SOME MISAPPLICATIONS AND LIMITATIONS IN USING STUDENT'S METHOD TO INTERPRET FIELD EXPERIMENTS

S. C. SALMON

In a recent publication, which presents the results secured with certain fertilizer treatments on wheat, corn, oats, clover and timothy grown in rotation, it is concluded that "Student's method of calculating odds is a sound, simple criterion in furthering an explanation of the results obtained." This assertion, considered with the discussion which precedes it, may be taken to imply that a statement of the odds as calculated by Student's method in favor of any treatment is a sound or safe measure of accuracy. Student's method is a valuable aid in evaluating experimental results; but it is doubtful if so sweeping a recommendation is justified at the present time. Furthermore, so much has been written in favor of this method and so many experiments are being interpreted in accordance with it, that it seems desirable to call attention to some limitations which must be considered if errors and misapplications are to be avoided.

Two main criticisms may be offered. The first relates to those fertilizer and tillage experiments (and possibly others) in which a given plot or tract of land receives the same treatment year after year. The second is more general and is related to the fact that Student's method measures the uniformity or consistency of a gain for a given treatment or variety regardless of whether the variable gains are due to experimental errors or to a differential response to environmental factors.

It is generally recognized that fertilizer and tillage experiments are subject to several possible sources of error. Among these may be mentioned errors in measuring plots, errors in harvesting, thrashing and weighing the grain, differential damage by birds and rodents, variation in the moisture content of the harvested product, and soil heterogeneity. It is probably a fair statement that with careful work and constant attention, soil heterogeneity is more important than any of the others. Yet, it is with respect to this source of error that Student's method may entirely fail. Consider, for example, two plots

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2Professor of Farm Crops.