A REAL evolutionary development in the technic of agronomic experimentation has occurred since the first field experiments were conducted a hundred years ago by Bouissingault. This branch of research had its beginning, as did all others, in relatively crude observations. Only comparatively simple methods of experimentation, which were primarily of a demonstrational nature, were available for the greater part of the past century. Owing to the fact that gross experiments were probably economical and desirable in the early stages of this research, and that the more obvious hypotheses needed testing first, the prevailing methods seemed adequate and entirely satisfactory for the purpose. And it is very significant that many of the fundamental principles of sound soil management and crop production were developed by these methods of field experimentation.

In recent years, however, and since the more obvious of the agronomic principles have been demonstrated, we have been confronted with the more complex and intricate of the agronomic problems. Furthermore, the heterogeneity of apparently uniform areas of soils used for experimental purposes, which was not recognized nor fully appreciated until rather recently, has been found to contribute in large measure to the errors involved in field experiments. This situation necessitated and stimulated the search for refined technic and improved methods. Extensive and complete experiments were conducted by many agronomists toward this end with the result that the methods were greatly improved and the way opened for increasing markedly the precision of field experimental results.

Coincident with this development came a recognition of the necessity for a statistical analysis of the data of field experiments. Hence the statistician was asked to analyze data that had already been obtained. This necessitated the formulation of an estimate of error, which, in most cases, could not be obtained from the data available owing to the inadequacy of the experimental design. Unfortunately, this often involved the formulation of assumptions that were not supported by the facts and conditions of the experiment. The statistician was helpless in these cases, however, for it is obvious that he could not inject into his statistical procedure something that had been left out of the experiment by the agronomist. This in turn stimulated research on the part of the statisticians, and in many instances their work was coordinated with that of the agronomist. As a result of the combined efforts of these two groups of people, we now have principles of experimental design and appropriate methods of statistical analysis which will permit the formulation of an estimate of the experimental error from the experiment itself, and by means of which the significance of differences can be interpreted. It is now regarded

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1 Contribution from the Intermountain Forest and Range Experiment Station, Ogden, Utah. Also presented before the annual meeting of the Society held in Washington, D. C., November 20, 1936. Received for publication April 12, 1937.

2 Conservationist.