NATIONAL VARIETY TRIALS

The GRDC have established a national system of evaluation for commercially bred crops, called the National Variety Trials (NVT). The objective of the NVT Project is to provide statistical evaluation of field trial data, with the results to be utilised by the GRDC to provide growers and their advisors, State Departments and grains industry researchers with independent information on the performance of new varieties. The NVT Project is closely linked to the SAGI2 Project and is led by Professor Brian Cullis and implements new methodology for the design and analysis of multi-environment trials using research outputs from the SAGI-2 project.

The key trait for consideration is grain yield and an important outcome is to provide an annual analysis of yield data for all crops. This involves both so-called single site analysis and an overall multi-environment trial (MET) analysis. The single site analysis follows the methods of Stefanova et. al., (2009, JABES). The MET analysis currently in use has been described by Smith et. al., (2001a, ANZJS) and comprises a two-stage analysis. In the first stage individual trials are analysed to obtain variety means (and weights) to be used in the second stage. The second stage involves a mixed model with variance components for the variety main effects and a partitioning of the variety by trial (V×T) interaction into (a minimum of) variety by region, variety by year and variety by region by year effects. Use of this approach is a legacy of the approaches used for the state-based testing programs that were in place prior to the commencement of NVT.

One of the key activities in this project and the SAGI-2 project is to develop and implement a more efficient approach. It is well known that this partitioning of V×T interaction is not competitive with the use of the factor analytic (FA) modelling approach advocated by Smith et. al., (2001b, Biometrics).

Implementation of an FA modelling approach for the NVT-MET analysis is challenging for several reasons. Firstly, connectivity across years can be poor. Secondly, there is a large number of trials so that FA models fitted to V×T effects suffer from problems of numerical instability as well as computational constraints for most hardware platforms. Furthermore, although FA models provide a more realistic model for explaining V×T interaction, it may be preferable to search for a more parsimonious approach for MET data-sets with relatively large numbers of trials. We are investigating a new approach to the NVT-MET analysis which involves a so-called informed reduced factor model. This model aims to preserve the attractive properties of the FA model in explaining V×T interaction, but reduces the computational burden and numerical instability via a dimension reduction in the environmental space of the MET.

For further information, contact Professor Brian Cullis.