Statistics for the Australian Grains Industry
Technical Report Series

Progress Report 2011-2012 for SAGI-2 project

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1 Achievements

1.1 Overview

1.1.1 ILT Division

In the 2011 season, a total of 716 trials comprising both NVT and breeders late stage trials, were analysed by SAGI-2 biometricians. Means and weights from the single site analyses were uploaded into Katmandoo and the data files were ready for all crops for MET analyses by the agreed date of January 19, 2012. Fourteen MET analyses were undertaken in total using agreed protocol.

Numerous reruns of the single site and MET analyses were required due to naming inconsistencies in some trials, which were only identified post-analysis. There was also a lengthy delay to the wheat MET due to questions raised by some of the breeding companies. These concerns were addressed in detail through further analyses of the data and meticulous reporting of the results, particular in relation to the comparisons of three varieties. This required a comprehensive report to be tabled and discussed, authored by Brian Cullis and Alison Smith. All MET results were endorsed by crop champions and returned to ACAS by February 8 for uploading onto the NVT website.

All quality data for 2005 to 2011 has been loaded into the Katmandoo database, with variance component MET analysis completed for three wheat quality traits and canola oil. A report was submitted to GRDC on future opportunities and recommendations for NVT quality analyses in April.

The key achievement for this milestone was SAGI-2’s involvement with the “Science of Selection” workshop series conducted at Adelaide, Horsham and Wagga Wagga in August 2011. These workshops were a huge success with Alison Smith preparing much of the original material and Alison Smith and Alison Kelly presenting and refining the material based on feedback and anticipated audience technical background and knowledge. This exercise has led to improvements to the planned delivery of the new NVT-MET analysis and information system SAGI-2 are developing in conjunction with ACAS. We look forward to our continued involvement in this work and in similar meetings.
1 Achievements

1.1.2 RCP Division

The mmontap website migration project has been completed. This project involved a significant contribution from Phil Testa, Senior Project Manager, IT Portfolio, Information Technology Services (ITS), The University of Wollongong (UOW), who worked with Bev Gogel and Damian Collins. An ITS-hosted mmontap virtual server is in place which is secure and regularly backed up. The ITS server has been fully configured and tested and all material from the original site has been loaded. There was minimal disruption of users of the web-site throughout the migration. The same domain name has been retained (ie www.mmontap.org).

In July 2011 Professor Fred van Eeuwijk, Professor in Applied Statistics, Biometris, Wageningen University, the Netherlands, visited Australia to attend the Australian Applied Statistics Conference (AASC) and present three QTL workshops. The first workshop was a pre-conference activity and was held on July 11. Approximately 25 people attended the workshop comprising mainly conference delegates. Professor van Eeuwijk also presented an invited talk at the meeting. This meeting was sponsored by GRDC. The conference web-site and workshop details are http://aasc2011.science.qld.gov.au/pre-conference/default.htm.

The second QTL workshop was held at the University of Adelaide (UA), Waite Campus, on July 18-19. It was organised locally by Bev Gogel and was very well attended. The attendance limit of 48 participants was achieved, with 35 from the UA, 9 from the ACPFG and the remainder either private or commercial.

The third and final QTL workshop was held at the University of Western Australia (UWA) in Perth on July 21-22. The workshop presented a flexible mapping approach for quantitative trait loci (QTL) and an introduction to the simulation of breeding strategies. It received support from UWA and CSIRO and was run at the International Centre for Plant Breeding Education and Research. The presenters were Fred van Eeuwijk, Marcos Malosetti, Assistant Professor in Applied Statistics, Biometris, Wageningen University, the Netherlands and Scott Chapman, Senior Scientist Crop Physiology and Simulation at CSIRO, Brisbane.

Preliminary research has been undertaken with Professor Robin Thompson. This work was initiated after the AASC conference at Port Douglas in July 2011. At this meeting Professor Thompson outlined an approach that can be easily implemented into ASReml and has the major advantage of significantly reducing the computational burden as the number of markers $m$, becomes large relative to the number of lines $p$. The approach has been tested using a large data-set in wheat, comprising over 4,000 markers and approximately 400 lines. The standard approach took over 8 minutes per iteration compared to the new approach which took 6 seconds per iteration. The memory required for the alternate approach relative to the standard approach was minimal with the implication that fitting more complex models to larger data-sets will be possible.
1 Achievements

This work will be completed by Colleen Hunt as a part of her PhD, in which several data-sets require genomic selection.

