



Australian Government

Cotton Research and
Development Corporation

Cotton Research and Development Corporation

Annual Report 2011–2012



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Photographs in this publication were sourced principally from CRDC itself or its researchers and research provider organisations.



Australian Government

**Cotton Research and
Development Corporation**

Cotton Research and Development Corporation

**Annual Report
2011–2012**

CRDC

Vision

A globally competitive and responsible cotton industry

Mission

The quest for sustainable competitive advantage

Purpose

Enhancing the performance of the Australian cotton industry and community through investing in research and development, and its application

Planned outcome

Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community

Our people

Board of Directors

Mike Logan (Chair)

Mary Corbett (Vice-Chair)

Bruce Finney (Executive Director)

Richard Haire

Hamish Millar

Michael Robinson

Cleave Rogan

Lorraine Stephenson

Staff

R&D investment team

Bruce Pyke (General Manager)

Tracey Leven

Business and finance team

Graeme Tolson (General Manager)

Elizabeth Eather

Fiona Mead

Dianne Purcell

Communication

Rohan Boehm

Who we are

One of 15 Rural R&D Corporations, CRDC is based in Narrabri, NSW – the heart of one of Australia's major cotton growing regions and home to the Australian Cotton Research Institute. The Corporation is a research and development partnership between the Australian cotton industry and the Australian Government.

What we do

CRDC invests in and manages a portfolio of research, development and extension projects that seek to enhance the environmental, social and economic values associated with cotton production systems for the benefit of cotton industry participants, regional communities and the Australian people.

CRDC funds and coordinates the development of technical and non-technical documents, guides and other information tools and coordinates workshops, seminars and field days for a range of purposes, including research reviews, information sharing and technology transfer to industry.

CRDC produces a range of publications about corporate activities and operations and disseminates research outcomes. It acts as a formal and informal information source for stakeholders and client groups (facilitated by its location in a major cotton growing centre), through general industry media activities and the Corporation's website, www.crdc.com.au.

CRDC researchers are actively involved in the dissemination of research results, working through a range of mechanisms, including the CRDC-supported Development and Delivery Team.

Key research partners 2011–12

Cotton growers

Rural Research and Development Corporations
CSIRO

Universities

Cotton Australia

Cotton Catchment Communities CRC

Other Cooperative Research Centres

NSW Department of Primary Industries

Queensland Department of Agriculture, Fisheries and Forestry

Other State Government Departments

Crop Consultants Australia

Agribusinesses



CONTENTS

Statement of Principles

CRDC Directors and staff members are required to:

- Commit to excellence and productivity
- Be accountable to stakeholders
- Act legally, ethically, professionally and responsibly in the performance of duties
- Strive to maximise return on investment of industry and public funds invested through our Corporation
- Strive to make a difference in improving the knowledge base for sustainable cotton production in Australia
- Value strategic, collaborative partnerships with research providers, other research and development bodies, industry organisations, stakeholders and clients, for mutual industry and public benefits; including cooperation with kindred organisations to address matters of national priority
- Value the contribution, knowledge and expertise of the people within our organisation and that of our contracted consultants, external program coordinators and research providers
- Promote active, honest and effective communication
- Commit to the future of rural and regional Australia
- Comply with and promote best practice in corporate governance
- Commit to meeting all statutory obligations and accountability requirements in a comprehensive and timely manner.

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WANT AN OVERVIEW OF OUR OPERATIONS?

The Executive Summary will give you a good summary, with in-depth information available in the rest of the report.

If you are interested in our work, you can find out more by exploring our publications and subscribing to our free and informative magazine *Spotlight* – all at www.crdc.com.au.



Letter of Transmittal



Australian Government
Cotton Research and
Development Corporation

4 October 2012

Senator the Hon Joe Ludwig
Minister for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600

Dear Minister

It is with great pleasure that I submit the Corporation's Annual Report for 2011–12, prepared in accordance with the provisions of section 28 of the *Primary Industries and Energy Research and Development Act 1989* and section 9 of the *Commonwealth Authorities and Companies Act 1997*.

Under section 9 of the *Commonwealth Authorities and Companies Act 1997*, CRDC Directors are responsible for the preparation and content of the Annual Report being made in accordance with the Finance Minister's orders. The report of operations has been prepared in accordance with a resolution of the Directors on 13 August 2012.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Mike Logan'.

Mike Logan
Chair

EXECUTIVE SUMMARY



FROM THE CHAIR & EXECUTIVE DIRECTOR

"The quest for sustainable competitive advantage"

A remarkable year

The 2011–12 season is set to exceed the previous season's record of four million bales with industry forecasting production will surpass five million bales. Whilst prices dropped from record levels in the prior season the harvest is still expected to contribute over \$2.7 billion in export earnings before considering the flow on benefits to rural, regional, state and national economies.

This achievement reflects the commitment and capability of the people in the industry, as 2011–12 was another challenging season of climate impacts and production levels that exposed the constraints of industry infrastructure.

The season saw another series of disastrous flood events across cotton producing regions in NSW and south western Queensland. This season's crop losses may well have exceeded 600,000 bales, which was the total annual crop production only four years ago during the worst of the drought. The industry ginning, classing and shipment infrastructure is designed to nominally handle an annual production of up to three million bales. It has been stretched to new levels of operation that have depended upon understanding of growers, the ingenuity and resilience of the industry personnel involved.

The capacity of the industry's Development & Delivery team to meet the R&D information needs of new growers was again tested. The support of industry researchers, agribusiness, commercial crop consultants and natural resource management groups for targeted extension campaigns continued to be of great importance. Post-flood advice to growers and consultants on how to manage flood-affected crops was aided by the experiences of the prior year's flooding and research initiated in central Queensland to assess the response of flood-affected cotton crops to various management techniques.

Beyond the immediacy of R&D information needs the CRDC continued to invest in the development and communication of contemporary market and product knowledge.

This work is assisting the industry to strengthen its current competitive advantages, consider the future sustainability of that position and the potential for new approaches to maximising the value for Australian cotton. At the farm level R&D successfully supported ongoing productivity growth and protection against biosecurity threats. Of particular note was the summation of the impact of industry water research and the commencement of a third assessment of industry environmental performance. CRDC's strategic investment in human capacity effectively assisted the development of individuals throughout the industry and research community. Importantly CRDC was able to support the industry to consider workforce challenges and solutions collectively.

During 2011–12, the industry was advised that the Cotton Catchment Communities CRC would cease at 30 June 2012. CRDC has been a major partner within three consecutive Cotton CRCs that commenced in 1993. The cessation of the Cotton CRC will be a substantive change to the industry's RD&E collaborative arrangements and resourcing. That this change should occur during a remarkable upturn in cotton production is opportune, as CRDC's capacity for funding R&D is once again strong and the key industry and research organisations collectively commenced implementing the Cotton Sector R,D&E Plan that will guide the future direction and foster collaboration in research.

None of this would be possible without the good will and engagement of industry and its research partners. CRDC is indeed fortunate to receive so many innovative research proposals and valuable industry guidance on research needs and priorities. These close linkages support strong levels of R&D adoption by industry and a responsive research community.

In May 2012, the Minister for Agriculture, Fisheries and Forestry, Senator the Hon Joe Ludwig, provided clear guidance on his expectations of RDCs, including investment priorities and collaboration. CRDC welcomes this guidance and we have highlighted our

relevant actions in regards to collaboration, climate change, carbon and water research through this report. CRDC has also reported its actions in working with the Australian Government and cotton industry to ensure the effectiveness and efficiency of our stakeholders' investment in rural R&D.

We take this opportunity to thank former CRDC Directors Kerry Adby, Leith Bouilly, Glenn Fresser, Juanita Hamparsum, Peter Hayes and Lisa Wilson, who completed their terms on 30 September 2011, for their excellent contribution to the Corporation in unusual times. We welcome back Mary Corbett for a second term and also welcome Richard Haire, Hamish Millar, Michael Robinson, Cleave Rogan and Lorraine Stephenson, who became Directors on 1 October 2011.

Looking to the future

The Australian Cotton Conference, held on the Gold Coast in August 2012, was aptly themed Growing Better all the Time and drew a record attendance of over 1600 delegates, including many growers. The scope of the conference agenda extended from futurist's identifying global changes and challenges through to detailed research presentations on cotton



agronomy and pest management. Importantly, the industry-developed and CRDC-coordinated Vision 2029 played an important role in framing the conference agenda and guiding presentations.

Equally, the conference provided the CRDC with valuable information and context for its preparation of the next five-year Strategic R&D Plan. The challenges to grower profitability from rising costs of production and market competition were apparent and confronting, given the record levels of production being achieved.

The conference was an opportunity to announce the formation of a new partnership between CRDC, Cotton Seed Distributors and Cotton Australia to manage and resource the industry Development and Delivery team. The organisations have committed to funding of around \$4 million per year for the delivery of the outputs of industry R&D over the next five years. This will result in a significant expansion of specialist extension information and R&D information services to assist growers across the cotton growing regions in time for the 2012–13 crop. In addition to the appointment and resourcing of new people in the field, new resources are being committed to the online delivery of R&D information that includes best management practices (myBMP).

At the time of writing the industry is anticipating its third successive big crop in 2012–13. With the assistance of plentiful water supplies the industry forecast is for a crop around four million bales, down from last season due to the fall in cotton prices to below long term average levels and a likely significant decrease in dryland cotton production.

Finally, we acknowledge the R&D Policy Statement released by the Minister for Agriculture, Fisheries and Forestry, Senator the Hon Joe Ludwig, in July and the ongoing support of the Government to build upon the strengths of the RDC model.


Mike Logan
Chair


Bruce Finney
Executive Director



THE YEAR'S HIGHLIGHTS

R&D HIGHLIGHTS

Timely flood response

Sections of the Australian cotton industry suffered flooding and crop water inundation for the second year in a row. CRDC researchers and extension staff were central to the quick response that sought to minimise damage and losses. Queensland agronomist Jamie Iker undertook a post-flood review for CRDC after the previous season to prepare the industry for similar events in the future. His work was of immediate benefit, forming the basis of advice for affected growers in the Moree district in the 2011–12 floods. See page 62.

Workforce planning

Agricultural industries, including cotton, face significant short to medium term problems in satisfying human resources needs. In response, CRDC:

- convened forums in November 2011 and May 2012 to discuss cotton industry human capacity and workforce attraction and retention initiatives and coordination
- commissioned a study, *Cotton Industry Succession and Professional Development – A Review of Employer and Industry Needs in the Agribusiness Sector*, completed in March 2012
- commenced a new project in which the Rural Innovation Research Group at the University of Melbourne and the Workplace Research Centre at The University of Sydney are establishing a workforce development plan for the cotton industry for sustained competitive advantage. See page 54.

D&D team proves its value to industry

In 2011–12 the Development and Delivery (D&D) team continued its collaboration with agribusiness, natural resource management groups, crop consultants and researchers in servicing of growers' R&D information needs. As well as advice on how to manage flood-affected crops, activities included a cotton bunchy top disease risk campaign and the timely development of the *Australian Cotton Production Manual 2012*, *Cotton Pest Management Guide 2012*, 'ute' guides and apps. The team was also responsible for user support for the myBMP system and its upgrades. See pages 60 to 62.

Industry environmental assessment: the next stage

In 2011–12, CRDC commissioned the third assessment of the environmental management and performance of the Australian cotton growing industry. This assessment covered the 2003 to 2012 period and analysed the cotton industry's implementation of the recommendations of the Second Environmental Audit that reported in 2003. The final report is to be available early in the 2012–13 reporting year. See page 44.

CRDC scholar continues her industry contribution

Having completed her PhD on *Benefits of establishing and managing native vegetation on cotton farms in the Namoi catchment* as a CRDC scholar, Dr Rhiannon Smith continues her link with CRDC as a post-doctoral fellow. Rhiannon is conducting a study on the important topic of how cotton farmers can take advantage of potential future ecosystems markets. See page 44.

Horizon scholarships

The Horizon Scholarship program is a successful rural R&D collaboration managed by RIRDC which supports agricultural science undergraduates who exhibit high potential to complete their university degrees assisted by a bursary and supported by mentoring, professional development workshops and industry placements. Two new CRDC-supported scholars, Billy Browning from Narromine (Agricultural Economics at The University of Sydney) and Kirsty McCormack (Rural Science, The University of New England) from Inverell joined existing scholars, Naomi Marks and Rebecca Dunsmuir. See page 58.

Water use gains brought together

CRDC investment outcomes are highlighted in the Cotton CRC-produced publication *The Australian cotton industry water story – A decade of Research and Development 2002–12*. This publication brings together a snapshot of the breadth of water-related R&D relating to cotton plants, fields, farms, catchments and communities.

Noteworthy gains include a 40 per cent increase in cotton water productivity, Cotton yields 2.5 times the world average (and of high quality) and changed attitudes on a range of water quality issues such as deep drainage, irrigation practices and local catchment groundwater knowledge. Underpinning and quantifying these gains are new tools and knowledge on how to measure water use accurately for the first time in Australian cotton farming systems. See *page 44*.



World research conference impact

CRDC sponsored nine researchers to present at the World Cotton Research Conference in Mumbai in November 2011. Australians were involved in chairing sessions, as well as presenting research papers. The Australian delegation participated in discussions that culminated in development of the World Cotton Research Council. This new international body seeks to integrate R&D initiatives globally to support cotton as a competitive apparel fibre and also to provide opportunities for researchers to collaborate across international borders. See *page 62*.

CORPORATE HIGHLIGHTS

Cotton CRC winds up

CRDC was a driver for establishment of the first industry Cooperative Research Centre in 1994 and the major investor participant in the three highly-successful cotton CRCs. Upon the announcement that the Cotton Catchment Communities CRC would cease to operate on 30 June 2012, key industry organisations met to analyse the implications for cotton industry R&D and to address the matters arising from this in a post-CRC research environment.

A new Board for CRDC

CRDC's new Board started its term on 1 October 2011.

Back row: Richard Haire, Hamish Millar, Mike Logan, Cleave Rogan. *Front row:* Michael Robinson, Mary Corbett, Bruce Finney, Lorraine Stephenson



Proud record for CRDC indigenous trainees

For the past several years CRDC has worked with the Aboriginal Employment Strategy (AES) to employ an indigenous trainee for one day a week. Trainees have undertaken the TAFE Business Certificate II Course as part of their Higher School Certificate studies.

Our first trainee, Chloe Pokarier (*below, left*), began working with the NSW Roads and Traffic Authority in Narrabri and has now been recruited to head office and leads her own team. Her successor, Erika Anderson (*below, right*), is studying zoology at university.



Tchkalee Booby, *right* with CRDC's Dianne Purcell, began a two-year AES traineeship at CRDC in 2012 and was recently appointed deputy captain of Wee Waa High School.

Our R&D program expands

CRDC's increased revenue, resulting from record cotton production, has enabled a ramping-up of investment in research, development and delivery. This significant increase in the capacity for funding R&D is timely given the cessation of the Cotton CRC and its contribution to research capacity. CRDC has increased the number of staff managing R&D investments to meet the greatly increased workload.

CRDC Strategic Planning process commences

CRDC commenced preparation of its next five-year Strategic R&D Plan in February 2012 with a strategic review session in Canberra with key stakeholders. A forum for researchers was held in March, in conjunction with the final Cotton CRC Science review. The invitation has been extended to researchers and research organisations to contribute to the development of the CRDC plan. CRDC has explored the industry and broader operating environments, trends, emerging issues and key drivers that will influence the future of the Australian cotton industry. The Cotton Sector RD&E Plan, 2029 Industry Vision and environmental scan produced in 2009 have been applied as useful references. Possible future R&D focus areas have been identified and strategies are now being considered ahead of government and industry stakeholder consultation. The new Strategic R&D Plan will, subject to Ministerial approval, commence on 1 July 2013.

Cotton Innovation Network underway

The Network held its inaugural meeting in February 2012 and is making good progress with the primary task of fostering collaboration in cotton research. The Network also has the role of guiding implementation of the Cotton Sector RD&E Plan.

New staff join CRDC

CRDC gained two new staff members in the reporting year to deal with an increased program of R&D investments. Allan Williams joined the R&D management team, with responsibility for soils, climate change/greenhouse gas emissions, energy efficiency and water research. For the previous seven years Allan worked for the Better Cotton Initiative as Program Manager for Asia and has chaired the International Cotton Advisory Committee's expert panel on the Social, Environmental and Economic Performance of cotton. Fiona Mead, who replaced Margaret Wheeler, brings extensive administrative experience to her role of Project Administration Manager. She has had various roles, mainly in agricultural-based organisations, including as an administration manager, management accountant and, most recently, as a Rural Financial Counsellor.

CRDC hosts graduate recruits visit

Each year the Australian Government Department of Agriculture, Fisheries and Forestry tasks its graduate recruits with a number of projects designed to further develop their policy skills and increase their knowledge of current and emerging issues within the portfolio. In August 2011, CRDC hosted a group of six graduates examining the issue of 'How Australian agricultural enterprises are improving their water efficiency'. CRDC staff organised visits with local farmers, researchers and industry water policy representatives to discuss the challenges and opportunities for improving on-farm water use efficiency.



Department of Agriculture, Fisheries and Forestry graduate recruits Justin Roach, Mary Hormis, Wendy Swain, Edward Paterson and Tathira Fatema hear from Auscott Namoi farm manager, Martin Mead



TRACKING THE STRATEGIC R&D PLAN 2008–2013

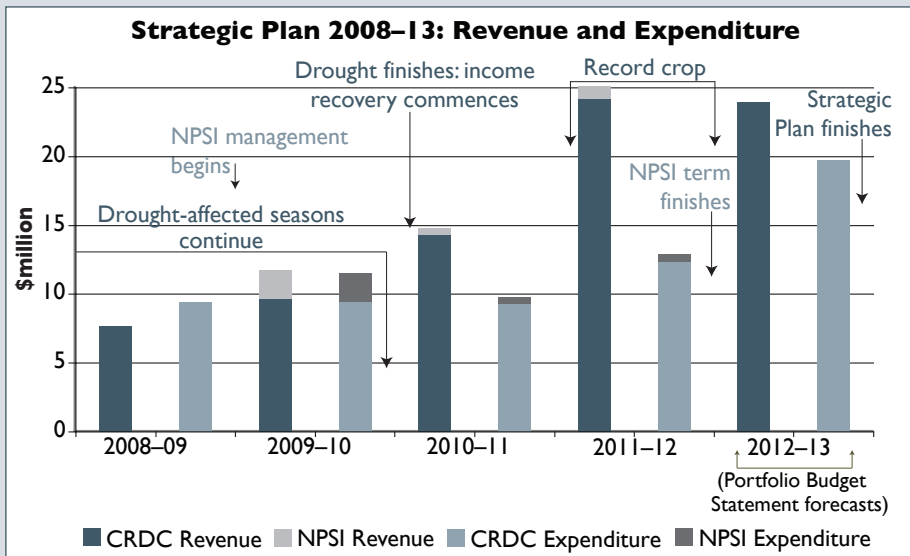
	2008–09	2009–10	2010–11	2011–12	2012–13
Cotton Crop Size (millions of bales)	1.45	1.71	3.956*	5.4 *	4.366 (forecast)**
\$ million					
Total Revenue	7.681	11.736	14.824	25.353	24.330****
Industry levies	2.374	3.433	4.576	9.532	
Australian Government	2.436	2.997	5.677	9.529	
Royalties	1.610	1.897	2.789	3.145	
Interest	0.740	0.568	0.805	1.401	
National Program for Sustainable Irrigation***	n/a	1.98	0.399	1.293	
Other	0.521	0.856	0.587	0.453	
Expenditure total	9.408	11.501	9.812	13.717	19.700****
Cotton RD&E activities	7.882	7.855	8.063	10.682	
Total equity position				27.317	

* Industry estimate September 2012 ** ABARES Australian Crop Report September 2012 *** Includes grant income and novation funding **** Budgeted

CRDC people	2008–09	2009–10	2010–11	2011–12
Full-time employees	7	7	7	7
Part-time employees	1	1	1	1
Total CRDC staff	8	8	8	8

Operating Statistics*	2008–09	2009–10	2010–11	2011–12
Number of new projects	44	57	66	128
Number of continuing projects	62	50	42	50
Projects finalised	61	58	45	117
Total number of R&D projects managed	106	107	108	178

* Excludes NPSI program



FINANCIAL SUMMARY

Revenue 2011–12

Total revenue for 2011–12 was \$25.353 million. This was comprised of \$24.025 million in cotton industry revenue and \$1.328 million in NPSI revenue. Cotton industry revenue was \$5.150 million (27 per cent) above budget of \$18.875 million.

Another record crop has boosted revenue from levies, Australian Government contributions and royalties. Normally, CRDC receives 50 per cent of levies in the crop year but because of seasonal conditions and very large size of the crop, the 2011–12 harvest has been protracted and ginning is expected to continue until autumn of 2013. This means only 26 per cent of levies were received by 30 June. The record production of cotton has increased the Gross Value of Production to an estimated \$2.62 billion.

Australian Government contributions in previous years were capped at 0.5 per cent of the three-year average gross value of production. In both 2010–11 and 2011–12 years the Australian cotton industry has experienced record production, high cotton prices and longer harvesting periods. These factors have delayed levy collection and increased GVP resulting in Australian Government contributions being capped at the value of levy collections.

The industry estimate (as at September 2012) is lint production of 1,226,000 tonnes or 5.4 million bales which is 2.4 million bales higher than the CRDC 2011–12 budget of 3.0 million bales.

Total revenue of \$25.353 million for 2011–12 comprised:

- Industry levy revenue of \$9.532 million, which includes \$6.798 million (74 per cent) of the 2010–11 crop and \$2.734 million (26 per cent) of the 2011–12 estimated crop.
- Australian Government contribution of \$9.529 million matching of levies collected during the year.
- \$3.145 million in royalties from the sale of CRDC-funded CSIRO seed varieties, which was \$0.054m above budget.
- Interest revenue of \$1.401 million was 82 per cent above budget, due to higher than expected interest rates on investments

Revenue sources

CRDC's revenue is drawn from the following sources:

- Cotton farmers pay a levy of \$2.25 for each 227 kilogram bale of cotton. Cotton levy revenue is collected at the point of ginning, that is, when cotton has been picked and delivered to cotton gins which then separate the cotton lint from the seed. This occurs from March to September of each calendar year, so cotton levy revenue in any financial year is drawn from two consecutive cotton crops.
- The Australian Government matches expenditure of levies on eligible R&D, capped at 0.5 per cent of the three-year average gross value of production or the cumulative levy receipts, whichever is the lesser. The setting and collection of the industry levy is enabled by the *Cotton Levy Act 1982* and the *Primary Industries Levied and Collections Act 1991*.
- Royalties from the sale of domestic and international planting seed, interest on investments, external grant revenue and research project refunds.

and additional revenue under CRDC management.

- National Program for Sustainable Irrigation (NPSI) program grant income was \$0.350 million and NPSI novation revenue utilised was \$0.943 million.
- Other revenue of \$0.453 million, which includes project refunds and external grant revenue.

Expenditure

Total expenditure for 2011–12 was \$13.717 million, which was \$0.164 million (1 per cent) below budget. This comprised \$12.389 million in cotton industry expenditure and \$1.328 million in NPSI expenditure. Research expenditure in CRDC's three strategic research programs and research-related corporate activities (excluding NPSI expenditure) was \$10.682 million; \$0.839 million below budget. Other areas of expenditure for the Corporation included employees and operational expenditure.





R&D Program Breakdown*

	Value Chain	Farming Systems	Human Capacity	Total
Number of projects	25	73	80	178
Program expenditure	\$1.387m	\$6.558m	\$1.842m	\$9.787m

* Excludes NPSI, Land & Water website grants, untied grants and corporate research activities supporting R&D planning and adoption.

Financial position

CRDC reported a net surplus of \$11.636 million for 2011-12 against a budgeted surplus of \$5.557 million, due to another record Australian cotton crop returning higher than budgeted levies, Australian Government matching contributions and increased royalties. In addition, expenditure did not exceed budget.

Cash reserves managed by CRDC have increased from \$16.296 million at 30 June 2011 to \$26.205 million at 30 June 2012. With the wind up of the NPSI joint venture, there were no NPSI cash reserves at 30 June 2012.

The Corporation's total equity position of \$27.317 million at 30 June 2012 is an increase of \$11.775 million from the previous year. The expenditure to equity ratio in 2011-12 was 50 per cent compared to 63 per cent in 2010-11, which is within the guidelines of the Corporation's policy to maintain reserves at a sustainable level.

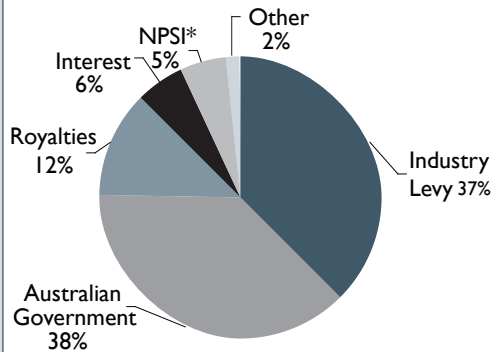
Outcome 2011-12

Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.

Total Budgeted Revenue:	\$19,438,181
Total Actual Revenue:	\$25,353,402
Total Budgeted Cost of Outputs:	\$13,881,300
Total Actual Costs of Outputs*:	\$13,717,047

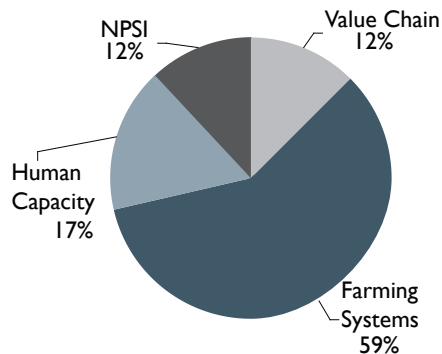
*Total cost is shown rather than total price because the Corporation is primarily funded through industry levies rather than on the basis of the price of its Outputs. Each research project and its funding contributes to the Outcome. Total research expenditure for the Outcome is calculated, with the remaining expenditure attributed to the Outcome on a pro rata basis.

CRDC Revenue 2011-12



* Comprises grant income of \$0.350m and utilised novation revenue of \$0.943m

CRDC R&D-related expenditure 2011-12



The Coming Year

Forecast revenue

Water availability and commodity prices are the significant factors in forthcoming cropping decisions made by cotton farmers. Most water storages in the cotton growing catchments are at near full capacity levels due to high rainfall during summer. The price for cotton has fallen to below historic averages and grain prices are now above average. CRDC expects this scenario will lead to some crop substitution away from cotton. Plantings of cotton under irrigation are expected to decrease by nine per cent in 2012–13. Low cotton prices are expected to have a greater impact on dryland cotton plantings, with a 55 per cent reduction from recent high levels anticipated.

Based on forecast conditions, CRDC forecasts a \$4.630 million operating surplus for 2012–13. This reflects revenue of \$24.330 million and expenditure of \$19.700 million. Industry levy revenue and Commonwealth contributions will continue to be drawn from two crop seasons, 2011–12 and 2012–13.

The size of levy and Government contributions is heavily reliant upon crop production, which is budgeted to be 4.0 million bales for 2012–13. CRDC expects future Australian Government contributions will be based on matched industry levy revenue.

Forecast expenditure

Budgeted expenditure for 2012–13 is \$19.700 million, an increase of \$5.983 million over 2011–12 actual expenditure. CRDC's capacity to invest in R&D has been enhanced in the last two years and CRDC has commenced the difficult task of both rebuilding the cotton industry's research capacity, which had been reduced during the drought period, and sustaining research capacity that had been supported previously by the Cotton CRC. Therefore, the forecast expenditure for the coming year for research, development and extension expenditure (RD&E) is budgeted at \$16.250 million and this is an increase of \$4.320 million above 2011–12 actual RD&E expenditure.



NATIONAL PROGRAM FOR SUSTAINABLE IRRIGATION



NPSI PHASE II STRATEGIC PLAN

Vision

Australian irrigation that is valued for its environmental, economic and social contribution

Mission

Investment in research, development and its adoption to improve the productivity and sustainability of irrigation in Australia.

Aims

- Provide national leadership for irrigation research and innovation
- Generate new knowledge and promote its adoption
- Contribute high quality science to the modernising of irrigation and its sustainability
- Contribute to the capacity of people to adapt, innovate and make better decisions
- Invest in the skills and knowledge of the irrigation community
- Enhance collaboration between industry and implementation with high quality science, and
- Enhance the global competitiveness and natural resource management of Australian irrigation.

These aims have been pursued through scientific innovation and excellence, compilation and extension of knowledge ready for adoption, collaboration across the irrigation industries, and a commitment to sustainable irrigation industries, communities and management of natural resources.

Partners

- Cotton Research and Development Corporation
- Goulburn-Murray Rural Water Corporation
- Gascoyne Water Cooperative and Gascoyne Water Asset Mutual Corporation
- Grains Research and Development Corporation
- Harvey Water
- Horticulture Australia Limited
- Lower Murray Water
- Ord Irrigation Cooperative and Ord Irrigation Asset Mutual Cooperative
- South Australian Research and Development Institute
- Sugar Research and Development Corporation
- SunWater
- Western Australia Department of Water
- Australian Government Department of Sustainability, Environment, Water, Population and Communities

Background

CRDC became Managing Agent for the National Program for Sustainable Irrigation (NPSI) in 2009. Although NPSI Phase II was due to finish at 30 June 2011, its term was extended to 30 June 2012 to allow the completion of some important projects as well as an effective wrap up of evaluation and communication activities with partners.

For accounting purposes, CRDC has managed NPSI as Program Four.

FINAL REPORT

Overview

The National Program for Sustainable Irrigation was a unique collaboration by governments, irrigators, water providers and researchers from across Australia. It covered every aspect of irrigation from dam management and water delivery, through on-farm management, to sustainable landscape environmental measures.

NPSI partners invested \$5.2 million between 2006 and 2012, which led to an additional \$6.5 million of co-investments in projects. The program has also supported 12 undergraduate student scholarships, four industry study award projects and other conferences and events.

In total, 42 per cent of funds were invested in projects that have increased knowledge, 37 per cent that increased efficiency and 21 per cent of invested funds have delivered a demonstrable industry economic impact. Benefit cost ratios from investments in irrigation research have been consistently high: between seven and 14 to one.

Income and expenditure 2011–12

NPSI grant income in 2011–12 was \$0.350 million, interest income \$0.035 million and novation revenue utilised \$0.943 million.

Total expenditure in 2011–12 was \$1.328 million, which includes R&D grants, communications, adoption, evaluation and administration costs. Total R&D expenditure for the four goals was \$926 081.

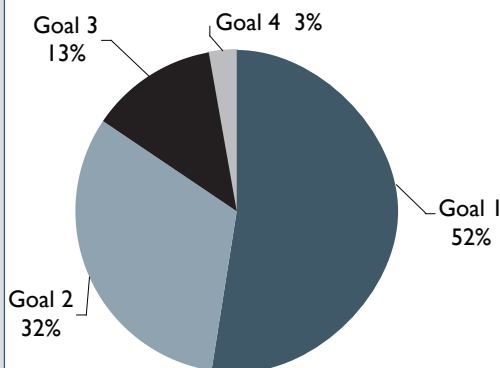
Achievements

The program has contributed to major increases in the efficiency and productivity of irrigation water, significant reductions in salinity in the Murray Darling River system and greater knowledge and technical capacity of irrigators and irrigation professionals.

Tangible benefits to irrigators have resulted from improved knowledge of water use efficiency benchmarks and tools, the ability to quantify water losses from dam farms and better management strategies put into practice through water storage capacity sharing strategies.

