

## CLIMATE AND CORN YIELD IN INDIANA, 1887-1930

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The concept of climatic limits and optima is not new. As regards corn or maize, such determinations have, however, been made only within rather wide limits. Cold and dry limits have received most attention with little mention of optima. Finch and Baker say: "Practically no corn is grown where the mean summer temperature is less than 66° F. or where the average night temperature during the summer months falls below 58° F. The climatic boundaries of the region of greatest production in the U. S. are a mean summer temperature of 70° to 80°, a mean night temperature exceeding 58°, frostless season of over 140 days and an annual precipitation of 25 to 50 inches of which 7 inches occur during July and August."<sup>1</sup> The present investigation is an attempt to gain more definite information as to the effect of several climatic factors on the yield of corn in Indiana.

The method herein employed is not new to climatology. Dr. Griffith Taylor of the Department of Geography, University of Chicago and Dr. Ellsworth Huntington of Yale University have employed variations of it. The method consists of plotting one factor, July rainfall for example, on the abscissas and the other factor on the ordinates. At the meeting point of the two factors for that year is located the yield for that year. The yield for each year covered by the problem is thus located. Only by a double smoothing can order be brought out of the chaos of the first figure. The smoothed yields are then placed on the diagram and shaded progressively lighter to represent progressively lower yields. State averages were used if available, otherwise data from the Indianapolis station sufficed.

This method, applicable to many other investigations, would seem to have some advantages over correlation coefficients in that the resulting information is visual and more easily and rapidly interpreted by most people. The disadvantage of this method is that only two climatic factors can be considered on one diagram.

<sup>1</sup> Finch and Baker. "Geography of the World's Agriculture." p. 29.

"Proc. Ind. Acad. Sci., vol. 41, 1931 (1932)."

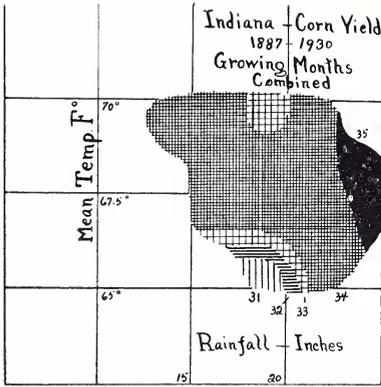


Fig. 1. Evidence is given that our material must be broken up in smaller parts for analysis.

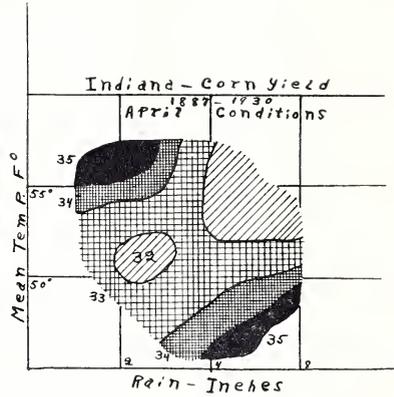


Fig. 2. April, it seems, should be either cool and moist or warm and dry for best yields. If rainfall for April is less than three inches temperatures above 55° give best results. For greater rainfall, a temperature below 50° gives highest yields.

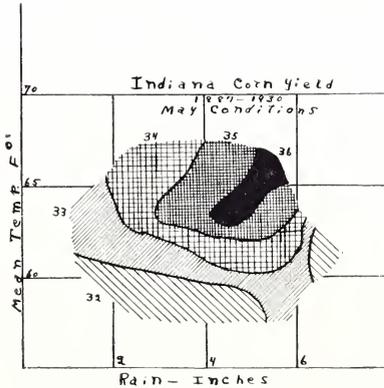


Fig. 3. A warm moist May is best. Temperatures above 63° and over four inches of rain give best yields. Rain and temperature seem to have about equal effect on the higher yields.

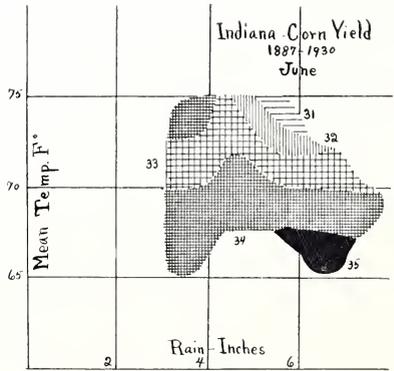


Fig. 4. A cool moist June gives highest yields. The temperature should be below 70° and the rain at least three inches. Even better yields result if the temperature is below 68° and accompanied by a rainfall of more than five inches.

