GENERALIZED probable or standard errors have often been used for evaluating the results of field experiments for the reason that they are believed to be a better measure of random variation than can be derived from the small number of plots of each variable characteristic of such experiments. Those who first used this device seem to have clearly realized that it provided approximate values only and that certain assumptions were involved which might or might not hold true.

Curiously enough, in the light of later developments, it formerly was quite generally assumed that the random error was highly correlated with yield or whatever was being measured. Thus, the characteristic feature of the “deviation of the mean” method devised by Hayes (4) consisted of expressing the standard error or probable error as a percentage of the mean yield, which was then applied to the yield of each individual variable. The validity of this procedure obviously depended upon the above assumption. Hayes and Immer (5) presented evidence for such a relation in varieties of wheat, but later in a more extensive study involving several crops, Immer (7) found none.

With the advent of analysis of variance, all thoughts of a possible relation between standard error and yield and other metrical attributes seem to have vanished. At least those who advocate this method seldom or never mention or emphasize the assumptions on which validity depends, nor is the degree to which they actually are realized in particular cases seriously considered. Furthermore, it appears to be assumed that by this method an accurate estimate of random error for any and all properly conducted experiments is assured.

Altogether the current situation with respect to the use of generalized estimates of random error can be characterized as nothing less than anomalous, as may be seen from a consideration of the manner in which analysis of variance has been used and the problems to which it has been applied. Thus, several workers in recent months have used it to interpret various disease-resistance trials with small grains in which a single error term is derived and applied to all varieties indiscriminately regardless of the range of infection between varieties. This range in some cases has varied from 0 or near 0 to 75 or 80%.

If it is not clear that the standard errors for varieties immune from or highly resistant to disease are materially different from those for varieties in which, say, 50% of the plants are infected, a casual consideration of the binomial formula for standard error will show that such is quite certain to be the case. The binomial, it may be noted, is

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1Contribution from the Division of Cereal Crops and Diseases, U. S. Dept. of Agriculture. Received for publication April 16, 1938.
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3Numbers in parentheses refer to “Literature Cited”, p. 662.