A GENERALIZATION OF PAPADAKIS METHOD FOR ADJUSTMENT OF GENETIC DATA TO ENVIRONMENTAL EFFECTS

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The original Papadakis or "nearest neighbour" method for adjustment of field data is an ARMA model of Spatial Statistics where a single trait is considered:
Given a particular field test, individual or plot values are adjusted to a simple linear regression model using as covariates means of adjacent individuals or plots.
This basic model was further modified and improved by several authors in two directions:

- Reiteration of the linear regression allowing substitution to raw values of neighbours adjusted values, until the subsequent reduction of the error variance reaches a plateau;
- Combination of nearest neighbour method and adjustment for a block effect.

We have built and integrated within a Plant Breeding software (DIOGENE) a more general and efficient model to adjust, in a single step, raw individual data for environmental variation controlled by site and block|site effects as well as uncontrolled microenvironmental variation present within blocks. This model includes three main extensions:

- Use of any number of covariates, including or not the trait to be adjusted;
- Nested groups of neighbours located by polar coordinates relative to each individual;
- Possibility of exclusion of neighbours genetically related to each "pivot" individual, to limit genetic correlation between predicted and independent variates.

The model applied to several perennial plant species was very efficient to increase heritabilities but also to reduce their confidence intervals. Its biological efficiency is discussed.