NPSI has been active in building improved skills, knowledge and decision making of end users via workshops, training events and publications. NPSI played a vital collaborative role in Australian irrigated agriculture by feeding information from research through to extension networks and sales/technical representatives, then on to farm.

**NPSI R&D expenditure by goal
2011–12**



Achievements 2008–2012

GOAL 1 Sustainable Production

Improved irrigation water use efficiency and enhanced ability to respond to changing levels of resource availability over time.

Improved benchmarking of water use by cotton and grain farmers. Evidence of 40 per cent improvement in water use. Water savings 0.15 megalitres per hectare.

Technology improvements and management options to maximise water use efficiency at the farm and delivery system scale. Irrigators surveyed indicated 50–100 per cent of their farmland had been impacted.



Changed thinking on drip irrigation and oxygation lead to 50 per cent yield improvement in various horticultural and cotton crops in Queensland.

Fertigation tools for citrus save \$400/ha.

Evaporation losses and mitigation options evaluated in irrigation channels in Victoria.

Precision irrigation review completed.

Increased soil testing, new soil management system in orchards.

New polymers developed and fields trialled at St George, Queensland and Dooki, Victoria to reduce evaporation losses on water storages and farm dams.

Farm dam evaporation resource kit and calculator.

Improved use of precision irrigation techniques in sugar, viticulture, citrus and vegetables. Water savings in Western Australia vegetables crops up to 40 per cent.

Soil monitoring technology developed and applied by farmers.

Climate and profit scenarios for grain growers.

Guidelines for managing soil salinity in groundwater irrigated vineyards.

New salinity monitoring sensors.

GOAL 2 Sustainable futures

Reduced environmental impacts, more sustainable ecosystems and more prosperous communities

Landscape biodiversity monitored in rice growing systems.

Reduced salinity impacts and improved water quality in Southern Murray Darling Basin with new tools and knowledge.

Surface and groundwater connectivity tool based on water temperature developed.

Soil structure and management techniques evaluated.

Ecological assessments.

Research paper on water storage policies and options.

Reduced nutrient leaching with improved practices in orchards.

New tools developed to better understand surface and groundwater connectivity.

Improved soil structure using ryegrass in horticultural crops.

Managed inundation of native wetlands for environmental gain.

Development of salinity management practice guidelines.

Review completed on irrigation acidity, chloride and salinity in vineyards.

Western Australia groundwater study used to inform water allocations & connectivity.

UNESCO Help program scoped for Ord and accepted.

Long term monitoring and grower network of soil salinity on Limestone Coast, South Australia.

GOAL 3 Knowledge into practice

Improved skills, knowledge and decision making of end users which leads to practice change, and more efficient and sustainable use and management of water

Improved current irrigation management practices and systems in cotton, grains, horticulture, grapes, citrus, rice and dairy.

Improved accessibility of knowledge, tools and practices to end users with farm walks, workshops, training, and websites.

70 farmer case studies published, 80 scientific papers, 230 industry conference papers, 1500 visits per month to the NPSI web site.

Increased understanding of irrigation decision-making.

New irrigation essentials web search engine released.

Provision of training for irrigators in a range of industries.
 278 vegetable growers in Western Australia involved in irrigation scheduling project.
 471 cotton and grain growers involved in project.
 300 wine grape growers engaged vineyard salinity workshops.
 50 citrus growers attended nutrient management workshops.
 80 farmers trained in reducing evaporation from farm dams.
 Rice growers environmental champions program updated.
 40 participants at water and solute master classes.
 Soil management guidelines for vineyards and orchards.
 Fertigation guidelines for citrus growers produced.
 Irrigation Essentials flagship document produced; 60 case studies.
 8 regions in Western Australia work shopped on climate and water such as Carnarvon, Harvey, Swan Valley, Margaret River.
 Information passed onto Industry, NRM bodies and government.

GOAL 4 Research leadership

A national approach to irrigation related R& D in Australia, which includes a strong focus on a skilled human resource base and enhanced R&D capacity and collaboration.
 A future national irrigation R&D investment plan launched in partnership with Irrigation Australia.
 Co-chaired with CSIRO, Primary Industries Standing Committee National Water Use in Agriculture strategy.
 Six industry international travel fellowships funded.
 10 training travel support for irrigators/advisers from sugar, horticulture, grains, cotton industries.
 12 undergraduate student research projects funded to encourage youth and the next generation of irrigation professionals.
 Sponsorship of Irrigation Australia Conferences and other workshops.



NPSI research teams have worked with irrigators to find practical solutions to their problems: cotton and grain farmer and CRDC Director, Cleve Rogan, with Dr Ian Dagley (CRC Polymers) and Dr Greg Qiao (The University of Melbourne).



COTTON AND CLIMATE CHANGE

The challenges of climate change

Responding to the challenges of lower water availability and reliability while remaining profitable are the key drivers for change on Australian cotton farms. Successfully responding to these drivers gives cotton growers the best chance to adapt to climate change and reduce greenhouse gas emissions.

A SWOT (strengths/weaknesses/opportunities/threats) analysis in relation to climate change showed that the industry has built significant capacity to address a range of climate-related challenges into its Best Management Practices (BMP) system, on-farm first and then through the rest of value chain. This should provide a head start for meeting the Australian Government's goal to reduce national emissions.

In July 2009, a workshop co-convened by CRDC and the Climate Change Research Strategy for Primary Industries (CCRSPI) enabled the cotton industry to discuss the possible implications of climate change and identify research, development, extension and communication priorities. The following table lists the priorities that emerged from the 2009 workshop, along with current CRDC actions or investments that address each priority and future actions planned to address them.

Industry Priority	Actions/Activities Addressing Priority in 2011–12	Planned Actions to Address Priority
Productivity related priorities		
Nitrogen Use Efficiency – seed Nitrogen testing	<p>A Cotton CRC project funded by CRDC has identified that:</p> <ul style="list-style-type: none"> on average, Australian cotton growers are oversupplying their crops with nitrogen (N) fertiliser testing the N content in cottonseed can be used to estimate whether crop N use was at an appropriate level. Oversupply of N is associated with higher costs and nitrous oxide emissions (a potent greenhouse gas) and undersupply with lower yield. 	<p>During 2011–12, CRDC worked with Cotton Australia and Cotton Seed Distributors to establish a new joint venture to support the future development and delivery of R&D and the <i>myBMP</i> program. In 2012–13, this joint venture will commit resources to a major campaign aimed at encouraging cotton growers to optimise N fertiliser use without increasing the risk of reducing yield.</p>
De-nitrification inhibitors	No current research is taking place.	<p>Research on de-nitrification inhibitors has been addressed in grain and livestock systems under the Nitrous Oxide Research Program. The outcomes are expected to inform the potential for using inhibitors in cotton systems.</p>
Resource use efficiency (energy, water): relationship to carbon (See above for Nitrogen Use Efficiency)	<p>Water Use Efficiency (WUE):</p> <p>A joint project with the Grains R&D Corporation (GRDC) continued to benchmark water use on irrigated cotton and grain farms. For cotton, the project has confirmed a 40 per cent improvement in WUE over the last decade. Improved WUE reduces unnecessary water pumping and energy use.</p>	<p>Benchmarking WUE on irrigated cotton farms is continuing under a new CRDC-funded project.</p>



Industry Priority	Actions/Activities Addressing Priority in 2011–12	Planned Actions to Address Priority
	<p>Energy Use Efficiency:</p> <p>In 2007, CRDC funded the development of EnergyCalc, an on-line tool to assist in monitoring and auditing on-farm energy use. Case studies on cotton farms indicated that average greenhouse gas emissions from fuel and electricity use were 0.71 tonnes carbon dioxide equivalent per hectare. The average annual greenhouse gas emissions estimate from soils for cotton in the National Greenhouse Gas Inventory was 0.67 tonnes carbon dioxide equivalent per hectare. Consequently, CRDC has concluded that in order to reduce the industry's carbon footprint effectively, addressing energy use efficiency is of equal importance to N use efficiency.</p>	<p>A continuing National Centre for Engineering in Agriculture project conducted more detailed assessments of energy use on cotton farms commenced in 2011–12 and is developing the capacity to benchmark energy use on farms and integrate tools, information and services with the cotton industry's <i>myBMP</i> system.</p> <p>In 2012, CRDC commissioned a small new project with the NCEA to develop EnergyCalc Lite, a reduced input energy calculator available on the internet or via a tablet app which enabled growers to assess their on-farm energy use and for those using <i>myBMP</i> to have the relevant BMPs ticked off automatically. EnergyCalc Lite is expected to be available by December 2012.</p>
	<p>Life Cycle Assessment (LCA):</p> <p>CRDC is contributing to a RIRDC initiative that will seek to develop a Life Cycle Inventory for Australian agricultural practices. This project commenced in 2011–12.</p> <p>In 2012, CRDC commissioned a review of water LCAs for cotton.</p>	<p>The water LCA review report will be used by CRDC in 2012–13 to determine the scope of an Australian cotton water LCA project that is under consideration.</p>
<p>Comparisons of gross margins and future supply chain modelling</p>	<p>The completion of the first LCA for Australian cotton has introduced an understanding of the impacts of inputs, production practices and processing on greenhouse emissions. Further work is required to utilise this for benchmarking and modelling more widely by the industry.</p> <p>A new project established with the University of Technology Sydney (UTS) in 2011–12 is seeking to identify opportunities for on-farm practice improvements (e.g. Adoption of BMPs) to be utilised further along the value chain and to fill the needs of garment manufacturers and brand owners in meeting consumer expectations.</p>	<p>This priority is partially addressed in a continuing project established in 2010–11, which is developing social, economic and environmental performance information and improving data gathering, access and reporting for the cotton industry.</p>
<p>Plant physiology under changed climate scenarios</p>	<p>A postgraduate project continued in 2011–12 to address this information gap. It will measure the response of cotton to changes in temperature, moisture and vapour pressure deficit. The outputs will be used to improve the CSIRO's cotton model, OZCOT.</p>	<p>Outputs from this research could influence the selection of future traits in cotton cultivars.</p> <p>New projects commencing in 2012–13 will assess the future impacts of climate change and extreme weather events on the cotton industry.</p>



Industry Priority	Actions/Activities Addressing Priority in 2011–12	Planned Actions to Address Priority
<p>Better Integrated Pest Management (IPM) of pests such as Silverleaf whitefly</p>	<p>Current research capacity has enabled the industry to respond to changing pest problems; however, pests that prefer hotter, drier conditions could further expand their territory under projected climate change scenarios.</p> <p>A project established in 2010–11 continues to focus on IPM of key pests such as Silverleaf whitefly, which has expanded its impact from the northern to the central cotton growing regions in Australia in recent seasons.</p>	<p>CRDC will continue investments in projects aimed at improving cotton IPM systems. These are expected to help the industry adapt and respond to climate-driven changes in pest populations.</p>
<p>New diseases/pests: new species and movement of existing pests</p>	<p>See the priority above for insect management. For diseases, CRDC continues to support projects in both NSW and Queensland. These projects conduct extensive surveys of commercial cotton crops in all districts to monitor the presence of existing diseases and to provide surveillance for potential new disease threats.</p>	<p>CRDC proposes to continue annual disease surveys in NSW and Queensland. Capacity to provide disease surveys in new areas such as the Burdekin and Ord River will be addressed through the expertise established under these investments.</p>
<p>Market place: Australia v. global situation (for example, a scoping study of climate change policy in other cotton producing countries)</p>	<p>No direct activities in 2011–12.</p>	<p>Opportunities to address climate change policy in other cotton producing countries will be considered by CRDC as it develops its new strategic plan for 2013–18. The UTS project mentioned above is expected to address this issue from the perspective of the countries to which Australia exports its cotton. This would include environmentally more sustainable cotton being driven in the market by the major brand owners.</p>
Social/Capacity and Communication related priorities		
<p>Communication to public of results relating to greenhouse gas emissions</p>	<p>As background, CRDC commissioned a cotton LCA in 2009, which considered global impacts including greenhouse gas emissions, ozone layer depletion, mineral and fossil fuel resource depletion. See the Summer 2009 edition of CRDC's <i>Spotlight</i> magazine at www.crdc.com.au.</p> <p>In 2011–12, CRDC continued to publish a range of articles in <i>Spotlight</i> (which can be found and subscribed to at www.crdc.com.au), that provide comprehensive information on different aspects of greenhouse gas emissions as they relate to the cotton industry.</p>	<p>The information provided in the LCA is being used to assist the industry to focus on key areas where cotton growers can achieve benefits from the Carbon Farming Initiative.</p>
<p>Government policy impacts on community</p>	<p>The Cotton CRC commissioned socio-economic case studies of eight communities in the Murray-Darling Basin. These were peer reviewed and released in July 2010. These case studies were of value to those communities, irrigation and other industries and policy makers in helping to understand the impact of policy responses to water resources and climate change.</p>	<p>In association with Cotton Australia, CRDC continues to monitor the need for further socio-economic research. A commissioned project to expand the current Stubbs & Associates longitudinal study of eight MDB communities, based on the census data from 1996 to 2006, will be considered in 2012–13 to enable 2011 census data to be included.</p>



Industry Priority	Actions/Activities Addressing Priority in 2011–12	Planned Actions to Address Priority
Benefit of downscaling of climate models	CRDC has not had the capacity to invest in the development of climatic models downscaled to provide better predictability of the impact of climate change scenarios at regional or local catchment scales. Instead, CRDC has concentrated on supporting research that will improve the responsiveness and accuracy of the cotton crop simulation model, OZCOT. If OZCOT is able to perform accurately under the current range of cotton production climatic conditions, it is reasoned that it can be used to forecast crop responses to future changes in climatic conditions.	CRDC will continue to monitor developments through the Bureau of Meteorology and is investigating opportunities to invest in the Managing Climate Variability Program, managed by GRDC. A postgraduate project established in 2010–11 is measuring the response of cotton to changes in temperature, moisture and vapour pressure deficit. The outputs will be used to improve the CSIRO's cotton model OZCOT.
Training on energy use efficiency	CRDC has previously contributed to projects that have led to training courses on water use efficiency. Courses on pump efficiency and the correct set up for overhead irrigation systems have been particularly popular amongst growers. Demand for these courses is expected to continue as the cost of energy increases. CRDC supported the development of a simpler version of the on-farm energy monitoring and assessment tool, EnergyCalc, as a first step to providing the foundation for training in energy use efficiency. A new irrigation benchmarking and extension project commenced in late 2011 and will include energy use as well as water use efficiency in all future on-farm benchmarking activities.	The new development and delivery joint venture between CRDC, Cotton Australia and Cotton Seed Distributors will include new resources to increase the level of information and training for growers on energy use efficiency.
A 'Carbon pack' linked to myBMP Highlight on-farm benefits of adapting to climate change – Win/win situation (NUE, energy savings) Benchmarking 'hot topics'	The incorporation of a new module on Energy and Input Efficiency in myBMP is expected to heighten the demand for information and training on energy use efficiency over time as more growers use myBMP in their businesses. CRDC is supporting a PhD student, Francois Visser, who is based at the University of Queensland, to review international cotton carbon calculators and seek to develop a more consistent approach.	myBMP will not only assist cotton growers to access relevant and up to date research information in accordance with their particular needs, it will also help the industry to identify demand for new information and training. The new development and delivery joint venture between CRDC, Cotton Australia and Cotton Seed Distributors will include new resources to increase the level of information and training for growers on adapting to climate change and managing carbon on-farm.



Industry Priority	Actions/Activities Addressing Priority in 2011–12	Planned Actions to Address Priority
Collaboration across industries	<p>CRDC has a representative on the Steering Committee of the Department of Agriculture, Fisheries and Forestry/GRDC Nitrous Oxide Research Program.</p> <p>In terms of CRDC funded greenhouse gas emission and carbon research, cotton and grain crops are included in the two long-term irrigated farming systems experimental sites at ACRI, Narrabri.</p>	<p>Even though the cotton industry was unsuccessful in obtaining support for its greenhouse gas emission research via the Australian Government Department of Agriculture, Fisheries and Forestry Carbon Farming Futures program CRDC has continued to support research on behalf of the cotton industry in this area which will also benefit the grains industry. CRDC will ensure the data from these sites will contribute to the national nitrous oxide program.</p>
Adoption strategies – collaboration	<p>The new development and delivery joint venture between CRDC, Cotton Australia and Cotton Seed Distributors will include new resources to increase the level of information and training for growers with a clearer focus on implementation of R&D outputs and knowledge and integration with <i>myBMP</i></p>	<p>The Cotton Development and Delivery team has developed its plans for 2012–13. Key priority areas will include N, energy and water use efficiency as well as Integrated Pest Management (IPM).</p>
Biophysical related priorities		
<p>Soil carbon-nitrogen interaction (with more locations, soil types over time)</p> <p>Soil carbon-water interaction (WUE: more location-specific needs)</p>	<p>CRDC is investing in a project to more fully research the opportunities to increase soil carbon and how this interacts with N use and management.</p> <p>See under “Resource use efficiency” for comments on WUE.</p>	<p>Opportunities to expand the number of sites and soil types covered by R&D on carbon and nitrogen will be investigated in 2012–13.</p>

EFFICIENCY AND EFFECTIVENESS OF OPERATIONS

The Cotton RD&E Strategy

The Cotton RD&E Strategy is a major efficiency and effectiveness collaboration opportunity for CRDC and for industry research, development and extension (RD&E) in general. It sets out priorities for the sector's RD&E organisations and industry to cooperate on a national basis to address the strategic needs of the cotton industry. The strategy was formally approved in 2011 by the Primary Industries Ministerial Council and is part of the National Primary Industries Research Development & Extension (RD&E) Framework (see www.daff.gov.au/agriculture-food/innovation/national-primary-industries). The specific benefits include improved strategic alignment of decision making; effective partnerships to implement RD&E where roles are clarified, resources optimised, collaboration and innovation are enhanced.

RD&E Priorities

There are five distinct RD&E priorities for the cotton sector over the next 10 to 20 years, with the potential to individually and collectively improve the cotton industry, while remaining flexible and dynamic in order to meet a range of social, climatic, market and regulatory conditions. There are challenges with maintaining a balanced portfolio of investment, focus (research versus development and extension) and capabilities across the priorities. The priorities are:

- **better cotton plant varieties**, which have contributed significantly to the industry's successes to date and is an area of considerable RD&E capability.
- **farming systems** to improve production sustainability and the quality of cotton produced.
- **innovative, resilient and adaptive people, businesses and communities** are crucial to the future success of the cotton industry. Building and sustaining the capacity of individuals and institutions, and working with them to adapt to change, will contribute to providing the future social fabric of the sector. This emerging RD&E priority has strong links to vocational training, regional development and structural adjustment.

- **product and market development**, which includes fibre processing, development of new high quality cotton products and markets, and providing quality assurance that integrates fibre quality and sustainability. This priority will become increasingly important to maintain market/resource access, improve industry reputation and differentiate Australian cotton.
- **RD&E development and delivery**, which explicitly recognises that considerable and sustained effort is required to ensure that research knowledge is developed to deliver a range of products and services to cotton farmers, communities, markets and government.

Implementation

The Cotton Innovation Network provides strategic oversight, coordination and communication for cotton RD&E in four interdependent focal elements: strategy and investment, research and development, development and delivery, and capability management.

Implementation has progressed beyond initiation of the Network and buy-in of members to the coordination stage, which focuses on establishing the network as a functioning entity and implementing immediate and practical coordination tasks identified for each element. The scope of research to be conducted within each of the RD&E priorities has been assessed and the alignment of current research is being evaluated.

The Cotton Innovation Network comprises senior representatives of the Australian Government Department of Agriculture, Fisheries and Forestry, Cotton Australia, Cotton Seed Distributors Ltd, CSIRO, NSW Department of Primary Industries, Queensland Department of Agriculture, Fisheries and Forestry and the Australian Council of the Deans of Agriculture. CRDC provides the secretariat and funds the services of an independent consultant to support the work of the Network.

Having a capable and effective network of RD&E organisations working with industry to consider options to improve cotton RD&E is



central to making improvements in efficiency and effectiveness. The challenges are the tight fiscal outlook for RD&E organisations, the need to maintain cotton specific capability as well as drawing on a broad range of capabilities to deliver on an expanding suite of RD&E priorities.

Corporate operations

The Corporation is committed to continuous improvement in the efficiency of its expenditure, whilst maintaining or improving the effectiveness of its R&D investments. In doing so, CRDC takes a holistic business approach that recognises not only the costs but also the risks and returns in delivering outcomes from the 80 to 90 per cent of CRDC expenditure invested in R&D. Having skilled and experienced people who can scan, scope and manage portfolios of R&D investment proactively through to adoption for strategic outcomes is an important element of capacity, which supports the effectiveness of the rural R&D system as a whole.

In response to the resurgence in cotton production and improved revenue, CRDC has been able to increase its total R&D expenditure of the previous year by nearly 40 per cent. Total R&D expenditure now exceeds pre-drought levels, whilst a small team of personnel has been maintained, thus increasing the proportion of overall expenditure in R&D.

CRDC continued to work with the Council of Rural R&D Corporations' Chairs to investigate administrative efficiency gains within the rural

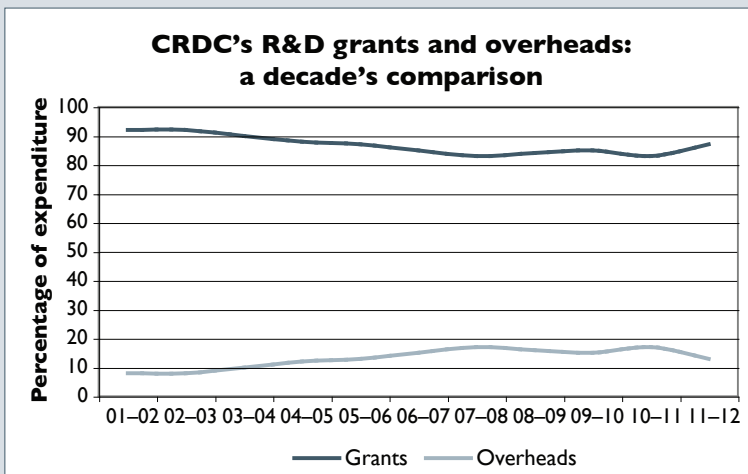
R&D Corporations (RDCs) and the rural R&D system as a whole. This includes standardisation of agreements and intellectual property policy.

CRDC also strives for continuous improvement in its planning and reporting procedures and documents. The CRDC Annual Report 2010-11 won an award in the Institute of Public Administration Australia (ACT Division) 2012 Annual Report Awards.

Delivering return on investment

One of the Corporation's formal Principles of Operation is to strive to maximise return on industry and public funds invested through our Corporation.

With significant taxpayer dollars invested in industry R&D through the 15 RDCs, the Council of Rural Research and Development Corporations' Chairs (CRRDC) developed a rigorous external process in 2006 to determine the value of these R&D investments to the industries involved and to the Australian taxpayers. Since that time CRDC has conducted seven evaluations compliant with the CRRDC's evaluation framework. In addition to this, in 2008, CRDC commissioned an independent whole of portfolio evaluation for the R&D investments made during the 2003-08 strategic plan. During 2011-12, CRDC directed its R&D evaluation efforts to support the evaluation of the Cotton CRC's previous six years which showed the CRC's R&D programs had contributed over \$1 billion worth of value



to the cotton industry, its catchments and communities. As the largest industry investor in the Cotton CRC, CRDC is proud to have been a partner in achieving this excellent outcome.

Changes to R&D procurement process

CRDC has introduced new dates for its annual open call for R&D proposals. Stage One is the Preliminary Research Proposals, which are submitted online using the Corporation's Clarity system by 1 August: four weeks earlier than previous years. Cotton Australia research panels provide advice on the proposals by 9 September and CRDC feedback is completed by 30 September. Proposals that meet strategic and industry priority needs are invited to develop full research proposals due in late November. In allowing more time for consultation with researchers on the proposals and with industry about priorities, research projects are refined to a higher standard and researchers are clearer on the obligations their contracts with CRDC place on them.

Collaboration and Cooperation

CRDC sought to maintain collaborative links and partnerships in 2011–12, where these maximise investment outcomes or where there is a need to respond to a broader issue or challenge facing agriculture or the cropping sector.

Collaboration with other RDCs at both strategic and conceptual levels is an important means by which CRDC leverages higher returns from its investments. CRDC participated in activities that include joint national strategic R&D planning with the Primary Industries Standing Committee (PISC), particularly in relation to climate change,

soils and water, communication and impact evaluation. A great deal of collaboration and cooperation takes place through the Council of Rural Research and Development Corporations' Chairs: a forum for supporting the RDCs in collectively maximise their ongoing contribution to a sustainable and profitable Australian agricultural sector.

This collaboration extends well beyond co-investment. Cooperation, coordination and communication are equally important to avoiding duplication in research and maximising the impact of research outcomes. The scale of this collaboration extends from large national research programs to small local projects and administration, to bring a national focus in dealing with climate change, soil health, irrigation, crop protection, farm safety and human capacity.

CRDC's largest financial collaborative investment in 2011–12 was through the Cotton Catchment Communities CRC (Cotton CRC). CRDC invested approximately \$3.6 million dollars in the CRC, with all but \$100,000 of that tied to specific projects that addressed both CRDC's and the CRC's strategic objectives. Community collaboration in 2011–12 included continuation of an Aboriginal school-based traineeship program, developed by CRDC with assistance from the Aboriginal Employment Strategy.

Below is a table summarising CRDC collaboration with other RDCs. Many of these initiatives are covered more fully in Report of Operations – Research and Development, beginning on page 31.

Collaboration with Rural R&D Corporations in 2011–12

Theme, Program or Project	Nature of Collaboration
Council of Rural RDC Chairs	Collaboration with all RDCs in communication, coordination and collaboration at the broadest level.
Communications Managers	Using cross-RDCs communication opportunities to promote our rural industries and R&D achievements.



Theme, Program or Project	Nature of Collaboration
Business managers	<p>Cooperation with all RDCs to improve administration, contracts, program management systems and IP management in alignment with the Council of RDCs harmonisation project.</p> <p>CRDC and GRDC continued to cooperate on best practices and innovation in IT, finance and administration. CRDC and RIRDC continue co-hosting arrangements for Clarity program management software systems.</p>
Climate change	<p>During 2011–12, CRDC worked collaboratively with other RDCs and partners of Climate Change Research Strategy for Primary Industries (CCRSPI) to review CCRSPI's key strategic themes as well as provide data to an audit of R, D & E on climate change.</p> <p>CRDC also continued to participate as a member of the steering committee for the Nitrous Oxide Research Program, which is convened by GRDC as the major industry co-investor with the Department of Agriculture, Fisheries and Forestry.</p>
Development of a Life Cycle Inventory for Australian Agriculture – AusAgLCI	<p>During 2011–12, CRDC contributed to a joint program managed by RIRDC to establish a Life Cycle Inventory for Australian agricultural industries. Other partners in the project include Forest and Wood Products Australia, Dairy Australia, GRDC, Horticulture Australia, Meat & Livestock Australia and Sugar RDC.</p>
National Program for Sustainable Irrigation (NPSI)	<p>CRDC successfully maintained its role as the managing agency for the NPSI program which was extended for an additional 12 month period to 30 June 2012. This enabled R&D projects to be completed as well as evaluation and communication activities with partners to be wrapped up effectively. NPSI involved GRDC, Horticulture Australia Ltd (HAL), the Sugar R&D Corporation (SRDC) and 12 other public and private sector partners and has allowed the establishment of cross-industry investment opportunities for irrigated agriculture. CRDC has benefited directly from investments in training and improved capacity to measure and manage water efficiently. The partnership has allowed targeted co-investment with GRDC in particular.</p>
Collaborative Partnership for Farming and Fishing Health and Safety	<p>CRDC continued this co-investment with the Rural Industries, Grains, Sugar and Fisheries RDCs and the Australian Government Department of Health and Ageing in this program, which began in 2007–08. The Partnership invests in R&D to improve the physical and mental health of farming and fishing workers and their families and the safety of the environment and work practices in these industries.</p> <p>This program wound up in June 2012; however, RIRDC agreed it would be willing to continue managing an ongoing collaborative program for another five years provided other partners wished to contribute. CRDC has joined RIRDC, GRDC, SRDC and FRDC in the new program to be known as the Primary Industries Health and Safety Collaborative Partnership.</p>

Theme, Program or Project	Nature of Collaboration
Spray drift minimisation	As the areas under conservation farming practices and GM herbicide-tolerant crop technology increase in cotton/grain producing regions, so too does the potential for spray drift damage to susceptible crops. During the year CRDC and GRDC continued to co-invest in a program to map the location of farms where cotton is grown and in delivering spray application management training workshops to growers and agronomic advisors. Spray drift damage to cotton crops in 2011–12 was relatively low considering the large areas planted, which demonstrates that the excellent cooperation between the cotton and grains industries continues to achieve results.
Crop nutrition	A collaborative project on phosphorus and potassium nutrition in cotton and grains in northern NSW and Queensland was finalised in 2011–12. GRDC is the project manager and CRDC provides its investment directly to them to reduce administrative costs for the research provider.
Insecticide resistance monitoring and management	CRDC and GRDC continued to co-invest in R&D to monitor resistance in <i>Helicoverpa armigera</i> and <i>Helicoverpa punctigera</i> to a range of pesticides commonly used on both crops.
Shared weed management issues	CRDC continued to collaborate with GRDC on a weed management research project in southern Queensland. In particular, close interaction continues within this project, and directly with GRDC, on the important issue of glyphosate resistance management and this led to the establishment of a new joint development and delivery-focused project initiated in 2011–12.
Education	<p>CRDC is collaborating broadly with rural RDCs and universities through the national Primary Industry Centre for Science Education (PICSE). This program is building on a decade of success in attracting high school students into science education and, beyond that, to careers in science that support agriculture. Other rural RDCs co-investing in PICSE are GRDC, FRDC, Dairy Australia, RIRDC and HAL. The universities involved are the University of Tasmania, University of Western Australia, The University of New England, University of Southern Queensland, University of the Sunshine Coast and Flinders University.</p> <p>During the year CRDC continued a partnership with six other RDCs (RIRDC, Grains, HAL, Grape and Wine, APL, AECL) to invest in an undergraduate scholarship program now known as the Horizon Scholarship. The program is managed by RIRDC and now supports 26 undergraduate scholarship holders, 4 of whom have scholarships funded by CRDC.</p>



OPERATING CONTEXT

The Australian cotton industry

The Australian cotton industry is regionally based and export-driven. Cotton is produced in regional NSW and Queensland by some 1,500 growers, and employs up to 14,000 people depending on variable seasonal and market conditions. The productivity and sustainability of the cotton industry has improved significantly over the past 20 years through technology development and improved management practices. Average production per hectare has increased from 7.3 bales to 8.7 bales in the past five years.

On a global scale, Australia is not a large cotton producer, growing only around three per cent of the global crop. Nevertheless, around 99 per cent of the national crop is exported and after a record crop in 2010–11 Australia returned to its pre-drought position of the world's third largest exporter of cotton. ABARES (*Agricultural Commodities, September Quarter 2012*) forecasts Australian cotton exports to increase by four per cent in 2012–13 to a record 1.04 million tonnes (4.58 million bales). If this forecast is realised, Australia will surpass India to become the second largest exporter of cotton in the world, after the United States.

More than 60 per cent of Australia's cotton is grown in NSW, with the remainder almost all grown in Queensland. Successful cotton trials are taking place in the Burdekin under tropical conditions and in 2011–12 cotton was grown as far south as the southern Riverina district in NSW. The average Australian cotton farm is 4630 hectares in size, with 362 hectares planted to cotton and 2840 hectares used for dryland cropping or grazing. Cotton production is highly mechanised, capital intensive, technologically sophisticated and requires high levels of management expertise.