1.1.3 SDI Division

Experimental designs for plant improvement studies are often selected on an informal basis, with due consideration to desirable properties such as replication, blocking, orthogonality or connectedness. In practice, adjustments are sometimes made to experimental procedures if an off the shelf design does not quite fit the intended application. Optimal design allows flexible combinations of the design specification parameters for special cases, and prespecified residual or treatment correlation structures. The software package od is a freely available package which is currently under development and is available as a β-version on request from David Butler. So far it’s use is mainly within the SAGI-2 project team as it is rapidly replacing sf DiGGeR as the design tool of choice. The package allows for sensible specification of the linear mixed model using syntax similar to ASReml-R with user-friendly arguments and associated methods which allow general design problems to be solved and operated on. Some designs which have been generated recently using od include glasshouse and ELISA slide designs for the LMA classification nurseries, field trial designs for the prime hard project and complex multi-phase milling and baking designs involving the use of partial composites for the MAGIC population.

1.2 Milestones

1.2.1 Milestone 1

Description

Develop and implement a standard operating procedure (SOP) for SAGI-2 support of grains industry research, development and extension projects. The SOP will involve an initial assessment of the statistical requirements of each project, followed by the development and implementation of an appropriate action plan. The plan will encompass both within-project capacity building and/or support from SAGI-2 biometricians. The effectiveness of the plan and client satisfaction will be monitored through annual follow-up discussions with each project primary investigator.

Achievements

A SOP for provision of statistical support of grains industry research, development and extension is hereafter defined to be a document which presents detailed and written instructions to achieve uniformity of the performance of members of the SAGI-2 project. The management team has put together a draft of the SOP for the SAGI project as a whole, as well as specific SOPs for each of the three divisions. Much of the draft SOPs have been based on the protocols and procedures that have been embedded within the work ethic of the SAGI project and carried forward to the SAGI-2 project. Some of the key elements of this include:
1 Achievements

- Assessment of the nature of work to be done. This includes both significance, amount and technical content.

- Ensure that all preliminary meetings are minuted and SAGI-2 staff report back to the relevant divisional leader with recommendations, timelines and an estimate of resources required for completion of the work.

- Obtain agreement between client and SAGI-2 as to the nature and extent of the collaboration with SAGI-2.

- Ensure that a minimum of two SAGI-2 staff are present at the design phase of the project.

- Provide client with a full schedule of deliverables and timelines (and cost if applicable).

- Review SAGI-2’s knowledge and experience in the area and align available staff with project if possible.

- Undertake project work with scheduled review points that align with either production of key outputs or payments.

- Production of outputs underpinned by a refereed SAGI-2 series report.

1.2.2 Milestone 2

Description

- Provide timely design and analysis for near-to-market research and extension projects (VSAP trials, herbicide/fungicide trials, NVT trials, GRDC-supported farming system/agronomy trials and disease resistance/tolerance trials).

- Provision of refereed reports and appropriate plain-english summaries to project leaders and the broader grains industry upon completion of project activities.

- Attendance at key industry/technical meetings to support activities (wheat breeders assembly, barley technical symposium, ARAB conference, WQA and at least 1 PBA meeting and 3 GRDC updates per annum).

Achievements

Design and analysis activities In the 2011 season, a total of 716 trials were analysed by SAGI-2 biometricians, comprising both NVT and breeders late stage trials. Means and weights from the single site analyses were uploaded into Katmandoo,
Achievements

with the data files ready for all crops for MET analyses by the agreed date of January 19, 2012. Fourteen MET analyses in total were undertaken using agreed protocol.

Numerous reruns of the single site and MET analyses were required due to naming inconsistencies in some trials, which were only identified post-analysis. Also, there was a lengthy delay to the wheat MET due to questions raised by some of the breeding companies. These concerns were addressed in detail through further analyses of the data and meticulous reporting of the results, and in particular, the comparison of three varieties. This required a comprehensive report to be tabled and discussed, authored by Brian Cullis and Alison Smith. All MET results were endorsed by crop champions and returned to ACAS by February 8 for uploading onto the website.

All quality data for 2005 to 2011 has been loaded into the Katmandoo database, with variance component MET analysis completed for three wheat quality traits and canola oil. A report was submitted to GRDC on future opportunities and recommendations for NVT quality analyses in April.

