A PRACTICAL METHOD OF REDUCING EXPERIMENTAL ERROR IN VARIETAL TESTS.

Experimental error in field tests has lately received so much attention that it seems unnecessary in this paper to demonstrate its presence or significance. However, there is reason to believe that where no provision is made for measuring it, its magnitude is more often underestimated than otherwise. This appears to be especially true of tests conducted in the semiarid Great Plains of the United States where nonuniformity of soil is of frequent occurrence and where the water supply is often near the lower limit of plant sustenance. Moreover, varietal tests differ from some other field tests in such a way that a consideration of experimental error is probably of more importance in their case.

In rotation and soil fertility tests there is usually a cumulative effect. The practices of one year affect the yields of following years so that the difference in results between a good and a bad practice increases with time. In such a case the experimental error is likely to be much less than the expected differences.

In a varietal test there is no tendency toward larger divergences as the test is continued. In fact, the direct opposite is true where a part of the varieties are not acclimated. Also, as a general rule, smaller differences are expected than in many other field tests. Much of the work which is classed with varietal tests is in reality a test of different strains and selections which it is expected will be very similar. Again, a just conception of varietal testing requires that such work be conducted with a broader aim than a mere knowledge of which variety will yield the most in a given period.

A regard for accuracy and the future improvement of crops makes imperative a knowledge of the causes of variation in yields. Is a variety a consistent yielder or is its average due to a single exceptional performance? In the latter case what assurance has the experimenter that this was due to varietal difference and not to variation in edaphic or climatic conditions? To what particular qualities does a variety owe its high yield? Why is a certain variety poor in yield, and has it any desirable qualities which by hybridization might with profit be added to another better yielding variety? Of what importance are the effects of disease and insect attacks, and are they due to