The future of the industry is influenced by a number of critical uncertainties, including climate variability, water availability, competitiveness with food production, product differentiation, grower dedication and industry profitability (including cotton's declining proportion of the international fabric market). This means that the industry's size will vary from year to year and growth will be reliant on

productivity gains, improved sustainability and market development. The decade-long drought saw the number of cotton growers reduced to fewer than 900; however, the excellent season and higher per-bale returns in 2010–11 saw the return of significant numbers of experienced cotton growers, as well as many growers new to the cotton industry. With the industry still in a buoyant state in 2011–12, this growth in the number of industry participants continued.

With 99 per cent of the Australian cotton crop exported, the industry operates in an environment of intense global competition and must therefore continually improve operational efficiency, environmental sustainability and quality of the product to remain competitive. An intensive R&D effort seeks a high value market niche for Australian premium cotton.

A record crop in 2012

The 2011–12 season saw Australian record cotton production of more than five million bales. The 2011–12 floods adversely affected some cotton regions in early 2012, particularly in the Gwydir, Namoi, Mungindi and Walgett regions in NSW and the Dirranbandi and St George regions in southern Queensland. This flooding is estimated to have caused an 11 per cent loss to total crop production.

The coming season

ABARES (*Crop Report, September 2012*) forecasts Australian cotton production in 2012–13 to be 4.37 million bales. This reflects a year in which irrigation dams are expected to hold plentiful supplies of water and gross margins that still favour production of irrigated cotton compared with alternative crops. This is despite the forecast decline in world cotton prices. There is expected to be a fall in dryland cotton production compared with 2011–12 record plantings.

The world indicator price for cotton, Cotlook 'A' index, is forecast to fall by 16.5 per cent in 2012 (ABARES). Global cotton production is forecast to exceed consumption for the third consecutive year, returning world cotton stocks to high levels and putting downward pressure on cotton prices.

According to ABARES, world cotton consumption is forecast to increase by three per cent in 2012–13. This forecast reflects an expected fall in the world cotton-to-polyester price ratio, an assumed gradual recover in apparel demand in the United States and Europe

and expected strong economic growth in China and India: two of the world's largest cotton consuming markets.



Vision 2029 guiding the industry's future

In 2009, leaders of the Australian cotton industry developed a vision for the future of their industry that encompassed improved industry performance, collaboration and capacity, using a twenty-year time frame to ensure a longer-term strategic focus.

CRDC, Cotton Australia and the Australian Cotton Industry Council collaborated on Vision 2029, which canvassed the whole of the Australian cotton industry from input suppliers through to marketers. The Vision builds on the immense improvements that have been made in recent years in producing an excellent product

in an environmentally responsible manner. These improvements have been sustained and built on in the face of prolonged drought and issues of water security. It also reflects a labour force impacted by the attraction of work in the mining industry and the emerging challenges of climate change and its increasing variability.

In 2011–12, CRDC analysed its RD&E program to determine the ways in which it advances the vision. This will aid greatly in formulating the new Strategic R&D Plan 2013–2018: a process that is already underway.

The CRDC R&D program and Vision 2029

Element	Achieving	Means	Measured by	Where CRDC invests
Differentiated	World leading supplier of an elite quality cotton highly sought in premium markets	Improved quality matched to markets	Trends in quality of crop and sales	Market and supply chain intelligence Product, processing and supply chain innovation and improvements
Responsible	Producer and supplier of the most environmentally and socially responsible cotton on the globe	Globally demanded and demonstrated performance	myBMP grower adoption and market demand/recognition	Solutions to production constraints Optimising inputs, processes and improving environmental performance. Supporting a best-practice framework
Tough	Resilient and equipped for future challenges	Sufficient resources & rate of innovation	Industry profitability and productivity	Solutions to production constraints The capacity to adapt to climate impacts Protection from biosecurity threats



Element	Achieving	Means	Measured by	Where CRDC invests
Successful	Exciting new levels of performance that transform productivity and profitability of every sector of industry	Continuous innovation through the supply chain	Financial, human and environmental health of firms & institutions	Improving product, production and people
Respected	An industry recognised and valued by the wider community for its contribution to fibre and food needs of the world	Communication of value and open/ethical issues management	Trends in stakeholder satisfaction	Measuring and communicating performance
Capable	An industry that retains, attracts and develops highly capable people	Excellent firm HRM and coordinated WFP across industry	Workforce supply is greater than demand	Determining future capacity needs Skills and leadership The industry D&D team

Our industry body: Cotton Australia

Cotton Australia is the Corporation’s industry representative organisation under the Primary Industries and Energy Research And Development Act 1989. It was originally established in 1972 as the Australian Cotton Foundation. As the peak industry representative body, its membership comprises all Cotton Grower Associations, cotton processors and some service industry members. It is funded through a voluntary grower levy of \$2.25 (2011-12) on each bale of cotton produced. Its head office is located in Sydney, with regional hubs in Narrabri, Brisbane and Toowoomba. The Board of Directors consists of 10 elected directors who are growers and/or ginners and it sets policy and strategic direction. In 2011-12 it was chaired by Andrew Watson, a cotton grower from Boggabri in north-west NSW.

The R&D role

Cotton Australia provides advice to CRDC on research funding submissions received by CRDC each year, after canvassing the views of its grower representative organisations on the relevance of the submissions to their needs.

Cotton Australia advisory panels reflect the R&D programs established under the CRDC Strategic Plan 2008–2013 – Value Chain, Farming Systems and Human Capacity – and address

each of the CRDC Strategic Research Priorities under those programs.

These panels consider relevant research applications in detail and report their views to the organisation and to CRDC at the annual research review meeting.

In addition to its role as CRDC’s industry representative body, Cotton Australia is formally responsible for liaising on research issues generally for the cotton industry and has advised the Cotton Catchment Communities CRC (closed June 30 2012) on its R&D program.

Other industry roles

Cotton Australia supports levy paying cotton growers in cotton production and marketing, represents and promotes the Australian cotton industry to the community. Directors and staff members are represented on a wide range of working groups, boards, committees, reference groups and Grower Associations, as well as the Australian Cotton Industry Council, the International Cotton Advisory Committee, the National Farmers’ Federation and Queensland Farmers’ Federation, and NSW and Queensland Irrigator Councils.

Further information can be found at www.cottonaustralia.com.au.



A photograph of a textile spinning machine, likely a ring spinning machine, showing rows of white spools and red bobbins. The machine is complex, with many moving parts and threads. The spools are arranged in a long line, and the bobbins are visible below them. The machine is set in a factory environment.

RESEARCH ACTIVITIES

INCORPORATING STAKEHOLDER PRIORITIES

Objects of the PIERD Act 1989
(see page 76)

- a. Increase economic, environmental and social benefits
- b. Achieve sustainable use and management of natural resources
- c. Make more effective use of human resources and skills
- d. Improve accountability for expenditure

**National Research
Priorities**
Australian Government
December 2002
(see page 132)

**An Environmentally
Sustainable Australia**
*Transforming the way we utilise
our land, water, mineral and
energy resources through a
better understanding of human
and environmental systems and
the use of new technologies*

**Promoting and Maintaining
Good Health**
*Promoting good health and well
being for all Australians*

**Frontier Technologies for
Building and Transforming
Australian Industries**
*Stimulating the growth of
world-class Australian industries
using innovative technologies
developed from cutting-edge
research*

Safeguarding Australia
*Safeguarding Australia
from terrorism, crime,
invasive diseases and
pests, strengthening our
understanding of Australia's
place in the region and the
world, and securing our
infrastructure, particularly with
respect to our digital systems*

Rural R&D Priorities
Australian Government
May 2007
(see page 132)

Productivity and Adding Value
*Improve the productivity and
profitability of existing industries
and support the development of
viable new industries*

Supply Chain and Markets
*Better understand and respond
to domestic and international
market and consumer
requirements and improve the
flow of such information through
the whole supply chain, including
to consumers*

**Natural Resource
Management**
*Support effective management
of Australia's natural resources
to ensure primary industries
are both economically and
environmentally sustainable*

**Climate Variability and
Climate Change**
*Build resilience to climate
variability and adapt to and
mitigate the effects of climate
change*

Biosecurity
*Protect Australia's community,
primary industries and
environment from biosecurity
threats*

Cotton Industry Priorities
Cotton Australia
(see page 28)

*Invest in the skills,
knowledge and
occupational health
and safety of the
human resources in the
cotton industry and its
communities*

*Improve the sustainability
of the cotton industry and
its catchments*

*Improve the profitability
of the cotton industry*

*Create and support
a strong, focused and
committed research
program*

COTTON RESEARCH AND DEVELOPMENT CORPORATION

Strategic R&D Plan 2008–2013 (at www.crdc.com.au)

Annual Operating Plan 2011–12 (at www.crdc.com.au)

Annual Report 2011–12



PROGRAM ONE VALUE CHAIN

Goal

Add value to the Australian cotton industry with premium products in improved routes to market

Planned Outcome

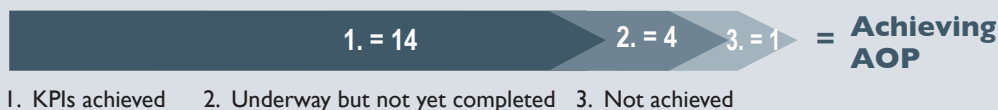
High quality consumer-preferred Australian cotton products in the world marketplace

R&D activities

	2011–12	2010–11	2009–10
Number of projects	25	32	20
Expenditure	\$1.387m	\$0.887m	\$1.185m

Performance

Performance has been assessed against two sets of criteria: the Australian Government's Operation Sunlight Key Performance Indicators, as submitted in the 2011–12 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2011–12. For detailed information, see *Measuring Performance*, starting on page 124.

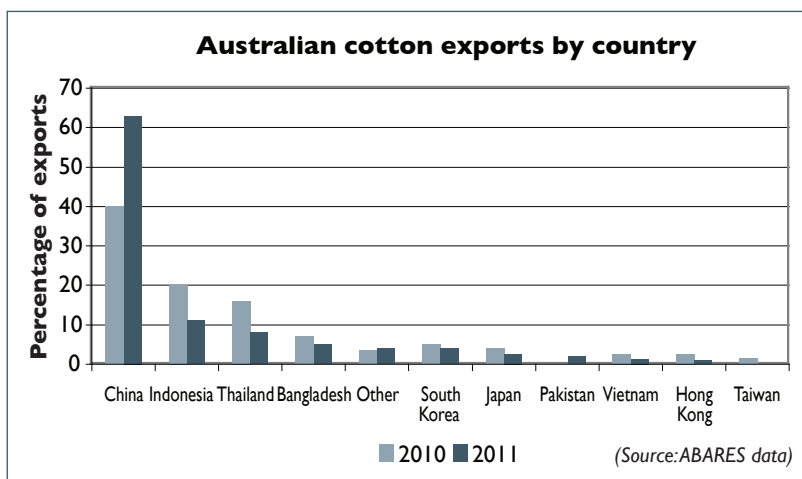


R&D activities 2011–12

The value chain context

Australian cotton production has reached records levels following a period of prolonged drought. Ginning of the 2011–12 crop is expected to continue until autumn 2013 but the industry expects to have produced some five million bales in 2011–12, returning to its pre-drought position as the world's third largest exporter of cotton.

Australian cotton exports to China increased by more than 300 per cent in 2011, which represented more than 60 per cent of total exports. Other major export destinations included Indonesia, Thailand, Bangladesh and South Korea.



Defining the challenges

While global production and consumption of man made fibres is increasing at four to five per cent per year, cotton consumption per capita has declined by 2.7 per cent per year for the last five years and there is little evidence that market demand will recover over the next five years. Major brands are seeking to increase the functionality of apparel products, which will see a greater focus on developing new man made fibre and fibre blends. Cotton's share of world fibre use, currently 36 per cent, is expected to decline relative to synthetics, whilst total world consumption for both textiles continues to grow.

Over the long term, global export markets are predicted to grow by no more than 530,000 bales per year or 0.4 per cent of world production. Minor increases in cotton production by India, China, Brazil and the United States or, in the long term, by countries such as Pakistan would result in significant competition. Cotton export markets are expected to change as spinning capacity and apparel manufacturing within China matures and major brands source cheaper alternatives. While the USA and the European Union dominate global apparel markets, significant growth is expected in the domestic markets of India and China.

Seizing the opportunities

Premium fibres represent less than three per cent of world cotton consumption but this sector of the market may provide greater resilience in use and price than base grade cotton markets. An increase in demand for premium fibres is expected as major brands shift away from low cost/low margin markets. Chinese mills are expected to focus on higher premium apparel markets, while outsourcing yarn production for base commodity markets to low cost countries.

Australian cotton has a reputation for quality. The opportunity exists to extend this reputation to secure both price premiums and, more importantly, market demand for Australian cotton. Continual improvement in fibre quality attributes, specifically around fibre length and strength will remain critical for future growth in use of Australian cotton within premium cotton apparel markets.

CRDC recognised these challenges and opportunities in devising its Strategic R&D Plan 2008–2013. This remains a key driver of the Australian cotton industry's Premium Cotton Initiative (PCI), involving partnerships across the cotton value chain aiming to secure higher value markets for Australian premium cotton varieties. The PCI brings together CSIRO-bred varieties, which have delivered a range of superior fibre quality attributes (many developed with the assistance of CRDC investments), with new textile processing knowledge, Best Management Practices (BMPs) throughout the value chain and fibre measurement tools developed with CRDC investment.

Investments in the Value Chain program have targeted on-farm and fibre processing practices that can improve fibre quality and move more of the Australian crop into the premium end of the market. During 2011–12, investments included value-adding technologies and practices across spinning and fabrics.

STRATEGIC OBJECTIVE 1

Develop contemporary knowledge and intelligence about products, markets and supply chains

Longer, stronger, finer...

International mill surveys have shown that Australian cotton is used in the production of 40 Ne to 60 Ne count yarns and fabrics (note: the higher the Ne count, the finer and higher quality the cotton). However, as the quality of cotton from competing countries improves, the price premiums for production of yarns greater than 40Ne will be reduced, leading to downward pressure on the price for raw cotton used in this market.

While yarn counts greater than 60Ne are only four per cent of the total volume of yarn produced, this premium yarn sector clearly identifies a market opportunity for Australian cotton to improve quality to a level where mills can produce higher quality 70 Ne to 100 Ne yarns efficiently. It is CRDC's objective to assess how Australian cotton can perform in these markets.

In collaboration with CSIRO and Australian Cotton Shippers (ACSA), CRDC has

investigated development of a premium class of Australian cotton or Australian Long Staple (ALS) cotton for a number of years. Evaluating the market potential for ALS cotton continued in 2011, with assessment of ALS cotton against other cotton types in selected mills. Data from the mill trials continue to show the capacity of ALS to produce premium yarn counts, either alone or in combination with other premium fibres. This work has been further extended in refining the development of Cottonspec, a novel spinning software technology that allows mills to improve their confidence in using Australian cotton for premium yarns.

... combined with sustainability

As can be seen in the Program Two summary, exceptional environmental performance is necessary to secure the industry's future. This goes hand-in-hand with premium fibre quality to strengthen the industry's developing reputation for Australian cotton in global cotton markets for which a premium is obtainable. Nevertheless, leveraging improved sustainability credentials and gaining an increased premium continue to be a challenge. CRDC has invested in a series of projects that examine key sustainability indices being adopted by international brands and non-government organisations so as to assess how the information on environmental performance collected by the *myBMP* program can be promoted internationally.

A project led by the University of Technology Sydney will determine how farmers can leverage sustainability information collected by *myBMP* to create more value from the cotton value chain. With a focus on energy and water use across the industry, the project will develop an environmental management control system (EMCS) that complements *myBMP*. This aims to enable cotton growers to gain a greater understanding of where product value is created post-farm gate by creating a more transparent pricing signal to cotton growers and more transparent on-farm sustainability information to the supply chain downstream.

In assessing *myBMP* against the internationally recognised 'Better Cotton Initiative', the project identified an overall alignment between the two systems. Complementing the UTS project, a PhD project with the University of Queensland is evaluating key international carbon indicators

used across agriculture and, in particular, the apparel industry. The project will provide an assessment of data collected within *myBMP* and how best it may be used in meeting the requirements of relevant international or apparel industry-driven carbon accreditation programs.

In assessing the array of accredited carbon calculators used across agriculture, both in Australia and internationally, it is evident that there are major differences in the final emissions estimated by these calculators. The PhD project leader, Francois Visser, is seeking to develop an internationally recognised cotton-specific carbon footprint calculator. Key to its development is assessment of input criteria and emissions factors so that it could be recognised by major international programs such as the Wal-Mart sustainability index (Apparel Index). The objective is to develop the tool as a web-based system for access by growers. The final tool may be jointly owned by CRDC, with options for uploading as a *myBMP* tool. Options for collaboration with the US 'Cool Farm Institute' established through the initial support of PepsiCo, Unilever, Marks and Spencers, Tesco and Yara are being investigated.

How international mills see our cotton

International mill survey data continues to be assessed and refined as more data is compiled across projects. The data show that Australian cotton is ranked as a premium fibre compared with other competitive cotton across most of the key fibre properties.

Australian cotton continues to score particularly well for key non-contracted specifications, particularly contamination, trash content and spinnability, where it was considered vastly superior to competing growths.

Data collected on fibre neps (tangled fibres that occur as a result of mechanical processing) has shown that in some cases Australian cotton may contain a high level of neps. More specific objective data collected across Australian cotton has shown that fibre micronaire was the most significant fibre property in terms of determining nep levels, with the next most important fibre property being fineness, followed by calculated maturity.



STRATEGIC OBJECTIVE 2

Develop improvements in current products

CRDC's investment in the Premium Cotton Initiative program targeted three core outcomes: strengthening the industry's reputation for quality, promoting industry practices in production and providing value across the whole value chain. A key aspect of this program is targeting markets that require premium fabrics and developing knowledge of how Australian cotton may best be used in these premium markets.

As shown in the graph below, the fibre length of Australian cotton continues to improve. This, combined with anticipated improvements in fibre strength and fineness, will enhance the opportunity to secure the new premium markets described above.

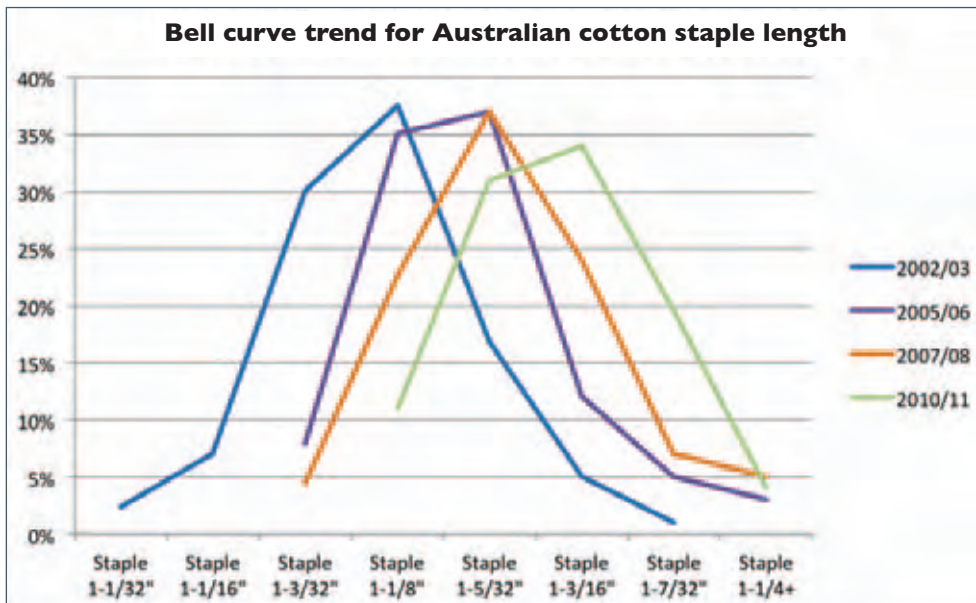
Investments in cotton yarn development have been further extended, with collaborative links established with a number of mills in China to understand how differences in fibre quality may affect yarn quality. This collaboration includes assessing the development of new yarns, fabrics and processing software tools.

In developing improved fabrics it is also important to consider consumers' purchasing

decisions. Overall fit, comfort, quality, durability and performance rank as key factors. CRDC's investment in the design of new yarns and fabrics considers how best to use the benefits provided by improvements in fibre quality and consumer demands.

The production of high quality cotton fibre is not just a question of post-farm gate processing. It begins with the decisions that farmers make in growing their crops. CRDC investments at the farm level aim to increase understanding of the key agronomic factors affecting fibre development and quality. A conclusion from this work was that a crop's fibre quality response to climatic conditions is most influenced by variety selection. Climatic conditions have been assessed for their impact on different fibre quality traits. This has led to improved modelling of fibre quality across a range of production conditions and growing regions. The use of improved crop models can assist growers develop risk assessments for fibre quality given set production conditions.

Field trials conducted in 2009–10 and 2010–11 involving selected agronomic inputs demonstrated strong correlation between fibre quality, water and nutrition stress and crop yield. The influence of variety selection across



(Source: ACSA Classing Statistics)

Case Study

Grown in Australia's backyard: a payoff for collaboration

The recently released Dri Glo Australian cotton collection is unique in that products come with more than just washing instructions. Each towel and sheet comes with its own Australian story of where it was grown – and by whom.

To date, the Australian cotton towels are manufactured using Premium ALS cotton grown in the 2009 and 2010 seasons by Glenn Rogan at St George, Queensland, and woven by Australian Weaving Mills in Devonport, Tasmania, in Australia's only towel weaving mill.

Glen Smith, at Talwood in South East Queensland, grows the cotton for Dri Glo sheets using Best Management Practices.

The official launch of these 100 per cent Australian cotton products is the culmination of work begun in 2008 under the Premium Cotton Initiative (PCI). This involved CRDC, Australian Weaving Mills, Cotton Australia, ACSA, CSIRO and a number of grower partners who committed to growing new Long Staple varieties to enable sufficient production to test the technical and commercial value of the yarn and fabrics they produced. Also involved were a number of partner spinning mills in various

markets, including India, China, Thailand and Vietnam.

The PCI was initiated to investigate brand differentiation and premium markets for Australian Long Staple and Premium cotton brands. The Premium cotton brand is used only for ALS cotton grown on *myBMP*-accredited farms.

The Dri Glo products are marketed with the slogan 'Better for the environment, for farmers, and better for you' which provides a strong message for consumers about the modern Australian cotton industry. Australian Weaving Mills' Marketing Manager, Bronwyn Morgan, said that while they knew in theory that they had premium cotton grown with best practices, it was not until they started manufacture that they realised how good the cotton is to handle. For the company, this means that with better quality causing fewer breaks, they can weave more productively, which is paramount in remaining competitive with overseas manufacturers. This, in turn, allows them to continue to bring Australian grown and made products to Australians.



The Rogan family grow the cotton that has been used to date to manufacture the towels in the Dri Glo Australian cotton collection



different agronomic inputs was less significant, with all varieties affected by treatments. There were no significant differences in yield, strength, and length uniformity in both seasons; the only fibre attributes that were consistently affected across both seasons were fibre length and fibre elongation.

The timing of crop defoliation and picking is a major factor affecting fibre quality and this was an area of investment in 2011–12. A key outcome from the research was the development of new crop management practices that improve consistency in the production of quality fibre and will enable growers to estimate fibre quality outcomes before the crop is harvested.

Research to assess the impact of agronomic management on fibre quality was extended to final yarn and fabric quality through micro-spinning techniques. Micro-spinning was used successfully in assessing experimental cotton varieties before they were released. This research allows for rapid assessment of spinnability without the need for extensive large scale spinning trials and provides direct feedback to breeders and growers on the value of fibre.

Defining fibre qualities accurately and consistently

Significant premiums can be achieved for yarns greater than 70 Ne; however, in order to justify paying these premiums, mills require an accurate assessment of which fibre properties can be used to produce a set quality yarn. This means it is critical to value-adding Australian cotton that mills understand how they can use this premium cotton to produce premium yarns and produce them efficiently.

Various types of cotton are blended at the spinning mill, depending on the quality of fabric being developed. Australian cotton is often used alone or with other lower grade cottons. To help mills improve their efficiency and use of Australian premium cotton types, CRDC investments have aided CSIRO Textile and Fibre Technology to develop the software system, Cottonspec, over the last four years. Assessment of Cottonspec continued in 2011 in a small number of quality mills in China (see the story on page 37).

International Market Development

Hong Kong manufacturer, Central Textiles, worked with brand owner UNY in Japan in 2010 on the promotion of Australian cotton. These activities continued throughout 2011 with the design of a new cotton fabric. The UNY group operates about 1,500 various specialty stores within Japan and market children's clothing (Teru Teru brand), women's apparel (Molie) and menswear (Rough Ox).

STRATEGIC OBJECTIVE 3

Facilitate the development of novel products

Developing premium yarns from new cotton varieties

The development of premium cotton varieties may allow Australian cotton to compete within the high value yarn market but it is important to demonstrate that such yarns can be produced from the new cotton varieties.

CRDC, together with researchers from CSIRO Materials Science and Engineering, has continued to investigate the performance of new varieties in the production of premium yarns. Spinning trials have shown that this Australian Long Staple (ALS) cotton can produce fine count combed ring-spun yarns in the range of 60Ne to 70Ne. More critically, in blends with Extra Long Staple (ELS) cotton, the trials found that a 70/30 blend of ELS/ALS did not result in a practical deterioration in yarn quality and processing efficiency. This is a key finding: ELS-type cotton can trade at prices 60 to 80 per cent higher than traditional Australian cotton.

These small-scale trials were supported by commercial trials in India, China, Thailand and Vietnam. Current mill perceptions of potential ALS usage are broadly consistent with the controlled spinning trials at CMSE. There is general recognition that ALS fibre can be used to produce 60Ne yarns consistently and, depending on mill setup, to 70Ne in a stand-alone lay-down. Blending ALS with Pima cotton (a variety with extra long and fine staples) enables the production of yarns up to 80 Ne.

The new opportunity for marketing ALS cotton will be dependent on the price differential



Case Study

Predicting fibre quality now a reality

Cottonspec, a yarn quality prediction software program has been developed by CSIRO with support from CRDC, the Cotton CRC and Chinese partner mills. It measures the effect of the four contributing fibre properties – short fibre content, micronaire, strength and length – on yarn properties and is expected to provide a valuable tool for selected quality mills by providing a range of commercial advantages. While not providing direct benefits to growers, indirectly the aim of the technology is to create demand-pull for higher quality Australian cotton.

Cottonspec has now undergone validation trials with mills and has proved a useful management tool, giving spinners immediate feedback on the yarn quality of fibre. It also provided excellent predictions of yarn tenacity and evenness and has been used to demonstrate to mills the value of new varieties of long staple cotton produced by Australian growers.

The impact of Cottonspec on mill performance is demonstrated by the example of a key partner mill in the project. Established in 2005, this mill is one of the most modern in China. Through collaboration with the Cottonspec project the quality of yarn they have produced has lifted dramatically. All of the yarn this mill produces is exported to Europe and Japan. Before the project, this mill had never used Australian cotton but in 2010–11 Australian cotton made up 10 per cent of its lay-downs and its management has made plans to increase this proportion in the next few years.

Cottonspec will be finalised in 2012 with a joint promotion of the technology planned within key mills across China. It will be presented in China later this year at a technical seminar to be held jointly by CSIRO, ACSA and the China Cotton Textile Association.



CSIRO researcher, Dr Shouren Yang, in China during Cottonspec validation trials. Aided by CRDC investments, CSIRO researchers are leading the world in creating tools to test and predict fibre quality.



between ALS and ELS raw fibre. If the market can be developed, higher premiums may be secured for Australian growers that produce high quality cotton.

Novel spinning technology opening new markets

The fabric industry continues to develop innovations in fabric treatments that improve function and durability. CRDC established a project in 2010 with CSIRO, Deakin University and Hong Kong Polytechnic University that is continuing to assess the use of Australian cotton in the production of low twist yarns which, without reducing yarn strength, may not only reduce spinning costs but also produce a fabric of higher quality.

In a new collaborative project with an international mill, CSIRO and Deakin University will examine the development of new thermal fabrics through the development of different thermal ratings designed for different segments of the markets. Market research by project partners has indicated that there is growing demand for such new fabrics, particularly for casual business style clothing. This project involves designing new spinning and fibre blending techniques to develop fabrics with different thermal ratings.

STRATEGIC OBJECTIVE 4

Advance cotton product processing

Extending BMPs through the value chain

CRDC investments in post-farm gate Best Management Practices (BMPs) focused initially on the ginning and classing sectors; this work was expanded in 2010 to include BMP for Warehousing and Despatch (W&D). These new BMP guidelines were finalised in 2012 and have been developed in collaboration with a range of private transport and warehouse companies, as well as relevant state government transport agencies.

The new BMP guidelines provide three clear outcomes for industry:

- A clear, concise set of guidelines for storage and handling providers to ensure cotton bales are stored in the most efficient, safe and effective way possible

- A clear, concise set of guidelines for existing and future road transport operators to load and strap cotton bale loads in the most efficient method possible, whilst still complying with performance based road safety standards
- Delivery of bale load width exemptions for cotton bale transport improves the efficiency and safety of loading and unloading, as well as the efficiency of load configuration and stability for transportation.

The project confirmed that the Load Restraint Guide and related Best Management Practices for Storage and Handling will require regular updates as legal requirements are modified. While efficiency in transport and handling has been achieved, further work may be directed to identify and test alternate load and strapping configurations.

Keeping Australian cotton contamination-free

The lack of contamination by foreign material in raw cotton is a key selling point for Australian cotton. New picking systems produce round modules that are wrapped in plastic which, if fragments were to enter the gin, could result in a significant contamination risk and potential damage to this existing competitive advantage.

Beyond reducing the chance of plastic contamination during picking, the best opportunity to detect and remove contamination is early in the ginning process. Through the use of existing high-speed lighting and colour image sensors a new prototype contamination sensor device has been developed for use in gins. The device has been developed to detect yellow and blue plastic particles but may also be used to detect other contaminants. Development of the technology has occurred through collaboration with Australian ginners and commercial partners. The work has involved technical collaboration with the company Truetzschler Gmbh, which is a producer of machines for spinning preparation and the nonwovens industry. In terms of removing material once detected, Truetzschler have commercial air nozzle ejection technology that may be adapted to use with the new sensors.

A risk assessment of plastic contamination was initiated in 2011–12, using image analysis within



selected gins. This work will be expanded to design new sensor technology to be used across different points within the gin to enable accurate detection of contaminants.

STRATEGIC OBJECTIVE 5

Develop objective measurement of Australian cotton

Taking the guesswork out of fibre classification

Although Australia has a reputation as a consistent supplier of high quality cotton, the cotton needs to be specified accurately and consistently. In order to achieve this, CRDC has, since 2004, invested in the independent assessment of the classing sector to allow individual classing facilities to correct any technical and operational shortcomings in their practices. CSIRO has conducted this work, in conjunction with the Cotton Classers Association of Australia (CCAA).

Through this assessment, the Best Management Practice Handbook for Classing has been extensively updated and expanded and linked to

the BMP Handbook for Ginning. All the classing facilities which operated over the last three years have been audited and recommended for certification by Cotton Australia: an excellent R&D outcome for the industry.

While Australian cotton is currently classed manually for colour, the Australian Cotton Shippers Association (ACSA) has requested that this subjective measurement of colour be discontinued and replaced by the objective measurement of colour by High Volume Instrument (HVI).

