GROWTH AND YIELD IN WHEAT, OATS, FLAX, AND CORN AS RELATED TO ENVIRONMENT

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THE complex of factors included in environment importantly affects the growth and yield of plants. As Klages (4) has suggested, the plotting of growth curves should add a datum to those observations commonly recorded by agronomists that would aid in the interpretation of varietal yields. There may be further uses for growth curves in determining the relative importance of certain environmental factors in one region as compared to another and even in estimating crop yields in an area of similar climatic conditions. The consensus of those who have attempted correlation of weather with yield and forecasts of crop production on the basis of meteorological data is that more refined studies are necessary in order to determine the possibility of forecasting yields in any given region.

The studies reported in this paper, made during 1934 to 1937, inclusive, include height measurements and phenological data for wheat, oats, flax, and corn in relation to temperature, precipitation, and moisture content of the soil under the growing crop.

REVIEW OF LITERATURE

The literature on the correlation of weather and crop yields with the view of forecasting such yields is much too voluminous to review in detail. Summary of this literature until 1929 has been published by the Food Research Institute, Stanford University (5), and an unpublished abstract of foreign investigations has been made available to the writer by the Bureau of Agricultural Economics, U. S. Dept. of Agriculture. A list of selected references on weather-crops compiled in the Department of Agronomy and Economics and Sociology, Kansas State College, Manhattan, Kansas, has been distributed in mimeograph form. Investigators are generally agreed that most data now available are inadequate for deductions concerning the influence of factors of environment on crop growth and yield. Although some forms of meteorological data are quite complete, phenological data are not. Furthermore, phenological observations at closer intervals than are commonly made appear desirable and perhaps essential. There is a need for basic knowledge concerning the influence of weather factors on plant growth.

Chilcott (3), in a summary of investigations covering 218 crop years at 16 stations on the northern Great Plains, found that, "Notwithstanding the fact that annual precipitation is a vital factor in determining crop yield, it is seldom if ever the dominant factor; but the limitation of crop yield is most frequently due to the operation of one or of several inhibiting factors other than shortage of rainfall."

Oldsberg and Griffing (5) call attention to two critical periods in the life of the

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1 Contribution from the Northwest Experiment Station, Crookston, Minn. Paper No. 1621 of the Journal Series, Minnesota Agricultural Experiment Station. Received for publication June 9, 1938.
2 Agronomist and Assistant Professor. Critical reading of this paper by Dr. F. J. Alway, Chief of the Division of Soils, and Dr. H. K. Hayes, Chief of the Division of Agronomy and Plant Genetics, Minnesota Agricultural Experiment Station, is gratefully acknowledged.
3 Figures in parenthesis refer to "Literature Cited", p. 908.