Climatological Data for December, 1910.
DISTRICT No. 6, MISSOURI VALLEY.

MONTROSE W. HAYES, District Editor.

GENERAL SUMMARY.

In the lower part of the drainage area, or below Omaha, the weather was dry and cold. In the remainder of the district it was generally warmer than in the average December, and the precipitation was irregularly distributed, but was not very much above or below the normal in any areas that were of any great extent. Upon the whole the conditions were quite favorable for outdoor work. Cattle were able to graze through most of the month, effecting a saving in forage and grain. On most of the government irrigation projects work progressed to a greater extent than is usual in December.

TEMPERATURE.

There was a marked absence of well-defined warm or cold periods. Each of the subdivisions of the drainage area had moderately high temperatures, but they occurred at times that differed widely, as the warm weather areas were quite limited in extent. The highest temperature was 74° at Farnsworth, Kans., on the 9th. The lowest temperatures at the various stations were not unusual. At some point in each of the States in the drainage area the temperature fell to zero or lower, but there were no especially low readings recorded. The lowest of record was 32° below zero at Marstonmoor, N. Dak., on the 6th. In the eastern portion of Nebraska and Kansas, in western Iowa, and in Missouri the average daily deficiency ranged from 0.1° to 3.9°. In the remainder of the district there was an excess that was most marked in the foothills of the Rocky Mountains, where, in several localities, it amounted to more than 5° per day.

PRECIPITATION.

The period of most general precipitation comprised the 3d, 4th, and 5th. In Colorado and western Nebraska the 10th, 11th, and 12th were rainy or snowy, but in the other portions of the district there was comparatively little precipitation between the 6th and the 19th. After the 19th the weather was rather unsettled and light rains or snows occurred frequently. There was a general deficiency in the Dakotas, eastern Nebraska, northern Kansas, and in those portions of Iowa and Missouri drained by the Missouri River, the deficiency being most marked in the two last-named districts. In the remainder of the drainage area the precipitation was unevenly distributed, and none of the subdrainage areas had either general excesses or deficiencies. The high mountain country, however, is an exception, as there the December snowfall, and there was very little rain, was deficient.

MOUNTAIN SNOWFALL.

Montana.—The autumn conditions were favorable for the natural storage of moisture. Over most of the mountain districts the precipitation was above the normal in September and October, and nearly all that occurred was absorbed by the soil, which was exceedingly dry on account of the long continued drought. During the latter part of November heavy snows fell in the mountains and by the close of the month from 2 to 5 feet had accumulated at high elevations. The temperatures were almost continuously below freezing during December, and the snow at the close of the month was quite solid and compact. The December snowfall was deficient in most sections, but as little of the earlier fall had melted the accumulated amount at the close of the year compared favorably with the average. However, the soil was unusually dry, notwithstanding the rains referred to above, and this fact must be given due weight in estimating the water supply for the coming season.

South Dakota.—Considerably less than the usual amount of snow fell in the Black Hills during December; as very little of the November fall remained at the beginning of the month the year closed with less than the normal amount on the ground.

Wyoming.—Both in November and December there was less snow than normally falls during those months. However, the amount remaining on the ground at the end of December was quite compact.

Colorado.—The season's snowfall up to December 31 was much less than for the corresponding period last year and as a whole considerably less than the normal. In a few localities approximately the average amount occurred, but the areas so favored are too small to make up for the general and marked deficiency in the water stored for late irrigation. The snow is generally unpacked, and there has been little drifting.

RIVERS.

Low stages continued throughout the month. At Hermann, Mo., on the Missouri River, 103 miles from its mouth, the lowest was 1.7 feet; this stage prevailed from the 18th to the 23d, inclusive. On December 21 and 22, 1878, the river at Hermann fell to a reading of 0.0, the lowest of record. At St. Louis the Mississippi River fell to −1.4 on the 17th, and established a new December record for low water; previously the low water record for the last month of the year was −1.3, in 1901. The Mississippi above the mouth of the Missouri was low also. At Hannibal, 113 miles above the confluence of the Mississippi and Missouri, the lowest stage since 1864 was −1.9 on December 4, 1893; on December 14, 1910, a stage of −1.8 was reached.