Assessment of the reproducibility of all HVIs has been improving consistently over the last three years. The reproducibility for fibre length, uniformity index, strength and +b (greyness) are all above 90 per cent, with the exception of Rd (reflectance) that relates to fibre colour, which is below 80 per cent. The lack of correlation of HVI colour assessment is principally due to the fact that the current colour chart loaded in the HVI instruments reflects US cotton, which is creamier than Australian cotton. Data comparing the colour grade obtained by the various HVI instruments



This semi trailer has the industry's new round cotton bales loaded and strapped in accordance with existing best practice



with visual grade assessment shows generally that HVI instruments tend to record a grade lower (that is, worse) than the visual grade. To further evaluate the assessment of fibre colour, a number of classing facilities participate in international Round Trials. The performance of the Australian instruments in the Commercial Standardisation of Instrument Testing of Cotton (CSITC) Round Trials has been encouraging; with a few exceptions, they perform better than the world average, the exception being the results for Rd.

CRDC is considering the best approach to evaluate HVI instruments for colour so that the true value of Australian cotton may be better represented.

Quarantine treatments preserving fibre quality

The Australian Quarantine Inspection Service (AQIS) plays a critical role in ensuring that Australia remains free from many serious pests, weeds and diseases present in other parts of the world.

A permit is not necessarily required to import cotton lint; nevertheless, all cotton lint imported into Australia must either be treated to ensure it is free of live insects, soil and other debris such as faeces or animal materials, or certified that any quarantine risk material present will be dealt with during processing. The quarantine treatments used by AQIS are either chemical (fumigation), using ethylene oxide or methyl bromide (being phased out as it depletes ozone) or by radiation (normally gamma irradiation), the preferred option, using a dose of 25 or 50 kGray (kGy).

CRDC invested in a project to assess the effect of quarantine treatment on fibre quality. The results indicated that fumigation treatments by either ethylene oxide or methyl bromide had little or no significant effect on the physical properties of the cotton fibre. However, gamma irradiation, even at lower dosages, did have an effect on the physical properties (strength, elongation, length and colour) of the fibre, with these effects becoming more apparent and significant as the dosage strength increased.

The results from this study allowed the CCAA to approach AQIS to amend their procedures. AQIS have now agreed that samples will only be treated by ethylene oxide fumigation, provided the facility has an import permit.

PROGRAM TWO FARMING SYSTEMS

Goal

Cotton in a highly productive farming system with improved environmental performance

Outcome

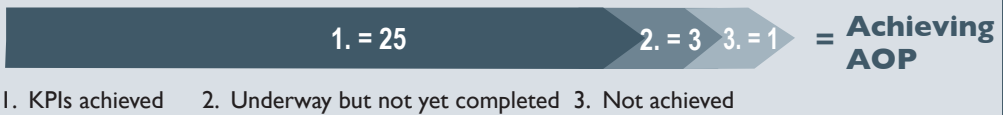
A more resilient, profitable and competitive cotton farming system

R&D activities

	2011–12	2010–11	2009–10
Number of projects	73	60	54
Expenditure	\$6.558m	\$4.853m	\$4.976m

Performance

Performance has been assessed against two sets of criteria: the Australian Government's Operation Sunlight Key Performance Indicators, as submitted in the 2011–12 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2011–12. For detailed information, see *Measuring Performance*, starting on page 124.



STRATEGIC OBJECTIVE 1

Build the industry's understanding of climate and natural resources challenges

Growing cotton in a changing climate

CRDC continued its support for the Climate Change Research Strategy for Primary Industries (CCRSPI). During the year the CCRSPI secretariat and partners dealt with several important matters:

- A review and revision of the CCRSPI key strategic theme areas in preparation for its submission to PISC as a national cross sector Research, Development and Extension plan on climate change
- An audit of the investments in climate change related R&D among partner organisations against the revised strategic theme areas
- Commencement of the development of an implementation plan for CCRSPI.
- Preparations are underway for a second CCRSPI conference in Melbourne in November 2012.

A new project supports Tanya Howard, one of four PhD students working on an integrated Australian Research Council-supported program to investigate the next generation of rural landscape governance. The project is progressing well with literature reviews, regional workshops and a national survey currently underway. The research has five core themes, with the research team focusing on different aspects of behaviourally effective rules, co-regulation, overarching legal architecture, effective engagement and risk instruments.

A continuing project seeks to improve capacity to assess greenhouse gas emissions from broadacre irrigated cropping systems. During winter and spring 2011, the automatic greenhouse gas (GHG) emission chamber equipment was deployed in plots of vetch, faba beans, wheat and fallow. The project began measuring GHG emissions from the cotton–faba bean–fallow system in September 2011. The cotton crop was measured during 2011–2012 and faba beans were planted in May. Nitrous oxide, carbon dioxide and methane concentrations were measured, which allowed GHG emissions to be determined on an hourly



basis. This system will be measured over the two-year cycle and the equipment will then be moved on to another rotation system.

This project confirmed that excessive nitrogen (N) fertiliser application increases nitrous oxide emissions exponentially (see the graph below). When crops received N fertiliser applications at the rate that soil analyses had identified as economically optimum, they emitted relatively small quantities of nitrous oxide. The carbon dioxide emissions were slightly higher when higher N fertiliser rates were applied.

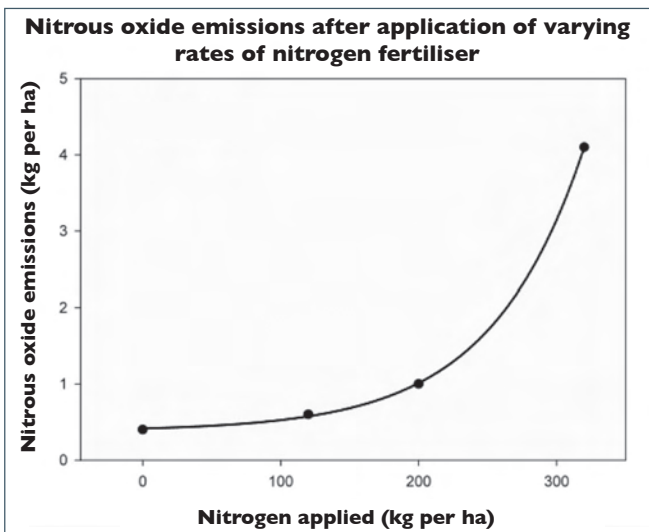
This trial site has been a long-term farming systems site for 16 seasons. Soil carbon levels are increasing in all of the cropping systems being compared, and at a rate exceeding the carbon dioxide equivalent emissions that occurred during the production of the cotton and rotation crops and fallows. GHG emissions increase after each irrigation. Management of irrigations to minimise waterlogging and promote better drainage will reduce those emissions.

An ongoing project developing a Protocol for Assessing On-Farm Energy Use and Associated Greenhouse Gas Emissions is progressing well. It uses farm energy use data benchmarked from site visits and the standard assessment and reporting methodology used in the previously developed tool, EnergyCalc. The benchmarking exercise continues, with core site visits

completed in March/April 2012 and again in May. The data set is growing and now encompasses 6,623 hectares and 60,198 bales of cotton production, providing a good basis for industry awareness.

Updated industry benchmarks suggest that energy costs per bale for dryland systems (\$12 per bale) are 2.6 times lower than irrigated systems (\$31 per bale) and GHG emissions per bale are 5.2 times lower for dryland systems (30 kilograms per bale) compared to irrigated systems (156 kilograms per bale).

A new project dealing with alternative energy sources for cotton production that commenced in 2011–12 has completed a desktop review of alternative energy and fuel technologies for consideration by the cotton industry. This report provides a good reference guide for the cotton industry of alternative energy options, highlighting specific technologies, costs, pros and cons. To complement the review, a brief survey has been developed in a web-enabled form to test current adoption, awareness and interest by the cotton industry in alternative energy technologies. This will help inform the project team and provide some direction for future activities planned in the project. The project team will look at the feasibility of these technologies in parallel with existing energy assessment field sites under the on-farm energy protocol project discussed above.



As this graph shows, nitrous oxide emissions increased exponentially once the economic optimum N fertiliser rate (200 kilograms of N per hectare in this instance) was exceeded.

Powering up with cotton seed oil a possibility

Laboratory trials are underway to investigate alternative fuel options. The work to date has included the testing of cotton seed oil biodiesel blends against conventional diesel to assess engine performance (power and torque) and engine emissions. Preliminary test results have

demonstrated that biodiesel from cotton seed oil could be a good alternative fuel for diesel engines (up to a 20 per cent blend) without engine modification. It was found that this blend can produce engine performance and exhaust gas emission results at medium load comparable to those of conventional diesel. Further experimental work is ongoing.

Case Study

Recognition for CRDC researchers

Two of our researchers, PhD student Katie Broughton and Dr Rebecca Haling, have received DAFF 2012 *Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry*.

Katie is conducting research to improve prediction of cotton growth and production in a changing climate. She has made good progress in the first year of her study into the impact of interactions between temperature, moisture availability and vapour pressure on

cotton plant growth. This project will provide a fundamental understanding of the way a cotton plant might be expected to react to key abiotic factors likely to be influenced by climate change.

Rebecca's award project will recommend ways growers can better manage fertiliser use and promote root growth to maximise profitability. With nearly one third of the Australian cotton industry affected by sodicity, her research at The University of New England has a particular focus on growing cotton in sodic soils.



Katie Broughton, Bruce Finney (CRDC Executive Director) and Rebecca Haling at the presentation of their Science and Innovation awards in Canberra



Postdoctoral fellow, Rhiannon Smith, is conducting a study on how cotton farmers can take advantage of potential future ecosystems markets. She has reviewed the literature that has become available since she completed her PhD studies in 2010, and compiled data on the vegetation and soil types commonly encountered on cotton farms in Queensland.

Rhiannon has spent some time comparing NSW and Queensland biodiversity and vegetation policies. Geographic Information System (GIS) layers of vegetation and soil types across Queensland have been obtained and are providing valuable information for site selection and fieldwork. This work will lead to a vegetation management tool for growers.

STRATEGIC OBJECTIVE 2

Enhance the capacity of the industry to adopt resilient and adaptive farming systems

Establishing robust triple bottom line industry performance indicators

A continuing project is establishing a social, economic and environmental performance information repository and reporting framework for the cotton industry. It made good progress in 2011–12 in analysing, reviewing and communicating data on cotton industry sustainability reporting.

The project has a range of achievements to date:

- The thesis, *Economic, Environmental and Social Sustainability Indicators of the Australian Cotton Industry*, has been printed and distributed to stakeholders. It has frequently been cited by others researching the Australian cotton industry and by the Murray Darling Basin Plan, Cotton Industry Environmental Review and rural communities researchers.
- A chapter, 'Retaining the social licence: the Australian cotton industry case study' in a CSIRO book, *Defending the Social Licence of Farming: Issues, Challenges and New Directions for Agriculture Chapter on social licence to farm – cotton industry case study*, which was launched by the Hon. Tony Windsor MP, in November 2011.
- Presentations of cotton industry data at Cotton CRC Science forums, Irrigation Australia Conferences, a Poster for Global

Reporting Initiative Australian Conference 2012, an article in *The Australian Cottongrower* in 2012 and in CRDC *Spotlight* magazine in 2012.

- A contribution to the development of the publication *The Australian cotton industry water story – A decade of Research and Development 2002–12*, including contributing to the organisation of a water forum held in August 2011 and editing and writing stories contributed to the publication, scheduled for release at the 16th Australian Cotton Conference.

Good progress has also been made in both starting and promoting the process of farm energy use assessments associated with management of water on-farm, with two irrigators recording energy use.

A survey underway on Centre Pivot and Lateral Move (CPLM) irrigation systems will complement one already completed in Queensland. Ten irrigators and four irrigation supplier interviews have been completed. Training workshops were planned for June to August 2012, including three CPLM National Training Courses and up to four Irrigation benchmarking workshops. Five videos have been produced, showcasing irrigation best practice and two technology demonstrations (drip irrigation demonstration and storage seepage and evaporation meter) have been conducted to improve irrigators' knowledge and skills to make informed infrastructure investment decisions.

CRDC continued to support the annual survey of cotton consultants, with data collection managed by Crop Consultants Australia Inc. Because data from consultants are gathered in the winter months each year, compilation and distribution of reports generally takes place in the following year. The 2010–11 crop report was completed during the 2011–12 year and data collection for the 2011–12 crop commenced. The report for the 2010–11 survey was scheduled for release at the 16th Australian Cotton Conference and is available on the CRDC website, www.crdc.com.au.

In 2011–12, CRDC commissioned the third assessment of the environmental management and performance of the Australian cotton growing industry. The study appraised the



cotton industry's implementation of the recommendations of the second environmental audit in 2003 and the industry's environmental progress since then. The approach used was to conduct a strategic assessment of environmental performance of the cotton-growing sector of the industry.

The reviewers undertook a comprehensive review and analysis of literature related to the environmental stewardship of cotton growing in Australia and overseas. They examined industry strategies and actions to improve environmental performance since 2003 and assessed research about on-farm changes that have been made and results achieved. The reviewers visited farms, consulted cotton value chain participants and, importantly, surveyed growers, cotton industry stakeholders and others with an interest in the industry's environmental stewardship. The report will be completed late in 2012 and the industry's response to its recommendations will be reported in CRDC's Annual Report 2012–13.

Growing cotton in the north

Growing cotton in dry tropics of northern Queensland is a different proposition to other growing areas in Queensland and NSW. CRDC

has provided ongoing support for completion of a Burdekin cotton feasibility study that began in 2007 (originally as a Cotton CRC investment). In 2011–12, CRDC invested with CSIRO to complete the final research phase of the study. This project is developing a full understanding of nitrogen and irrigation practices suitable for use in a coastal reef catchment. As an interim measure, the work to date has been packaged for maximum accessibility by sugar cane farmers who wish to understand the potential for growing cotton within their farming systems. The resulting document, NORpak, was prepared for launch in mid-2012.

Getting water use right in different environments

In a mix of ongoing and new work to benchmark cotton water use efficiencies and energy efficiencies for a range of irrigation systems, the NSW Department of Primary Industries has made good progress in its first six months against milestones for the Promoting Water Smart Infrastructure Investment in NSW (PWSII) project. The first milestone is due by 30 December 2012 and the project will easily meet this date. The activities associated



The NORpak launch in mid-2012 with farmers and researchers. *Left to right:* Layton and Sheree McDonald, Philip Armitage, Lyndsay Hall, Paul Grundy, Steve Yeates, Andrew Parkes, Wayne Dalsanto, Jeff Marson and Barry Bredsal.



with this project will build capacity within the irrigation industry to make informed decisions about investing in irrigation infrastructure, help growers to optimise water use and energy efficiency and provide an opportunity to highlight and accelerate adoption of best irrigation management practice.

A planned project to investigate applying plant-based measurements for irrigation in water-limited environments aimed to include both Australian and US studies. However, it was not possible to achieve a level of co-investment from US partners that would have enabled the US components to proceed. As a result, the project as proposed did not go ahead. CSIRO has submitted a revised proposal that would enable the studies to be conducted solely in Australia, for consideration by CRDC in 2012–13.

A continuing project is looking at changing the degree of precision in water application within irrigation systems from the field level down to as low as within one furrow. This is achieved by integrating soil moisture monitoring with data fed back from a range of crop sensors that monitor plant stress through three measures: changes in colour, whether the orientation of leaves shows early water stress and canopy temperature.

The automated real-time optimisation system developed at the National Centre for Engineering in Agriculture utilises Model Predictive Control (MPC) methodology via a model-based irrigation strategy implemented in the irrigation control simulation framework 'VARIwise'.

Previous research has shown that the application of VARIwise can lead to improved efficiencies via real time adaptive control of centre pivot and lateral move irrigation systems. However, to achieve maximum impact, this system needs to be applied in furrow irrigation, as this is still the most widely practiced form of irrigation in the cotton industry.

A field experiment was conducted in 2011–12 to evaluate real-time adaptive control of furrow irrigated cotton. Results indicate that adaptive irrigation control increased cotton yield by 12 per cent and reduced water use by 24 per cent compared with the standard practice on the

farm trial site. The water saving occurred as a result of applying a reduced flow rate after the water had advanced approximately half way. This field evaluation demonstrates that real time adaptive control can be applied to furrow irrigation. Further field trials with this system will be conducted in 2012–13.

Carbon and cotton farming systems

A new project to investigate management of carbon in cotton-based farming systems builds on long-term farming systems experiments to enable long-term soil carbon monitoring under different crop rotation and management regimes. Crop rotation regimes must run their course for up to four years before analysis and interpretation, thus the information was not available in 2011–12.

Previous research on a long-term farming systems experiment (LTE) at the Australia Cotton Research Institute (ACRI) near Narrabri has indicated that the inclusion of corn could contribute larger quantities of carbon to the system than traditional cotton–cereal rotations. Consequently corn was sown in the LTE at ACRI in September 2011. Soil analyses were completed by mid-February. Salinity and sodicity related indices in the experiment were lowest within the plots with a cotton-wheat/permanent bed history and highest with continuous cotton/conventional tillage history. These responses were closely correlated to previously documented drainage patterns. Carbon in the beds was higher with permanent bed treatments. Growth and yields were superior on ex-cotton-wheat/permanent bed treatments relative to other treatments. Corn grain yields were in the order of 7.0 t/ha in ex-conventional tillage/continuous cotton plots, 8.3 t/ha in ex-permanent beds/continuous cotton plots and 8.8 t/ha in ex-permanent beds/cotton-wheat plots. This may be largely related to better drainage and consequently, less waterlogging in the cotton-wheat/permanent bed system. High rainfall and flooding prevented measurements related to soil water and greenhouse gas emissions being undertaken during 2011–12 season.

This project also monitored soil carbon on a number of commercial cotton farms in which

corn had been grown. In comparison to plots sown with cotton, soil carbon storage in the surface 30 centimetres was higher by 28 per cent in plots that had been sown with corn during 2010 in irrigated farms. Differences were greater in the 10 to 30 centimetre depth than in the surface 10 centimetre, presumed to be due to significant contributions by corn roots. No significant differences in carbon storage were detected on dryland farms.

Collaborative research with GRDC was ongoing in 2011–12 to fine tune fertiliser application to optimise nutrient efficiency for the soil type and crop rotations used in both dryland and irrigated cotton systems in northern NSW and Queensland. The Darling Downs and Gwydir regions, where this research was conducted, suffered from flooding in the past two seasons, meaning waterlogging and nitrogen losses have constrained yields and confounded results. This has changed the nature of the information that the trials have produced which has unexpectedly provided a good understanding of the nature and extent of losses and means the project will be able to monitor the recovery of nitrogen mineralisation, soil structure and readily leached nutrients such as boron and sulphur.

A continuing project to encourage cotton systems that are nutrient-efficient and promote healthy soil has identified that carbon dioxide emissions can be reduced by encouraging soil carbon sequestration through retention and incorporation of stubble.

It also found that carbon dioxide emissions can be minimised by optimising N fertiliser use and that it may be possible to produce carbon-neutral cotton from the field with current best management practices, where fertiliser inputs have been managed optimally, tillage operations minimised and stubbles managed effectively.

Statistically significant increases in soil carbon to 90 centimetre depths have been measured over a seven-year period. The rate of increase was estimated to be 1.38 tonnes of carbon or 5.0 tonnes of carbon dioxide equivalent per hectare per year. These levels of carbon sequestration appear to substantially exceed estimated and measured greenhouse gas emissions on this site.

Using pest sprays appropriately and safely

Ongoing support to build cotton and grain industry capacity for continual improvement of pesticide application and drift management had two components:

Workshop Program for Cotton Growers and Their Neighbours.

In this project, co-funded by GRDC, a total of 53 application and drift management workshops were delivered to 1046 cotton and grain growers, with independent evaluation showing more than 80 per cent of the participants surveyed had changed one or more practices within three to six months of attending the workshop. Exit surveys showed that 97 per cent of participants were satisfied with the workshop, 80 per cent were very satisfied, and 15 per cent suggested the workshop exceeded their expectations. A further six workshops were provided to 103 advisors, and six workshops for trainers delivered to more than 154 participants (an additional two of the trainer workshops were run in conjunction with the GRDC project). The external cash and in-kind contributions to this project more than doubled the CRDC cash contribution.

Application and Drift Management Trial Program

The workshop program was supported by seven application trials. The data obtained was used to modify training materials and presented to growers and advisors at industry meetings and updates. Three trials resulted in a change to the WeedSeeker® setup by the manufacturer, four separate efficacy-based trials demonstrated that coarse droplets do provide equivalent efficacy for many types of herbicide applications and that the use of coarse droplets was effective in fallow situations for phenoxy and glyphosate products. Trials indicated that in wider row situations (1.5 metres) efficacy could also be achieved with Roundup Ready® herbicide; however, the use of extremely coarse droplets for over the top Roundup Ready applications had the potential to reduce efficacy in one metre row, solid plant situations.



A single study evaluating relatively new techniques for measuring spray drift (comparing daytime and night time spraying) highlighted that more drift risks are associated with night spraying. The methodology used for the spray drift study using a range of cations (atoms that have lost an electron to become positively charged) and mass spectrometry, in place of traditional fluorometric methodologies, proved to be a useful and relatively low cost method for estimating drift potential under differing environmental conditions.

The results of this study were passed on to the National Working Committee for Pesticide Application for further consideration.

Minimising spray drift continues to be a challenge for all agricultural industries. The cotton industry, through its long term support for training and extension in drift management has been able to act as a catalyst for establishing a national program for delivering the application and drift management workshops developed by Bill Gordon Consulting. GRDC will be funding the delivery of this program nationally to grain growers for the 2012–2015 period. The challenge for the cotton industry will be to maintain its status as a leader in extending information related to spray application and drift management.

STRATEGIC OBJECTIVE 3

Protect industry from biosecurity threats

Identifying and dealing with biosecurity threats

CRDC invested in two new projects conducted by DAFF Queensland to increase surveillance and preparedness for endemic and exotic viral diseases of cotton. One project is investigating the virus, cotton bunchy top, and preparing a contingency plan for cotton blue disease. Field monitoring of cotton bunchy top in weed and cotton hosts showed that there is more than one strain. This may have implications for the host range of each strain and the applicability of management practices and development of varietal tolerances. International travel to Thailand and Brazil within this project has provided an understanding of the differences and

similarities of cotton bunchy top compared to other cotton viral diseases.

The second project is developing a contingency plan for cotton leaf curl disease (looking at the risk of entry into Australia via the nursery industry) and furthering industry preparedness by aligning surveillance with the vegetable industry. The researchers are hosting a major symposium in October 2012, workshopping Australian preparedness to manage viral diseases transmitted by Silverleaf whitefly.

Continuing research projects for improving management of cotton diseases and disease surveillance involve 100 fields in NSW and 66 in Queensland, which were surveyed in early and late season in 2011–12, marking the 29th consecutive survey in NSW and 10th in Queensland. The season was marked by extreme verticillium wilt in NSW, an increasing incidence of fusarium wilt, the surprising continuance of sclerotinia and the prevalence of boll rot. This disease presence was principally driven by the cool, wet seasonal conditions experienced across the cotton belt.

Limitations to variety tolerance and avoidance strategies for these diseases mean the principal means of control is farm hygiene, which is promoted through the industry's Come Clean–Go Clean campaign, financially supported by CRDC.

A continuing project is investigating integrated pest management (IPM) for Silverleaf whitefly and emerging pests in central regions and ongoing work is studying the damage from honeydew excreted by Silverleaf whitefly (see *page 49*).

Ongoing work is improving the accuracy of mirid plant bug sampling techniques, while new work seeks to establish robust thresholds for pale cotton stainers in cotton: an occasional pest that has become more common in some regions due to cooler, wetter seasons (it cannot reproduce in temperatures of 40 degrees or higher, or in low humidity).

Other sampling and threshold development work relates to the solenopsis mealybug. As an unexpected bonus in 2011–12, a new parasitoid and hyperparasitoid (both beneficial insects) were identified for combating mealybug. This

is an important discovery, as no fully effective insecticide options are available for mealybug. The future work will measure the survival of these beneficial insects as part of an overall control strategy.

Wet seasons like the one experienced in 2011–12 bring about unusual entomological events. For example, flies infested cotton in the upper Darling Downs, with maggots growing in cotton bolls. Although this affected yield in a number of

crops, a research response is not considered to be warranted at this stage because of the very unusual nature of this occurrence.

A continuing project to monitor Silverleaf whitefly resistance found no changes in frequency of resistance to any products used for whitefly control. Results were reported to the industry's Transgenic and Insect Management Strategy Committee (TIMS) to enable the annual review of the Insect Resistance Management

Case Study

Honeydew not at all sweet for fibre quality

A reputation for stickiness has a negative impact on sales, exports and price for cotton from regions suspected of having stickiness. Stickiness is a major concern for spinning and has a range of potential sources: plant sugars in immature fibres, contamination from crushed seed and seed coat fragments, grease, oil and pesticide residues. All of these factors are addressed in different aspects of our Farming Systems and Value Chain programs.

A significant proportion of all cases of stickiness are, however, attributable to honeydew exudates of the *Bemisia tabaci* B-type Silverleaf whitefly and cotton aphid, *Aphis gossypii*. Their sugar exudates can lead to a build-up of residues on textile machinery, which results in irregularities and stoppages in sliver and yarn production.

Honeydew, rather than affecting yield, affects the quality and processing qualities of the lint, leading to price penalties and diminishing the reputation of the Australian cotton industry. As well as investigating IPM for Silverleaf whitefly, CRDC-funded research is determining which seasonal conditions break down honeydew, meaning no treatment is needed. An added complexity is that there is a trade-off between the direct effect on quality from honeydew contamination and an indirect impact from the honeydew being broken down by sooty mould, which discolours the lint. It will take some three seasons to determine the best balance between these factors.

For further information, see *Spotlight* Autumn 2012 (www.crdc.com.au)



This research is comparing the direct effects of honeydew produced by aphids (*left*) on cotton quality with the indirect effects from breakdown of the honeydew caused by sooty moulds (*right*)



Strategy (IRMS). Within the program, this was the first year that a post-spray field colony was established and could be tested, confirming suspicions that resistance evolves very quickly in whitefly populations (the post-spray colony was only about 67 per cent susceptible to sprays, compared to 90 per cent susceptibility for pre-spray testing). This highlights the need to use chemicals judiciously and to continue rotation of products.

A new research project to provide sustainable chemical control of mirids, aphids and two-spotted mite in cotton continues long-term insecticide resistance monitoring for these pests. The cotton industry has concerns over the development of resistance to neonicotinoid insecticides in cotton aphids, despite declining aphid pressure in 2011–12 compared to previous seasons. However, the well-supported IRMS continues to demonstrate its robustness, with no changes in resistance to other aphicides such as pirimicarb.

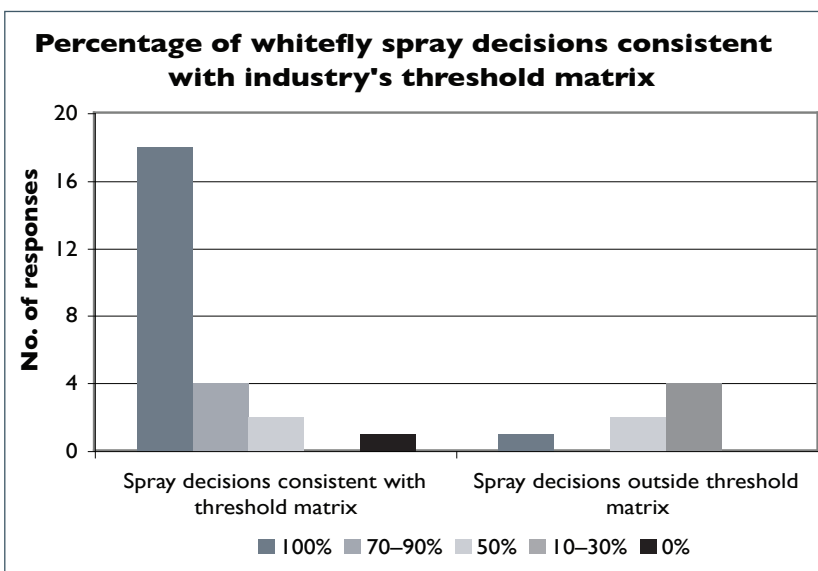
Wet conditions in 2011–12 saw the presence of a greater diversity of mite species infesting cotton, including bean spider mites, broad mites and strawberry spider mites, in addition to the normally present two-spotted mite. Resistance monitoring showed the presence of resistance to abamectin, which highlights the fragile nature

of miticide chemistries and the importance of increasing the level of voluntary compliance with the IRMS.

Ongoing difficulties in establishing resistance testing for mirids sees the NSW Department of Primary Industries' research looking to establish molecular testing methodologies rather than continue to attempt traditional culture-based methodologies.

A continuing project to develop new applications for fungal insecticides against cotton pests has undertaken efficacy and environmental evaluations of a candidate biopesticide product, with a new strain showing good efficacy for mirid, green vegetable bug, whitefly and *Helicoverpa* control. Data is now being packaged for a submission to Australian Pesticides and Veterinary Medicines Authority (APVMA) for registration. Should the application be successful, CRDC holds an intellectual property position with the research partners involved.

A continuing project is monitoring resistance of *Helicoverpa* spp. to *Bt* cotton. Full season results are somewhat ambiguous and interpretation by the research organisations involved continues. With CRDC involvement, the TIMS Committee Technical Panel continues to develop a contingency plan to manage resistance to *Cry2Ab*



Given our current knowledge of whitefly damage potential, the cotton industry is confident R&D is enabling it to optimise the use of pesticides for whitefly control. (Source: CCA Crop Survey 2010–11)

(one of the two genes expressing in Bollgard II cotton varieties that provide protection from *Helicoverpa* spp.).

Herbicide resistance is an increasingly important issue for the cotton and grains farming system. CCA survey results in 2010–11 suggest it occurs in as many as one in ten hectares of cotton.

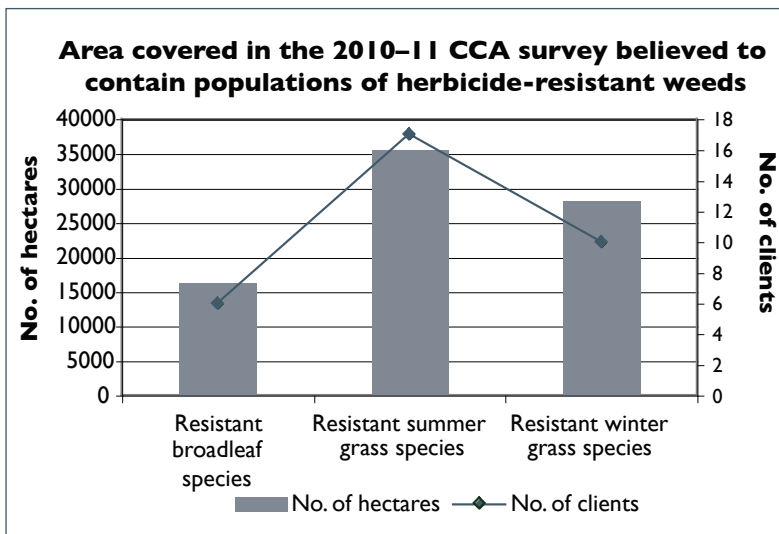
CRDC-sponsored research for managing weeds and herbicides in a genetically modified cotton farming system collaborates with similar work by GRDC in grains systems, as each has glyphosate as the central herbicide, with an overlapping use of other herbicides. This collaboration is critical for future weed control in both industries. CRDC research on understanding the ecology of weeds, such as conditions favouring emergence, complements GRDC work evaluating the efficacy of different management options such as farming implement selection for strategic tillage.