A list of project activities is as follows:

- 2012 Canola Blackleg analysis. Chris Lisle - CL
- Linkages with Grower Solution groups: Agritech NSW - Analysis of crown rot inoculum trials and NGA, Toowoomba - Advice on statistical design and analysis. Susan Fletcher - SF
- National Frost trials 2008-2011, DEEDI. SF
- Crown Rot phenotyping, DEEDI. SF
- Barley disease screening, DEEDI. SF
- Barley grain defects, DEEDI. SF
- Root architecture in wheat, QAAFI. Alison Kelly - AK
- National Lupin Breeding for Southern Australia. Katia Stefanova - KS
- Molecular Diagnostics Group (Nematodes), SARDI. Bev Gogel - BG
- Fababean Breeding program, Pulse breeding Australia. BG
- Vetch Breeding, SARDI. BG
1 Achievements

- New Variety Agronomy, SARDI. BG

Reports A list of SAGI-2 series reports which are completed and reviewed is as follows:

1. 2008-2010 A3H/A4H wheat MET for 2011 season (BG)

2. MET analysis of the 2010 S4 hard wheat data (BG)

3. MET analyses: Intergrain wheat 2011 (BG)

4. Design of 2011 Pratylenchus bioassay tests for NVT (BG)

5. Analysis of resistance and tolerance of cereal varieties to Pratylenchus and CCN: 2010 trials (BG)

6. Analysis of 2011 Pratylenchus bioassay tests for NVT (BG)

7. Analysis of tolerance of cereal varieties to Pratylenchus and CCN: 2011 trials (BG)

8. The effect on soil acidity through Managing Acid Soils Through Efficient Rotations (MASTER) Part I - unlimed section (CL)

9. Oat stage4 grain MET (CL)

10. Blackleg report for CAA (CL)

11. The effect on soil acidity through Managing Acid Soils Through Efficient Rotations (MASTER) Part II - Limed section (CL)

12. Gladius×Drysdale map construction (Paul Eckermann)

13. Wheat time of sowing 1998-2010 (CL)

14. How to handbook: Analysing NVT single site trials (CL)

15. Agritech NSW - Analysis of CR inoculum trials (SF)

16. Analysis of the National Frost Program data 2008-2011: For the final report on frost resistance and testing methodology (SF)

17. Statistical approaches for the NVT MET analysis: faba beans 2011 (SF)

Meetings SAGI-2 staff members have attended and presented an invited session at each
of the following meetings. The sessions covered interpretation of NVT trial results and current developments in statistical methodology, with the aim of informing both industry representatives and researchers at a level appropriate to their understanding.

1. Crown Rot project meeting, November 2011 (SF and AK)

2. Pulse Breeding Australia project meeting, October 2011 (Gabriela Borgognone - GB)

3. Canola Breeders meeting, February 2012 (AK)

4. Wheat Breeders meeting, March 2012 (BC, CL, AK)

5. GRDC Northern panel, December 2011 (GB)

6. GRDC Western panel, January 2012 (AK)

7. NVT advisory committee - West, April 2012 (AK)

8. GRDC updates, “Creating a level playing field for on-farm trials”, Dubbo and Goondiwindi, March 2012 (AK)


10. ARAB, Wagga Wagga, August, 2011 (AS:oral)


1.2.3 Milestone 3

Description

Develop and deliver in-region statistical training modules for near-to-market researchers, advisors and grower groups. A minimum of 3×1day and 6×2day workshops to be delivered per year in each of three GRDC regions and distributed across key stakeholder groups, including Regional Cropping Solution Groups (RCSG), farming systems groups, NVT users, PBA and organisations performing critical near-to-market functions (eg. pilot brewing). Coordination of in-region training activities will be made by interaction through RCSG coordinators and GRDC regional Grower Services Managers.
Achievements

The key achievement for this milestone was SAGI-2’s involvement with the “Science of Selection” workshop series conducted at Adelaide, Horsham and Wagga Wagga in August 2011. These workshops were a huge success with Alison Smith preparing much of the original material and Alison Smith and Alison Kelly presenting and refining the material based on feedback and expected audience technical background and knowledge. This exercise has led to improvements to the planned delivery of the new NVT-MET analysis and information system SAGI-2 are developing in conjunction with ACAS. We look forward to our continued involvement in this work and in similar meetings.

