EVALUATING CROP ROTATION AND THE USE OF FERTILIZERS

(Abtract)

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The total benefits of crop rotation may be compared with the benefits derived from the use of fertilizers, measured in terms of the increases in yields which may be effected by these farm practices. Results of long-continued fertility experiments are desirable. Comparable data must concern a particular crop grown in continuous culture, fertilized and unfertilized, and grown in rotation, fertilized and unfertilized. In as much as the long-time experiments were not planned with a view to evaluating the benefits of rotation, the analysis and interpretation of the available data are attended with problems.

One problem concerns the selection of results obtained from fertilized plats. Should single-plat yields be selected, or should the yields of several fertilized plats in a series be averaged and treated as a single or composite yield? When one considers, for example, the 18-year average yields obtained in the 3-year rotation test at Wooster, he will observe that there is but little difference between the yields obtained with mixed fertilizers. If the results obtained on the various plats show statistical significance they should not be averaged. But how may any significance be determined? Here the probable-error formulas can not be used. The Student method has been recommended for interpreting fertilizer tests.

The Student method is a means for obtaining a mathematical expression of statistical significance or nonsignificance, based on the parallelism of small-sample results. However, this is no magic formula for converting any paired results into profound and useful scientific knowledge. In interpreting fertilizer results plain common sense in most cases may prove of greater value than the Student method, as it is commonly applied. If one member of a pair of yields is always greater, no matter how little the difference, the odds in favor of it will be more than 10,000 to 1. Again, one yield may show high odds over another, while the actual increases resulting from the two treatments may be exactly the same so that there can not possibly be any significance in favor of the higher yield.

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