Management of cotton refuges to prevent the development of resistance is the subject of three research projects. A continuing PhD project is examining ways to improve management of cotton refuges. Early results show that optimising nitrogen and water management of refuge crops increases the survival of non-resistant *Helicoverpa* spp. The challenge is to understand how this knowledge can be applied.

This PhD project supports the second research project, which has ruled out the viability of crop alternatives to the dominant refuge crop, pigeon pea, which has the drawbacks of needing high temperatures for establishment, being more susceptible to waterlogging and having fewer herbicides available for weed control.

The third project is a continuing PhD study investigating the flight characteristics of *Helicoverpa* spp. in relation to the efficacy of transgenic cotton refuges. This is making good progress in both laboratory and field experiments. Early analysis of data indicates differences in flight capabilities of Bt-resistant moths compared to susceptible moths.

Research in all three projects will improve understanding of how best to locate refuges in the landscape for maximum impact.



As this graph shows, the issue of greatest concern to the cotton-grains system is the prevalence of resistant summer grass species. This issue has emerged only in the last five seasons, with the confident assumption that the resistance is to glyphosate herbicide. (Source: CCA Crop Survey 2010–11)



Case Study

Back to basics on *H. punctigera* migration patterns

A new research project is revisiting the ecology of the major cotton pest, *Helicoverpa punctigera*, in relation to migration, over-wintering and implications for *Bt* resistance. All experiments relating to environmental controls for diapause induction and emergence in *H. punctigera* have been established.

Interestingly, this project is looking at the migration of *H. punctigera* from inland regions to cropping regions such as the Namoi valley. Long-held beliefs about migration patterns from research conducted in the

1970s and 1980s are being revisited and the underlying drivers of migration re-examined. The moths manage the long journey by using intervening mulga country as a staging post. Recent investigations show the host plant availability in the mulga country has been changed by the recent long drought and it is uncertain whether the seed bank can restore the previous balance. This has immense significance for the nature or very existence of future migrations, which, in turn, may have positive implications for the development of resistance to *Bt* cotton by *H. punctigera*.



These photographs, taken at the same time of year, show the stark drought-related change in mulga country near Thyungra, Queensland – a staging post on the migration path of *H. punctigera*.

In 1989 (*top*), native daisies, a host for *H. punctigera*, dominated the landscape, whereas in 2011 (*bottom*), the same country shows a predominance of native grasses.

PROGRAM THREE HUMAN CAPACITY

Goal

A culture of innovation and learning

Planned Outcome

Innovative people in the cotton industry and community, creating a sustainable industry and viable regional communities

R&D Projects

	2011–12	2010–11	2009–10
Number of projects	80	35	33
Expenditure	\$1.842m	\$1.072	\$0.951

Performance

Performance has been assessed against two sets of criteria: the Australian Government's Operation Sunlight Key Performance Indicators, as submitted in the 2011–12 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2011–12. For detailed information, see *Measuring Performance*, starting on page 124.

1. = 18

2. = 3

3. = 1

= **Achieving AOP**

1. KPIs achieved 2. Underway but not yet completed 3. Not achieved

R&D activities 2011–12

Smarter communication meeting industry needs

This year has seen the full bedding down of the new industry framework first introduced in 2011 to deliver R&D industry-wide. The Development and Delivery (D&D) team oversees 15 adoption target areas set by the Cotton Catchment Communities CRC, CRDC and Cotton Australia. Previous roles of regional extension were largely replaced by roles that principally have a developmental focus that relates to actual practices commonly in use throughout the industry: Certified Best Practice within the myBMP framework; Weeds Management; Pest Management; Human Capacity; Farm Hygiene and Disease; Commercialisation; Catchment; Communities; Product Post-Farm Gate; Water Use Efficiency; Farm Systems and Energy; Soil and Plant Nutrition; and New Growers.

The team oversaw production and launch of the *Australian Cotton Production Manual 2012* and the annual *Cotton Pest Management Guide 2011–12*, along with providing input to the web-based myBMP system of best practice benchmarking

that doubles as industry's newest information source.

Find out more about the D&D team on pages 60 to 62.

STRATEGIC OBJECTIVE 1

Identify, understand and plan for future industry capacity needs

Workforce planning and action for a sustainable industry

This objective took on even greater importance for CRDC in 2011–12, as it has become increasingly clear that the cotton industry faces significant challenges in the short to medium term in meeting its workforce needs. As the whole agricultural sector finds, the mining industry offers financial incentives that simply cannot be matched. Instead, the cotton industry must seek to offer employment that provides and recognises skills, and offers definable, satisfying and long-term career paths as part of an innovative and creative industry.



In response to this challenge, CRDC convened forums in November 2011 and May 2012 to discuss cotton industry human capacity and workforce attraction and retention initiatives and coordination, as well as commissioning a study, *Cotton Industry Succession and Professional Development – A Review of Employer and Industry Needs in the Agribusiness Sector*. The final report was received in March 2012 (see below).

In addition, a new project involving the Rural Innovation Research Group, University of Melbourne and the Workplace Research Centre at The University of Sydney is establishing a workforce development plan for the cotton industry for sustained competitive advantage. It is seeking to conduct research into how well the cotton workforce development system is working and to support increased

Case Study

Supporting the businesses that support our industry

There is increasing concern across the cotton industry about how it might address the increasing gap between jobs and candidates emerging as graduates from Australian universities. CRDC formally addressed this key need in the Strategic Plan 2008–2013, making it one of its three human capacity strategies.

A broad range of businesses, including cotton processors, merchandise and equipment suppliers, on-farm advisory services and specialist cotton industry suppliers, serve the Australian cotton industry and are crucial to its operations. In common with other rural industries, they face the prospect of difficulties in recruiting suitable staff.

To understand future needs, CRDC commissioned a study, *Cotton Industry Succession and Professional Development: a Review of Employer and Industry Needs in the Agribusiness Sector*, in late 2011.

The study, conducted by Gordon Stone and Associates, makes for sober reading. It estimates that there will be a need for 110 new people with appropriate qualifications, including some 65 agronomists. This figure does not take into account those who will be retiring or leaving the industry in the normal course of events. It also does not include numbers required eventually to meet senior/strategic profession management staff, researchers, farm managers, business advisers, IT and electronics staff or company directors.

The study is a wake-up call for a strategic and integrated industry response to workforce requirements.

The report is unequivocal: timing is such that the qualified staff needed for future job placements should be beginning their studies as early as 2013. In short, the study concludes, the remainder of 2012 is key for the industry to kick-start this process and devise:

- An integrated supply chain system with dedicated resources and investments
- An actionable industry plan rolled on in 2012
- Employers taking action in 2012 to secure their future staff needs
- A five-year supply chain of Years 11 and 12 students to commence studies in 2013.

To develop a truly sustainable solution that will grow as the industry expands and contracts will require an integrated industry approach across the whole supply chain. The results of the report have been used by CRDC and Cotton Australia to direct an increased investment in 2012–13 into initiatives aimed at addressing this critical issue. CRDC will contribute to an industry solution by commissioning a project in 2012–13 to assist in the gathering of improved information about industry skills and workforce needs so the industry strategy has a firm foundation.

For further detailed information on CRDC-related industry workforce planning, see several articles in *Spotlight* Winter 2012 at www.crdc.com.au.

capacity where it is required, so that cotton has a sustainable workforce planning and action process.

During 2011–12, the Professional Development Officer (Cotton), Mark Hickman, was central to the cotton industry's culture of innovation and learning. Working with CRDC, Mark constantly reviewed existing programs and formulated new activities to meet the ever-evolving needs of the cotton industry.

The available registered cotton traineeships have not received sufficient industry support and have been replaced by a more generic Certificate III traineeship in Agriculture. However, an investigation has begun, in collaboration with Cotton Australia, NSW Industry Training Advisory Board (ITAB) and the Queensland Department of Agriculture, Fisheries and Forestry (DAFF), to guide reinvigoration of the traineeship to ensure it addresses the workplace skills required by the industry.

As part of his CRDC-sponsored activities, the Professional Development Officer provided input into various surveys, reports and inquiries relevant to the industry, including a University of Queensland survey seeking feedback from agribusiness on education of agricultural undergraduates, the Senate Inquiry into Higher Education and Skills, the Agrifood 2012 Environmental scan survey, the NSW ITAB skill report; and Queensland DAFF training and skilling demand report.

2012 saw development of a concept for a web portal, Cotton Campus, which would provide the industry with web linkages, resources and advice to foster an individual's learning and development. A prototype under development should be made available to the industry for comment during the latter half of 2012.

The Professional Development Officer brokered a stakeholder meeting of participants engaged in local Goondiwindi workforce initiatives involving various community groups, training providers, schools, the agribusiness sector and the cotton industry. A major outcome was the formation of an action plan that promotes the integration and utilisation of resources of all current and intended programs and enhanced innovative projects such as 'Agribusiness Gateway Schools' and 'Pushing the Boundaries, Part II'. See page 61.

Work continued to promote the value of Recognition of Prior Learning (RPL) processes in the professional development of farm managers: in particular, the promotion of the RPL-driven Certified BMP Farm Manager award as a Professional Farmer concept linked to the industry's myBMP system.

The Professional Development Officer also continued to investigate and seek funding and in-kind support for the development of additional blended learning opportunities for the cotton industry, combining face-to-face and online delivery similar to the successful Centre Pivot and Lateral Move System Evaluation Workshop that has been delivered via the Queensland Healthy Headwaters program.

The cotton industry and its communities

A continuing project is studying the relationship between the cotton industry and cotton communities from 1996 to 2006. This project is building upon four previous studies which covered the impact of cotton production on employment, community wellbeing and resilience in the Murray-Darling Basin. It is also quantifying the impacts of potential changes in irrigation water availability on eight communities within the Murray-Darling Basin.

The original work was based on data from the Australian Bureau of Statistics 2006 census. The 2011–12 study added a temporal component to this body of research by including data from the 1996 and 2001 censuses, identifying two noteworthy time trends. First, a diminishing trend for agriculture to be associated with lower household incomes (suggesting a trend of declining rural poverty in line with trends of amalgamation of farming enterprises) and, second, that the expansion of cotton between 1996 and 2001 was associated with positive impacts such as increasing household incomes in smaller and more remote centres, population growth and increased employment. Conversely, the impact of water allocation cuts and the drought on cotton production between 2001 and 2006 reversed employment and population trends.

The study also confirmed that smaller and/or more remote communities most reliant on agriculture were the most sensitive to



changes in availability of irrigation water, with the case study communities of Balonne Shire, Bourke Shire and Moree Plains Shire being more sensitive than the previous studies had identified.

The value of this research lies in understanding the changes and sensitivities of communities reliant on agriculture and irrigation due to drought and/or changes in water availability as a basis for possible action. Ongoing analysis of these changes over time will be considered by CRDC now that the 2011 Census data have been made available.

STRATEGIC OBJECTIVE 2

Improve human resource development and capacity

Utilising the skills of Wincott women once more, a new project enabled an educational tour of the Murray River region, tailored to encourage growers to explore differing methodologies aimed at farming smarter, and using water wisely across the agricultural sector.

A survey conducted after the tour identified uptake of *myBMP*, growers undertaking their own extension and an increased focus on biological farming systems and rotation as the principle practice changes participants planned to implement on their farms as a result of the tour. Participants were enthusiastic about a range of measures to help in growing cotton in a changing climate, particularly zero tillage, stubble retention, opportunity cropping, stubble mulching, plant-soil-animal relationships and measures to improve soil health.

CRDC invested in a new project to identify the value added by vocational education training in the cotton industry and identify the potential to measure the value gained from training of on-farm employees. The project began with a review of the literature on valuing training and interviewing industry stakeholders to develop an understanding of the training system. Once the system was defined, opportunities to measure and improve the systems were identified. The vast majority of training is currently done on-farm. Initial analysis of available production figures suggests that there is a significant

range in the contribution of employees to farm productivity. Using the BOYCE Cotton Comparative Analysis report for 2005–06, labour productivity metrics suggest the following ranges: 74 to 290 hectares of farmed area and 1260 to 2,290 bales of cotton per employee, and \$23 to \$36 cost of labour per bale.

Although these metrics do not take into account influencing factors such as machinery used or use of contractors, they do suggest there may be significant potential gains to be made to farm productivity from more targeted valuation of skills and training with the aim of providing more focused improvements to employee capacity development. Consequently, this project points to a need for more detailed case studies to develop a fuller understanding of the skills and attributes that are valued on-farm, the relationship of these skills and attributes to specific farm practices, prior training and the current practice of employee capacity development. CRDC will consider what form future action should take to address this need.

The reporting year saw two eLearning opportunities for BMP farms successfully piloted within the cotton industry. As in 2009, CRDC utilised the working relationship with the Australian Agricultural College Corporation (AACC) and Tocal College for ongoing testing and implementation of the two new projects from the Australian Flexible eLearning Framework, with Mark Hickman providing the industry coordination. The AACC (Queensland) project developed a blended learning system framework for growers wishing to gain knowledge via online services, which was used in the Centre Pivot Lateral move blended learning program. The Tocal College (NSW) project developed a framework for an online OH&S induction program for transit staff on cotton farms for the harvest period. This tool allows backpackers, casual staff or staff new to a business to undertake OH&S training at a convenient time, prior to the specific farm tour they receive on arrival. Over time, a review by the producer of the individual performance and subsequent vocational assessment may result in the issue of a unit of competency.

Achieving a skilled, sustainable workforce for the cotton industry starts early. CRDC provides

Case Study

Cotton's women contributing to environmental change

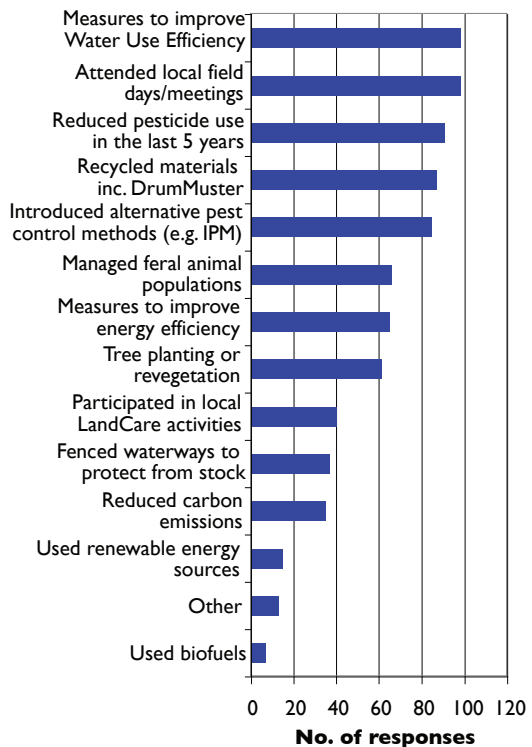
Women play crucial roles in many Australian cotton enterprises. CRDC invested in a Women's Industry Network, Cotton (Wincott) project to develop a survey to canvass rural women's' opinions on Natural Resource Management (NRM) issues. The survey targeted women from many sectors across the industry – including growers, agribusiness, marketing and agronomic, and research – and in all valleys, to gain insight into the perception, understanding and implementation of environmental resource management programs such as *myBMP*, and further determine avenues and practices to encourage increased participation in the program. The survey received 142 responses at a time when the drought had not yet broken in most areas. Wincott followed up with three focus groups in different regions to delve further into the issues identified in the survey and gain a richer understanding of rural women's' opinions and what they actually do on their farms and businesses.

The survey report was received in August 2011 and provided excellent feedback on the active role many women play on-farm and in their communities in relation to NRM and highlighted the range of activities undertaken to improve environmental management. On-farm, the women undertook a wide range of measures such as soil health, controlling feral animals, planting native grasses and tree corridors, and encouraging biodiversity. On a broader scale, they were involved in measures such as fish release programs, running a climate change workshop and Landcare programs. Participants also made a range of recommendations and suggestions for the promotion of *myBMP*, and identified NRM topics on which they need further information.



Participants in a focus group held in Narromine in July 2011 to follow up the initial survey

Measures within respondents' enterprises to improve environmental management



Source: Wincott NRM Survey



ongoing support for capacity building incentives through schools programs and courses and undergraduate scholarship programs. During the year this included several initiatives aimed at helping to meet the industry's future human capacity needs, particularly in the area of graduate careers for agribusinesses servicing the industry and future research capacity. These included:

- collaborating with, and supporting, Cotton Australia to become the industry's member of the Primary Industries Education Foundation (PIEF), which seeks to promote our primary industries, their products and exciting careers in schools, particularly through the development of resources such as a web portal (Primezone) for teachers to use as part of the national curriculum.
- continuing to support the Cotton CRC's Education Officer, Trudy Staines, as the cotton industry contact point for schools. Trudy facilitates interactions between researchers and schools in cotton communities and nearby towns, arranging and conducting student visits to the Australian Cotton Research Institute near Narrabri, and other centres. She has also developed simple resources to help scientists and extension officers with school activities, arranged competitions and events that promote the industry. CRDC's contribution enabled the education officer to act as a part time Science Education Officer for the Primary Industries Centre for Science Education program (PICSE). This focuses on high school students, providing class visits, science investigations, industry camps, industry placements, teacher professional development and development of industry-specific resources.
- continuing to support the Horizon Scholarship program managed by the Rural Industries R&D Corporation (RIRDC). The scholarships support agricultural science undergraduates of high potential through their university degrees by providing a bursary, mentoring, professional development workshops and industry placements. Through these actions, the

students are more likely to commit to a career in agriculture as well as act as ambassadors for their chosen industries and promote agriculture as a career to their peers. In 2012, CRDC is supporting two new scholars: Billy Browning from Narromine and Kirsty McCormack from Inverell. Billy is enrolled at The University of Sydney in Agricultural Economics and Kirsty at The University of New England (UNE) in Rural Science. During 2011–12, CRDC assisted its two other Horizon scholars to find suitable industry placements and mentors. Naomi Marks spent her industry placement at Cotton Australia's head office in Sydney and Rebecca Dunsmuir spent hers at Narrabri working with Cotton Growers Services.

Health and safety a high priority

A new project to review and update cotton farm safety resources and potential links to the *myBMP* system was established as planned; however, a delayed start meant the resources review was not completed in 2011–12. A project steering committee has been established and will meet for the first time in the early part of the 2012–13 financial year.

CRDC continued to participate in the cross-Research and Development Corporations program, the Collaborative Partnership for Farming and Fishing Health and Safety. The Rural Industries Research and Development Corporation (RIRDC) manage the Program on behalf of program partners CRDC, FRDC (fisheries), GRDC (grains) and SRDC (sugar). The Department of Health and Ageing was a partner until recently.

The aim of this Program is to undertake R&D and research application activities that improve the physical and mental health of farming and fishing workers and their families and the safety of the work environment and practices in farming and fishing industries. A cost:benefit analysis of the program completed in August 2011 provided an assessment of the impact of the collaborative investment, using cost:benefit analysis as prescribed by the Council of Rural Research and Development Corporations (CRRDC).

The Collaborative Partnership funded four projects in 2011–12:

- *Capacity building of rural and remote communities to manage their mental health*, conducted by the University of Southern Queensland
- *Cross contamination by chemicals of farming family members*. The South East Premium Wheat Growers' Association is leading this project in collaboration with the Combined Universities Centre for Rural Health
- *Drug and alcohol use by farming and fishing workers*, led by the Lyndon Community
- *Staying healthy: Behaviours and services used by farmers and fishers*, conducted by Deakin University

Details of these and other projects conducted during the life of the partnership can be found at www.rirdc.gov.au.

Cotton growers invested in the R&D effort

CRDC introduced a new small grant program in 2011–12, designed to stimulate grower-led projects that build the capacity of Cotton Grower Associations (CGAs) across the cotton industry. CRDC set broad parameters for the projects in which it was prepared to invest, ranging from testing and/or adopting new R&D knowledge, to technical or practice-based innovations, to more socially focused initiatives aimed at improving the communities in which the industry operates. All CGAs were offered the opportunity to apply for a grant of up to \$10,000. The following projects were established during the 2011–2012 financial year:

- **Menindee & Lower Darling CGA:** Feasibility study into utilising a biomass burner at Tandou gin in response to increasing energy costs



CRDC Horizon scholars (left to right) Kirsty McCormack, Bec Dunsmir, Billy Browning and Naomi Marks with CRDC General Manager Research and Development Investments, Bruce Pyke



- St George CGA: Capacity building via a range of small projects for St George CGA members and the community
- Walgett CGA: Purchase of a weather station allowing Walgett growers to participate in the IrriSAT Project
- Gwydir Valley CGA: Encouraging cotton growing by providing extension to new and existing Gwydir valley cotton growers
- Upper Namoi CGA: Contribution to the employment of a Network Development Officer to facilitate information/knowledge exchange between existing and new growers across cotton and grain farming systems
- Macintyre CGA: Pushing The Boundaries II: Agribusiness Careers. Engaging teachers and high school science students in potential cotton industry career paths. See page 61.
- Macquarie CGA: Macquarie cotton growers welcome back project to address a resurgence in new growers and a lack of engagement in the industry
- Darling Downs CGA: Up-skilling growers in safe chemical use and nurturing high school students to be engaged in the cotton industry by exposing them to the Australian Cotton Conference.

Delivering knowledge across the industry

CRDC continued to co-invest with the Cotton CRC and Cotton Australia to support the Development and Delivery (D&D) team to develop a range of products to improve the resources for growers, consultants and agribusiness to deliver on key target areas for R&D adoption. A range of new resources was released in 2011–12:

- *WEEDpak* – an update to the guide to integrated weed management as well as an update to weed identification
- *Pests and Beneficials in Cotton Landscapes* – an update to the popular CRDC publication, with additional information on farm vegetation that maintains biodiversity of beneficial species
- *Cotton Symptoms Guide* – a new guide covering symptoms of diseases and other disorders of cotton in Australia
- *Cotton Pest Management Guide 2012* – the annual publication that provides a comprehensive resource for managing agrochemicals and resistance to insecticides and herbicides in both GM and conventional crops.

Work in 2012 has produced mobile smartphone and tablet ‘app’ versions of some of these identification guides. Agribusinesses are key delivery partners for these products and in order to engage them in the distribution process the products can be personalised with their logos. The new products are scheduled for release at the 16th Australian Cotton Conference. Work also commenced on the revised 2012 version of the annual *Cotton Production Manual* and the *Cotton Pest Management Guide*.

During the year the D&D team ran campaigns associated with key discipline areas and *myBMP* alignment. Some of these are detailed elsewhere in this report in relation to resistance management in weeds to herbicides and disease management.

D&D campaigns often need to be developed quickly in response to emerging and emergency issues. During 2011–12, such an emerging issue was the potential for a predicted second consecutive La Niña season to increase the risk of the aphid-borne disease, cotton bunchy top (CBT), spreading to more farms and regions. The response campaign was initiated by a CRDC investment in a project with Crop Consultants Australia to conduct an on-farm risk assessment and survey of their clients’ farms to determine whether overwintering weed control was effective in reducing the build up of aphid populations and to recommend remedial action for clients where risk was assessed as being too high. To support this risk assessment, the D&D team worked with researchers to develop information resources for consultants to use including the on-farm risk assessment survey procedure. The project was well supported by



Case Study

Local industry, local engagement

Macintyre Valley Cotton Growers Association took advantage of CRDC's small grants program for grower-led R&D initiatives to extend and improve their existing program, 'Pushing the Boundaries II', which addresses future capacity needs by running a mentoring program for students and teachers to keep kids in the bush and in agriculture.

Their program tackles two different issues with the same solution. The issues are a shortage of both on-farm staff and university graduates and the solution is showing high school students the range of employment opportunities in agriculture and then assisting them in their journey whether they are keen on vocation on-farm training or would like to attend university – or both.

Students have been able to do a range of activities from starting irrigation syphons and bug checking to watching a new pump site

being installed. Local businesses that service the cotton industry opened their doors so the students could gain a greater understanding of agriculture-related services the industry relies on and the opportunities on offer within these businesses.

An out of region tour to examine other tertiary career options between Goondiwindi and the Brisbane port associated with the industry is planned for August 2012.

Pushing the Boundaries is also about educating teachers so they understand the needs of agriculture in their own communities, as well as gaining a knowledge of agriculture in general and the opportunities it offers their students.

For further information on CRDC's small grants program, see *Spotlight Winter 2012* at www.crdc.com.au.



Goondiwindi High School students experience life on a cotton farm as part of the Pushing the Boundaries initiative by their local Cotton Growers Association



consultants and although the 2011–12 season was wet and conducive to the spread of CBT, the levels recorded were quite low.

An example of the emergency issues the team must deal with was the need to provide growers who had flood-damaged crops with advice for dealing with decisions on whether to continue with these crops and options available to them where continuing to recover a damaged crop was the choice. During the previous season CRDC had supported monitoring of crop management options taken with flood damage crops at Emerald. This information, along with advice from researchers, was compiled by the D&D team and provided to growers in southern Queensland and northern NSW who experienced flood damage in 2011–12.

Taking Australian cotton research to the world

CRDC sponsored nine researchers to attend and present at the World Cotton Research Conference in Mumbai in November 2011. Australians were involved in chairing sessions, as well as presenting research papers. CRDC Communication Manager, Rohan Boehm, presented a paper on the CRDC-led Australian cotton industry transition from a conventional extension model to the innovative Development and Delivery model that includes retail agribusinesses and integration with the industry's *myBMP* system. The Australian delegation participated in discussions that culminated in development of the World Cotton Research Council, which will seek to integrate R&D initiatives globally and provide opportunities for researchers to collaborate across international borders.

STRATEGIC OBJECTIVE 3

Enhance capacity to innovate

myBMP promoting industry best practice

The online, interactive iteration of the industry's Best Management Practices program, launched in 2010, is continually updated to reflect the latest R&D outputs. This work continued in 2011–12 and the program expanded to include a new module on Energy and Input Efficiency. The value of *myBMP* is that it will not only assist

cotton growers to access relevant and up to date research information in accordance with their particular needs, but will also help the industry to identify demand for new information and training.

During 2011–12, CRDC worked with Cotton Australia and Cotton Seed Distributors to establish a new joint venture to support the future development and delivery of R&D and the *myBMP* program. In 2012–13, this new joint venture will commit resources for communication campaigns aimed at increasing adoption of improved practices.

Moving R&D knowledge out to the sharp end

CRDC's continued support for the extension effort in 2011–12 is based on constant review and refinement to meet changing circumstances and needs. Key campaigns for the D&D team focused on:

- *myBMP* website content
- Cotton Bunchy Top risk and management
- the industry's farm hygiene campaign 'Come clean. Go clean.'
- the annual field survey of crops in NSW and Queensland to track disease status
- best practice agronomy

Find further D&D information in this program under Strategic Objective 2.

In short: other learning initiatives

- CRDC continued to support the CSIRO Field to Fabric course but due to the large cotton season, which impacted on the ability of growers and ginners to attend a course in June, the 2012 course was rescheduled to September 2012. CRDC is supporting five cotton growers to participate in this highly regarded course held at CSIRO in Geelong.
- Indigenous Wee Waa High School student Tchkalee Booby began a two-year Aboriginal Employment Strategy traineeship at CRDC in 2012. Tchkalee, who is undertaking a TAFE Business Certificate II Course as part of her Higher School Certificate studies, has since been appointed deputy captain of her school. Under the terms of the traineeship, Tchkalee works at CRDC one day per week for which she is paid a salary.

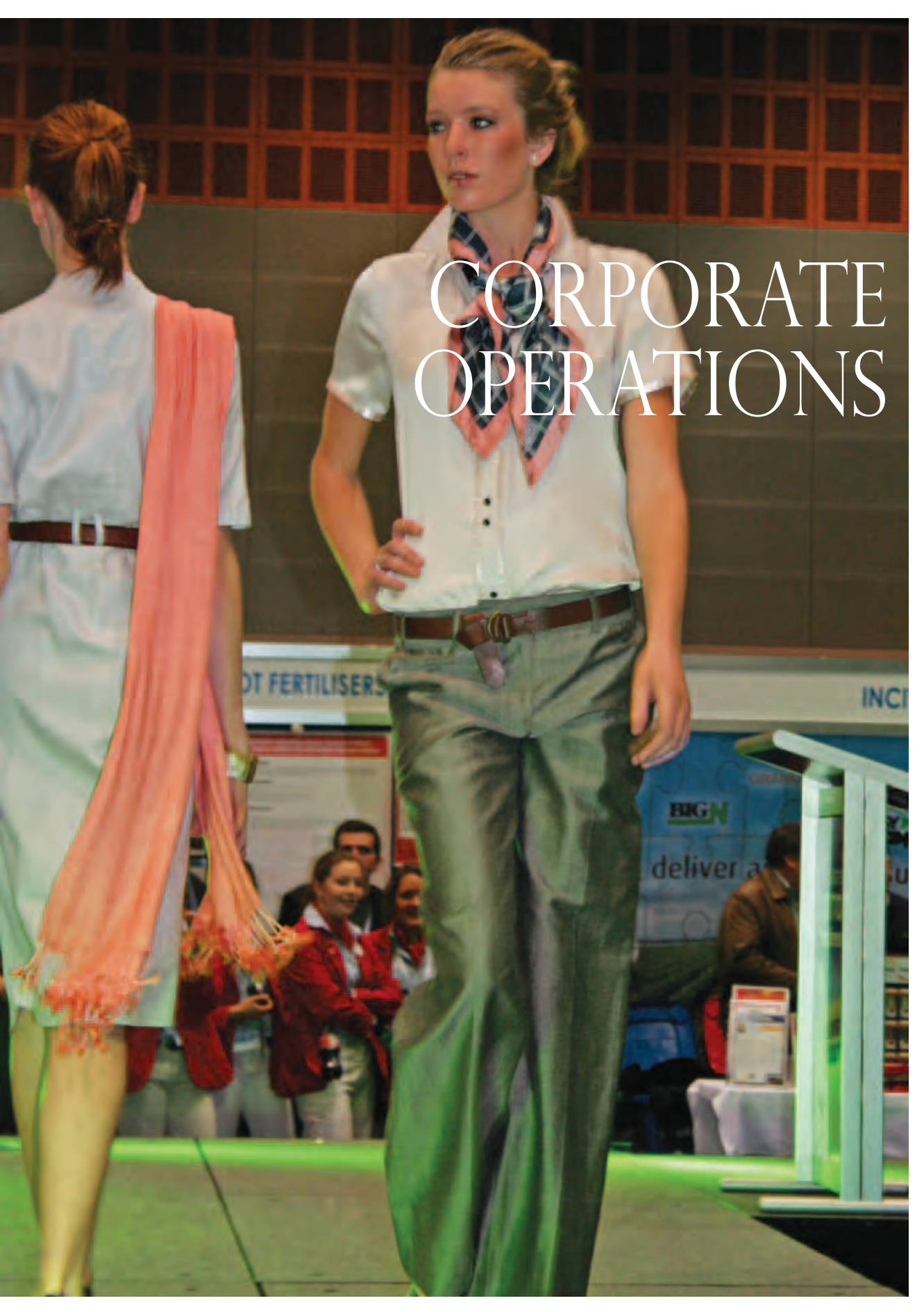
- CRDC contributed to two sponsorships for Course 19 of the Australian Cotton Leadership Program: Dr Paula Jones from Narrabri (formerly the Cotton CRC Operating Officer) and David Wigginton from Toowoomba (an agricultural and irrigation consultant).
- CRDC provided eight scholarships to the popular Cotton Production Course run at The University of New England. CRDC targets its scholarship support towards young growers and agronomists. In 2012, this course has seen a resurgence in numbers, in line with the post-drought resurgence in the industry as a whole, with over fifty students enrolled. The lecturer for this course was previously supported by the Cotton CRC, which wound up in June 2012. As a consequence, CRDC has approved a new project in 2012–13, which will see this course continue under the leadership of the new course lecturer, Brendan Griffiths.
- CRDC initiated five new PhD scholarships in 2011–12:
 - Tanya Howard (UNE): Next generation rural landscape governance: the Australian dimension
 - Hannah Pham and Paul Thambar (UTS): Accounting for value chain sustainability and competitive advantage
 - Kate Marshall (UWS): Molecular genetic methods to detect neonicotinoid resistance in cotton aphids
 - Mahdi Mousai Al (UTS): Image processing method to estimate cotton requirements for nitrogen fertiliser.