ARE THE SPRINGS COLDER NOW?

A paper on "Late spring frosts in relation to the fruit crop of Missouri."

(Read by GEORGE REEDER, Section Director, Weather Bureau, before the Fifty-third Annual Meeting of the Missouri State Horticultural Society, University of Missouri, Columbia, Mo., January 10-13, 1911.)

The frequent and heavy losses suffered by Missouri fruit growers from late spring frosts during the last 10 years have created some alarm among orchardists and have caused a few to question the policy of attempting the raising of fruit in this State on an extensive commercial scale. It is asserted by many that the climate of Missouri has changed; that our winters are milder and our springs are colder than formerly.

OPINION WIDESPREAD.

The assertion that our climate has changed, and for the worse, is not confined to Missouri alone by any means. Indeed, east of the Rocky Mountains the opinion that the climate is undergoing an appreciable change is general, especially among the agriculturists. The man who is the closest to nature always has been quick to note weather changes, and while many of his sayings and signs are not worthy perhaps to be handed down from father to son, still there are a few not to be altogether despised or thrown aside.

It is of course not an easy matter to compare the losses in fruit culture of 20 or 30 years ago with those occurring to the industry as carried on to-day. During the first decade of the 30 years ending with the spring of 1910, there were few, if any, so-called commercial orchards in Missouri. While every farmer possessed an orchard for home use, they were as a rule composed of many varieties of trees that blossomed at different times. It was no doubt a rare occurrence indeed,

owing largely to this difference in the blossoming time, when there was not sufficient fruit from some variety for home consumption. On the other hand, in the present day of the large commercial orchards, the varieties maintained in any one orchard may be counted on the fingers of one hand, and consequently the almost total destruction of fruit from late spring frosts has become more frequent.

THE SPRINGS APPEAR TO BE COLDER NOW.

Notwithstanding the supposition that orchards may be more liable to injury from late spring frost at the present time because in many cases almost the entire orchard blossoms at the same time, or to the improved strain of fruit now grown (the latter statement is much in doubt, many authorities claiming that improved fruit is not more sensitive to cold than the varieties grown 30 years ago), the fact remains that the springs of the last 10 years, and particularly the last 5 years averaged colder than those of the preceding 10 or 15 years, and this statement is well supported by climatological data, presented here, possibly for the first time, in apparent substantiation of the popular idea that "our climate has changed." I would, however, earnestly caution the reader not to be too hasty in the conclusion from data here presented that the climate of Missouri is undergoing a permanent change. Meteorologists of the world generally agree, and the world's climatological records show, that climate is practically unchangeable; that is to say, permanent climatic changes are noticeable, probably, only in geological units of time. On the other hand, the records also indicate that while weather may change from day to day or from hour to hour, there are certain changes that move in cycles or oscillations, having uncertain units of time. The cause of these cycles or oscillations is not definitely known, but it has been pointed out by one or two authorities that the wet and cool periods and the dry and warm periods on the earth appear to correspond somewhat with the periods of maximum and minimum sun spots, which in turn are thought to be due to changes in the sun's photosphere. A few students of the subject claim that these weather changes go in cycles of 3 years, then a longer one of about 9 or 11 years, and still a greater cycle of 30 to 35 years, the last being more clearly pronounced; but no general agreement has yet been reached regarding them.

DAILY MINIMUM TEMPERATURE IMPORTANT FACTOR.

Studies of the mean daily, mean monthly, and mean annual temperatures, while important in themselves, give us a nearly unchangeable factor, and one not particularly interesting or striking in its features. For instance, the variations in the mean annual temperature of Missouri, covering a period of 25 years or more, rarely exceed 3° and are often less than 1°. It matters not what the extremes may have been during the 4 seasons, or 12 months, at the close of each 365 days the final value is practically the same year after year. Another example in which the mean temperature gives but little satisfaction as to the variations in the weather that have taken place during a certain period is that for April, 1910, which, for the State of Missouri, differed from its 20-year normal by only 0.3°. Yet the frosts of that month were the most destructive from the viewpoint of the agriculturist and horticulturist, and the weather generally was the most disagreeable from the physiological side that has occurred during, possibly, the past 30 years.

