SOME LIMITATIONS IN THE APPLICATION OF THE
METHOD OF LEAST SQUARES TO
FIELD EXPERIMENTS

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The marked attention to methods in field experimentation so evident during the past ten or twelve years is desirable in every way. The work of Mercer and Hall (11), Wood and Stratton (19), Harris (8) and others in showing the great variation in the soil that may normally be expected has done much to put experimental work on a scientific basis. Likewise, the demonstration by Montgomery (13) and Kiesselbach (9) of the fact and importance of competition, of border effect by Arny and Hayes (2) and of variation in moisture content of the harvested product by Farrell (7) and by Vinall and McKee (17) are contributions of the greatest importance. The substitution of repeated shall plots for single tenth acre plots in variety tests is certainly an important forward step. It is only when statements appear such as that in a recent paper (10) in which grave doubt is expressed as to the value of a large class of experiments because they fail to measure up to certain mathematical standards, that one seems justified in asking if a broader view of methods is not needed. The suggestion, for example, that a major, or at least a large part of the work that has been done has no value is not only obviously untrue, but may greatly injure the prestige of agronomic experimentation among those who have little opportunity to know what such work has done for agriculture in the past. This statement should not be interpreted as sanctioning or condoning in any way careless work or the all too common practice of emphasizing differences which a proper regard for experimental error will show are not significant.

The purpose of this paper is not to question the value of the probable error and other constants wherever they may be properly applied. Everyone who has given the matter attention must recognize their great value. Nor is it the purpose to question the application of such constants to crops, nursery, and laboratory experiments, although it is believed that some of the objections mentioned herein will apply to such experiments as well. It does seem desirable, how-

1 Paper read by title at the meeting of the Society held at Washington, D. C. November 21, 1922. Contribution number 144, Department of Agronomy, Kansas Agricultural Experiment Station.
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3 Reference by number is to "Literature cited", p. 238.