A CRDC presence at the World Cotton Research Conference 2011: CRDC Communication Manager Rohan Boehm (*left*) with PhD student Katie Broughton and cotton researchers Dr Daniel Tan (both The University of Sydney), Dr Tom Walsh (CSIRO) and Dr Nicola Cottee (The University of Sydney)



CORPORATE OPERATIONS



OUR PEOPLE

BOARD OF DIRECTORS

Chair

Mike Logan
(GAICD)



Mike Logan, was initially appointed Chair of CRDC on 13 August 2007, and reappointed for a further three-year term commencing 13 August 2010. He is Chair of the Remuneration Committee and a member of the Audit Committee.

Mr Logan is a cotton farmer from Narrabri, NSW, and brings a wealth of practical industry experience and a strong vision to the position. He has long been a strong advocate of best practice use of natural resources in the Australian cotton industry. His cotton farm was the first in the world to gain International Organisation for Standardisation (ISO) certification for compliance with world's best practice principles for environmental management.

Mr Logan also spent six years on the board of Land and Water Australia, where he played a leadership role in a number of key programs dealing with irrigation and climate variability. He was a Director of the Australian Rural Leadership Foundation, the CRC for Irrigation Futures and Cotton Australia (for four years). He is currently CEO of Dairy Connect NSW.

Executive Director

Bruce Finney
BSc Ag (MAICD)



Bruce Finney joined the Board in August 2004 by virtue of his appointment as Executive Director of CRDC. He attends the Audit, Intellectual Property and Remuneration Committees as an observer.

Mr Finney has extensive experience in the agricultural sector. Prior to his appointment to CRDC he worked in corporate agriculture in various corporate, management and agronomy roles in Australia and in an advisory role in Argentina. He is a past chair of the Australian Cotton Growers Research Association, a past director of the Cotton Catchment Communities CRC and Irrigation Association of Australia.

Mr Finney is a graduate of the Australian Rural Leadership Program and of the Company Directors Course of the Australian Institute of Company Directors.

Non-executive Directors from 1 October 2011

Mary Corbett

Vice-Chair

BSc PhD (FAICD, AFAIM)



Mary Corbett was appointed to the Board for a three-year term commencing 1 October 2008 and reappointed for a second term commencing 1 October 2011. She is the Chair of the Intellectual Property Committee and a member of the Remuneration Committee.

Dr Corbett is Managing Director of Australian Business Class, an organisation specialising in executive leadership development. She has a strong research background and over ten years experience in rural agriculture. She has an extensive background in the private and public sectors, with specific emphasis on capacity building and governance.

Dr Corbett is Chair of the West Moreton Health and Hospital Board, and Deputy Chair of the Boards of the Australian Agriculture College Corporation and Southbank Institute of Technology. She was previously on the Board of the Sugar Research and Development Corporation.

Richard Haire
(FAICD, FAIM)



Richard Haire was appointed to the Board for a three-year term commencing 1 October 2011. He is Chair of the Audit Committee and a member of the Remuneration Committee.

Mr Haire is the Australian and New Zealand Managing Director and regional head of Olam International, a global leader in the supply chain management of agricultural products and food ingredients. He was formerly the Chief Executive of Queensland Cotton Corporation Pty Ltd and has been director of several organisations, including Cotton Australia, SunWater Limited, the Cooperative Research Centre for Sustainable Cotton Production and the CSIRO Advisory Board for Field Crops. He is currently a director of the Bank of Queensland and the Australian Institute of Company Directors (Queensland Division).

Hamish Millar
(FAICD)



Hamish Millar was appointed to the Board for a three-year term commencing 1 October 2011. He is a member of the Intellectual Property Committee.

Mr Millar is an irrigated cotton and grain grower from Emerald in Central Queensland and farms 1500 hectares within a family partnership. He has extensive knowledge of production and agribusiness within the cotton industry, including roles requiring strategic planning, business management and marketing. He also has experience in cotton classification and trading, having worked with Queensland Cotton Corporation Pty Ltd.

Mr Millar has extensive experience in several cotton industry organisations, including as Chair of the Australian Cotton Growers Research Association, Director of Cotton Australia Ltd, Director of the Australian Cotton Industry Council and Chair of Cotton Industry Development in Northern Australia.

Michael Robinson
BSc (Hons), PhD (FAIMS,
GAICD)



Dr Michael Robinson was appointed to the Board for a three-year term commencing 1 October 2011. He is a member of the Audit Committee.

Dr Robinson is the CEO of FrOG Tech Pty Ltd, a private company specialising in geological reconstructions and interpretations across a range of sectors, including oil and groundwater. He is also CEO of GeoSphere Ltd, a specialist geological consulting firm in New Zealand. He has extensive experience in primary industries and natural resources research, development and extension.

Dr Robinson was the Executive Director of Land & Water Australia, Centre Director of the Primary Industries Climate Challenges Centre, Chair of the National Climate Change Research Strategy for Primary Industries and a member of the National Primary Industries RD&E Extension Subcommittee.





Leith Bouly

BRuSc, DipBusStud
(GAICD)



Leith Bouly is a primary producer from Dirranbandi in Queensland. She was appointed to the Board on 1 October 2005 and reappointed for a further three-year term concluding 30 September 2011. She was Vice-Chair of the Board and a member of the Remuneration Committee.

Ms Bouly is an Adjunct Professor with the School of Integrative Systems at the University of Queensland. She is also Chair of Wide Bay Water Corporation, The Glennie School Council and Lower Balonne Water Resources Ministerial Advisory Council, and a Board member of Seqwater, Murrumbidgee Irrigation Ltd and Agrifood Skills Australia Ltd. She is a graduate of the Australian Rural Leadership Program.

Glenn Fleischfresser

(Fresser)
(MAICD)



Glenn Fresser was appointed to the CRDC Board in October 2005 and reappointed for a further three-year term concluding 30 September 2011. He has owned and operated a successful cotton and grain production business on the Darling Downs since 1981. He was a member of the Intellectual Property Committee.

Mr Fresser has extensive experience in the cotton industry. His farming approach is underpinned by a respect for the natural environment, and an interest in adopting new technology and farming systems approaches. Mr Fresser has a strong understanding of the needs and issues of farmers and a genuine interest in ensuring the cotton industry continues to be sustainable, profitable and progressive. Mr Fresser is past Chairman of the Australian Cotton Growers Research Association (ACGRA) and has held other industry positions including member of the Australian Cotton Conference Committee, Chairman of TIMS Committee and Cotton Biotechnology Review Panel. He is an Honorary Ambassador to the Queensland Minister for Primary Industries and Fisheries.

Juanita Hamparsum

B Bus, CA, (GAICD)



Juanita Hamparsum was appointed to the Board for a three-year term commencing 1 October 2008 and concluding 30 September 2011. She was Chair of the Audit Committee.

Ms Hamparsum is a chartered accountant. She is a Director of the Hamparsum Family Trust and Kalori Pty Ltd, where she is the corporate trustee, accountant and finance manager for the family farming agribusiness of irrigated and broad acre cropping of cotton, wheat, sunflowers, chickpeas and sorghum. She is also a board member of the Namoi Catchment Management Authority, a fellow of the Peter Cullen Trust and a member of the Watermark Coal Project Community Consultative Committee. Ms Hamparsum has previously worked with Goldman Sachs in London and Ernst and Young in Sydney. She is a graduate member of the Australian Institute of Company Directors.



Peter Hayes

BSc, Dip Ed, BAppSci, M S



Peter Hayes was appointed to the Board for a three-year term commencing 1 October 2008 and concluding 30 September 2011. He was a member of the Remuneration Committee.

Mr Hayes is a self-employed wine industry strategist and adviser. He worked as a national viticulturist, with roles in industry relations and grower relations management for Southcorp Wines/ Fosters Wine Estates.

Mr Hayes has extensive knowledge and experience in strategic planning and in the international commercial environment. He is a former Executive Director of the Grape and Wine Research and Development Corporation and is currently Vice President of the International Organisation of Vine and Wine.

Lisa Wilson

BAgSci (Hons) (FAICD)



Lisa Wilson was appointed to the CRDC Board in October 2005 and reappointed for a further three-year term concluding 30 September 2011. She was a member of the Audit Committee.

Ms Wilson is an agribusiness professional, senior executive and company director with more than 20 years experience in the agricultural sector. She was Chief Executive Officer of Australian Dairy Farmers Limited until April 2009 and previously acting Executive Director of the Australian Rural Leadership Foundation. She is Chair of the Albert Park Advisory Group for Parks Victoria and a Victorian Advisory Group Member of Landcare Australia Ltd. Her past non-executive directorships include Deputy Chair of the Australian Rural Leadership Foundation.

About the Board

Composition

The Corporation's Board comprises the Chair (appointed by the Minister for Agriculture, Fisheries and Forestry), the Executive Director (selected by the Board) and five to seven non-executive Directors nominated by an independent Selection Committee established by legislation. Appointment of non-executive Directors is subject to Ministerial approval and directors other than the Executive Director are appointed for three-year terms.

Appointments

The term of the previous Board of Directors (with the exception of the Chair and Executive Director) finished on 30 September 2011, shortly after the end of the reporting year. The Minister appointed five new Directors

and reappointed one Director for a three-year period commencing 1 October 2011, with their terms of appointment finishing on 30 September 2014.

Selection Committee

The Minister notified the Corporation on 27 May 2011 that he had appointed Ms Christine Hawkins as the Presiding Member of the Cotton Research and Development Corporation Selection Committee. The term of appointment for the non-executive Directors ended on 30 September 2012. Ms Hawkins conducted the process for the appointment of a new Board of Directors, whose appointments commenced on 1 October 2011, following the Minister's approval of nominations. Full details can be found in the Selection Committee report on page 122.

Expertise

Directors must, and do, collectively bring expertise in cotton production, processing and marketing, conservation/management of natural resources, science and technology and technology transfer, environmental and ecological matters, economics, finance and business management, administration of research and development, sociology and public administration. The Primary Industries and Energy Research and Development (PIERD) Amendment Act 2007 requires the CRDC Selection Committee to specify how its Board nominations will ensure that CRDC collectively possesses experience in board affairs, adding to the existing requirement for an appropriate balance of expertise.

Induction

Following appointment to the Board, each Director is provided with a Director's Manual, which provides them with an appropriate level of information about the Corporation, its history and operations, and the rights, responsibilities and obligations of Directors. Copies of the Board Charter, Strategic R&D Plan and relevant legislation are included in the package.

The induction process for Directors includes an initial visit to CRDC offices in Narrabri to meet with the Chair and staff for a comprehensive overview of corporate activities and practices and a tour of key industry research facilities.

Training

Where necessary and appropriate, the Corporation sources training for Directors, either individually or as a group. The Board generally establishes the need for such training. In 2011–12, no such training was undertaken.

Responsibilities

The roles and responsibilities of Directors are set out in the Board Charter, which includes conduct and ethical standards provisions. Internal reviews of Board performance are conducted annually. The Board also obtains an external review of its performance periodically. An internal Board review was held in January 2011 and reported to the February Board meeting. The Board performance was evaluated

as of a high standard, meeting its charter. The review informed the Board work plan for the coming year.

Functions

- Establishing strategic directions and targets
- Monitoring and evaluating the research and development needs of the industry and ensuring the Corporation's research program is effective in meeting those needs
- Approving policies, plans, performance information and budgets
- Monitoring policies, procedures and internal controls to manage business and financial risk
- Ensuring compliance with statutory and legal obligations and corporate governance standards.

Responsibility for the day-to-day management of the Corporation lies with the Executive Director and senior management team. Close links between the Board of Directors and management have assisted the development of a sense of mutual confidence, trust, teamwork and common purpose. Senior management participates in Board meetings, with other staff invited to contribute wherever appropriate.

Directors may obtain independent legal and professional advice at CRDC's expense to enable them to discharge their duties effectively, subject to prior approval from the Chair, in consultation with the Board and Executive Director. This advice may relate to legislative and other obligations, technical research matters and general skill development to ensure there is a sufficient mix of financial, operational and compliance skills amongst Board members.

Conflicts of interest

In accordance with Section 131 of the *Primary Industries and Energy Research and Development Act 1989*, Directors are appointed based on their expertise and do not represent any particular organisation or interest group.

The Board follows section 54 of the *Primary Industries and Energy Research and Development (PIERD) Act 1989* and section 21 of the *Commonwealth Authorities and Companies (CAC) Act 1997* regarding Directors' disclosures of



interests. A Director who considers that he or she may have a direct or indirect pecuniary or non-pecuniary interest in a matter to be discussed by the Board must disclose the existence and nature of the interest before the discussion. Depending on the nature and significance of the interest, Directors may be required to absent themselves from the Board's deliberations. The Board has a standing notice of Director's interests, which is an agenda item at each Board meeting and is updated as necessary.

The Board is very aware of its responsibilities regarding conflict of interest and duty of care and has adopted a very cautious approach. A Board Charter clearly outlines the roles and responsibilities of Directors in terms of potential conflicts of interest. This approach has been successful and no difficulties have been encountered.

Board meetings

Board Meeting	Date	Location
2011/04	9 August 2011	Narrabri, NSW
2011/05	23-24 November 2011	Dalby, Queensland
2012/01	2 February 2012	Canberra, ACT
2012/02	21-22 March 2012	Narrabri, NSW
2012/03	6-7 June 2012	Griffith, NSW

Attendances at Board Meetings

Director	Board meetings				
	2011/04	2011/05	2012/01	2012/02	2012/03
Mike Logan (Chair)	Yes	Yes	Yes	Yes	Yes
Kerry Adby	Yes	n/a			
Leith Bouilly	Yes	n/a			
Mary Corbett	Yes	Yes	Yes	Yes	Yes
Bruce Finney	Yes	Yes	Yes	Yes	Yes
Glenn Fresser	Yes	n/a			
Richard Haire	n/a	Apology	Yes	Yes	Yes
Juanita Hamparsum	Yes	n/a			
Peter Hayes	Yes	n/a			
Hamish Millar	n/a	Yes	Yes	Yes	Yes
Michael Robinson	n/a	Yes	Apology	Yes	Yes
Cleave Rogan	n/a	Yes	Yes	Yes	Yes
Lorraine Stephenson	n/a	Apology	Yes	Yes	Yes
Lisa Wilson	Yes	n/a			

Board Committees

The Board operated three committees in 2011–12: the Audit, Intellectual Property and Remuneration Committees. In addition to formal meetings, much of the work of the Committees is conducted via email and telephone. The Corporation finds this arrangement to be effective and productive.

Audit Committee

Established under section 89 of the *Primary Industries and Energy Research and Development Act 1989* and section 32 of the *Commonwealth Authorities and Companies Act 1997*, the Audit Committee's primary role is to ensure the Corporation's financial reporting is a true and fair reflection of its financial transactions. The Committee also provides a forum for communication between the Directors, the senior managers of the Corporation and the internal and external auditors of the Corporation. It carries responsibility for identifying areas of significant business risk and stipulating the means of managing any such risk.

Juanita Hamparsum was Chair of the committee until October 2011, with Mike Logan and Lisa Wilson as the other members. With the commencement of a new Board, Richard Haire and Michael Robinson were appointed to the committee in November 2011, with Richard Haire elected as Chair in February 2012. The Executive Director, Bruce Finney, attended the meetings as an observer. The Audit Committee met four times during 2011–12.

Intellectual Property Committee

The role of the Intellectual Property Committee is to assist the Corporation's Board in fulfilling its responsibilities and to monitor the adequacy and effectiveness of the Corporation's policies and procedures relating to the management of intellectual property (IP). The Committee's specific responsibilities are to review the operation of CRDC's IP Policy and IP Operating Principles and to consider IP matters directed to it by the Board for consideration.

Mary Corbett was Chair of the Intellectual Property Committee in 2011–12. Kerry Adby and Glenn Fresser were the other members until October 2011. With the commencement of a new Board, Lorraine Stephenson, Hamish Millar and Cleave Rogan were appointed to the committee in November 2011. Executive Director, Bruce Finney, attended as an observer. The committee met four times during 2011–12.

Remuneration Committee

The Remuneration Committee advises the Board on the Executive Director's remuneration and senior staff remuneration adjustments. Mike Logan was the Chair of the Remuneration Committee in 2011–12. The members were Mike Logan (Chair), Leith Bouilly and Peter Hayes were members until October 2011. With the commencement of a new Board Mary Corbett and Richard Haire were appointed to the committee in November 2011. The Remuneration Committee met twice during 2011–12.

Attendances at Audit Committee meetings

Member	Date of meeting			
	8 August 2011	1 February 2012	15 March 2012	6 June 2012
Juanita Hamparsum (<i>Chair</i>)	Yes	n/a	n/a	n/a
Mike Logan	Yes	Yes	Yes	Yes
Lisa Wilson	Yes	n/a	n/a	n/a
Richard Haire	n/a	Yes	Yes	Yes
Michael Robinson	n/a	Apology	Yes	Yes

Attendances at Intellectual Property Committee meetings

Member	Date of meeting			
	8 August 2011	1 February 2012	15 March 2012	6 June 2012
Mary Corbett (<i>Chair</i>)	Yes	Yes	Yes	Yes
Kerry Adby	Yes	n/a	n/a	n/a
Glenn Fresser	Yes	n/a	n/a	n/a
Lorraine Stephenson	n/a	Yes	Yes	Yes
Hamish Millar	n/a	Yes	Yes	Yes
Cleave Rogan	n/a	Yes	Yes	Yes

Attendances at Remuneration Committee meetings

Member	Meetings	
	15 July 2011	21 March 2012
Mike Logan (<i>Chair</i>)	Yes	Yes
Leith Bouilly	Yes	n/a
Peter Hayes	Yes	n/a
Mary Corbett	n/a	Yes
Richard Haire	n/a	Yes



Indemnities

The Board has taken the necessary steps to ensure professional indemnity cover is in place for present and past Directors and officers of the Corporation. The Corporation's insurance cover is provided through Comcover; however, the insurance contract prohibits CRDC from disclosing the nature or limit of the liabilities covered or the amounts of premiums paid.

Board Charter

A Board Charter assists Directors in carrying out their duties and setting out roles and responsibilities of Directors and staff.

STAFF

Organisational structure at 30 June 2012

CRDC Board of Directors		
Chair Mike Logan		
Executive Director Bruce Finney		
R&D Investment Team	Communication	Business and Finance Team
General Manager R&D Investment, and Manager, Program 3 Bruce Pyke* Research Program Investment Managers Program 1 Dallas Gibb** Program 2 Tracey Leven* Allan Williams** (Soils, Nutrition and Climate Change)	Communication Manager Rohan Boehm*	General Manager Business and Finance Graeme Tolson* Trainee Accountant Elizabeth Eather* Executive Assistant Dianne Purcell* Project Administration Manager Fiona Mead*

* Employee ** External (contractor)

Employment

Staff members are employed under Section 87 of the PIERD Act 1989, which provides that the terms and conditions of employment are to be determined by the Corporation. Including the Executive Director, there were seven full-time employees and one part-time casual employee as at 30 June 2012.

CRDC complies with the Australian Government Bargaining Framework when exercising its power to engage employees in relation to sections 12, 87 and 119 of the PIERD Act.

Staff Changes during 2011–12

Administrative assistant, Margaret Wheeler, left the Corporation on 31 January 2012 after some ten years of service. Fiona Mead was appointed as Project Administration Manager, commencing on 20 February 2012. Georgia Ethridge was employed on a part time, temporary basis from 19 August 2011 to 29 June 2012.

Staff training and development

In 2011–12, the Corporation spent \$6,335.18 on training and \$22,893.43 on recruitment. Areas of direct training activities were Comcover



Benchmarking workshop, Certified Practising Accountants (CPA) workshop and support for an employee undertaking academic studies in accounting.

Throughout the year, Corporation Directors and staff participate in a wide range of Corporation-related activities involving external bodies relating to the operations of the Corporation, providing valuable experience, as well as skills and knowledge upgrades for the personnel involved.

Equal Employment Opportunity

CRDC is committed to a merit-based, non-discriminatory recruitment and promotion policy and staff members are chosen strictly according to their qualifications for the job.

Scientists undertaking CRDC-funded research are of diverse backgrounds and cultures.

CRDC's Equal Opportunity and Harassment Policy defines prohibited discrimination and harassment and sets out a complaints procedure to be followed if there is a breach of this policy, including details of what action can be taken once the complaint has been made. The policy applies to all employees, whether full-time, part-time, casual or temporary, to directors and to contractors and customers (clients).

GOVERNANCE AND ACCOUNTABILITY

CRDC's background

The Cotton Research and Development Corporation was established in 1990 under the *Primary Industries and Energy Research and Development (PIERD) Act 1989*. The Act provides the Corporation with a charter to invest in and manage a portfolio of research, development and extension projects and programs. The purpose of this Act is to secure economic, environmental and social benefits for the Australian cotton industry and the community and to achieve sustainable use and management of natural resources, while making more effective use of the resources and skills of the scientific and general communities. All of this is to be conducted in a framework of improved accountability for research and development spending in relation to the cotton industry.

CRDC is a partnership between the Australian people (through the Australian Government) and the Australian cotton industry (through Cotton Australia – its legislated industry body). We are based in one of Australia's major cotton-growing areas, Narrabri, in north west NSW, centrally located within the Australian cotton industry with the benefits that brings in developing and maintaining important

relationships with cotton growers, researchers, processors and members of regional cotton communities.

Arrangements with other companies

The Narrabri district is also home to a key industry research facility, the Australian Cotton Research Institute: a collaborative research site and until 30 June 2012, the headquarters of the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC). CRDC was a core participant in the Cotton CRC throughout its life and its activities for 2011–12 are detailed in its final Annual Report, accessible on its website at www.cottoncrc.org.au. Its activities relating to CRDC are also contained in this publication, principally in Research Activities, starting on page 30.



Enabling legislation

The Cotton Research and Development Corporation began operations in 1990 under the *Primary Industries and Energy Research and Development (PIERD) Act 1989*, which sets out the following objectives:

- a. Increasing the economic, environmental and social benefits to members of primary industries and the community in general by improving the production, processing, storage, transport and marketing of the products of primary industries
- b. Achieving the sustainable use and management of natural resources
- c. Making more effective use of the resources and skills of the community in general and the scientific community in particular
- d. Improving accountability for expenditure on research and development activities in relation to primary industries.

The requirements of the PIERD Act are central to the Corporation's R&D planning. These requirements, as well as government and industry research priorities, form the Corporation's planning instruments and are addressed in the three R&D programs devised under the five-year Strategic Plan for 2008–2013.

The *Primary Industries and Energy Research and Development Amendment Act 2007* amended the PIERD Act in several respects intended to deliver an enhancement in the governance of Rural R&D Corporations.

The setting and collection of levies on the cotton industry is enabled by the *Cotton Levy Act 1982* and the *Primary Industries Levies and Collections Act 1991*. Accountability and reporting requirements are set out in the *Commonwealth Authorities and Companies (CAC) Act 1997*.

Legislative Functions

CRDC Function	Application
Investigating and evaluating the cotton industry's requirements for research and development, and the preparation, review and revision of an R&D plan on that basis	<i>This is achieved by continuing interaction with CRDC's legislated industry body, Cotton Australia, as well as the industry peak body, the Australian Cotton Industry Council (ACIC). Cotton Australia undertakes a range of functions relating to CRDC, including an annual review to ensure the CRDC Strategic Plan remains current and relevant. The cotton industry and cotton researchers were closely involved in development of the CRDC Strategic Plan 2008–2013, which incorporated Government and industry R&D priorities, as well as advice from the Minister and the Department of Agriculture, Fisheries and Forestry.</i>
Preparing an Annual Operating Plan for each financial year	<i>An Annual Operating Plan is submitted to the Australian Government in April each year and implementation proceeds once Government approval is received.</i>
Coordinating and funding R&D activities consistent with current planning documents	<i>Research, development and extension projects are approved or commissioned in line with the Annual Operating Plan each year. The Annual Operating Plan is devised to address the objectives and strategies outlined in the current five-year Strategic R&D Plan.</i>
Monitoring, evaluating and reporting to Parliament, the Minister for Agriculture, Fisheries and Forestry, and to industry on R&D activities coordinated or funded by the Corporation	<i>The Corporation reports formally to the Australian Government through its Annual Report, which is usually tabled in Parliament in October; in addition, the Corporation informs the Minister for Agriculture, Fisheries and Forestry of any matters of interest or concern in the current operating environment. This occurs in written and, where possible, face-to-face communication. CRDC is also in communication with the Department of Agriculture, Fisheries and Forestry on a range of issues. Communication with the industry occurs continually on both a formal and informal basis, as outlined above.</i> <i>In order to ensure stringent evaluation of its R&D activities, CRDC is committed to the ongoing Council of Rural Research and Development Corporation's Impact Evaluation process.</i>



CRDC Function	Application
Facilitating the dissemination, adoption and commercialisation of research and development results in relation to the cotton industry	<p>Over the past decade, the Australian cotton industry has benefited from having an industry-wide extension network, the Cotton Catchment Communities CRC-coordinated Development and Delivery team. In 2010–11 industry consolidation and investigation of new approaches for supporting R&D adoption by CRDC led actions to transition to a new demand driven and ‘commercial-like’ model. The new model recognises the importance of supporting adoption of R&D through multiple delivery pathways and will be underpinned by the redevelopment of the industry best management practice program, <i>myBMP</i>.</p> <p>CRDC staff members continued to play a pivotal role in facilitating fast and effective dissemination of CRDC-funded research outcomes.</p> <p>More broadly, CRDC hosts forums, participates in roadshows and the annual cotton trade show, produces publications, sponsors the biennial research-based Australian Cotton Conference and has a communication strategy to extend and enhance the adoption of R&D. CRDC also collaborates in the successful commercialisation of R&D where possible.</p>

Powers

Under Section 12 of the PIERD Act, CRDC has the power to do all things necessary to carry out its functions, including but not restricted to:

- Entering into agreements for the carrying out of R&D activities;
- Applying for patents, either solely or jointly;
- Charging for work done, services rendered, and goods and information supplied;
- Acquiring, holding and disposing of real or personal property; and
- Anything incidental to any of its powers.

Responsible Minister

The Corporation is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig. The Minister’s powers and responsibilities, as outlined under various sections of the PIERD Act, include:

- appointing the Corporation’s Chair and Directors
- the option to terminate the appointment of the Chair or any Director under certain conditions
- approving the Corporation’s Research and Development (Five Year) Plan and any variations

- approving the Corporation’s Annual Operating Plans and any variations
- appointing a person as Presiding Member of the Corporation’s Selection Committee, as well as other members of that Committee
- transferring to the Corporation any assets held by the Commonwealth that the Minister considers appropriate and which would assist the performance and function of the Corporation.

Ministerial Directions

As at 30 June 2012, CRDC is compliant with all legislative and policy requirements of the Australian Government that it has been able to ascertain.

Ongoing directions from previous years that are applicable to the Corporation are the Commonwealth Fraud Control Guidelines 2011, Australian Government Foreign Exchange Risk Management Guidelines, Australian Government Cost Recovery Guidelines, National Code of Practice for the Construction Industry and the Australian Government Implementation Guidelines for the National Code of Practice for the Construction Industry, the Commonwealth Procurement Guidelines, the Commonwealth Property Management Framework and the Australian Government Protective Security Policy Framework.



CRDC complies with the Australian Government Bargaining Framework (AGBF) when exercising its power to engage employees in relation to sections 12, 87 and 119 of the PIERD Act. A review conducted in March 2012 confirmed CRDC's compliance with the AGBF and work place legislation.

In a letter dated 14 September 2011, the Minister notified the Corporation of the reappointment of Dr Mary Corbett to the CRDC board and the appointment of new directors, Mr Richard Haire, Mr Hamish Millar, Dr Michael Robinson, Mr Cleave Rogan and Dr Lorraine Stephenson for a term extending from 1 October 2011 to 30 September 2014.

The Minister wrote once more to the Corporation on 1 May 2012 asking that CRDC draw on information sources he outlined when finalising and implementing its water use research priorities and plans. He also expressed his desire to see carbon and water-related R&D appropriately reflected the annual operating plans and strategic plans, in conjunction with other productivity-related R&D drivers and continued RDC collaboration under the Rural RD&E Framework, to ensure effective and efficient delivery of outcomes.

Research accountabilities

CRDC is accountable to the Australian people through the Australian Government and to the cotton industry through its industry representative body, Cotton Australia.

The Corporation has been subject to the *Commonwealth Authorities and Companies (CAC) Act 1997* since August 1998. The CAC Act provided enhanced levels of accountability, as well as a new planning and reporting framework. The Annual Operating Plan 2011–12 marked the fourth year of operation under the framework requirements of the Strategic Plan 2008–2013.

CRDC's stakeholders set broad objectives, which the Corporation addresses through its Strategic (Five Year) Plan and Annual Operating Plan. CRDC has used these objectives as a basis for the development of its planned outcomes and the identification of key outputs.

Intellectual property

A review of the Corporation's Intellectual Property (IP) policy and procedures was finalised in 2010. An audit of internal procedures was conducted in 2011–12.

Risk management

The Corporation has in place a risk management framework, policies for Terms of Employment, Equal Employment Opportunity and Harassment, Appropriate Internet and Email Access, Government Protective Security, Delegations of Authority and Risk Register.

The risk management process also involves consulting widely and participating in appropriate industry, Rural Research and Development Corporations forums and Government forums to remain fully informed about our operating environment. Situations involving even minor business risk are fully discussed at Board level, with policy developed through consensus. Management and staff have responsibility for implementing policy as directed by the Board.

The Protective Security Manual 2005 (PSM) has applied to CRDC as a general policy of the Government since 1 March 2007. In accordance with subsections 28(2) and 28(3) of the CAC Act, the Corporation has continued to ensure that Protective Security Policy was carried out and is transitioning to the Australian Government Protective Security Policy Framework.

The Board holds a focused and facilitated strategic review session in conjunction with Board meetings, focusing on a specific issue or area of research. Depending on the topic, a variety of speakers and industry participants may also be invited to attend, to enable broad discussion and to expose risks and opportunities for the Corporation and the industry. The Corporation adopted risk management as a standing item at staff meetings, including discussing and defining fraud.

Risk Management reviews

Directors and management conducted, commissioned or enacted the following reviews during 2011–12:

Review	Process and/or Outcome
Corporate reviews	
Risk management framework & risk register	The audit committee and Board reviewed and updated the risk management framework and risk register. CRDC also participated in Comcover's Risk Management and Benchmarking Survey 2011.
Fraud control & risk management audit	Nexia Court & Co. conducted an external audit in May 2011. The audit was conducted in accordance with Australian Auditing Standards for the assistance of Directors in evaluating the compliance of CRDC with internal controls.
R&D strategic reviews	
Third assessment of the environmental management and performance of the Australian cotton growing industry	Analysis completed 2011–12. The final report will be available early in the 2012–13 reporting year.
Water R&D review	Brought together the breadth of water-related R&D relating to cotton plants, fields, farms, catchments and communities. Outcome published as <i>The Australian cotton industry water story – A decade of Research and Development 2002–12</i> .
Ginning R&D review	Review commenced and ongoing.