Progress on preparation and delivery of training materials has been limited due to the delay in finalising a contract for SAGI-2. One FTE has not yet been appointed and the role of this position is specifically NVT and training. Chris Lisle only commenced at Charles Sturt University (CSU) in January, creating a further shortfall in delivery of ILT. Furthermore, the external consultancies undertaken by Bev Gogel and DEEDI staff have taken resources from ILT at the expense of developing training material. The milestone of delivering all training courses in this financial year will not be met.

However, there have been some successes with the limited staff available and some achievements include:

- Contact has been made with Elders to scope the training needs of their Agronomy group.

- Presentation of information sessions has been widespread, and this phase has paved the way for further project linkages and networks for delivery of training. For example, talks with the private agronomy company linking the three northern groups: northern grower alliance, Emerald farming systems group in DEEDI and GOA, has resulted in a plan for SAGI-2 training at their next meeting.

1.2.4 Milestone 4

Description

- Co-ordinate a revision of the statistical methods and statistical reasoning courses offered at Charles Sturt University (CSU) and offer these courses to a wider audience (linked to UW00004).

- Provision of support at the University of WA (UWA) to advise higher degree students in Agriculture and present Applied Statistics workshops to them.

- Provision of support for Dr O Kravchuk at the University of Adelaide (UA) to enable development of Applied Statistics training workshops for Agricultural scientists (linked to UW00004). Utilise UOW, CSU, UWA and UA service course material to
achievements

foster collaboration with other universities in the provision of undergraduate and postgraduate statistics and biometry courses.

Achievements

CSU There has been significant challenges meeting this milestone with the delay in appointing the additional staff member at CSU, as a large component of the new appointment’s role is based on the delivery of this milestone. Despite this, Professor Ken Russell has made significant progress with revising some of the key statistical modules offered to undergraduate students studying agriculture at CSU. A full report has been provided to the progress report for the companion GRDC funded project, UW0004. Copies of this report can be obtained on request.

UWA This activity is also linked to UW0004. A brief overview of activities thus far is:

- Modules on Experimental Design and ANOVA, Students Year 4, Unit SCIE4401, Faculty of Natural and Agricultural Sciences, UWA.
- Module on Linear Mixed Models, Students Year 4, Unit SCIE4402, Faculty of Natural and Agricultural Sciences, UWA.
- “Spatial Variation and Statistical Analysis of Field Trials” at AusAID-sponsored short course (5-weeks) of Iraq Partnership Facility: Crop Improvement for Iraq, 3 October 2011.

UA This activity is also linked to UW0004. Much focus has been centred on the preparation and planning for the workshop on Statistical consulting linked to the Australian Statistics Conference which was held in Adelaide in July 2012. A full report in this workshop has been included in the progress report for 2011/12 for the UW0004 project. Copies of this report can be provided on request.

1.2.5 Milestone 5

Description

Upgrade and relocate the MMonTAP website to UOW. Implement a fully functional web-based report series to:

- Account for SAGI staff time allocation to research areas (to also be used for GRDC progress reporting)
- Facilitate internal interaction between SAGI members
- Provide R,D & E clients with peer-reviewed reports relating to work conducted for them
1 Achievements

Populate the web-site with training materials, software downloads, howto guides, course and workshop materials, upcoming news and events and current research topics.

Achievements

The mmontap website migration project has been completed. This project involved a significant contribution from Phil Testa, Senior Project Manager, IT Portfolio, Information Technology Services (ITS), UOW, who worked with Bev Gogel and Damian Collins. An ITS-hosted MMontap virtual server is in place which is secure and regularly backed up. The ITS server has been fully configured and tested and all material from the original site has been loaded. There was minimal disruption of users of the web-site throughout the migration. The same domain name has been retained (ie www.mmontap.org).

1.2.6 Milestone 6

Description

Application of the SAGI-2 SOP (Milestone 1) to all GRDC strategic and/or applied research projects and pre-breeding projects involving SAGI-2 collaboration. Ensure that the statistical components of each project are met in accordance with the project Output and Milestone timelines. See attachment AA for assignment of SAGI-2 staff to GRDC R, D & E areas.

