

On July 2, 0.68 inch of rain fell in two showers. This rainfall was slow and steady and probably most of the water penetrated the soil for a few inches, but a rainfall of 0.68 inch was totally inadequate to materially assist a semisandy soil that had been without sufficient moisture since May 20, or for 42 days. Following these showers of July 2 the long drought set in and continued until September 12-13, when a slow, steady rain of over 3 inches relieved the condition. The entire period from May 21 to September 12, 114 days, may be characterized as abnormally dry. The total amount of precipitation for June was 1.51 inches, or 2.44 inches below the normal; for July 0.71 inch, or 2.29 inches below the normal, and in August only 0.23 inch of rain fell. This small amount of rain was 1.99 inches below the August normal, and at the end of August there was an accumulated deficiency since January 1 of 10.63 inches. From May 1 to September 1, the cotton-growing period, the total amount of rainfall at Palestine was 7.80 inches less than the average rainfall for the same period, this being the greatest deficiency during the cotton-growing season since the establishment of the local office of the United States Weather Bureau in 1881.

OTHER METEOROLOGICAL CONDITIONS IN 1913.

Concomitant with the lack of sufficient moisture appears an abnormally high percentage of sunshine and a correspondingly large number of clear days. In April there were 21 clear days, 6 partly cloudy and 3 cloudy days; in May 22 clear, 7 partly cloudy and 2 cloudy; in June 17 clear, 11 partly cloudy, and 2 cloudy; in July 24 clear, 7 partly, and no cloudy; and in August 19 clear, 12 partly cloudy, and again not a single cloudy day. The prevailing winds were from the warm regions of Mexico and from the Gulf of Mexico. Their velocity was less than normal, and cool, bracing winds from the northwest were entirely absent. The intense afternoon heat of the summer months was also an important factor contributing to the damage of the cotton crop. The plant, so well developed by the spring rains, not only lacked sustenance from the soil on account of absence of moisture, but was further desiccated by the abnormally hot rays of the sun. In June a maximum temperature of 90° or above occurred on 11 days, in July on 28 days, and in August on 30 days.

RESULTING EFFECTS.

The cotton crop for 1913 is conservatively estimated at scarcely two-thirds of an average crop, and the sugarcane crop at probably one-half an average crop. Corn is about the average, and the good soaking rains of September 12-13 will materially assist the fall farm products. The water in the reservoirs at Palestine has been at the lowest stage ever known. During the first decade in September the entire supply was discontinued for many hours, and for several days only a very slight stream of muddy water was obtainable, and that only on the ground floors of both residential and business districts, leaving the second-floor baths and toilets without any water at all for four days. Similar conditions are reported from other towns in east Texas, but the heavy rains of September 12-13 alleviated further danger of a water famine.

The loss from the cotton crop in Anderson County will be the heaviest ever known, and is conservatively estimated at over \$75,000 in this county alone.

The drought in 1913 produced an early season for cotton, the first bale being ginned August 7. In 1912 the first bale was ginned August 16. The Palestine Ice, Fuel & Gin Co., the largest ginning company in Anderson County, have ginned 148 bales of cotton up to September 1, 1913. In 1912 they ginned only 86 bales up to September 1, but the president of the company, Mr. W. L. Welborne, states that the 1913 cotton crop will fall behind the 1912 crop by 33½ per cent in spite of a 10 per cent increase in acreage. The decrease will be due to a total lack of late cotton, known as "top crop," as the late plants were entirely destroyed by the heat and drought.

HEAT AND DROUGHT IN SOUTH DAKOTA DURING THE SUMMER OF 1913.

By S. W. GLENN, Section Director.

The heat wave which affected the more southerly States did not prevail in this vicinity until the latter part of August and the first week in September, more especially during the latter period, but there were several periods of three or four days in August with maximum temperatures of 90° or slightly higher.

While there was some quite warm weather in July and August, it was not on the whole more severe than has occurred in some other years. The current September, however, 1st to 6th, is the only September since the opening of the station in which an extended hot period has prevailed. From the 1st to 6th, inclusive, with a break of only two days, maximum temperatures of 100° or higher occurred. From August 10 to 18, there was an average daily excess in mean temperature of 8.1°, from August 25 to 31 an average daily excess of 6.6°, and from September 1 to 6, inclusive, the average daily excess was 15.6°.

August of this year gave the highest mean temperature of any August since the Huron station was opened, except in 1900 and 1909. In some former years hot winds have occurred several times in a season; this year there were four days in September when the winds could be called hot, but there were no others.

Whatever injury was sustained by small grains in this vicinity was largely due to a pronounced deficiency in rainfall in June. The season started out well with a good supply of moisture at the end of May, but June gave about 2.70 inches less than the normal, and at the end of the month there was no excess of moisture in the soil for plant life to draw from. Rains in July were very beneficial for corn, which generally did well up to the latter part of August, and for other late crops. Corn was adversely affected by the heat wave, according to the reports of some persons, while some others report no material damage. The effect of the heat wave was to absorb the moisture of the foliage, while the absence of good rains, and deficient soil moisture, aided in the process.

When the heat wave started in, small grains were being harvested, and corn was far advanced toward maturity, but the dry heat hastened its ripening, and doubtless this crop was hurt by the weather conditions, forcing it to early maturity, but how much it was damaged is hard to determine as yet.