The factor that is the most important, in my opinion, is the daily minimum temperature, which is as a rule nothing more than the lowest night temperature. The night temperatures explain the interesting cause why the crops do not grow and why the season is delayed. The days may be warm and bright, but vegetation as a rule will not flourish as long as the nights continue abnormally cold.

The present paper presents graphically in figure 1 the average daily minimum temperature, by decades, recorded during April and May, at Columbia, Boone County, Mo., during the 20 years 1891 to 1910, and in figure 2 the last date on which a temperature of 32° F. occurred during the 30 years 1881 to 1910, at Mexico, Audrain County, and the 20 years 1891 to 1910, at Columbia. Tables numbered I and II are also presented, showing daily minimum temperatures of Columbia for the two mentioned spring months, and also Tables III and IV, which give the dates of the last killing frost (32° F.) at both places for the entire period under discussion.

The data for Columbia have been used for the reason that at this station self-recording instruments have been in use continuously during the entire 20 years, covering a longer continuous period with self-recording thermometers than any other station in the State outside of the larger cities. Its situation is at a moderate elevation (738 feet above mean sea level) and near the center of the State. It is remarkably free from local temperature control, and the climatic values also closely agree with the average values for the entire State. While the length of time covered by the tables is not sufficient to justify exact conclusions in regard to temperature oscillations, it is sufficient for a comparison of two 10-year periods. The data for the first 11 years at Mexico Mo., in figure 2, were taken from the dry-bulb thermometer readings at or near 7 a. m., supported by annotations on killing frosts, ice, etc., made at the time by the observer; they are, therefore, perhaps not strictly comparable with the last 19 years which were obtained from self-recording instruments.

It requires but a casual inspection of figure 1 to note that the mean minimum temperature at Columbia, Mo., during the last 10 years, indicated by the broken line marked "B," is lower than the preceding 10 years as shown by the solid line marked "A." Particularly is the difference noticeable from April 12 to May 10—the period when fruit is in its most critical stage. Now, if we refer to Table I, we shall find that for April the 10-year averages are as follows:

	°
1891–1900	45.0
1901–1910	42.0

which shows second decade to be 3° colder than the first. In Table II for May the averages are:

	°
1891–1900	53.0
1901–1910	53.0

showing no difference for the whole month; but if we take the first 15 days of May of the first 10 years and compare them with the first 15 days of the last 10 years, we find that the latter period was 2.6° colder than the first, as shown in the following table:

	°
First 15 days of May, 1891–1900	51.9
First 15 days of May, 1901–1910	49.3

For further comparison other near-by stations having records from self-registering instruments for nearly the entire periods under discussion are entered here, the mean monthly minimum temperature being given:

	April.	May.
	°	°
Mexico:		
1891–1900	43.9	53.6
1901–1910	40.2	51.7
Fayette:		
1891–1900	45.6	54.3
1901–1910 (May, 1907, out)	41.5	52.4
Harrisonville (in western part of State):		
1891–1900	43.6	53.5
1901–1910	40.6	52.4

This comparison shows that the month of April during the last 10 years averaged 3.6° colder than the preceding 10 years, and that May was 1.7° colder during the last decade.

A closer inspection of Table II will show the interesting fact that during the first 10 years the temperatures during the first 15 days of May registered in the thirties 10 times, reaching 32° once, and during the last 15 days they were in the thirties 9 times. During the first 15 days of the last 10 years the number had increased to 18, reaching 32° or lower 5 times; during the last 15 days of the last 10 years, however, the temperatures were in the thirties but once.

We shall find that there is a close agreement between the tables and curves. For instance, an examination of figure 1 will disclose the fact that during the period from 1891 to 1900 danger from frost was practically over by the 15th of April, but during the last decade the probability of damaging frosts had been extended into May.

