Interpretation of Yield Data from a Long-time Soil Fertility Experiment

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Very little work has been published on the statistical interpretation of long-time soil fertility experiments in the United States. Most of the publications dealing with such experiments are compilations of yield data, together with a discussion of the data, or with occasional graphic presentation of yield trends. Much more work of this type has been done by English workers, especially on data from the long-continued experiments at Rothamsted and Woburn.

There are certain possible explanations for the lack of work in the United States along this line. One is that there are relatively few experiments in this country which have been continued with similar treatment for a sufficiently long period for distinct fertility trends to become apparent. Another reason may be the considerable time and labor required to reduce a mass of data to statistical values. A third reason may be that practically no experiment which has been in progress for more than 10 to 15 years was planned so that modern statistical procedures may be applied with strict validity. For example, as recently stressed by Brandt (1), the important features of experiments to lend validity to statistical interpretation and simplify the calculation of various statistics are (a) provide for all crops and treatments each year, (b) replicate, and (c) randomize. Many of the older experiments consider none of these fundamentals. Others consider one or more. The experiment discussed in this paper considers only the first, that of having all crops and treatments each year. The treatments, however, were not replicated and were located in a systematic order across the field rather than a random one.

Despite the objection to the older experiments as to their experimental design, it is the belief of the writers and of others who have made statistical studies of long-time experiments, that such studies produce information of definite value. Certain trends and relationships may be made apparent, which without statistical reduction, might be obscured or be apparent only after laborious study of the mass of data at hand. Lack of replication for any one year in the experiments is at least partially offset by providing for repetition of all crops and treatments each year. This aspect of replication is discussed by Cochran (3).

1The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director. Also presented before Section IV of the Soil Science Society of America at the annual meeting at Cincinnati, Ohio, November 17, 1947. Received for publication January 7, 1948.

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3Figures in parenthesis refer to “Literature Cited”, p. 884.