Achievements

A SOP for provision of statistical support to all GRDC strategic and/or applied research projects and pre-breeding projects has been defined to be a document which presents detailed and written instructions to achieve uniformity of the performance of a members of the SAGI project. The management team has put together a draft of the SOP for the SAGI project as a whole, as well as specific SOPs for each of the three divisions. Much of the draft SOPs have been based on the protocols and procedures that have been embedded within the work ethic of the SAGI project and carried forward to the SAGI-2 project. Some of the key elements of this include:

- Assessment of the nature of work to be done. This includes both significance, amount and technical content.
- Ensure that all preliminary meetings are minuted and SAGI-2 staff report back to the relevant divisional leader with recommendations, timelines and an estimate of resources required for completion of the work.
- Obtain agreement between client and SAGI-2 as to the nature and extent of the collaboration with SAGI-2.
- Ensure that a minimum of two SAGI-2 staff are present at the design phase of the
1 Achievements

- Provide client with a full schedule of deliverables and timelines (and cost if applicable).

- Review SAGI-2’s knowledge and experience in the area and align available staff with project if possible.

- Undertake project work with scheduled review points that align with either production of key outputs or payments.

- Production of outputs underpinned by a refereed SAGI-2 series report.

1.2.7 Milestone 7

Description

Develop and deliver a minimum of 2×2 day specialist (researcher/breeder focussed) training workshops per year covering QTL analysis, whole-genome selection methodologies, advanced software application and other areas based upon need (areas will be identified through Milestones 1, 2 and 6). Bi-annual presentation of specialist workshops involving leading international collaborators to ensure locally applied methods are of an international standard. The frequency of topic coverage to be based on demand, release of new software and implementation of new statistical methods.

Achievements

In July 2011 Professor Fred van Eeuwijk visited Australia to attend the Australian Applied Statistics Conference (AASC) and present three QTL workshops. The first workshop was a pre-conference activity and was held on July 11. Approximately 25 people attended the workshop comprising mainly conference delegates. Professor van Eeuwijk also presented an invited talk at the meeting. This meeting was sponsored by GRDC. The conference web-site and workshop details are http://aasc2011.science.qld.gov.au/pre-conference/default.htm.

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1 Achievements

Malosetti, Assistant Professor in Applied Statistics, Biometris, Wageningen University, the Netherlands and Scott Chapman, Senior Scientist Crop Physiology and Simulation at CSIRO, Brisbane.

The course was aimed at graduate students and professionals interested in a flexible QTL mapping approach in GenStat applicable to single traits in single environments as well as to multiple traits and multiple environments, for standard bi-parental populations as well as association panels and multi-parent populations. In addition, the simulation of breeding strategies provided an introduction to the QuGene software.

QTL mapping was introduced as an extension of mixed model analysis of single traits in single trials. The calculation of these genetic covariates was explained for various types of populations: inbreeders, outbreeders and association panels. After mixed model QTL analysis for single traits in single trials, extensions were described for multiple trials and multiple traits. Hands on QTL analyses utilized Windows menus in GenStat.

By the end of the course the participants were able to:

- Construct a genetic map from marker scores on different types of breeding populations
- Perform a QTL analysis for a wide array of breeding populations, for single and multiple environments, and for single and multiple traits
- Use various inference procedures for assessing QTL evidence
- Report QTL locations and effects
- Formulate and evaluate breeding strategies given QTL locations and effects.

There were 18 participants who attended the course, with most from UWA (9) and DAFWA (4). The feedback was very positive with the average rating for all components of the course exceeding 4 (on a 5 point scale: 1 very bad to 5 very good).

1.2.8 Milestone 8

Description

Internal capacity and staff development.

- Completion of PhD studies by David Butler on optimal design
- Completion of PhD studies by Alison Kelly on use of factor analytic and other singular variance models in plant breeding
1 Achievements

- Enrolment of Colleen Hunt in PhD studies on advanced statistical methods for hybrid breeding programs
- Engage Arthur Gilmour for ASReml development.

Achievements

David Butler was granted study for four days per week by DAFF to concentrate on completing his PhD. Since this time there has been significant progress made towards submission. The working title of the thesis is “On the Optimal Design of Experiments Under the Linear Mixed Model”. Two additional papers are in preparation which add to the three already published from the PhD making the thesis a very worthy award. The submission date is the end of January 2013.