Now, along with figure 1 let us inspect figure 2. From this chart we find that during the period represented by the years 1881–1890 at Mexico there was but one killing frost after the 20th of April; during the following 10 years there were three, one occurring in May; and during the last 10 years, bringing us down to the spring of 1910, there were 9, 5 of which occurred in May. We may disregard the record of the period from 1881 to 1890 as the data are based upon eye observations and dry thermometer records, but the data for the 20 years beginning with 1891 at Mexico agree with similar data recorded at Columbia during the same period. Beginning with 1896 the record shows a peculiar oscillation of the frost isochronals; the advances and retreats are interesting from the view that each advance was greater than the retreat until the line of April 30 was crossed; the two following years the forces were very nearly equal, but in 1906 King Frost was again successful, crossing into May, where he maintained his forces, though apparently strictly on the defensive, for 4 successive years, a phenomenon unparalleled by previous records in this State covering 3 decades. It will be noticed that after 1906 the retreats are greater than the advances, the last retreat, as shown in the spring of 1910, it is to be hoped—especially from the horticulturist's point of view—may turn into a complete rout.

CHANGES IN THE EARTH'S CLIMATE.

While there is abundant evidence in the records of geology to prove that great changes took place in the earth's climate during prehistoric ages, the world's leading meteorological authorities generally concur in the opinion that there have been no appreciable climatic changes during the period covered by authentic history. The popular idea that the climate is changing is evidently an old one, and is caused by the temperature and precipitation conditions remaining for comparatively short periods below or above the normal conditions; such changes should be referred to as oscillations in the weather rather than as changes in the climate.

CONCLUSION.

It appears from climatological data of the Columbia station and a few others given here that the springs of the past 10 years experienced quite marked temperature departures from the normal. The most interesting as well as the most important question to be answered is how long will the cold period last? Unfortunately our climatological data do not cover a sufficient length of time to enable us to work out the number of years to each cycle. While the records show periods of both mild and cold springs for the 30 years, the change during the last 20 years from mild springs to unusually cold springs is not only of marked interest to the climatologist, but bears rather more serious import to the orchardists, whose earnings have been affected, and who are of course interested in the question of whether mild springs will ever come again.

As we are unable to answer this question positively, and as it is rather more pleasant to be optimistic than pessimistic, we will look to the future springs from the brighter side. It is quite evident that freezing temperatures in May are abnormal for Missouri, especially most of that part south of latitude 39° 40′ N. The frost isochronals of the last 4 years, while unusually late, rather indicate a return to more normal conditions. While it is possible of course the next 10 years may furnish several Mays in which freezing temperatures will occur, the probabilities are that the tendency will be more and more toward the conditions that prevailed from 1894 to 1902, inclusive, which from the record appear to have been highly favorable to the fruit man. Possibly by the close of the decade ending with 1930 the average date of the last killing frost in spring will have receded to where it was, as claimed by the "old timers," in the eighties—along about April 12.

Doubtless at that period the youth of to-day, then a man of middle age, will be declaiming to all who will listen that "our climate has changed; the springs were colder when I was a boy." "Why," he will continue, "the springs were so cold we had to use mechanical heaters in the orchards during those days to get any fruit at all." And to prove what he says he will point to the old heaters rusting away in the barn.

And thus the pendulum may swing the other way, and again later on swing back to where we are to-day, continuing to swing back and forth for stated periods for centuries to come. Such are the so-called cycles or oscillations of the weather.

While the hoped-for period of mild springs may return during the next 10 years, nevertheless we should be prepared to combat, whenever necessary, the late spring frost with scientific methods. Every fruit grower on a large scale should equip himself with the necessary heaters and a few good thermometers. It has been demonstrated in Colorado and Kansas that 70 to 80 heating pots to the acre (and I would not recommend less) are sufficient to save a fruit crop when the temperature outside the protected area falls to 25° and even as low as 22°. Perhaps some of you have followed such methods in Missouri.

The pots should hold about 3 quarts of fuel oil, and, in the majority of cases, it will not be necessary to light them until about 2 a. m. or later. The oil is not costly, and it seems to me that the little extra cost and labor are small items when compared with the damage one frosty night will do to an orchard when no effort is made to save it, and what the loss or saving of that crop means to the owner.

