



Australian Government

Cotton Research and
Development Corporation

FINAL REPORT

Part 1 - Summary Details

Please use your TAB key to complete Parts 1 & 2.

CRDC Project Number: CRDC1720

Project Title: AACS 2017 Australian Cotton Researcher
Conference, 5-7 September 2017

Project Commencement Date: 5/9/2017 **Project Completion Date:** 7/9/2017

Part 2 – Contact Details

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Part 3 – Final Report

Background

1. Outline the background to the project.

The Australian Cotton Research Conference is a biennial Research Conference run by the Association of Australian Cotton Scientists (AACS) hosted each time by a different Research Organisation and administered by an Organising Committee. This was the third Conference and was hosted by CSIRO in Canberra at the CSIRO Discovery Centre. The Committee for the 2017 event was Danny Llewellyn, Chair (CSIRO, Canberra); Paul Grundy (QDAF); Warren Conaty (CSIRO, Narrabri); Ruth Redfern (CRDC); Mark Peoples (CSIRO, Canberra); Iain Wilson (CSIRO, Canberra); Filomena Pettolino (CSIRO, Canberra); Colleen MacMillan (CSIRO, Canberra); Philippe Moncuquet (CSIRO, Canberra); Lisa Ermanli, Admin Support (CSIRO, Canberra).

Objectives

2. List the project objectives (from the application) and the extent to which these have been achieved.

The objectives of the biennial Australian Cotton Research Conferences are to serve as a platform for cotton researchers to present and discuss concepts, key issues and the latest findings in research relevant to the Australian cotton industry, and cotton research community. The conference also encourages networking and collaborations, and a better

understanding of the scope of science performed across the breadth of the cotton industry. The three day conference included plenary lectures from renowned speakers (including one international invited speaker, Dr Juan Landivar Bowles, Texas A&M, USA), and research talks within a range of themes, as well as tours of the High Performance Plant Phenomics Centre at CSIRO. There was a welcome reception on the first evening at the CSIRO Discovery Centre and a conference dinner on the second night at the National Museum of Australia, where a number of Association Awards were presented (including the Association's Early Career Scientist Encouragement Award that was presented to Dr Guna Nachimuthu (NSW DPI) in acknowledgement of his contributions to soil science, the Service to Cotton Science Award to Dr Lewis Wilson (CSIRO) for his contributions to cotton IPM research and the Scientific Publication Award to Drs Grant Herron (NSW DPI) and Lewis Wilson for their recent publication on resistance management strategies to recover insecticide susceptibility in the cotton aphid in Australian cotton. Nilantha Hulugalle, Ian Rochester (posthumously), Jim Peacock, Geoff Baker, and Stephen Allen were elected Lifetime Members of the Association in recognition of their distinguished careers in supporting Cotton Science in Australia). The Annual General Meeting of the Association was held on the final day at which a new Executive committee was elected, including Paul Grundy as the new President. Cleave Rogan (Deputy Chair, CRDC) closed off the conference noting the high international standard of the research being undertaken in Australia and the obvious renewal happening in the research space as many of our older industry stalwarts move on and new blood is attracted to the industry to fill their places, ensuring that the research base of the industry is in safe hands for the future.

Details of the conference, invited speakers and abstracts are available at the AACS website www.cottonresearch.org.

The conference was well attended and all sessions were actively participated in. All delegates that elected to give a talk were accommodated in one of the many sessions. About half the delegates went on the tour of the HPPC. This was the first time that we have used a Conference App for tablets and smart phones instead of a printed Conference booklet and this was well received by the conference delegates. There were also no physical posters displayed but the eight posters received were available through the App and on the conference website for download and were displayed on the large screen during some of the breaks.

Outcomes

3. Describe how the project's outputs will contribute to the planned outcomes identified in the project application. Describe the planned outcomes achieved to date.

The presentations given and accessibility of the Abstracts on the Association website provided a valuable resource for cotton researchers and consultants who attended the meeting or who wish to review the material at a later stage. Of particular value was the opportunity for researchers from different disciplines to interact with each other at the morning and afternoon teas, lunches and other social events during the conference. An article about the conference was written for the Australian Cotton Grower Magazine which may appear in the next issue.

4. Please report on any:-

- a) The highlights for participants or key learnings achieved
Over 80 presentations on a diverse range of aspects of cotton science from genes, through to genomes up to whole plants, fields, farms and farming systems were delivered. The first day of the conference had a digital agriculture theme highlighting the growing use of digital imagery, sensor technologies and computational sciences in