Alison Kelly has also made good progress towards completion of her PhD. This working title is “Reduced rank variance models in a linear mixed model framework” and is planned to be completed by December 2012.

Colleen Hunt has commenced her PhD studies and enrolled in November 2011 (part time) at the University of Queensland, School of Agriculture and Food Science. The working title at the time of enrolment was “Statistical analysis of sorghum breeding trials with complex genetic components”. Her supervisors are David Jordan and Brian Cullis. One paper is under revision and another in preparation.

Arthur Gilmour has been employed as a Senior Research Fellow at UOW since 2010. His funding is secure as UOW and VSN International (the owners of the ASReml IP) have entered into a long-term research agreement in which UOW provides support for ASReml.

1.2.9 Milestone 9

Description

Cluster based approach to NVT-MET will be developed and tested. Approach will be applied to each of the NVT crops in collaboration with key stakeholders and breeders. New approach will be reviewed on an annual basis. Initiate a whole-industry approach to the provision of information from these new methods.

Achievements

Some progress towards this milestone has been made. Brian Cullis presented an invited talk at the Biometrics by the Blowholes, Australasian Region of The International Biometric Society Conference, Kiama, NSW which was held in December 2011. The underlying principles of implementing the new MET analysis have been resolved. An internal workshop was conducted in May 2012 to inform those within SAGI-2 of progress and the
outstanding tasks to be completed. Each biometrician is now undertaking a retrospective analysis of each crop for each year to prepare for the next and final stage which depends on the development of an algorithm to groups trials with similar factor loadings within a year. Development of this algorithm is technically challenging and requires at least six weeks input from Brian Cullis. He intends to spend whatever time is needed for the remainder of 2012 to complete this work, given that we are committed to implementation of the new MET analysis for the upcoming NVT season.

1.2.10 Milestone 10

Description

Software conversion of GENSTAT procedures to R for

- Mixed model QTL mapping facilities: source code & documentation (including worked examples) for a) diploid biparental populations single trait & single environment and for multiple traits and/or environments

- As above but for multi-cross populations, like, for example, nested association mapping populations (star design populations), diallel populations, and for multi-parent populations and association panels

- As above plus including additional full or partial pedigree/kinship information if available

Work closely with Wageningen group.

Achievements

There has been no progress towards this milestone for this report.

1.2.11 Milestone 11

Description

Review existing methods for genomic selection (GS) and develop new methods for GS with ability to model non-genetic variation and GxE interaction. This work to be performed in collaboration with Professor Robin Thompson.

Achievements

Preliminary research has been undertaken with Professor Thompson. This work was initiated after the AASC conference at Port Douglas in July 2011. At this meeting Professor Thompson outlined an approach which can be easily implemented into ASReml and has the significant advantage that the computational burden can be significantly
1 Achievements

reduced as the number of markers $m$, becomes large relative to the number of lines $p$. The approach has been tested using a large data-set in wheat which comprised over 4,000 markers and around 400 lines. The standard approach took over 8 minutes per iteration compared to the new approach which took just 6 seconds per iteration. The amount of memory required for the alternate approach was minimal implying that fitting more complex models to larger data-sets will be possible.

This work will be completed by Colleen Hunt as part of her PhD, where there are several data-sets in place that require GS.

1.2.12 Milestone 12

Description

New release of ASReml software, namely ASReml 4 in 2012. This release requires improved R documentation and UOW and VSN will work together on this. Agreement with VSN in place to allow free access for academic use to open the way for ASReml to be used as a teaching tool in new courses developed in this project. See other milestones.

Achievements

The new release of ASReml will occur in December at the AASC 2012 meeting to be held at Queenstown. Bev Gogel has been contracted by VSN for 10% of her time for the period from July 2012 to December 2012 to help complete the documentation.

1.2.13 Milestone 13

Description

Collaboration with Professor Thompson and Dr. Hackett to continue extensions of techniques for identification of QTLs in complex experiments and genetic designs including experiments with multiple treatments.

Achievements

Another paper has been recently published which considers QTL×E or QTL×T, where E and T are environments or traits respectively. This paper is joint work between Brian Cullis and Ari Verbyla and extends the WGAIM approach. Further work will consider the extension of the model described in the previous section to multi-environment or multi-trait data-sets.
1 Achievements

1.2.14 Milestone 14

Description

Contribute to a mid-term, independent technical and strategic GRDC review of the SAGI-2 program as directed by the relevant GRDC manager.