Where there are telegraph facilities, and if the funds on hand permit, timely warnings will be sent by the Weather Bureau. There are many places that can not be reached by telegraph, but nearly all towns and in fact many homes have the telephone installed. The Bell, Kinloch, and the Missouri and Kansas telephone systems cooperate with the Weather Bureau in the dissemination of the weather forecasts and warnings, and in many cases the fruit grower can obtain the information free of cost by simply calling up the nearest exchange.

Personally I should be glad to render any assistance needed in the way of advising how to place and read the thermometers and when to start the heaters. Those having orchards in the valleys or so-called pockets should be particularly watchful, especially if the night is clear with little or no wind, as, owing to air drainage, the valleys become colder than the hillsides when there are no clouds; on the other hand, when the sky is heavily overcast or when there is moisture in the form of either rain or snow, there is little difference between the temperature of the valleys and the hills, or if there is any difference, the valleys are warmer. There appears to be less damage to fruit by frost on or along the southern Ozark border, which has an elevation between 500 and 1,000 feet, than in either the valleys or on top of the highest hills; this is probably due to the fact that the air of comparatively

still, cold nights, when usually the greatest damage is done, is kept moving and probably mixing at the elevations lying between the two extremes, by reason of drainage currents.

Daily minimum temperature, Columbia, Mo., 1891-1910 (April).

FIRST DECADE.

April.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1891	31	32	28	27	22	30	30	40	51	43	35	47	56	52	48	48
1892	56	43	54	56	39	33	42	35	28	33	39	34	42	33	26	45
1893	43	38	55	51	53	56	70	52	39	42	48	53	44	30	28	43
1894	34	36	54	40	32	33	50	40	42	34	30	33	41	48	48	53
1895	38	33	32	39	56	46	42	42	40	44	52	56	41	40	53	46
1896	30	29	21	32	42	46	43	43	44	53	62	58	54	50	63	68
1897	43	45	50	43	43	36	35	40	35	41	31	46	44	38	39	37
1898	40	32	43	36	26	21	25	42	39	42	35	47	39	38	35	44
1899	21	24	26	18	28	27	34	33	28	41	59	45	60	48	40	29
1900	34	33	44	30	33	37	42	51	42	33	28	31	35	41	51	54
Average	37.0	34.5	40.7	37.2	37.4	36.5	41.3	41.8	38.8	40.6	41.9	45.0	45.6	41.8	43.1	46.7

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	10-year mean.
1891	55	50	60	62	59	57	48	49	48	49	52	46	49	59	.....
1892	54	46	41	43	43	41	33	47	47	54	63	50	35	49	.....
1893	41	51	51	34	33	33	26	43	42	49	38	48	45	45	.....
1894	62	57	49	39	38	33	35	45	47	54	56	60	65	62	.....
1895	39	37	38	48	50	41	49	50	57	57	53	55	60	60	.....
1896	67	58	51	65	53	52	59	60	60	60	57	71	60	52	.....
1897	29	45	35	36	50	66	56	62	59	51	52	56	48	44	.....
1898	58	54	41	40	47	54	50	44	40	41	42	50	43	55	.....
1899	46	46	43	49	44	49	47	47	46	59	68	58	64	65	.....
1900	50	47	42	51	51	44	57	58	54	54	57	56	51	50	.....
Average	50.1	49.1	45.1	46.7	46.8	47.0	46.0	50.5	50.0	52.8	53.8	55.0	52.0	54.1	45.0

SECOND DECADE.

April.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1901	30	33	30	40	37	38	38	38	38	48	46	47	47	45	40	44
1902	30	28	38	34	36	44	32	26	37	35	39	35	37	42	38	32
1903	54	45	32	29	45	49	40	38	46	58	56	53	41	39	39	42
1904	44	37	29	31	40	36	43	31	35	31	44	36	33	32	35	29
1905	54	48	54	39	33	31	31	42	49	45	43	34	35	36	32	29
1906	31	37	50	50	45	36	49	50	45	39	48	57	45	39	34	34
1907	32	38	48	50	37	35	42	36	32	29	36	32	27	27	42	32
1908	32	26	24	41	45	42	56	42	38	51	40	37	47	57	46	37
1909	30	27	38	45	59	43	36	31	27	27	47	36	30	41	39	54
1910	41	47	56	56	33	43	37	54	46	52	57	47	45	55	47	33
Average	37.8	36.6	39.9	41.5	41.0	39.7	40.4	38.8	39.3	41.5	45.6	41.4	38.7	41.3	39.2	36.6

