

Modelling spatial variation in field experiments

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Abstract

The main purpose of field trials is to compare the effects of a number of treatments (varieties) applied to a set of experimental units. In order to obtain precise estimates of the variety effects it is important to reduce or control the residual variation not due to the variety effects. This can be managed by use of proper design and models that account for spatial heterogeneity.

The modelling process, which will be presented in this paper, involves spatial linear mixed models' techniques (Gilmour, Cullis and Verbyla, 1997) and use of some tests and diagnostic tools, such as residual plots, sample variogram and coverage intervals (Stefanova, Smith and Cullis, 2007). This approach adopts some ideas of geostatistics (Cressie, 1991) and extends to accommodate variation typical for field experiments. The techniques of Gilmour *et al.* (1997) are followed here, where three major components of spatial variation in plot errors from field experiments are identified and accounted for: nonstationary, global variation across the field; stationary, local variation across the trial and extraneous variation, predominantly induced by some agronomic/management practices.

This approach will be illustrated on data from Western Australian plant breeding trials.

Keywords

Sample variogram; Spatial variation; Linear mixed models; Residual maximum likelihood.

References

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