A Method of Estimating Optimum Plot Size from Experimental Data

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In field experimentation, optimum plot size depends on soil variability and the costs of the various steps involved in conducting the test. The latter will vary with every experiment but can be approximated rather quickly by the experienced agronomist. However, an evaluation of soil variability has been more difficult to obtain. Although many schemes for quantitatively expressing soil variation have been reported, the one devised by Smith seems to be the only one which has proven useful to date. He proposed the evaluation from uniformity data of an expression which indicates the degree of correlation among adjacent experimental units. This index of soil heterogeneity combined with cost estimates to indicate optimum size.

Although well over 100 uniformity trials have been reported in the literature, this is a relatively small number compared to the different types of experiments currently in progress. If an estimate of optimum plot size were to be made for each kind of experiment, considerably more information on soil variability would be needed. Since uniformity trials are expensive, and time consuming to conduct and evaluate, it seemed desirable to find additional sources of information on soil variation. This paper presents a technique for reclaiming such information from certain types of experiments which include differential treatments.

Estimation of Soil Heterogeneity in Uniformity Data

The technique proposed by Smith for evaluating and expressing soil variability has been used sparingly, if at all, by agronomists in this country in spite of their continuing interest in the problem.