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	10-year mean.
1901	34	31	34	35	33	38	45	41	53	58	60	59	55	53	.....
1902	40	49	45	50	70	47	39	43	49	45	41	54	53	53	.....
1903	35	49	50	51	42	37	33	48	40	30	44	57	53	34	.....
1904	27	40	35	32	32	46	57	56	41	40	37	39	40	47	.....
1905	26	30	38	57	42	36	43	50	55	53	48	55	46	43	.....
1906	44	48	48	55	49	48	45	50	58	50	61	55	51	54	.....
1907	28	38	37	33	29	40	41	50	39	35	41	52	39	35	.....
1908	46	52	48	55	59	59	62	57	54	41	36	35	37	28	.....
1909	53	46	42	40	45	40	35	40	50	44	44	43	51	36	.....
1910	30	33	33	29	48	40	28	27	32	37	46	57	64	56	.....
Average	36.3	41.6	41.0	43.7	44.9	43.1	42.8	46.2	47.1	43.3	45.8	50.6	48.9	43.9	42.0

Daily minimum temperature, Columbia, Mo., 1891-1910 (May).

FIRST DECADE.

May.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1891	43	49	49	46	44	32	36	45	54	46	43	39	51	45	49	50
1892	63	65	58	50	54	50	47	44	54	45	47	35	51	59	55	49
1893	44	34	41	48	58	45	43	50	51	56	64	52	48	58	53	45
1894	58	46	60	53	57	62	52	50	60	53	42	50	58	63	65	68
1895	64	60	66	64	60	61	58	58	63	62	43	38	48	33	45	44
1896	58	49	49	56	58	62	60	61	65	64	65	66	60	56	49	58
1897	40	38	48	40	45	52	55	59	60	46	59	46	48	40	42	47
1898	59	53	51	46	42	39	40	40	50	55	51	49	50	54	59	56
1899	59	61	55	41	44	56	61	55	54	58	45	62	50	56	64	69
1900	45	52	40	48	48	59	63	59	45	37	55	57	63	65	59	60
Average	53.3	50.7	51.7	49.2	51.0	51.8	51.5	52.1	55.6	52.2	51.4	49.4	52.7	52.9	54.0	54.6

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	10-year mean.
1891	44	49	55	62	54	58	52	50	56	47	40	39	45	50	61	.....
1892	60	52	50	42	37	35	38	47	58	55	44	56	54	63	61	.....
1893	43	42	60	55	61	65	45	46	55	57	51	50	50	58	58	.....
1894	67	47	37	36	47	46	45	49	53	51	57	43	51	53	38	.....
1895	35	39	43	45	42	43	44	50	59	49	50	65	66	68	67	.....
1896	55	65	63	59	67	63	63	67	74	64	63	52	48	63	57	.....
1897	52	55	55	60	57	59	56	46	40	54	59	61	47	51	39	.....
1898	57	60	63	60	59	56	56	58	62	57	64	60	63	58	57	.....
1899	52	43	52	49	53	56	50	46	55	65	68	62	63	61	59	.....
1900	60	48	48	43	44	55	59	55	56	59	62	65	64	64	64	.....
Average	52.5	50.0	52.6	51.1	52.1	53.6	50.8	51.4	56.8	55.8	55.8	55.3	55.1	58.9	56.1	53.0

SECOND DECADE.

