

and vegetation. Corn was rushed to maturity prematurely, and late potatoes were considered almost a failure. The ground was too hard and dry to permit plowing, and as a result its preparation for winter wheat was greatly delayed.

### THE DROUGHT OF 1913 IN TEXAS.

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Droughty sections of Texas, while they may form a large portion of the State in the aggregate, are usually interspersed with areas of greater or less dimensions that have not suffered materially from lack of precipitation. In so large a State with its varying geographical features and climatic conditions, it is not likely that any considerable area should go entirely without moisture for so long a time as two months. Individual localities, however, may go without precipitation for even longer periods, while neighboring sections during the same time may have been well supplied with moisture, due to the fact that the summer rainfall occurs nearly always in local showers. Independent of the deficiency of precipitation the severity of a drought depends largely upon its effect on animal and plant life. The mere absence of rainfall for any protracted period may do no harm if the ground be well soaked previously, as many plants, and especially cotton, seek the moisture in the subsoil, and can therefore live for some time after the surface soil may have become pulverized from the dryness.

#### CONDITIONS PREVIOUS TO DROUGHT.

The winter of 1912-13 started in auspiciously with well-timed rains that put a good season in the ground, the amount of moisture received during the winter months averaging 0.78 inch more than normal for Texas as a whole. A decided setback occurred during the spring months, which normally constitute the wettest season of the year, but in this case showed a total shortage of 2.59 inches. No material harm resulted, however, as there was not only considerable moisture in the ground from the winter rains, but also the precipitation was well distributed, because the monthly amounts increased as the weather grew warmer and more moisture was needed. The average precipitation for March was 1.69, for April 2.02, and for May 2.55 inches, and although these amounts were below the normal they were encouraging and kept the husbandman in good spirits. June added decidedly to the prospects, with a total rainfall of 3.61 inches, which exceeded the normal by 0.18 inch, and optimistic crop reports came in from all sections.

#### DURATION AND AREA OF DROUGHT.

The month of June closed with splendid showers, and showery conditions continued until July 5, which marks the inception of the drought, although the dryness was not seriously felt during the succeeding two or three weeks on account of the preceding good rains. Droughty conditions continued until September 6, when a showery area overspread the State, which continued for several days and culminated in general and heavy precipitation. It is difficult to define the exact limits of the drought-stricken area for reasons already explained in the introductory remarks. Nearly all sections of the State suf-

fered at some time between July 5 and September 6, but in the main the area of least precipitation embraced the central and southwestern portions of the State in July and the northern portions in August, although in either month there were scattered sections in other portions of the State that also received little or no moisture.

#### PRECIPITATION.

The average rainfall for July was only 1.29 inches, notwithstanding the fact that record-breaking rains occurred during the opening days of the month in northeast Texas, centering around Hunt County, with amounts ranging from 5 to over 10 inches. There were also good local showers in the lower Panhandle and portions of northwest Texas. The August rainfall was slightly less than that of July, amounting to 1.26 inches, but there were beneficial showers in many central and southern counties, the shortage for the two months being 1.62 and 1.15 inches, respectively. While there have been three years since 1888 in which July was drier than in 1913, and four years in which August was drier, yet, taking the two months together, they were drier than any other corresponding period since 1888. All in all, there were 50 localities in various parts of the State that received no moisture, or at least not more than a mere trace, during one of the two months. Of this number 24 occurred in July and 26 in August. At four of these stations, located in Burleson, Callahan, Duval, and Nueces Counties, there was no precipitation during either month. The average number of days with 0.01 inch or more of precipitation was small, being only two in July and four in August, and there was a correspondingly large number of clear days, amounting to 21 for July and 18 for August. The number of clear days in July broke all previous records.

#### TEMPERATURE.

An aggravating factor of the droughty condition was the persistently high day temperatures coupled with excessive sunshine, which caused the ground to dry rapidly after any occasional showers. From July 5 to September 6 the highest daily temperatures averaged as follows: 94° on 9 days, 96° on 26 days, 98° on 23 days, and 100° on 6 days.

Temperatures at individual stations ran much higher in the northern and northwestern portions of the State, the highest reported for July being 110° at Graham, Denton, and Jewett; and for August, 110° at Graham, and a number of stations had an average maximum temperature of 100° or slightly higher.

The mean temperatures for July and August, while 1.2 and 1.4°, respectively, above the normal, were not as high as recorded in some previous years. Since 1888 there were six years in which July was warmer and seven years in which August was warmer. The warmest July was that of 1909, with an average excess of 2.4°, and the warmest August that of 1902, with an average excess of 3.6°; but there was probably no year in which the temperature was more evenly and persistently high. The year 1909 was droughty, while 1902 was wet, although August of that year was exceedingly dry, with a total rainfall of only 0.30 inch, which is the lowest of record for that month. The month was, however, preceded by an unusually wet July and followed by an unusually wet September.

DAMAGE.

The damage from the hot and dry weather can hardly be estimated at this time. All crops suffered more or less, but of the staple crops cotton appears to have been damaged most and corn least. The latter crop had been largely harvested before the drought became serious, and some of the cotton had also been picked. The official crop report of September 1 gave the condition of cotton in Texas as 64 per cent against an average of 72 per cent for the previous 10 years, while that of corn was 78 per cent against a 10-year average of 74 per cent. The yield of hay was given as 1.16 tons per acre against a 10-year average of 1.48 tons per acre. The boll weevil added to the damage suffered by cotton, especially in southwestern and southern counties. In many sections of the State the water supply for man and beast depends upon the rainfall, and in such sections a large number of cisterns and reservoirs became exhausted, while streams were generally at low-water mark and some river beds entirely dry.

