
WEATHER AND CROP YIELD.*

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I am convinced that the yield of most of our staple crops is affected greatly by favorable or unfavorable weather conditions during a comparatively short period of their growth.

Also that the yield can be very closely approximated at the close of this critical period by an exhaustive study of the weather conditions and crop yields of previous years.

The United States Weather Bureau is accumulating a vast amount of weather data that are being splendidly tabulated for use in studies of this character and considerable attention is being given to the subject.

In 1902 Professor W. D. Gibbs and myself charted some very interesting curves showing the relation between the yield of corn in the eight great corn producing states in this country, and the rainfall during June, July and August.

The period covered was from 1888 to 1902, and the states considered were Ohio, Indiana, Illinois, Iowa, Nebraska, Kansas, Missouri, and Kentucky.

The result showed that the yield was very little affected by the rainfall in August and not greatly affected by the rainfall during June. The curves, showed, however, that the rainfall in July controls the corn yield to a marked extent.

* Read at the meeting of the Ohio State Academy of Science.

The normal corn yield for these states is 28 bushels per acre, and the normal rainfall for July is 4 inches. Whenever the rainfall has approximated 5 inches, the corn yield has been over 32 bushels per acre. On the other hand whenever the rainfall has been less than 3 inches the yield has been less than 23 bushels per acre.

By taking the June and July rainfall together the rainfall curve and the yield curves agree even more closely than the July rainfall and yield curve.

The normal rainfall for June and July is 8 inches, while as stated above, the normal corn yield is 28 bushels per acre. Whenever the rainfall for these two months has averaged over 9 inches the corn yield has been 32 bushels or more, and when the rainfall has been less than 7 inches the yield has been below 25 bushels.

The best yield was 34 bushels an acre in 1902, when the June and July rainfall was over 11 inches. In 1896 the yeild was 33 bushels and the rainfall was almost 11 inches.

The lowest yield was less than 18 bushels per acre in 1901. The rainfall in June and July of that year was less than 6 inches and for July alone it was about 2 inches.

Other charts prepared for individual states show that by not including western Nebraska and Kansas, and eastern Ohio and Kentucky, and by considering carefully the rate of rainfall, and the length of periods with little or no rainfall, one can give a very close estimate of the yield of corn per acre in the United States, by the latter part of July; long before the crop is ready for harvesting.

We believe that a closer analysis of the daily data will show that the period during which a good corn yield is assured by good rains or seriously lessened by the lack of rain, is less than one month.

In 1904 the writer made a very exhaustive study of the weather and the yield of various corps in Fulton County, Ohio, from 1874 to 1903 inclusive.

The data showing the yield of corps were obtained from the records of the Secretary of State, but the weather records, as well as many valuable records of farm operations, the advance of vegetation, the flight of birds, the blossoming, leafing, etc., of trees, shrubs and plants, were obtained of Hon. Thomas Mikesell of Wauseon. This gentleman has a most remarkable record of phenological observations since 1869—I know of no more complete and exact record in this country than these.

Charts were made showing the departure of the average temperature and total rainfall from the normals, by months from January 1876 to 1904, and the departure of the different crop yields from the normal for the same period.

By a comparison of these curves it is comparatively easy to see the relation between the weather and crop yield, insofar as the average temperature and total rainfall of *whole* months affect the yield. It is apparent, however, that for some of the crops the period of usually favorable or unfavorable weather are less than one month in length and are not shown in the monthly data.

It is probable that wheat, for example, is affected by alternate freezing and thawing, short periods of severe cold, snow covering, etc., more than by monthly temperature of precipitation conditions. The February preceding the lowest wheat yield of the period gave the coldest week ever experienced in many sections of the State. The low yield of 1875 was preceded by the coldest winter on record, that of 1896 was preceded by a very cold January and that of 1900 by a cold February and March. The good yields of 1891, 1894 and 1898 were preceded by mild winters.

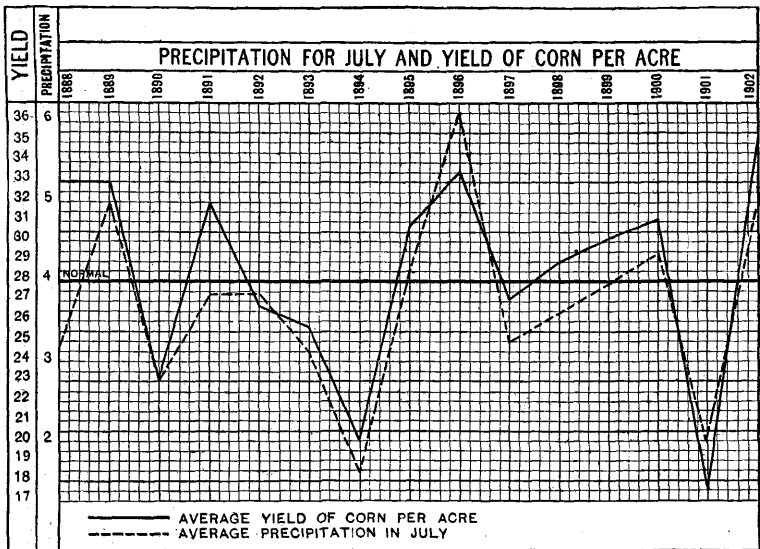


FIG. 1. Precipitation for July and yield of corn per acre.

The relation between the yield of corn and the rainfall in July is not so well marked in a small district as in a large one, yet nearly every year with a large corn yield in this county had a July rainfall above the normal, and nearly every year with a small yield of corn had a small July rainfall. One exception, however, was the year 1883 which had a July rainfall above the

normal yet gave the lowest corn yield on record. This is accounted for by the fact that the whole summer was cold and wet; the number of days between the spring and fall frosts was the least on record.

It is very apparent from the charts that to produce the best yield of oats June and July or both must be moderately cool and dry.

Barley is not so important in this county but from the records given the summer should be warm and dry.

The best potato years have been those with a cool summer, with a fair amount of rain in June and July and with a dry September.

Rye and clover are affected by winter conditions much as wheat is affected. The best yields of hay other than clover are with an abundant rainfall in April, May and June.

The dates of blossoming of fruits depends to a marked degree upon the temperature of March and April. In general poor fruit yields have been preceded by cold winters and good yields by comparatively mild winters.