May.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1901	54	58	63	62	59	52	50	50	53	46	46	45	34	41	57	60
1902	60	65	68	61	60	57	47	48	55	55	48	57	63	60	52	57
1903	30	41	37	40	49	49	53	57	58	55	61	60	59	59	57	55
1904	52	50	51	55	58	58	60	52	45	45	54	53	46	45	43	50
1905	53	59	66	59	50	54	44	52	52	71	54	44	58	53	49	48
1906	58	56	48	54	49	36	33	40	31	44	58	59	62	60	61	64
1907	32	38	35	28	41	41	50	53	46	54	38	54	64	44	36	40
1908	39	33	42	49	49	44	46	43	42	50	60	57	62	60	56	60
1909	31	36	41	47	60	48	41	53	42	37	42	49	59	64	53	47
1910	53	43	42	42	43	46	45	44	46	54	52	44	37	39	50	51
Average	46.2	47.9	49.3	49.7	51.8	48.5	46.9	49.2	47.0	51.1	51.3	52.2	54.4	52.5	51.4	53.2

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	10-year mean.
1901	61	59	59	50	48	47	64	50	47	38	42	49	48	50	46	.....
1902	67	72	65	70	67	62	63	62	59	52	48	46	51	57	61	.....
1903	63	64	59	59	61	70	62	66	62	68	60	55	61	52	50	.....
1904	48	44	48	48	51	62	64	59	63	54	48	54	61	59	55	.....
1905	49	46	49	54	55	59	52	49	53	44	57	60	66	58	56	.....
1906	65	65	55	49	51	58	63	66	64	65	47	45	46	66	65	.....
1907	55	66	54	47	46	59	63	64	65	46	40	41	50	56	53	.....
1908	65	60	56	63	62	52	63	71	66	69	60	60	60	56	53	.....
1909	53	55	59	52	50	55	51	54	55	53	52	54	62	57	54	.....
1910	51	44	54	60	65	59	55	49	46	54	53	56	62	52	47	.....
Average	57.7	57.5	55.8	55.2	55.6	58.3	60.0	59.0	58.0	54.3	50.7	52.0	56.7	56.3	54.0	53.0

Date of the last killing frost, or a temperature of 32° F. or lower, in spring, at Mexico, Mo., 1881–1910.

FIRST DECADE.

Year.	Month and date.	Day of year.	Year.	Month and date.	Day of year.
1881	Apr. 14	104	1887	Apr. 5	95
1882	Apr. 12	102	1888	Apr. 20	111
1883	Apr. 1	91	1889	Apr. 6	96
1884	Apr. 22	113	1890	Apr. 1	91
1885	Apr. 13	103			
1886	Apr. 6	96	Average	Apr. 10	100.2

SECOND DECADE.

1891	May 6	126	1897	Apr. 11	101
1892	Apr. 15	106	1898	Apr. 7	97
1893	Apr. 23	113	1899	Apr. 16	106
1894	do	113	1900	Apr. 12	102
1895	Apr. 19	109			
1896	Apr. 4	95	Average	Apr. 16–17	106.8

THIRD DECADE.

1901	Apr. 22	112	1907	May 5	125
1902	Apr. 16	106	1908	May 2	123
1903	May 1	121	1909	do	122
1904	Apr. 21	112	1910	Apr. 25	115
1905	Apr. 22	112			
1906	May 7	127	Average	Apr. 27–28	117.5

Average date of the last 10 years, 11 days later than preceding 10 years.

Date of the last killing frost, or a temperature of 32° F. or lower, in spring, at Columbia, Mo., 1891–1910.

FIRST DECADE.

Year.	Month and date.	Day of year.	Year.	Month and date.	Day of year.
1891	May 6	126	1897	Apr. 17	107
1892	Apr. 15	106	1898	Apr. 7	97
1893	Apr. 23	113	1899	Apr. 16	106
1894	Apr. 12	102	1900	Apr. 12	102
1895	Apr. 3	93			
1896	Apr. 4	94	Average	Apr. 15–16	106.8

SECOND DECADE.

1901	Apr. 19	109	1907	May 4	124
1902	Apr. 17	107	1908	Apr. 30	120
1903	May 1	121	1909	May 2	122
1904	Apr. 21	112	1910	Apr. 25	115
1905	Apr. 18	108			
1906	May 9	129	Average	Apr. 26–27	117.5

Average date of the last 10 years, 11 days later than preceding 10 years.