PREVIOUS DROUGHTS.

While droughty conditions occur locally in one or another section of this vast State almost annually, there are only five years since 1888 in which droughts of more or less severity occurred over considerable areas and in which the total rainfall for the crop season was at least 4 inches less than the normal. The following table shows these droughty years, together with the total precipitation for the crop-growing season and the departures from the normal. The condition of the season for 1913 has been added for purposes of comparison.

Year.	Spring.	Departure.	Summer.	Departure.	Total departure.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
1893.....	6.84	-2.01	5.93	-2.82	-4.83
1896.....	4.57	-4.28	4.95	-3.80	-8.08
1901.....	6.82	-2.03	5.28	-3.47	-5.50
1909.....	5.69	-3.16	7.94	-0.81	-3.97
1910.....	8.05	-0.80	4.52	-4.23	-5.03
1913.....	6.26	-2.59	6.16	-2.59	-5.18

From the foregoing table it will be seen that the year 1896 showed the greatest shortage of precipitation during the crop-growing season, but it had good rains during the winter and fall. In 1893 every month except November showed a shortage, and in 1901 every month except September. The drought of 1910 was probably severer than that of the current year, and the rainfall for July and August was greater by 0.07 inch than for the same period in 1913; but the preceding month of June was unusually dry in 1910, with a shortage of 1.53 inches, while in 1913 June was wetter than normal.

HOT WINDS.

Occasionally the northern and western portions of the State are visited by hot winds from the south and southwest, which usually occur during the passage of an area of low pressure and are exceedingly trying to animal and plant life on account of their withering effect, and for that reason deserve passing notice in this connection. During the last two days of June, 1907, such winds occurred over a large area of northern and western Texas with temperatures ranging from 110° to 117°, causing serious damage to vegetation. At Ballinger, where the thermometer registered 116°, the heat was sufficient to kill shrubbery and cause the leaves to fall from the trees.

NOTES.

The following notes have been extracted from reports of correspondents and cooperative observers for July and August, 1913:

*Big Spring.*—July: Crop prospects are good in most of the county. August: Hot winds ruined the cotton crop in the last three weeks, cutting it in two. Early feed is good for the most part.

*Boerne.*—July: The prospect for a full crop of cotton has been destroyed by heat and want of rain. August: There was no rain in the last 63 days to do any good. This has materially reduced cotton crop, garden truck, sweet potatoes, and tomatoes.

*Canadian.*—July: Corn was blasted by hot winds on the 14th, 15th, and 16th. August: There were 18 days with temperature 100° or higher, of which 13 occurred consecutively.

*Corsecan.*—July: Crops are better in this county than immediately west and south. August: Some cotton will make only half a bale per acre. Prospects for cotton are not now as good as was expected.

*Gorham.*—July: The weather was very hot and dry, with quite a bit of wind that was very damaging to all growing crops. Corn is all about ripe, but of poor quality. Cotton plants are small and very much in need of moisture. August: The weather was hot and dry. The last half of the month was very severe on cotton and other plant life.

*Hondo.*—July: The weather was dry and hot and the boll weevil is hurting cotton. A general rain is needed. August: The weather continued dry, good for cotton picking, but the crop has been cut short on account of the boll weevil. A good general rain is needed.

*Jewett.*—July: The weather was hot, dry, and sultry. The corn is all burnt up and nothing but young cotton will be saved by rain now. August: The weather was hot and dry. Cotton is coming in rapidly.

*Sealy.*—July: The crops are suffering badly on account of the terrible heat and drought which is cutting the cotton crop considerably below what it was last year. August: The precipitation was somewhat heavier than last month, but consisted only of local showers. There is plenty of moisture in some places, and probably not half a mile away everything is burnt up. A hard rain right now would mean much damage to cotton, as the greater part of it is still in the field.

*Cuero.*—July: The cotton is very much in need of a good rain.

*Flint.*—July: The cotton is nearly gone. All other crops have been damaged by the dry weather.

*Fowlerston.*—July: The drought did not hurt the crops, as the heavy rains of June were enough to offset the dry weather.

*Snyder.*—July: The crops in this section are very good. Cotton and feed will be plentiful.

*Spur.*—July: All crops are late, but now growing well. The early cotton that was damaged by the drought has been largely replaced by feed stuff.

*Sutherland Springs.*—July: The cotton looks bad and the crop will be short.

*Angleton.*—August: Three-fourths of the boll squares have fallen, due to the wet weather and the boll weevil. The wet weather also damaged corn standing in the field.

*Archer City.*—August: Crops have been damaged severely by the hot and dry weather. The supply of stock water has been exhausted.

*Goree.*—August: Hot winds in July and dry weather in August have ruined cotton, which is from 25 to 50 per cent behind last year's yield.

*Kaufman.*—August: The month closed with 59 dry days since the last general rain. The two showers in August were local.

*Lubbock.*—August: The drought continues and crop conditions decreased steadily during the month.

*Marathon.*—August: Fairly good rains in most sections of the county have been a great help to grass. Gardens in some places are good without irrigation; not so good in others.

*Paducah.*—August: Owing to the light rainfall in July and August, crops are almost a failure. Grass is dead and crops are badly scorched.

*Plemons.*—August: The dry weather and hot winds have destroyed crops in this community. The grass is very short and stock of all kinds is suffering.

*Tulia.*—August: Crops are in bad shape and but little grain will be raised.

*Winfield.*—All late crops have suffered for water, especially cotton and sugar cane.