Corporate Planning

In accordance with the *Primary Industries and Energy Research and Development (PIERD) Act 1989* and the *Commonwealth Authorities and Companies (CAC) Act 1997*, the Corporation prepares a Strategic (Five Year) Plan as well as an Annual Operating Plan for each financial year.

The Corporation submitted its Annual Operating Plan 2012–13 to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig, on 1 May 2012 and received written advice of approval dated 19 June 2012.

The Corporation submitted its Annual Report 2010–11 to the Minister on 4 October 2011 and received his agreement to table the report dated 9 November 2011. Prior to receiving the Minister's response, the report had been tabled in the House of Representatives on 5 November 2011.

Fraud Control

The Corporation fosters an environment that minimises the likelihood and impact of fraud. Active fraud control is a major responsibility of all staff and clear standards and procedures have been established. All personnel engaged in the prevention, detection and investigation of fraud receive appropriate fraud control training, consistent with the Australian Government's Fraud Control Guidelines.

The Audit Committee endorses, monitors and reviews the plan, which is read in conjunction with the Risk Management Plan and the Board Charter for Directors and Statement of Principles for staff.

The Corporation's Audit Committee, Executive Director and General Manager Business and Finance (the nominated fraud control officer) carry out the functions of a fraud investigation unit collectively, as described in the Commonwealth Fraud Investigation Model. The support of the Australian Federal Police



would be sought if the Corporation felt there was a prima facie case of fraud and further investigation was required. No such action was necessary in 2011–12.

Service Charter

The Corporation does not provide services direct to the public and does not have a service charter; however, the Corporation has a Board Charter and a Statement of Principles. The latter can be found at the front of this publication. It embodies the set of values underlying our decisions, actions and relationships.

National Disability Strategy

Corporation working conditions and procedures for employees and stakeholders align with the *Commonwealth Disability Discrimination Act 1992* in the broader context of the National Disability Strategy 2010–2020 insofar as the small size of the Corporation and physical nature of the CRDC building allow. CRDC has ensured that any person with a disability could be properly accommodated and carry out all functions, as either a staff member or a visitor. Should a future staff member or visitor need more specialised disability assistance, CRDC will assess and meet these needs to the extent that it is possible.

CRDC's Equal Opportunity and Harassment Policy defines prohibited discrimination and harassment and sets out a complaints procedure. Further details can be found under Equal Employment Opportunity on page 75.

Significant Events

The Corporation had no significant events in 2011–12, as defined in section 15 of the *Commonwealth Authorities and Companies (CAC) Act 1997*.

CRDC Work Health and Safety notifiable incidents

Notifiable incidents	2008–09	2009–10	2010–11	2011–12
Deaths	0	0	0	0
Serious injury or illness (a)	0	0	1	0
Dangerous incidents (b)	0	0	0	0
Total	0	0	1	0

Significant Changes in the State of Affairs

CRDC had no significant change in its state of affairs in 2011–12, as defined in section 16 of the *CAC Act 1997*.

Judicial decisions and reviews by outside bodies

CRDC had no judicial decisions or reviews by outside bodies in 2011–12 within the meaning of Division two of Part two of the *PIERD Act 1989*.

Work Health and Safety

CRDC has a strong culture of achieving best practice and continuous improvement in Work Health and Safety (WHS), as required by the *Work Health and Safety Act 2011*. This is achieved by providing the necessary resources (both human and financial) to ensure that WHS functions effectively.

In accordance with Schedule 2 Part 4 of the *WHS Act*, CRDC details notifiable incidents reported each year. In view of its WHS record, CRDC remains vigilant in maintaining its safety performance by conducting audits and reviews of policies and procedures.

Serious injury or incident means that a person needs emergency treatment by a doctor; treatment in a hospital as a casualty, with or without being admitted to the hospital; or admission to hospital.

Dangerous incidents are 'near misses' that could have, but did not, result in fatality, serious injury or incapacity.

CRDC Work Health and Safety 2011–12: a summary	
Legislative reporting requirements under Schedule 2 Part 4 of the Work Health and Safety Act 2011	Action undertaken 2011–12
Initiatives during the year and outcomes	<p>An independent audit of WHS performance was initiated at year-end.</p> <p>Safety issues discussed formally at workplace meetings, workplace inspections held (including vehicles) and staff consulted in resolving safety issues and physical conditions of the workplace.</p> <p>A flu vaccination program provided for all staff.</p> <p>Work Health and Safety inductions provided for new staff, directors and contractors.</p>
Statistics of any notifiable incidents as defined by s.38 of the WHS Act	CRDC had no notifiable incidents in 2011–12.
Details of any investigations conducted during the year, including details of all notices under Part 10 of the WHS Act	CRDC conducted no investigations and no notices were received from or given to an employee.

Freedom of Information

CRDC has never received a Freedom of Information request, including in 2011–12, but should it receive such a request it would be managed in accordance with the provisions of its Freedom of Information plan, which complies with subsection 8(1) of the *Freedom of Information Act 1982* and can be found at www.crdc.com.au.

General enquiries regarding access to documents or other matters relating to Freedom of Information should be made in the first instance to the Executive Director. Funding information on individual projects funded by the Corporation is available on request, unless that information has been classified as commercial-in-confidence. Information about CRDC projects is available at www.crdc.com.au.

Freedom of Information: categories of documents held

Category	Nature	Access
Administration	Files	D
Annual Operational Plans	Files, Publications	C
Annual Reports	Files, Publications	C
Applications, Guidelines and Contracts	Files, Publications	C, D
Assets Register	Files	D
Financial Management	Files	D
Five Year Plans	Files, Publications	C
Project Lists	Files, Publications	C, D
Research Reports	Files, Publications	C, D
Workshop Reports	Files, Publications	C, D

C: Documents customarily made available

D: Documents not customarily made available for reasons of privacy or commercial-in confidence



Contractors and consultants

Policy

The Corporation employs consultants and contractors on a needs basis and after background checks to ensure proposed appointees have the necessary skills and experience. During the reporting year the Corporation spent \$442,359.79, exclusive of GST, to remunerate consultants and contractors. Privacy and confidentiality arrangements mean that Corporation policy is not to disclose amounts paid to individual consultants. A list of contractors and consultants with remuneration of \$10,000 or more, exclusive of GST, can be found in the adjoining table.

Payments to advertising agencies

The Corporation did not engage the services of any advertising agency, market research organisation, polling organisation, direct mail organisation or media advertising organisation during the reporting year.

Industry stakeholder relations

Reporting

CRDC's industry stakeholder reporting processes include the presentation of a formal report to its industry stakeholder, Cotton Australia. Part of this presentation includes an opportunity for questioning and debating Board decisions. In addition, CRDC and Cotton Australia have a great deal of contact, both formal and informal, at which information on activities is exchanged. Further information on the relationship between the Corporation and Cotton Australia can be found on page 28.

Payments

The role of CRDC's industry representative body, Cotton Australia, involves several specific activities:

- Participation in development of the five year Strategic Plan. This ensures CRDC's strategic planning continues to address evolving industry R&D needs

Contractors and consultants 2011–12

Contractor	Service provided 2011–12
A & A Williams	Program management
ACIL Tasman	Strategic advice
Banki Haddock Fiora	Legal advice
Lawyers	
CA (Pacific) Pty Ltd	IT support
Griffith University	Strategic advice
Helen Wheels HR	Project management
Rachael Holloway	Project management
Melanie Jenson	Publication management and content
Neil Deacon Art Director	Creative direction and design
TechMAC Pty Limited	Program management
Weemalah Writeability	Publication content, editing and design

- A meeting to receive and discuss the CRDC annual report for the preceding year. This enables the industry representative body to ensure that CRDC's activities for that year have met its strategic objectives (listed on page 30) and to question senior staff on any matters of interest or concern
- Participation in CRDC and Cotton Catchment Communities CRC Farming Systems forums.

While CRDC does not pay a fee for service to the industry representative body for these activities, it contributes to the expenses they incur in carrying them out, as authorised by section 15 of the PIERD Act, which relates to consultation with the industry stakeholder.

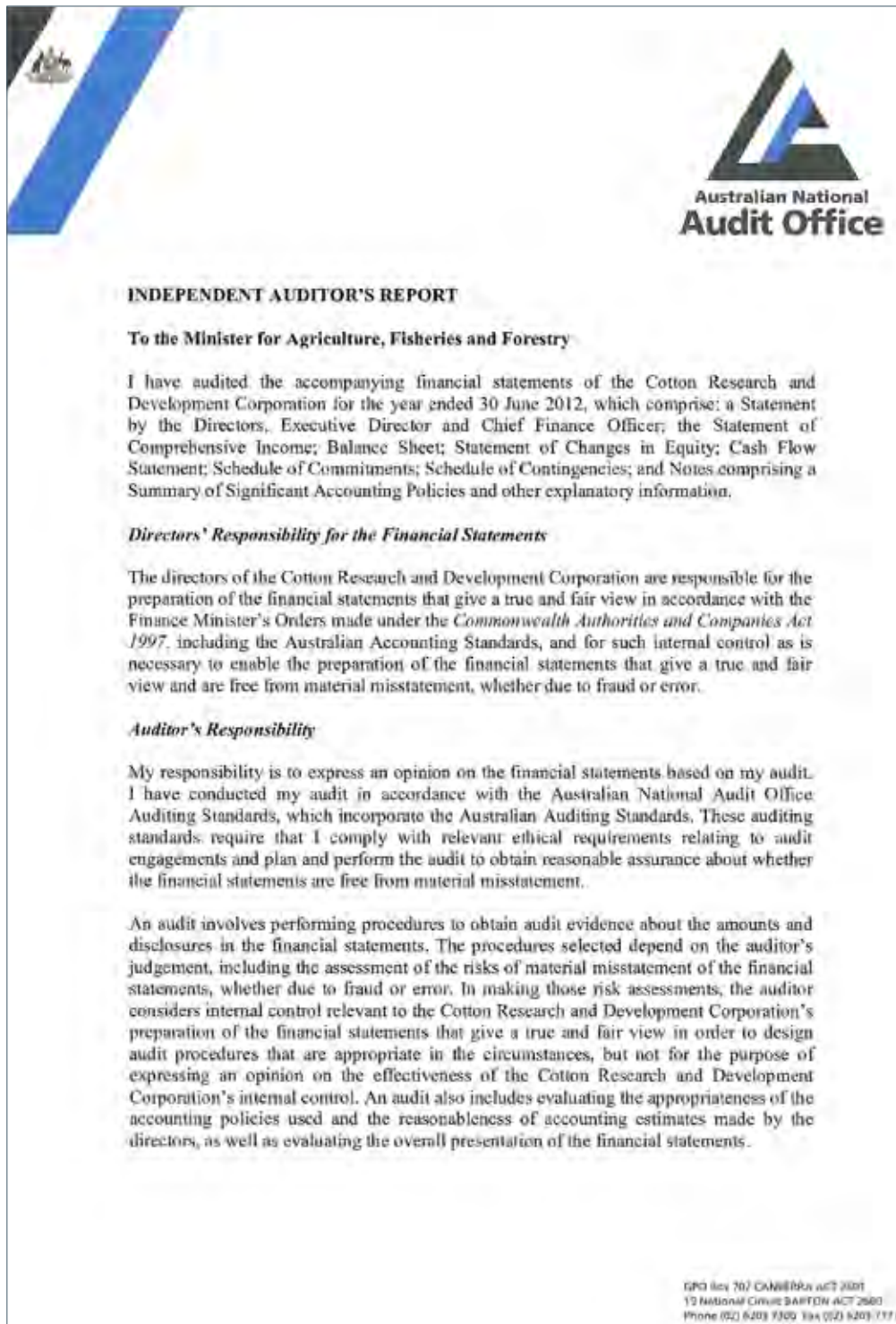
In 2011–12, CRDC contributed a total of \$162,414.41 to Cotton Australia for the following activities:

- Review of CRDC 2011–12 research reports
- Review of CRDC 2012–13 research applications
- Project support for biosecurity training for growers and agronomists
- Project support for the Primary Industries Education Foundation
- Support for the 16th Australian Cotton Conference.



A man wearing a brown cowboy hat, a purple long-sleeved shirt, and blue jeans is walking in a field. He is smiling and looking down at a young child walking beside him. The child is wearing a blue and white striped shirt with a yellow graphic and blue pants. The background is a clear blue sky and a field of dry, brownish vegetation.

FINANCIAL STATEMENTS



I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

Independence

In conducting my audit, I have followed the independence requirements of the Australian National Audit Office, which incorporate the requirements of the Australian accounting profession.

Opinion

In my opinion, the financial statements of the Cotton Research and Development Corporation:

- (a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards; and
- (b) give a true and fair view of the matters required by the Finance Minister's Orders including the Cotton Research and Development Corporation's financial position as at 30 June 2012 and of its financial performance and cash flows for the year then ended.

Australian National Audit Office

S. Buchanan

Serena Buchanan
Audit Principal

Delegate of the Auditor-General

Canberra
14 September 2012



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Statement by the Directors, Executive Director and Chief Finance Officer

In our opinion, the attached financial statements for the year ended 30 June 2012 are based on properly maintained financial records and give a true and fair view of the matters required by the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, as amended.

In our opinion, at the date of this statement, there are reasonable grounds to believe that the Cotton Research and Development Corporation will be able to pay its debts as and when they become due and payable.

This statement is made in accordance with a resolution of the directors.

Signed



Mike Logan
Chairperson

14th September 2012

Signed



Richard Haire
Director

14th September 2012

Signed



Bruce Finney
Executive Director

14th September 2012

Signed



Graeme Tolson
Chief Finance Officer

14th September 2012



STATEMENT OF COMPREHENSIVE INCOME*for the period ended 30 June 2012*

	Notes	2012 \$	2011 \$
EXPENSES			
Employee benefits	3A	1,306,251	1,260,230
Supplier	3B	443,555	379,967
Grants	3C	11,930,521	8,112,576
Depreciation and amortisation	3D	35,584	51,431
Losses from asset sales	3E	1,136	8,138
Total expenses		13,717,047	9,812,342
LESS:			
OWN-SOURCE INCOME			
Own-source revenue			
Interest	4A	1,401,196	804,851
Rental income	4B	15,000	15,000
Royalties	4C	3,144,994	2,789,277
Other	4D	1,731,120	962,054
Total own-source revenue		6,292,310	4,571,182
Net cost of (contribution by) services		7,424,737	5,241,160
Revenue from Government			
PIERD Act 1989 Contribution	4E	9,529,194	5,677,104
Levies and penalties	4F	9,531,898	4,575,879
Total revenue from Government		19,061,092	10,252,983
Surplus (deficit) attributable to the Australian Government		11,636,355	5,011,823
OTHER COMPREHENSIVE INCOME			
Changes in asset revaluation surplus		139,238	-
Total other comprehensive income		139,238	-
Total comprehensive income (loss) attributable to the Australian Government		11,775,593	5,011,823

The above statement should be read in conjunction with the accompanying notes.

COTTON RESEARCH AND DEVELOPMENT CORPORATION

BALANCE SHEET

as at 30 June 2012

	Notes	2012 \$	2011 \$
ASSETS			
Financial assets			
Cash and cash equivalents	5A	26,205,066	16,296,478
Trade and other receivables	5B	4,481,513	1,884,714
Total financial assets		30,686,579	18,181,192
Non-financial assets			
Land and buildings	6A	690,000	531,000
Property, plant and equipment	6B,C	85,298	68,059
Intangibles	6D,E	3,875	12,386
Other	6F	7,965	7,695
Total non-financial assets		787,138	619,140
Total assets		31,473,717	18,800,332
LIABILITIES			
Payables			
Suppliers	7A	90,826	54,786
Grants	7B	3,684,745	1,900,362
Other	7C	59,464	51,867
Total payables		3,835,035	2,007,015
Provisions			
Employee provisions	8A	230,223	217,747
Other	8B	91,197	1,033,901
Total provisions		321,420	1,251,648
Total liabilities		4,156,455	3,258,663
Net assets		27,317,262	15,541,669
EQUITY			
Reserves		345,937	206,699
Retained surplus		26,971,325	15,334,970
Total equity		27,317,262	15,541,669

The above statement should be read in conjunction with the accompanying notes.



STATEMENT OF CHANGES IN EQUITY*for the period ended 30 June 2012*

	Retained earnings		Asset revaluation reserve		Total equity	
	2012	2011	2012	2011	2012	2011
	\$	\$	\$	\$	\$	\$
Opening balance						
Balance carried forward from previous period	15,334,970	10,323,147	206,699	206,699	15,541,669	10,529,846
Adjustment for errors	-	-	-	-	-	-
Adjustment for changes in accounting policies	-	-	-	-	-	-
Adjusted opening balance	15,334,970	10,323,147	206,699	206,699	15,541,669	10,529,846
Comprehensive income						
Other comprehensive income	-	-	139,238	-	139,238	-
Surplus (deficit) for the period	11,636,355	5,011,823			11,636,355	5,011,823
Total comprehensive income	11,636,355	5,011,823	139,238	-	11,775,593	5,011,823
Transfers between equity components	-	-	-	-	-	-
Closing balance as at 30 June	26,971,325	15,334,970	345,937	206,699	27,317,262	15,541,669

The above statement should be read in conjunction with the accompanying notes.

CASH FLOW STATEMENT*for the period ended 30 June 2012*

	Notes	2012 \$	2011 \$
OPERATING ACTIVITIES			
Cash received			
Industry levies and penalties		8,323,165	4,531,539
Commonwealth contributions		8,212,888	5,448,799
Royalties		3,432,860	4,796,622
Grants		71,763	27,000
NPSI novation receipts		418,333	270,022
Interest		1,236,522	716,489
NPSI interest		35,568	87,269
Net GST received		726,127	536,619
Other		395,304	647,216
Total cash received		22,852,530	17,061,575
Cash used			
Employees		1,288,382	1,247,570
Grants		9,826,739	8,689,722
Suppliers		301,143	278,823
NPSI novation grants paid		1,378,178	1,690,824
NPSI novation suppliers paid		84,290	101,930
Total cash used		12,878,732	12,008,869
Net cash from (used by) operating activities	9	9,973,798	5,052,706
INVESTING ACTIVITIES			
Cash received			
Proceeds from sales of property, plant and equipment		-	2,273
Total cash received		-	2,273
Cash used			
Purchase of property, plant and equipment		65,210	40,921
Total cash used		65,210	40,921
Net cash from (used by) investing activities		(65,210)	(38,648)
Net increase (decrease) in cash held			
Cash and cash equivalents at the beginning of the reporting period		16,296,478	11,282,420
Cash and cash equivalents at the end of the reporting period	5A	26,205,066	16,296,478

The above statement should be read in conjunction with the accompanying notes.



SCHEDULE OF COMMITMENTS*as at 30 June 2012*

	2012	2011
	\$	\$
BY TYPE		
Commitments receivable		
Sublease rental income	-	-
Net GST recoverable on commitments ¹	1,069,799	813,358
Total commitments receivable	1,069,799	813,358
Commitments payable		
Other commitments		
Operating leases ²	12,135	60,676
Research grant commitments ³	11,755,656	8,886,263
Total other commitments	11,767,791	8,946,939
Net commitments payable by type	10,697,992	8,133,581
BY MATURITY		
Commitments receivable		
Operating lease income		
One year or less	-	-
Total operating lease income	-	-
Other commitments receivable		
One year or less	650,317	535,312
From one to five years	419,482	278,046
Total other commitments receivable	1,069,799	813,358
Commitments payable		
Operating lease commitments		
One year or less	12,135	48,541
From one to five years	-	12,135
Total operating lease commitments	12,135	60,676
Other Commitments		
One year or less	7,141,356	5,839,888
From one to five years	4,614,300	3,046,375
Total other commitments	11,755,656	8,886,263
Net commitments by maturity	10,697,992	8,133,581

Note 1: Commitments are GST inclusive where relevant.

Note 2: Operating leases are effectively non-cancellable and comprise of agreements for the provision of motor vehicles for the Corporation.

Note 3: Research grant commitments are amounts payable under grant agreements in respect of which the recipient is yet to perform the services required or meet eligibility conditions.

This schedule should be read in conjunction with the accompanying notes.

SCHEDULE OF CONTINGENCIES

as at 30 June 2012

The Corporation had no contingent assets and liabilities in the current or prior period.
The above schedule should be read in conjunction with the accompanying notes.



Note 1: Summary of Significant Accounting Policies

1.1 Objective of Cotton Research and Development Corporation

Cotton Research and Development Corporation is an Australian Government controlled entity. The objective of the Corporation is to bring industry and researchers together to establish research and development strategic directions and to fund projects that provide the cotton industry with the innovation and productivity tools to compete in global markets.

The Corporation is structured to meet one outcome:

"Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community."

The continued existence of the Corporation in its present form and with its present programs is dependent on Government policy and on continuing funding by Parliament for the Corporation's administration and programs.

1.2 Basis of Preparation of the Financial Statements

The financial statements are general purpose financial statements and are required by clause 1 (b) of Schedule 1 to the *Commonwealth Authorities and Companies Act 1997*.

The financial statements have been prepared in accordance with:

- a) Finance Minister's Orders (FMOs) for reporting periods ending on or after 1 July 2011; and
- b) Australian Accounting Standards and Interpretations issued by the Australian Accounting Standards Board (AASB) that apply for the reporting period.

The financial statements have been prepared on an accrual basis and in accordance with the historical cost convention, except for certain assets and liabilities at fair value. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

The financial statements are presented in Australian dollars and values are rounded to the nearest dollar unless otherwise specified.

Unless an alternative treatment is specifically required by an accounting standard or the FMOs, assets and liabilities are recognised in the balance sheet when and only when it is probable that future economic benefits will flow to the Corporation or a future sacrifice of economic benefits will be required and the amounts of the assets or liabilities can be reliably measured. However, assets and liabilities arising under Agreements Equally Proportionately Unperformed are not recognised unless required by an accounting standard. Liabilities and assets that are unrecognised are reported in the schedule of commitments or the schedule of contingencies.

Unless alternative treatment is specifically required by an accounting standard, income and expenses are recognised in the Statement of Comprehensive Income when, and only when the flow, consumption or loss of economic benefits has occurred and can be reliably measured.

1.3 Significant Accounting Judgements and Estimates

In the process of applying the accounting policies listed in this note, the Corporation has made the following judgements that have the most significant impact on the amounts recorded in the financial statement:

- a) The fair value of land and buildings has been taken to be the market value of similar properties as determined by an independent valuer.
- b) Leave provisions also involve actuarial assumptions based on the likely tenure of existing staff, patterns of leave claims and payouts, future salary movements and future discount rates.

No accounting assumptions or estimates have been identified that have a significant risk of causing a material adjustment to carrying amounts of assets and liabilities within the next accounting period.

1.4 New Australian Accounting Standards

Adoption of New Australian Accounting Standard Requirements

No accounting standard has been adopted earlier than the application date as stated in the standard.

No new standards, amendments to standards or interpretations applicable to the current reporting period had a material financial impact, and are not expected to have a future financial impact on the entity.

Future Australian Accounting Standard Requirements

Of the new standards, amendments to standards or interpretations that have been issued by the Australian Accounting Standards Board that are applicable to future reporting periods, none will have a material impact on the Corporation.

1.5 Revenue

Revenue from the sale of goods is recognised when:

- a) the risks and rewards of ownership have been transferred to the buyer;
- b) the Corporation retains no managerial involvement or effective control over the goods;
- c) the revenue and transaction costs incurred can be reliably measured; and
- d) it is probable that the economic benefits associated with the transaction will flow to the Corporation.

Revenue from rendering of services is recognised by reference to the stage of completion of contracts at the reporting date. The revenue is recognised when:

- a) the amount of revenue, stage of completion and transaction costs incurred can be reliably measured; and
- b) the probable economic benefits associated with the transaction will flow to the entity.

The stage of completion of contracts at the reporting date is determined by reference to the proportion that costs incurred to date bear to the estimated total costs of the transaction.

Receivables for goods and services, which have 30 day terms, are recognised at the nominal amounts due less any impairment allowance account. Collectability of debts is reviewed at end of the reporting period. Allowances are made when collectability of the debt is no longer probable.

Interest revenue is recognised using the effective interest method as set out in AASB 139 *Financial Instruments: Recognition and Measurement*.

Resources Received Free of Charge

Resources received free of charge are recognised as revenue when, and only when, a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense. Resources received free of charge are recorded as either revenue or gains depending on their nature.

Revenue from Government

Funding received or receivable from agencies (appropriated to DAFF as a CAC Act body payment item for payment to this Corporation) is recognised as Revenue from Government unless they are in the nature of an equity injection or a loan. Revenue from DAFF is recognised on an accrual basis from the date that DAFF notifies the Corporation of the amount receivable.

Parental Leave Payments Scheme

Amounts received under the Parental Leave Payments Scheme by the Corporation not yet paid to employees were presented as gross cash and a liability (payable). The total amount received under this scheme is disclosed as a footnote to the Note 4: Revenue from Government.



1.6 Royalties

Revenue from royalties are recognised on an accruals basis in accordance with the substance of the relevant agreements. CRDC's major agreement in plant breeding royalties with CSIRO ceases at 30th June 2017.

Royalties from Australian cottonseed include "End-Point-Royalties" and "Late Plough-in Royalties". End-Point-Royalties are based on bales of cotton ginned. The proportion of End-Point-Royalty crop ginned at 30th June cannot be measured with sufficient reliability. Late Plough-in Royalties are based on grower reports submitted after the 30th June. The proportion of Late Plough-in Royalties crop harvested at 30th June cannot be measured with sufficient reliability. Accordingly the End-Point-Royalties and Late Plough-in Royalties revenue recognised is based on the cash received.

1.7 Gains

Resources Received Free of Charge

Resources received free of charge are recognised as gains when, and only when, a fair value can be reliably determined and the services would have been purchased if they had not been donated. Use of those resources is recognised as an expense.

Resources received free of charge are recorded as either revenue or gains depending on their nature.

Contributions of assets at no cost of acquisition or for nominal consideration are recognised as gains at their fair value when the asset qualifies for recognition, unless received from another Government agency or authority as a consequence of a restructuring of administrative arrangements (Refer to Note 1.8).

Sale of Assets

Gains from disposal of assets are recognised when control of the asset has passed to the buyer.

1.8 Transactions with the Government as Owner

Equity Injections

Amounts that are designated as equity injections for a year are recognised directly in contributed equity in that year.

Restructuring of Administrative Arrangements

Net assets received from or relinquished to another Government agency or authority under a restructuring of administrative arrangements are adjusted at their book value directly against contributed equity.

Other Distributions to Owners

The FMOs require that distributions to owners be debited to contributed equity unless it is in the nature of a dividend.

1.9 Employee Benefits

Liabilities for 'short-term employee benefits' (as defined in AASB 119 *Employee Benefits*) and termination benefits due within twelve months of the end of reporting period are measured at their nominal amounts.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability.

Other long-term employee benefits are measured at the present value of the estimated future cash outflows to be made in respect of services provided by employees up to the reporting date.

Leave

The liability for employee benefits includes provision for annual leave and long service leave. No provision has been made for sick leave as all sick leave is non-vesting and the average sick leave taken in future years by employees of the Corporation is estimated to be less than the annual entitlement for sick leave.

The leave liabilities are calculated on the basis of employees' remuneration at the estimated salary rates that will be applied at the time the leave is taken, including the Corporation's employer superannuation contribution rates to the extent that the leave is likely to be taken during service rather than paid out on termination.

The liability for long service leave has been determined by reference to the Dept of Finance and Deregulation standard parameters for the Long Service Leave Shorthand Method as at 30 June 2012. The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Separation and Redundancy

Provision is made for separation and redundancy benefit payments. The Corporation recognises a provision for termination when it has developed a detailed formal plan for the terminations and has informed those employees affected that it will carry out the terminations.

Superannuation

Staff of the Corporation are members of Public Superannuation Funds, Self Managed Superannuation Funds, the Public Sector Superannuation Scheme (PSS) or the PSS accumulation plan (PSSap).

The PSS is a defined benefit schemes for the Australian Government. The PSSap is a defined contribution scheme.

The liability for defined benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course. This liability is reported in the Department of Finance and Deregulation's administered schedules and notes.

The Corporation makes employer contributions to the employees' superannuation scheme at rates determined by an actuary, or by statute, sufficient to meet the current cost to the Government. The Corporation accounts for the contributions as if they were contributions to defined contribution plans.

The liability for superannuation recognised as at 30 June represents outstanding contributions for the final fortnight of the year.

1.10 Leases

A distinction is made between finance leases and operating leases. Finance leases effectively transfer from the lessor to the lessee substantially all the risks and rewards incidental to ownership of leased assets. An operating lease is a lease that is not a finance lease. In operating leases, the lessor effectively retains substantially all such risks and benefits.

Where an asset is acquired by means of a finance lease, the asset is capitalised at either the fair value of the lease property or, if lower, the present value of minimum lease payments at the inception of the contract and a liability is recognised at the same time and for the same amount.

The discount rate used is the interest rate implicit in the lease. Leased assets are amortised over the period of the lease. Lease payments are allocated between the principal component and the interest expense.

Operating lease payments are expensed on a straight-line basis which is representative of the pattern of benefits derived from the leased assets.

1.11 Borrowing Costs

No borrowing costs were incurred by the Corporation during the year.



1.12 Cash

Cash and cash equivalents includes cash on hand and demand deposits in bank accounts with an original maturity of 12 months or less that are readily convertible to known amounts of cash and subject to insignificant risk of changes in value. Cash is recognised at its nominal amount.

1.13 Financial Assets

The Corporation classifies its financial assets in the following categories:

- a) financial assets at fair value through profit or loss;
- b) held-to-maturity investments;
- c) available-for-sale financial assets; and
- d) loans and receivables.

The classification depends on the nature and purpose of the financial assets and is determined at the time of initial recognition. Financial assets are recognised and derecognised upon trade date.

Effective Interest Method

The effective interest method is a method of calculating the amortised cost of a financial asset and of allocating interest income over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash receipts through the expected life of the financial asset, or, where appropriate, a shorter period.

Income is recognised on an effective interest rate basis except for financial assets that are recognised at fair value through profit or loss.

Financial Assets at Fair Value Through Profit or Loss

Financial assets are classified as financial assets at fair value through profit or loss where the financial assets:

- a) have been acquired principally for the purpose of selling in the near future;
- b) are derivatives that are not designated and effective as a hedging instrument; or
- c) are a part of an identified portfolio of financial instruments that the Corporation manages together and has a recent actual pattern of short-term profit-taking.

Assets in this category are classified as current assets.

Financial assets at fair value through profit or loss are stated at fair value, with any resultant gain or loss recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest earned on the financial asset.

The Corporation has no derivative financial assets in both the current and prior year.

Held-to-Maturity Investments

Non-derivative financial assets with fixed or determinable payments and fixed maturity dates that the Corporation has the positive intent and ability to hold to maturity are classified as held-to-maturity investments. Held-to-maturity investments are recorded at amortised cost using the effective interest method less impairment, with revenue recognised on an effective yield basis.

Loans and Receivables

Trade receivables, loans and other receivables that have fixed or determinable payments that are not quoted in an active market are classified as 'loans and receivables'. Loans and receivables are measured at amortised cost using the effective interest method less impairment. Interest is recognised by applying the effective interest rate.

Impairment of Financial Assets

Financial assets are assessed for impairment at the end of each reporting period.

Financial assets carried at amortised cost – If there is objective evidence that an impairment loss has been incurred for loans and receivables or held to maturity investments held at amortised cost, the amount of the loss is measured as the difference between the asset's carrying amount and the present value of estimated future cash flows discounted at the asset's original effective interest rate. The carrying amount is reduced by way of an allowance account. The loss is recognised in the Statement of Comprehensive Income.

