per acre yield of all

[14] Ibid., p. 67, 1934.

cereal crops, except barley, was below the average. Rains in early August and September aided the pasture and potato crop.

## Summary

The drought of 1934 is summed up in a bulletin of the Bureau of Agricultural Economics as follows: "The drought of 1934 was the most widespread and devastating of any drought ever experienced in this country. . . . The production of corn for grain, and of barley, oats and grain sorghums in 1934 is 53% of the five-year, 1929-33, averages."[15] Pasture conditions and conditions of the corn crop on September 1, in the areas discussed in this paper are shown to have been less than 35% of normal for the areas lying west of the Missouri river and between 35% and 65% for most of the remaining area. Intense heat was a more important factor than lack of precipitation although the seriousness of the drought was due to a combination of both.

## Drought Conditions in 1936

**Indiana.**[16]—The year 1936 was one of record breaking in Indiana. "All previous official records were broken as to long periods of severe cold in the winter of 1935-36, particularly in January and February; of intense heat during the summer months of July and August; and of sustained drought during a large part of the growing season."[17] Although the average temperature for the state during the year was only slightly above normal, 6 months were exceedingly warm and only 2 months had near average temperatures (Fig. 1). Deficiency of rain began during the winter and continued through spring and into the summer. The maximum deficiency was reached in July in the northern part of the state and in August in the southern part. The effects of the drought conditions were marked by the end of June. This was shown especially by the deterioration of the oat and grass crops. July was noted not only for the low average precipitation, 48% of normal, but also for its long period of unusually high temperatures. Eleven days with temperatures of 100° or higher was the average for the state. Some stations reported as many as 17 days. At some stations there were as many as 13 successive days with maximum temperatures of 100° or higher during July. One station reported 10 successive days with maximum temperatures ranging between 106° and 116°, the latter being a new high temperature record for the state.

The high temperatures of July continued through August. One station reported 20 successive days in August with temperature recordings each day ranging from 100° to 109° and an average maximum for the month of 101°. In the southern half of the state, most stations reported maximum temperatures of 100° or more from 8 to 14 days during the latter half of August. The mean temperature of the month was the highest ever recorded for August in the state.

The drought and excessive temperatures were very severe on the crops in the southern half of the state. Rains during the latter half

[15] Effects of the Drought of 1934 on Feed, Forage and Livestock. October, 1934.
[16] Climatological Data, Indiana Section, 41:49-52, 1936.
[17] Ibid., p. 49, 1936.

of August in the northern part of the state improved the corn and pastures and greatly aided in plowing for fall-sown crops. September was a wet month except in certain portions of the southern part of the state where drought conditions continued. Corn, wheat, and rye yields per acre were almost the same as they were during the drought year of 1930.

**Illinois.**[18]—Illinois was characterized by an "unparalleled 35-day period of cold in January and February and an unprecedented drought and heat wave in summer."[19] The frequency of zero weather in January and February exceeded that of any year since the winter of 1884-85, and the number of days of 100° or more in July and August exceeded that of any summer. The maximum temperature of 115° equaled that of the previous record of 1901. The state deficiency in precipitation was 6.7 in. The deficiency during the period of April-July was 7.4 in., or 1 in. greater than that of any previous record for those months. Drought effectiveness, a result of low rainfall and intense heat, was the greatest of any of the 7 severe droughts which have occurred during the past 59 years. The yield of corn per acre was less than that of 1930, and about 13 bu. below the average of 1919-1928 period. Rye yield per acre just equaled the average, and wheat was slightly above the average.

**Missouri.**—Missouri weather records recount three droughts of greater intensity than that of 1930. They occurred in 1901, 1934, and 1936. Of the three the 1901 drought ranked third in intensity. The other two were about equal in intensity and in destructive effects. A comparison of the two is summed up by Roscoe Nunn, Meteorologist at the St. Louis Station, as follows: "Judging by the weather records alone, 1934 was worse in some respects and 1936 worse in others. The rainfall and the water in the principal rivers were less in 1936 than in 1934, but the heat in 1934 averaged for the three summer months a fraction of a degree higher than in 1936. The early onset of the heat was stronger in 1934, when the June temperatures averaged the highest ever known for June. The persistence and duration of the heat were greater in 1936, but June was mostly only moderately warm. The high temperature record of the state was broken twice in 1936, reaching a final maximum of 118°."[20]

In crop yields per acre, corn, wheat, and oat yields were greater in 1936 than in 1934. The corn yield was especially low, both years being less than one-fourth the average in 1934 and less than one-third the average in 1936. The per acre wheat yield in 1936 was slightly above the average for 1919-1928. This was partly due to the fact that the period of intense heat did not begin until the wheat was nearly matured. Severe cold in January and February, together with heavy snows in some sections, protected the wheat plants, conserved the ground moisture, and furthered the growth of wheat in the spring.