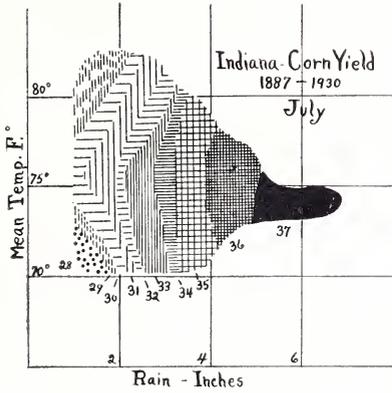


Fig. 5. If July has more than 3.38 inches average rainfall for the state, rain is the controlling factor, over five inches giving the best results. If rainfall is less than average, temperature plays an equal part; temperatures either higher or lower than 75° to 76° give lower yields.

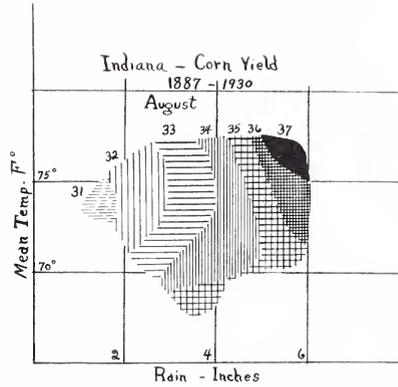


Fig. 6. A warm moist August gives highest yields. Rainfall should be at least five inches and mean temperature at least 72°; yields are even better if the mean temperature is 75° to 76°. Rainfall is, however, of more importance than temperature.

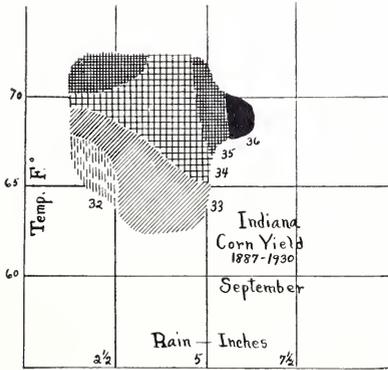


Fig. 7. The yield is highest if September has a temperature of at least 67° with over five inches of rain. If above 70° in mean temperature, a dry September is also highly productive.

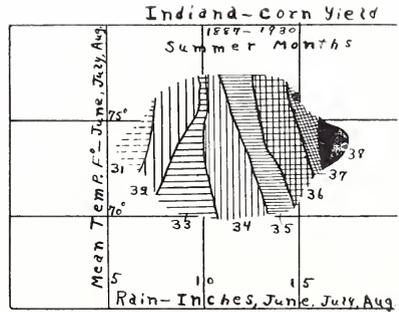


Fig. 8. A mean temperature for the three summer months of 73° to 75° and at least 15 inches of rainfall for these months give the greatest yields.

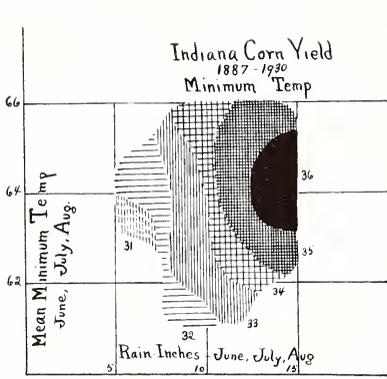


Fig. 9. Mean minimum temperatures of summer have often been given as important to yield. This figure shows that the best yields are accompanied by mean minimum temperatures of 63° to 65° though another degree either higher or lower makes little difference.

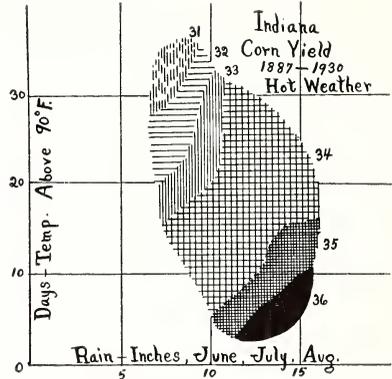


Fig. 10. Extremely warm weather is injurious to corn yield. Such hot days have as great an influence as does rainfall. An increase in the number of such days from 10 to 20 even with the same amount of rainfall may decrease the yield notably.