As compared with other years, this vicinity, as well as the State, has on the whole experienced more unfavorable crop seasons several times, in my judgment and that of others competent to give an opinion.

In this vicinity there was practically no scarcity of water for either live stock or domestic purposes, as artesian wells are numerous and in many cases tend to feed small watercourses, and other wells are generally deep. The streams are low.

During the heat wave dry weather predominated, except that a generous rain fell on August 17. On September 7 more seasonable temperature set in and continued until this writing, September 15. By this date small grains were mostly in the bin or granary, and corn and other late crops were practically all either matured or nearly so, except late vine crops.

The temperature conditions during the heat wave, while causing considerable discomfort, resulted in no material increase in mortality in either human or animal life, so far as appears. During the heated period in September there was no decidedly great discomfort if one was in a breeze, the heat being dry, and the nights, comparatively cool, gave relief.

FOR THE STATE.

The conditions for the State as a whole were similar to the local conditions, except that the southeastern and extreme eastern counties were favored with more rain. Most of the northern and western counties were more affected by dry weather than other parts. In the western counties, excepting the Black Hills, there is nearly always warmer weather than elsewhere in the State.

DROUGHT AND HEAT WAVE OF THE SUMMER OF 1913 IN KENTUCKY.

By FERDINAND J. WALZ, Professor of Meteorology.

The shortage in rainfall together with the intense heat which prevailed so largely during the summer and crop-growing months of 1913 resulted in one of the most severe, far-reaching, and destructive droughts experienced in this section during the past quarter of a century. In heat the season is comparable only to that of 1901, and in dryness to the seasons of 1894 and 1904. In the combination of both heat and dryness for so long a time the season of 1913 has no equal in the records of the past 25 years.

Deficiency in rainfall began with the month of April and continued through the months of May, June, July, and August, and the first decade of September. The average aggregate rainfall for the months April to August, inclusive, for the State of Kentucky as a whole was 13.87 inches, or a deficiency of nearly 5.50 inches. The year having the next smallest amount for these months is 1894, with 14.8 inches. In 1904 the amount was 15.06 inches. In 1901 rainfall was deficient up to the month of August, the driest month being July, which is also the hottest month of record in this section, but in August of that year there was ample rainfall over the greater portion of the State, the droughty conditions continuing only in the north border counties. In 1895 rainfall was decidedly deficient during the crop-growing months except July, when generous rains occurred which not only terminated the drought but gave a sufficient excess of moisture to tide over the deficiency of August and September. In 1889, another dry year, the rainfall was plentiful in May, June, and July, the dry months occurring in the early part of the year and after July.

The drought of the current year was most severe in the western part of the State, where in many of the counties the total rainfall for the five months ranged between 7 and 12 inches, a deficiency of 9 to 13 inches. The drought was felt least in the central portion of the State and over sections on the western border of the mountain region, the rainfall in these sections ranging between 11 and 20 inches, a deficiency of 1 to 7 inches. At Middlesboro, in the extreme southeastern part of the State, the rainfall of this period was 12.4 inches, which shows a deficiency of 10 inches, but the normal in that section is large.

At Louisville, Ky., from April 1 to September 10, 1913, the total rainfall was 11.4 inches, or 8.6 inches below the normal for that period. The driest year, however, at Louisville since the records began in 1871 was 1904. From April 1 to September 10, inclusive, of that year the total rainfall was 10.7 inches, and the deficiency was much greater in October and November, the total rainfall for these two months being only 0.52 inch. Other dry years were: 1881 with a rainfall of 11.92 inches; 1894, 17.85 inches; and 1901, 15.0 inches in the period under discussion. In 1881 only 0.15 inch fell during the month of August.

The intense heat began the 16th of June and continued with few interruptions until September 8. The longest interruption in this heat wave was from July 19 to 26, inclusive. During these 12 weeks the temperature was above normal at Louisville and Lexington on 63 days. The temperature was 90° or above at Lexington on 40, and at Louisville on 55 of these days, and it was 100° or above at Louisville on 5 days.

In 1894 and 1901 the temperature was 90° or above at Louisville on 52 and 48 days, respectively, for a like period. At Louisville the temperature was above normal on 66 days in 1901 and on 41 days in 1904. In 1901 the temperature was 90° or above on 48 days and 100° or above on 7 days at Louisville, and the average maximum temperature for the month of July was 95.2. In 1904 the temperature did not reach 100° and was 90° or above on only 24 days.

Considering the State as a whole and the duration, the hot wave of this year exceeds that of any year on record. The hot weather of 1901 occurred mostly in the month of July, while this year it extended through practically 12 weeks.

The following statements relative to the effect of the drought and hot weather upon crops, water supply, etc., are gathered from the September crop report of the commissioner of agriculture for the State of Kentucky, from personal correspondence with him, interviews with persons who have been over the State, newspaper reports, and general hearsay. In the main, reports from all these sources agree that all crops, except wheat, oats, and early hay suffered severely from heat and lack of moisture, yet the reports as to the extent of the damage vary so considerably that anything like a true estimate at present of the amount of damage inflicted on the several crops is impossible.

The wheat, which is harvested in the latter part of June or the first part of July, was a very good crop and of unusually good quality, the weather being ideal at time of harvest. The oats crop was also good. Corn and tobacco will hardly make an average half crop, and abundant rains now, September 13, would not help these crops, as they are, for the most part, in the curing period,