**Iowa**[21].—Iowa's winter of 1936 was noted for its intensity of cold and

[18] Climatological Data, Illinois Section, 41:49-53, 1936.
[19] Ibid., p. 49, 1936.
[20] Climatological Data, Missouri Section, 41:39, 1936.
[21] Climatological Data, Iowa Section, 47:117-127, 1936.

depth of snow cover. A snow fall of 42.9 in. was the greatest in the official records of the state. The period from January 17 to February 21 was probably the most prolonged and severe cold in 117 years (Fig. 1). However, these conditions tended to conserve the soil moisture and protect the fall sown crops. The spring months were favorable for the preparation of the ground for sowing spring crops. May had hardly sufficient rainfall to provide good conditions for the growth of small grains and pasture. June was relatively mild until near the end of the month. On the 25th a prolonged hot period began, which lasted almost without a break until the middle of September. This was probably the longest period of intense heat in 100 years. During July and August all records of high temperatures were broken not only for maximum temperatures but also for the length of the period of intensity. A new high temperature record of 117° was established. The long period of intense heat was also a period of very low rainfall. July approached its lowest record of precipitation. These conditions, especially the prolonged period of intense heat, reduced the per acre corn yield to approximately one-half the average. It is estimated that in total yield it reduced the crop by 235,000,000 bu. This was due chiefly to the heat wave of July 14-31. The cold and snow of winter and the late beginning of the intense heat permitted the wheat crop to reach maturity under favorable conditions. Its yield per acre was above that of the 1919-1928 average and above the average of any year since 1930. Hay and other grain crops harvested in June or early July were not seriously affected by the heat or drought.

**Nebraska**[22].—For Nebraska, 1936 was the 7th consecutive warm year and the 6th consecutive dry year. February was the coldest month ever recorded in the state and July was the warmest. Precipitation for the year was only 63% of normal and was the least on record except 1894. A warm May with a rainfall 93% of the normal gave an auspicious start to the crop season. However, the 4 following months were far above normal temperatures as reported by practically all stations in the state. June had only about one-half the normal precipitation. July was not only the driest July on record but also the hottest. Maximum temperatures were 100° or more on from 15 to 20 days. The previous maximum for the state, 118°, was reached. July's precipitation was only 18% of normal. August was dry and the warmest August on record. The summer as a whole was the hottest and driest on record. The summer months had only 43% of their normal rainfall.

Crop deterioration which began the latter half of June continued without interruption until September. The drought did not interfere materially with the rye and wheat crops but was disastrous to corn and oats. The per acre yield of corn was less than one-fifth the 1919-1928 average and of oats less than one-half. During September moisture conditions were improved and rye and winter wheat were sown for fall pasturage.

**Kansas**[23].—1936 was the 5th abnormally dry year since 1930 and the driest in the 50 years of state-wide records. The precipitation for the

[22] Climatological Data, Nebraska Section, 41:73-77, 1936.
[23] Climatological Data, Kansas Section, 50:93-99, 1936.

state as a whole was 8.3 in. below normal and 1.29 in. below that of the previous driest year, 1917. Every station in the state reported temperature averages above normal for every month from May to September inclusive. Practically every station in the state reported deficiencies in precipitation every month except May from February to August inclusive. A new high temperature of 121° was recorded twice in July. In the eastern half, wheat matured under favorable conditions during May and June, but it was greatly damaged by heat in the western half. Corn began to suffer by the last of June and was practically ruined by the end of July which was the second hottest month ever known in the state. August was the hottest and third driest August on record. A plague of grasshoppers added to the disastrous conditions produced by the drought. Rains in September revived the grass, alfalfa, and grain sorghums that had survived the drought and made conditions favorable for fall wheat sowing.

**Other States.**—In Ohio the drought began in May, which was among the warmest and driest Mays. It was followed by the driest June on record. A heat wave of unusual intensity spread over the state from July 8 to 15 with temperatures reaching 100° or more. A low rainfall and very low humidity prevailed throughout most of the state. August temperatures have been exceeded but three times.

In Kentucky, the drought began in May, was increased by the driest June of record, and was further intensified by intense heat and continued drought during the first half of July. Much damage was done to crops. During the latter half of the month, good rains restored crop conditions in the southern counties. The northern counties were aided by rains in the first half of August, but intense heat and shortage of precipitation brought drought conditions again in the latter part of August.

The year in Wisconsin and Michigan was characterized by unseasonable cold in January and February and unusual heat in July. April and June were below normal temperatures. May, July, and August were above normal. July and August had extended periods of heat waves, and each established new maximum temperature records, 112° for Michigan and 114° for Wisconsin. The average crop production was near the average for each state.

## Summary

The three droughts of 1930, 1934, and 1936 were widespread in the central portion of the United States. They decreased in intensity and destructive effects toward the north and south. The year 1930 was relatively moist in the western Great Plains area. In general each drought was more devastating than the preceding one. New high temperature records were established in most of the states. The intensity of the droughts were, in general, proportional to the extremes of high temperature and the length of their period of duration. Excessive evaporation was as important a factor in the deterioration of the crops as was the deficiency in precipitation.