research underpinning breeding, crop management and crop physiology. Dr Juan Landivar Bowles from Texas A&M's Agrilife Research & Extension Centre in Corpus Christi kicked off the conference with a keynote talk on Texas A&M's program using UAVs or "drones" to collect crop images from the air across a range of sensor technologies to determine the growth rates, flowering and boll production that contribute to the productivity of cotton (and other crops like sorghum) and how they use that data and growth simulation models to predict final yields. As image capture is almost instantaneous, thousands of research plots can be examined with each drone flight and it is hoped that they can eventually be used to help the selection of the best performing lines in breeder's fields to accelerate their breeding objectives in a more cost effective manner. The same technologies are also being used to assess a range of plant health and stress status parameters of cotton that could also be used as aids in crop management. Juan was followed by CSIRO's Ross Searle who launched the concept of an "AgData Hackathon" for cotton and covered some of the technical challenges that it entails in combining data from disparate sources. The Hackathon will be a competition run by CSIRO and CRDC hopefully in time for the next grower Conference at the Gold Coast. It will bring together a number of multi-disciplinary teams of informatics and agronomy researchers to develop a useful analysis method, app or web tool for growers, consultants or researchers, utilising historical production, climate and management records (including the ever increasing sensor data collected by on-farm machinery) from a large enterprise cotton farm, with a cash prize for the winning team. The hackathon is seen as an incubator and a way to showcase how digital technologies can be used to assist cotton growers in their decision making and to encourage new researchers into the industry. The digital agriculture session was finished off with a number of presentations on the ways Australian researchers are using drones, and fixed and machinery mounted sensors to manage irrigation scheduling, variable rate irrigations, crop nutrition and yield predictions in cotton crops from Queensland down to the new industry in the South. Afternoon sessions were mainly around managing irrigations.

Day two covered pest and disease management with keynote talks from Linda Smith (QDAF) highlighting the ongoing battle with fast evolving pathogens in monoculture cropping systems like cotton and from Mary Whitehouse (CSIRO) who gave a history of the devastating spiral of pesticide release and loss through resistance development that plagued the industry over the last three decades and how Bt-cotton halted that cycle and allowed greater adoption of IPM approaches. In both cases development of varieties with greater resistance to pests and diseases have been critical to keeping the industry sustainable, but there is little room for complacency and both speakers stressed the importance of on-going vigilance in monitoring and adherence to best management practise to prevent the emergence of new pests and diseases and to manage those we already have. The final session for the second day looked at farming systems research and it was fitting to see the legacy of Ian "Rocky" Rochester and his long-term crop rotation trials at ACRI emphasized in several talks as an acknowledgment of the important part that these experiments have played in understanding the impacts that different rotations can have on soil health, carbon sequestration and farm productivity.

Day three had a post-harvest theme in the morning with a focus on the products of cotton, primarily the fibre, but also its oil as a potential feedstock for replacing those currently derived from petroleum products. Filomena Pettolino (CSIRO) delivered a keynote talk on her group's research in understanding the molecular and chemical structures of fibres and how new technologies might be used to genetically manipulate those fibres to have novel functional properties beyond existing uses for cotton. The day ended with a keynote talk from David Tissue (Hawkesbury Institute

for the Environment) on the multi-disciplinary research being undertaken to understand how cotton may respond to future climates with elevated levels of CO₂, higher global temperatures and more extreme weather events. While it is still early days in the research, some researchers had predicted that the higher CO₂ levels would increase plant productivity and compensate for the negative effects of elevated temperature, experiments to date suggest that this may not be the case and that we will therefore need to manage the whole production cycle, including nitrogen nutrition, if we are to continue to maintain sustainable cotton production as climate change progresses. Some exciting collaborations harnessing expertise in climate science and cotton physiology across research institutions (HIE, ANU, CSIRO) and across continents (USA) were presented that will ensure our industry is ready for those predicted changes in climate and that it will remain globally competitive.

b) The number of people participating and any comments on level of participation

147 registered delegates attended with another three ad hoc delegates attending on the first day so we reached our target number for the meeting (CSIRO Discovery Centre accommodates a maximum of 180 with a bit of a squeeze so 150 was a perfect fit). Sponsors were given a number of complementary registrations proportionate to the level of sponsorship. Cotton Australia funded four undergraduate students to attend the meeting (Kathy Bauer- UQ, Lauren Gibson – CSU, Charles Black – UNE, Christine Harris –CSU) while Crop Consultants Australia and CRDC sponsored two consultants to attend (Nikolaus Fritz - Internode Agronomy; Sam Simmons - Agromax Consulting). In addition there were 14 postgraduate students. There were half a dozen US researchers from USDA, Cotton Inc and Univ Arkansas who also attended the meeting and gave talks. Unfortunately one invited speaker Dr Paxton Payton, had trouble with flights at the last minute and was unable to attend and give his Plenary talk, but as it was a very full program this slot was just skipped.

Budget

5. Describe how the project's budget was spent in comparison with the application budget. Outline any changes and provide justification.

The conference was run to budget with a small profit. This was assisted by CSIRO not charging for any use of the venue or facilities and unexpected inability of one of the invited speakers to attend the meeting at the last minute so did not require any support for travel or accommodation. All postgraduate students were offered a contribution towards their expenses, but, at the time of writing, not all have yet claimed the stipend, so we expect that the small surplus may be used up in the next month or so, but otherwise will go towards future conferences.

Conclusion

6. Provide an assessment of the likely impact of the results and conclusions of the research project for the cotton industry. What are the take home messages?