Achievements

NIL
2 Planned Research

2.1 ILT Division

Many of the planned activities for the ILT division remain focussed on the existing list of clients and activities. Staff of the division will remain active in attending and presenting at relevant meetings. Two examples include an oral presentation at the Australasian Weeds Conference, Melbourne, 2012 and papers for the Soil-bourne diseases conference, Fremantle, 2012.

The NVT quality data for 2005 to 2011 has been loaded into the Katmandoo database, with variance component MET analysis completed for three wheat quality traits and canola oil. We plan to undertake a more comprehensive study to examine the feasibility of undertaking a formal analysis of receival traits for wheat and barley and key quality traits in canola annually as is currently done for yield. Funds have been allocated for this purpose for the next twelve months.

With the appointment of the new position at CSU there will be a concerted effort to deliver on the development and delivery of industry based training modules. Contact has been made with Elders to scope the training needs of their Agronomy group and along with the preliminary discussions with private agronomy groups we are confident that we can establish the linkages for our training package to deliver.

There has also been much activity with SAGI-2 staff working directly with private industry. Three significant contracts have been established and the work will continue over the next year. These include the following:

- Intergrain - Bev Gogel undertook a five month contract with Intergrain to analyse trial data from their wheat and barley breeding programs. The 2011 trials were combined in a multi-environment trial analysis with trials from previous years, using a factor analytic model to produce cluster summaries of genotype by environment interaction and prediction of genotypic performance and stability. The agreement has been renewed for 2012 and covers statistical design and analysis of wheat and barley trials from the breeding programs.
2 Planned Research

- Longreach - A contract with Longreach Plant Breeding has been negotiated with Bertus Jacobs for statistical design and analysis of wheat breeding trials. Stage 1 trials were analysed from the 2011 season. Design and analysis of stage 1 and 2 trials is planned for the 2012 season. The agreement is that each year an additional stage of testing will be added to the statistical design and analysis provided by SAGI-2 until the entire program is utilising best practice statistical methodologies.

- Pacific Seeds - A five month contract is currently underway providing statistical support to canola, maize and sorghum programs in Pacific Seeds. The agreement covers both the breeding and research groups and marketing and extension teams. At the end of the five month period, part of the work will be re-negotiated to stay with SAGI-2 and the majority of statistical support will be passed back to their biometrician who is currently on leave.

2.2 RCP Division

The focus of the RCP division remains to underpin GRDC’s near-to-market research with high quality statistical support. Significant progress has been made with the Frost research programme and a detailed report is in preparation which outlines an approach to the design and analysis of the frost benchmarking trials. This report also discusses options for improving the current protocol which are aimed at reducing the amount of within plot variability which is the dominant source of variation in these data-sets.

Some other activities for the coming year include:

- The new MET analysis for the NVT yield data will be developed, published and implemented this year.

- Attendance at the Australasian Applied Statistics Conference in December 2012 - invited papers from Brian Cullis and Julian Taylor, workshop presented by Brian Cullis and Sue Welham, talks from other SAGI project staff. GRDC are major sponsor.

- Release of ASReml 4 in December.

- Attendance at XVth meeting of the Eucarpia section - Biometrics in plant breeding to be held 5-7 September at Stuttgart Germany. Bev Gogel and Brian Cullis will present talks.

- Attendance at International Biometric Conference to be held from 27-31 August at Kobe Japan - Brian Cullis will chair the inaugural planning meeting for the International Scientific Programme Committee for the next IBC to be held at Florence, Italy in 2014.
2 Planned Research

- Visits to Rothamsted UK in September and October - Brian Cullis, Alison Smith, David Butler and Bev Gogel will work on a range of problems spanning the new MET analysis, the analysis of large MET data-sets with pedigree information, genomic selection and the release of ASReml 4 and associated documentation. Work with Professor van Eeuwijk will be undertaken on conversion of GENSTAT QTL routines into R.

- New protocols for frost research to be implemented and published - Paul Eckermann will lead this work.

- Submission of PhD theses for David Butler and Alison Kelly.

- Submission of papers describing the design of multi-phase experiments with partial compositing.

2.3 SDI Division

The main activity will involve the release of ASReml 4 and commencement of work to convert GENSTAT QTL facilities into R.
Bibliography


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