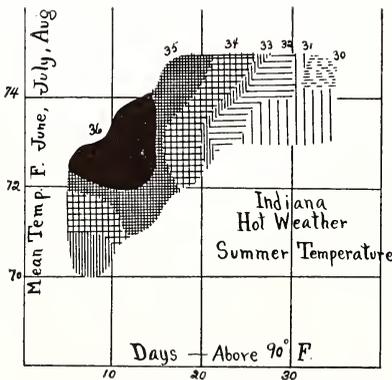


Fig. 11. Hot weather compared with mean summer temperatures shows that a mean summer temperature of 72° to 74° with not more than 15 days with temperatures above 90° gives best results. Lower mean temperatures decrease yields as does an increase in the amount of hot weather.

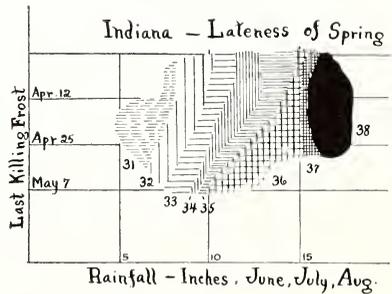


Fig. 12. Contrary to usual opinion, conditions accompanying late spring frost favor a high yield of corn, especially if the summer has only the normal summer precipitation of about 10 inches for June, July and August.

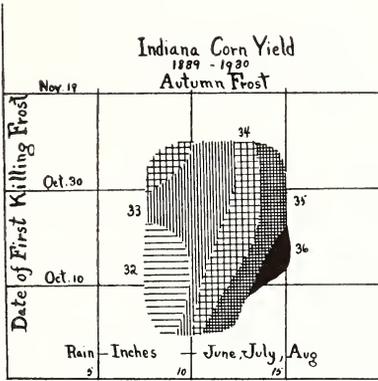


Fig. 13. An early frost in the fall is favorable if the season has been normal or above as regards rainfall.

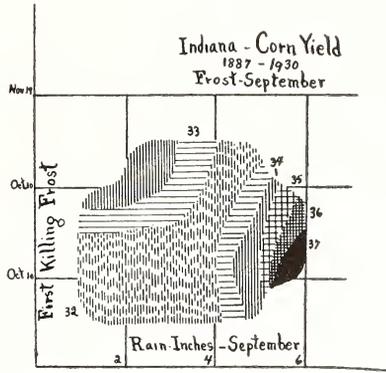


Fig. 14. A frost not later than the average frost date of October 20 is beneficial, especially if September has been abnormally wet.

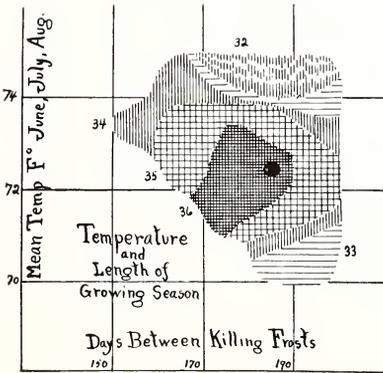


Fig. 15. A mean summer temperature of 71° to 73° and a growing season of 170 to 190 days is here shown as giving the highest yields.

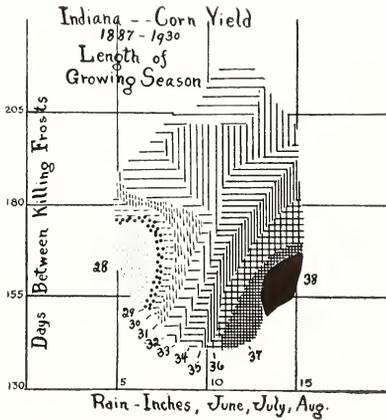


Fig. 16. Low yields result from short dry seasons, medium yields from long seasons having either much or little rain and high yields result from short moist seasons.

