USING SEMIVARIOGRAMS TO IDENTIFY YIELD TRENDS CAUSED BY SPATIAL VARIABILITY IN FIELD EXPERIMENTS

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ABSTRACT

A study was conducted to identify the structure of yield trends in field research trials using semivariograms of either % yield deviation or total yield. Parameters of semivariogram models such as the nugget or range were used to indicate the presence and extent of spatial trends in crop yield. Data from field fertilizer trials on rice in Pakistan and potatoes in the U.S.A. were used for these comparisons.

Semivariograms of % yield deviations were consistently a better indicator of yield trends than semivariograms of total yield. For semivariograms of total yield, the ratio of the nugget parameter to total variance was approximately unity. In contrast, the ratio of the nugget to total variance for semivariograms of % yield deviation was 0.74 or 0.70 for the rice or potato experiment, respectively. The range for spherical semivariogram models of % yield deviations was approximately equal to the width of 5 experimental plots, indicating the presence of short-range yield trends even though block differences from classical analysis of variance were non-significant. Failure to detect yield trends using semivariograms of total yield occurs because total yields are additive effect of different treatments and soil variability which masks underlying trends caused by spatial variability in soil or environmental properties.