## Update on multiplicative models for multi-site cultivar trials and other multi-site studies. (Z09-cornelius162728-Oral)

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## Abstract:

Useful multiplicative (linear-bilinear) model forms for analyzing multisite cultivar trials (and other multisite studies) are AMMI, GREG, SREG, SHMM and COMM models (each defined in the paper). PRESS statistics and Tukey-Mandel analysis are useful helps for choosing a model form. Conventional anova F-tests are not valid for multiplicative terms, a.k.a. principal component axes (PCAs), and are extremely liberal, but PCAs can be properly tested by F-like tests that closely approximate sequential Studentized Maximum Root tests, or by sequential lack-of-fit tests. Both computer simulation results and empirical cross validation studies have indicated that multiplying the multiplicative terms by suitably defined shrinkage factors produces fitted models with predictive accuracy as good as, and usually better than, parsimonious models chosen by either hypothesis testing or cross validation. All five model forms appear to be equally good vis-a-vis predictive accuracy if such shrinkage estimators are used. SHMM and SREG models can be exploited for grouping cultivars or sites into clusters without significant cultivar crossover interaction within clusters.

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