Financial assets carried at cost – If there is objective evidence that an impairment loss has been incurred, the amount of the impairment loss is the difference between the carrying amount of the asset and the present value of the estimated future cash flows discounted at the current market rate for similar assets.

1.14 Financial Liabilities

Financial liabilities are classified as either financial liabilities 'at fair value through profit or loss' or other financial liabilities. Financial liabilities are recognised and derecognised upon 'trade date'.

Financial Liabilities at Fair Value Through Profit or Loss

Financial liabilities at fair value through profit or loss are initially measured at fair value. Subsequent fair value adjustments are recognised in profit or loss. The net gain or loss recognised in profit or loss incorporates any interest paid on the financial liability.

Other Financial Liabilities

Other financial liabilities, including borrowings, are initially measured at fair value, net of transaction costs. These liabilities are subsequently measured at amortised cost using the effective interest method, with interest expense recognised on an effective yield basis.

The effective interest method is a method of calculating the amortised cost of a financial liability and of allocating interest expense over the relevant period. The effective interest rate is the rate that exactly discounts estimated future cash payments through the expected life of the financial liability, or, where appropriate, a shorter period.

Supplier and other payables are recognised at amortised cost. Liabilities are recognised to the extent that the goods or services have been received (and irrespective of having been invoiced).

Grants

Grant liabilities are recognised to the extent that:

- the services required to be performed by the grantee have been performed, or
- the grant eligibility criteria have been satisfied, but payments due have not been made.

A commitment is recorded when the Corporation enters into an agreement to make these grants but services have not been performed or criteria satisfied.

1.15 Contingent Liabilities and Contingent Assets

Contingent liabilities and contingent assets are not recognised in the balance sheet but are reported in the relevant schedules and notes. They may arise from uncertainty as to the existence of a liability or asset or represent an asset or liability in respect of which the amount cannot be reliably measured. Contingent assets are disclosed when settlement is probable but not virtually certain and contingent liabilities are disclosed when settlement is greater than remote.

1.16 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken. Financial assets are initially measured at their fair value plus transaction costs where appropriate.



Assets acquired at no cost, or for nominal consideration, are initially recognised as assets and income at their fair value at the date of acquisition, unless acquired as a consequence of restructuring of administrative arrangements. In the latter case, assets are initially recognised as contributions by owners at the amounts at which they were recognised in the transferor’s accounts immediately prior to the restructuring.

1.17 Property, Plant and Equipment

Asset Recognition Threshold

Purchases of property, plant and equipment are recognised initially at cost in the balance sheet, except for purchases costing less than \$1,000, which are expensed in the year of acquisition (other than where they form part of a group of similar items which are significant in total).

The initial cost of an asset includes an estimate of the cost of dismantling and removing the item and restoring the site on which it is located.

Revaluations

Fair values for each class of asset are determined as shown below:

<i>Asset Class</i>	<i>Fair value measured at</i>
Land	Market selling price
Buildings	Market selling price
Office equipment	Depreciated replacement cost
Computer equipment	Depreciated replacement cost
Fittings & furniture	Depreciated replacement cost

Following initial recognition at cost, property, plant and equipment were carried at fair value less subsequent accumulated depreciation and accumulated impairment losses. Valuations were conducted with sufficient frequency to ensure that the carrying amounts of assets did not differ materially from the assets’ fair values as at the reporting date. The regularity of independent valuations depended upon the volatility of movements in market values for the relevant assets.

Fair value is measured at market selling price where the market value can be determined in an “Active Market” in accordance with AASB 116 Property, Plant and Equipment, and AASB 136 Impairment. Where an active market is not available then “Depreciated Replacement Cost” has been used.

Revaluation adjustments were made on a class basis. Any revaluation increment was credited to equity under the heading of asset revaluation reserve except to the extent that it reversed a previous revaluation decrement of the same asset class that was previously recognised in the surplus/deficit. Revaluation decrements for a class of assets were recognised directly in the surplus/deficit except to the extent that they reversed a previous revaluation increment for that class.

Any accumulated depreciation as at the revaluation date is eliminated against the gross carrying amount of the asset and the asset was restated to the revalued amount.

Depreciation

Depreciable property, plant and equipment assets are written-off to their estimated residual values over their estimated useful lives to the Corporation using, in all cases, the straight-line method of depreciation.

Depreciation rates (useful lives), residual values and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate.



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Depreciation rates applying to each class of depreciable asset are based on the following useful lives:

	2012	2011
Buildings on freehold land	40 years	40 years
Improvements, Plant and Equipment	3 to 10 years	3 to 10 years

Impairment

All assets were assessed for impairment at 30 June 2012. Where indications of impairment exist, the asset's recoverable amount is estimated and an impairment adjustment made if the asset's recoverable amount is less than its carrying amount.

The recoverable amount of an asset is the higher of its fair value less costs to sell and its value in use. Value in use is the present value of the future cash flows expected to be derived from the asset. Where the future economic benefit of an asset is not primarily dependent on the asset's ability to generate future cash flows, and the asset would be replaced if the Corporation were deprived of the asset, its value in use is taken to be its depreciated replacement cost.

No indicators of impairment were found for assets at fair value.

Derecognition

An item of property, plant and equipment is derecognised upon disposal or when no further future economic benefits are expected from its use or disposal.

1.18 Intangibles

The Corporation's intangibles comprise internally developed software for internal use. These assets are carried at cost less accumulated amortisation and accumulated impairment losses.

Software is amortised on a straight-line basis over its anticipated useful life. The useful lives of the Corporation's software are 5 years (2010-11: 5 years).

All software assets were assessed for indications of impairment as at 30 June 2012.

1.19 Taxation / Competitive Neutrality

The Corporation is exempt from all forms of taxation except Fringe Benefits Tax (FBT), NSW payroll tax and the Goods and Services Tax (GST).

Revenues, expenses and assets are recognised net of GST except:

- a) where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- b) receivables and payables.

Note 2: Events After the Reporting Period

No matters or circumstances have arisen since the end of the financial year which significantly affected or may affect the operations of the Corporation, the results of these operations or state of affairs of the Corporation in subsequent years.

Note 3: Expenses

Note 3A: Employee Benefits

	2012	2011
	\$	\$
Wages and salaries	1,109,266	1,063,602
Superannuation:		
Defined contribution plans	94,416	85,745
Defined benefit plans	36,211	44,232
Leave and other entitlements	66,358	66,651
Total employee benefits	1,306,251	1,260,230



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	2012 \$	2011 \$
Note 3B: Suppliers		
Goods and services		
External Parties	393,284	334,406
Total goods and services	393,284	334,406
Goods and services are made up of:		
Provision of goods – external parties	61,596	43,568
Rendering of services – external parties	331,688	290,838
Total goods and services	393,284	334,406
Other supplier expenses		
Operating lease rentals – external parties:		
Minimum lease payments	48,715	44,128
Workers compensation expenses	1,556	1,433
Total other supplier expenses	50,271	45,561
Total supplier expenses	443,555	379,967
Note 3C: Grants		
Public sector:		
Australian Government entities (related entities)	1,853,311	708,364
State and Territory Governments	2,325,356	1,170,860
Universities & Colleges	1,164,802	626,441
Other Research Institutions	4,158,232	4,074,266
Corporate activities	1,111,984	947,665
Private sector:		
Commercial entities	1,316,836	584,980
Total grants	11,930,521	8,112,576
Note 3D: Depreciation and Amortisation		
Depreciation:		
Buildings	9,519	9,500
Office equipment	10,685	6,402
Computer equipment	490	8,214
Fixtures & Fittings	4,744	4,419
Total depreciation	25,438	28,535
Amortisation:		
Intangibles		
Computer Software	10,146	22,896
Total amortisation	10,146	22,896
Total depreciation and amortisation	35,584	51,431
Note 3E: Losses from Asset Sales		
Other Property, plant and equipment:		
Proceeds from sale	-	(2,273)
Carrying value of assets sold	1,136	10,411
Total losses from asset sales	1,136	8,138



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	2012	2011
	\$	\$
Note 4: Income		
OWN-SOURCE REVENUE		
<u>Note 4A: Interest</u>		
Deposits	1,365,628	726,481
Deposits held for NPSI	35,568	78,370
Total interest	1,401,196	804,851
<u>Note 4B: Rental Income</u>		
Operating lease:		
Other	15,000	15,000
Total rental income	15,000	15,000
<u>Note 4C: Royalties</u>		
Royalties	3,144,994	2,789,277
Total royalties	3,144,994	2,789,277
<u>Note 4D: Other Revenue</u>		
Project refunds	233,063	445,610
Industry grants	495,239	350,000
NPSI novation revenue utilised	942,705	154,020
Other revenue	60,113	12,424
Total other revenue	1,731,120	962,054
REVENUE FROM GOVERNMENT		
<u>Note 4E: Revenue from Government</u>		
Department of Agriculture, Fisheries and Forestry:		
PIERD Act 1989 Contribution	9,529,194	5,677,104
Total revenue from Government	9,529,194	5,677,104
<u>Note 4F: Levies and Penalties</u>		
Industry Levies	9,529,194	4,574,863
Penalties	2,704	1,016
Total fees and fines	9,531,898	4,575,879
Note 5: Financial Assets		
<u>Note 5A: Cash and Cash Equivalents</u>		
Cash on hand or on deposit	26,205,066	16,296,478
Total cash and cash equivalents	26,205,066	16,296,478



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	2012	2011
	\$	\$
Note 5B: Trade and Other Receivables		
Goods and services:		
Goods and services - related entities	3,186	-
Goods and services - external entities	30,215	33,334
Total receivables for goods and services	33,401	33,334
Department of Agriculture, Fisheries and Forestry		
PIERD Act 1989 Contributions receivable	2,105,357	789,051
Industry levies receivable	1,997,784	789,051
Total receivables from government	4,103,141	1,578,102
Other receivables:		
GST receivable from the Australian Taxation Office	94,874	152,288
Interest	250,097	120,990
Total other receivables	344,971	273,278
Total trade and other receivables	4,481,513	1,884,714
Receivables are expected to be recovered in:		
No more than 12 months	4,481,513	1,884,714
Total trade and other receivables	4,481,513	1,884,714
Receivables are aged as follows:		
Not overdue	4,476,611	1,851,380
Overdue by:		
0 to 30 days	-	-
31 to 60 days	4,902	33,334
61 to 90 days	-	-
More than 90 days	-	-
Total receivables (gross)	4,481,513	1,884,714
Note 6: Non-Financial Assets		
Note 6A: Land and Buildings		
Land:		
Land at fair value	180,000	170,000
Buildings on freehold land:		
Work in progress	-	-
Fair value	510,000	380,000
Accumulated depreciation	-	(19,000)
Total buildings on freehold land	510,000	361,000
Total land and buildings	690,000	531,000

No indicators of impairment were found for land and buildings.

No land or buildings were expected to be sold or disposed of within the next 12 months.



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	2012	2011
	\$	\$
Note 6B: Other Property, Plant and Equipment		
Office equipment:		
Fair value	56,812	59,606
Accumulated depreciation	(18,945)	(14,172)
Total office equipment	37,867	45,434
Computer equipment:		
Fair value	75,089	49,692
Accumulated depreciation	(33,490)	(49,692)
Total computer equipment	41,599	-
Fittings and furniture:		
Fair value	12,598	44,188
Accumulated depreciation	(6,766)	(21,563)
Total fittings and furniture	5,832	22,625
Total other property, plant and equipment	85,298	68,059

No indicators of impairment were found for property, plant and equipment.

No property, plant or equipment is expected to be sold or disposed of within the next 12 months.

Revaluations of non-financial assets

All revaluations were conducted in accordance with the revaluation policy stated at Note 1. On 30th June 2012, an independent valuer conducted the revaluation.

Revaluation increments include freehold land \$10,000 (2011:nil) and buildings on freehold land \$129,238 (2011:nil).

All increments were transferred to the asset revaluation surplus by asset class and included in the equity section of the balance sheet.



Note 6C: Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment (2011-12)

	Land \$	Buildings \$	Total land and buildings \$	Office equipment \$	Computer equipment \$	Fittings & furniture \$	Total other property, plant & \$	Total \$
As at 1 July 2011								
Gross book value	170,000	380,000	550,000	59,606	49,692	44,188	153,486	703,486
Accumulated depreciation and impairment	(19,000)	(19,000)	(19,000)	(14,172)	(49,692)	(21,563)	(85,427)	(104,427)
Net book value 1 July 2011	170,000	361,000	531,000	45,434	-	22,625	68,059	599,059
Additions	-	4,025	4,025	7,106	42,089	10,355	59,550	63,575
Revaluations recognised in other comprehensive income	10,000	129,238	139,238				-	139,238
Depreciation expense		(9,519)	(9,519)	(10,685)	(490)	(4,744)	(15,919)	(25,438)
Reclassification:		25,256	25,256	(2,852)	-	(22,404)	(25,256)	-
Disposals:								
Gross book value	-	-	-	(4,040)	(16,692)	-	(20,732)	(20,732)
Accumulated depreciation and impairment	-	-	-	2,904	16,692	-	19,596	19,596
Net book value 30 June 2012	180,000	510,000	690,000	37,867	41,599	5,832	85,298	775,298
Net book value as of 30 June 2012 represented by:								
Gross book value	180,000	510,000	690,000	56,812	75,089	12,598	144,499	834,499
Accumulated depreciation and impairment	180,000	510,000	690,000	(18,945)	(33,490)	(6,766)	(59,201)	(59,201)
	180,000	510,000	690,000	37,867	41,599	5,832	85,298	775,298

Note 6C (Cont'd): Reconciliation of the Opening and Closing Balances of Property, Plant and Equipment (2010-11)

	Land	Buildings	Total land and buildings	Office equipment	Computer equipment	Fittings & furniture	Total other property, plant & equipment	Total
	\$	\$	\$	\$	\$	\$	\$	\$
As at 1 July 2010								
Gross book value	170,000	380,000	550,000	40,970	49,692	44,188	134,850	684,850
Accumulated depreciation and impairment		(9,500)	(9,500)	(16,359)	(41,478)	(17,144)	(74,981)	(84,481)
Net book value 1 July 2010	170,000	370,500	540,500	24,611	8,214	27,044	59,869	600,369
Additions	-	-	-	37,636	-	-	37,636	37,636
Revaluations recognised in other comprehensive income	-	-	-	-	-	-	-	-
Depreciation expense	-	(9,500)	(9,500)	(6,402)	(8,214)	(4,419)	(19,035)	(28,535)
Reclassification:								
Disposals:								
Gross book value	-	-	-	(19,000)	-	-	(19,000)	(19,000)
Accumulated depreciation and impairment	-	-	-	8,589	-	-	8,589	8,589
Net book value 30 June 2011	170,000	361,000	531,000	45,434	-	22,625	68,059	599,059
Net book value as of 30 June 2011 represented by:								
Gross book value	170,000	380,000	550,000	59,606	49,692	44,188	153,486	703,486
Accumulated depreciation and impairment		(19,000)	(19,000)	(14,172)	(49,692)	(21,563)	(85,427)	(104,427)
	170,000	361,000	531,000	45,434	-	22,625	68,059	599,059



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	2012 \$	2011 \$
Note 6D: Intangibles		
Computer software:		
Purchased	122,465	120,830
Accumulated amortisation	(118,590)	(108,444)
Total intangibles	3,875	12,386

No indicators of impairment were found for intangible assets.

No intangibles are expected to be sold or disposed of within the next 12 months.

Note 6E: Reconciliation of the Opening and Closing Balances of Intangibles

	Computer software purchased	Computer software purchased
As at 1 July		
Gross book value	120,830	117,544
Accumulated amortisation and impairment	(108,444)	(85,548)
Net book value 1 July	12,386	31,996
Additions	1,635	3,286
Amortisation	(10,146)	(22,896)
Net book value 30 June	3,875	12,386
Net book value as of 30 June represented by:		
Gross book value	122,465	120,830
Accumulated amortisation and impairment	(118,590)	(108,444)
	3,875	12,386

Note 6F: Other Non-Financial Assets

Prepayments	7,965	7,695
Total other non-financial assets	7,965	7,695
Total other non-financial assets - are expected to be recovered in:		
No more than 12 months	7,965	7,695
More than 12 months	-	-
Total other non-financial assets	7,965	7,695

Non-financial assets are expected to be recovered in no more than 12 months.

No indicators of impairment were found for other non-financial assets

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	2012 \$	2011 \$
Note 7: Payables		
Note 7A: Suppliers		
Trade creditors and accruals	90,826	54,786
Total supplier payables	90,826	54,786
Supplier payables expected to be settled within 12 months:		
Related entities	3,114	668
External parties	87,712	54,118
Total	90,826	54,786
Settlement was usually made within 30 days.		
Note 7B: Grants, Subsidies and Personal Benefits		
Grants:		
Public sector:		
Australian Government entities (related entities)	685,781	329,718
State and Territory Governments	1,458,061	569,869
Universities and colleges	568,989	113,146
Other research organisations	466,984	800,517
Private sector:		
Other	504,930	87,112
Total grants	3,684,745	1,900,362
Total grants, subsidies and personal benefits are expected to be settled in:		
No more than 12 months	3,684,745	1,900,362
More than 12 months	-	-
Total grants, subsidies and personal benefits	3,684,745	1,900,362
Settlement was usually made according to the terms and conditions of each grant. This was usually within 30 days of performance or eligibility.		
Note 7C: Other Payables		
Salaries and wages	21,974	17,301
Superannuation	2,692	2,108
PAYG & FBT	31,081	28,627
State payroll tax	3,717	3,656
Other	-	175
Total other payables	59,464	51,867
Total other payables are expected to be settled in:		
No more than 12 months	59,464	51,867
More than 12 months	-	-
Total other payables	59,464	51,867



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	2012 \$	2011 \$
Note 8: Provisions		
Note 8A: Employee Provisions		
Leave	230,223	217,747
Total employee provisions	230,223	217,747
Employee provisions are expected to be settled in:		
No more than 12 months	143,411	139,647
More than 12 months	86,812	78,100
Total employee provisions	230,223	217,747
Note 8B: Other Provisions		
Novation of National Program for Sustainable Irrigation Revenue received in advance refundable on termination of management agreement	91,197	1,033,901
Total other provisions	91,197	1,033,901
Other provisions are expected to be settled in:		
No more than 12 months	91,197	1,033,901
More than 12 months	-	-
Total other provisions	91,197	1,033,901

The Novated Program Management Agreement for the National Program for Sustainable Irrigation states in clause 14.5 Repayment of Contributions: The Manager must, on termination of this agreement, repay any unexpended or uncommitted monies to the Partners in accordance with their respective Interests. Therefore, partner contributions received and held by Cotton Research and Development Corporation are a current liability held in trust until paid to Project Researchers in accordance with the research agreements or returned to the Partners as unexpended funds.

The projects for the National Program for Sustainable Irrigation were completed in June 2012. The unexpended funds in Note 8B have been advised to the Partners and are awaiting invoices from each Partner before final payment.



Note 9: Cash Flow Reconciliation**Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement****Cash and cash equivalents as per:**

	2012 \$	2011 \$
Cash flow statement	26,205,066	16,296,478
Balance sheet	26,205,066	16,296,478
Difference	-	-

Reconciliation of net cost of services to net cash from operating activities:

Net cost of services	(7,424,737)	(5,241,160)
Add revenue from Government	19,061,092	10,252,983

Adjustments for non-cash items

Depreciation / amortisation	35,584	51,431
Net write down of non-financial assets	1,136	8,138

Changes in assets / liabilities

(Increase) / decrease in net receivables	(2,596,798)	1,500,103
(Increase) / decrease in prepayments	(270)	(210)
Increase / (decrease) in employee provisions	12,475	12,325
Increase / (decrease) in employee withholdings	2,553	(530)
Increase / (decrease) in supplier payables	36,039	(18,664)
Increase / (decrease) in other payable	5,045	2,894
Increase / (decrease) in grants payable	1,784,383	(1,360,584)
Increase / (decrease) in NPSI novation payable	(942,704)	(154,020)
Net cash from (used by) operating activities	9,973,798	5,052,706

Note 10: Contingent Liabilities and Assets**Significant Remote Contingencies****Commonwealth Contributions**

The Cotton Research and Development Corporation was established under the *Primary Industries and Energy Research and Development Act, 1989*. This Act states the Commonwealth government will make payments to the Corporation equal to one half of the Corporation's annual expenditure. However, government matching payments must not exceed industry levy receipts nor exceed 0.5% of the amount that the Minister determines to be the gross value of production (GVP) for that financial year. In 2011–12 Commonwealth contributions were capped to levy receipts of \$9,529,194, leaving a remote contingent receivable of \$7.145m for unmatched R&D expenditure.



Liability to return levies

Cotton levies are imposed by clause 2 of Schedule 5 to the *Primary Industries (Excise) Levies Act 1999*. Levies are collected by the Levies Revenue Service (DAFF Levies) of the Department of Agriculture, Fisheries and Forestry (DAFF) and then paid to the Cotton Research and Development Corporation (CRDC). DAFF Levies consider individual levy payment information as private and confidential and cannot disclose this information to CRDC. DAFF advises that levies have the status of unsecured creditor and may be deemed to be an "unfair preference" payment in some circumstances. Unfair preference payments may be clawed-back by a liquidator. In 2011-12 a significant remote contingent liability was identified for a major levy payer for an undisclosed amount. CRDC has increased the minimum reserves to be held for payment of contingent liabilities under its Reserves Policy.

Cotton Catchment Communities CRC Wind-up

The Cotton Catchment Communities CRC Ltd (Cotton CRC) ceased operations on the 30th June 2012. Cotton CRC is negotiating to novate ongoing research projects that will continue to operate after the 30th June 2012 to the Cotton CRC Participants through a "Wind-up Deed" for the Participants to manage the projects to completion or termination. The Cotton CRC will transfer the unused funds for each project to the Participant appointed to manage that project. The Cotton Research and Development Corporation (CRDC) may be appointed to manage a number of the projects. CRDC will manage the projects in accordance with the Cotton CRC Wind-up Deed and from the funds received will make payments to the research organisations based on the work completed after the 30th June 2012. Any surplus funds must be returned to the Cotton CRC Participants. A significant remote contingent asset for the funds to be received from the Cotton CRC cannot be determined until the Wind-up Deed has been finalised. A significant remote contingent liability exists for the same value.

Note 11: Directors Remuneration

The number of non-executive directors of the entity included in these figures are shown below in the relevant remuneration bands:

\$0 to \$29,999
\$30,000 to \$59,999

Total

2012	2011
No.	No.
12	7
1	1
13	8
<hr/>	
2012	2011
\$	\$
180,005	190,080

Total remuneration received or due and receivable by directors of the entity

The number of non-executive directors includes directors that ceased to be directors or were appointed as directors during the year.

Remuneration of executive directors is included in Note 13: Senior Executive Remuneration.



Note 12: Related Party Disclosures

Grants were made to a number of research institutions which are director related entities. They were approved under the normal terms and conditions of the Corporation. Following full disclosure of their relevant interests, the relevant Directors may or may not take part in discussion and abstain from decisions of the Board.

	2012 \$	2011 \$
Grants to Director-Related Entities		
Queensland Dept. of Primary Industries & Fisheries	1,007,770	604,646
University of Queensland	46,780	41,000
Grants to director-related entities	1,054,550	645,646

Note 13: Senior Executive Remuneration**Note 13A: Senior Executive Remuneration Expense for the Reporting Period****Short-term employee benefits:**

Salary	445,806	435,918
Annual leave accrued	41,608	39,682
Other ¹	29,407	29,637
Total short-term employee benefits	516,821	505,237

Post-employment benefits:

Superannuation	53,033	50,677
Total post-employment benefits	53,033	50,677

Other long-term benefits:

Long-service leave	20,730	15,924
Total other long-term benefits	20,730	15,924

Total	590,584	571,838
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Notes:

1. Other includes motor vehicle benefits, other benefits and fringe benefit tax on those benefits.
2. Note 13A was prepared on an accrual basis.
3. Note 13A excludes acting arrangements and part-year service where remuneration expensed for a senior executive was less than \$150,000.



Note 13B: Average Annual Reportable Remuneration Paid to Substantive Senior Executives During the Reporting Period

as at 30 June 2012

Average annual reportable remuneration ¹	Senior Executives No.	Fixed elements			Total \$
		Reportable salary ² \$	Contributed superannuation ³ \$	Reportable allowances ⁴ \$	
Total remuneration (including part-time arrangements):					
less than \$150,000	1	135,622	12,227	-	147,849
\$150,000 to \$179,999	1	154,046	22,083	-	176,129
\$210,000 to \$239,999	1	216,097	19,095	-	235,192
Total	3				

as at 30 June 2011

Average annual reportable remuneration ¹	Senior Executives No.	Fixed elements			Total \$
		Reportable salary ² \$	Contributed superannuation ³ \$	Reportable allowances ⁴ \$	
Total remuneration (including part-time arrangements):					
less than \$150,000	1	123,853	11,146	-	134,999
\$150,000 to \$179,999	1	149,462	20,977	-	170,439
\$210,000 to \$239,999	1	209,040	18,334	-	227,374
Total	3				

Notes:

- This table reports substantive senior executives who received remuneration during the reporting period. Each row is an averaged figure based on headcount for individuals in the band.
- 'Reportable salary' includes the following:
 - gross payments (the Corporation currently does not provide bonuses); and
 - reportable fringe benefits (at the net amount prior to 'grossing up' to account for tax benefits).
- The 'contributed superannuation' amount is the average actual superannuation contributions paid to senior executives in that reportable remuneration band during the reporting period, including any salary sacrificed amounts, as per the individuals' payslips.
- 'Reportable allowances' are the average actual allowances paid as per the 'total allowances' line on individuals' payment summaries.



5. Various salary sacrifice arrangements were available to senior executives including superannuation, motor vehicle and expense payment fringe benefits. Salary sacrifice benefits are reported in the 'reportable salary' column, excluding salary sacrificed superannuation, which is reported in the 'contributed superannuation' column.

6. For the purposes of this note, the Authority has defined senior executives as those employees who report directly to the Board and Executive Director. These employees are the only employees considered to have the capacity and responsibility for decision making that can have a significant and direct impact on the strategic direction and financial performance of the group. The Executive Director and General Managers of the Corporation are classified as senior executives and are disclosed in sections A and B of this note.

	2012	2011
Note 14: Average Staffing Levels		
The average staffing levels for the Corporation during the year were:	8.7	8.2

	2012 \$	2011 \$
Note 15: Remuneration of Auditors		
Financial statement audit services were provided to the corporation by the Auditor General.		
Fair value of the services provided:	13,100	12,750
Total	13,100	12,750

No other services were provided by the auditors of the financial statements.

Note 16: Financial Instruments

Note 16A: Categories of Financial Instruments

Financial Assets

Loans and receivables:

Cash and cash equivalents	26,205,066	16,296,478
Trade and other receivables	33,401	33,334

Carrying amount of financial assets

Financial Liabilities

At amortised cost:

Grants payable	3,684,745	1,900,362
Other payables	90,826	54,786

Carrying amount of financial liabilities

13,100	12,750
13,100	12,750
26,205,066	16,296,478
33,401	33,334
26,238,467	16,329,812
3,684,745	1,900,362
90,826	54,786
3,775,571	1,955,148



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	2012	2011
	\$	\$
Note 16B: Net Income and Expense from Financial Assets		
Loans and receivables		
Interest revenue	1,401,196	804,851
Net gain/(loss) from financial assets	1,401,196	804,851

Note 16C: Fair Value of Financial Instruments

	Carrying amount 2012 \$	Fair value 2012 \$	Carrying amount 2011 \$	Fair value 2011 \$
Financial Assets				
Cash and cash equivalents	26,205,066	26,205,066	16,296,478	16,296,478
Trade and other receivables	33,401	33,401	33,334	33,334
Total	26,238,467	26,238,467	16,329,812	16,329,812
Financial Liabilities				
Grants payable	3,684,745	3,684,745	1,900,362	1,900,362
Other payables	90,826	90,826	54,786	54,786
Total	3,775,571	3,775,571	1,955,148	1,955,148

The Corporation's financial assets and financial liabilities comprise cash and deposits held at banks, current receivables and current liabilities. It is held that their carrying amount and fair value are the same.

Note 16D: Credit Risk

The Corporation's maximum exposure to credit risk is the risk that arises from the potential default of a debtor. This amount is equal to the total amount of trade receivables (2012: \$33,401 and 2011: \$33,334). The Corporation has assessed that there is no risk of default and has not recognised an impairment allowance account.

The Corporation manages its credit risk through monthly reviews by management of the Corporation's investments and the use of policies and procedures that guide employees in managing debtors.

The Corporation holds no collateral to mitigate against credit risk.

Credit quality of financial instruments not past due or individually determined as impaired

	Not past due nor impaired 2012 \$	Not past due nor impaired 2011 \$	Past due or impaired 2012 \$	Past due or impaired 2011 \$
Cash and cash equivalents	26,205,066	16,296,478	-	-
Trade and other receivables	28,499	-	4,902	33,334
Total	26,233,565	16,296,478	4,902	33,334



(Note 16D (cont'd): Credit Risk**Ageing of financial assets that were past due but not impaired for 2012**

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	\$	\$	\$	\$	\$
Trade and other receivables	-	4,902	-	-	4,902
Total	-	4,902	-	-	4,902

Ageing of financial assets that were past due but not impaired for 2011

	0 to 30 days	31 to 60 days	61 to 90 days	90+ days	Total
	\$	\$	\$	\$	\$
Trade and other receivables	-	33,334	-	-	33,334
Total	-	33,334	-	-	33,334

The following list of assets have been individually assessed as impaired

The Corporation's receivables overdue are not impaired as the majority relate to grant refunds due from government entities and the grants have not been finalised.

Note 16E: Liquidity Risk

The Corporation's financial liabilities are payables. The exposure to liquidity risk is based on the notion that the Corporation will encounter difficulty in meeting its obligations associated with financial liabilities. This is highly unlikely due to the internal policies and procedures put in place to ensure there are appropriate resources to meet its financial obligations.

Maturities for non-derivative financial liabilities 2012

	On demand	within 1 year	1 to 5 years	> 5 years	Total
	\$	\$	\$	\$	\$
Grants payable	-	3,684,745	-	-	3,684,745
Other payables	-	90,826	-	-	90,826
Total	-	3,775,571	-	-	3,775,571

Maturities for non-derivative financial liabilities 2011

	On demand	within 1 year	1 to 5 years	> 5 years	Total
	\$	\$	\$	\$	\$
Grants payable	-	1,900,362	-	-	1,900,362
Other payables	-	54,786	-	-	54,786
Total	-	1,955,148	-	-	1,955,148

The Corporation manages its finances to ensure it has adequate funds to meet payments as they fall due. In addition, the Corporation has policies in place to ensure timely payments are made when due and has no past experience of default.

The Corporation has no derivative financial liabilities in both the current and prior year.



Note 16F: Market Risk

The Corporation holds basic financial instruments that do not expose it to certain market risks. The Corporation is not exposed to 'currency risk' or 'other price risk'.

Interest Rate Risk

The only interest-bearing items on the balance sheet are the "Cash and cash equivalents". Cash at bank has variable interest rates and term deposits have fixed interest. Interest will fluctuate due to changes in the market interest rate. The interest rate risk does not have any impact on the fair value of the Cash and cash equivalents.

Interest rates for cash held at banks in operating accounts and at call accounts ranged from 0% to 5.6% as at 30th June 2012. Term deposit fixed interest rates during the year decreased from a high of 6.50% down to 5.31%. Interest rates on term deposits held at the end of the year ranges from 5.31% to 6.00%. Although Australian interest rates are at record lows it is expected there will continue to be downward pressure on interest rates due to volatility in the world economy continuing to effect the Australian economy. The sensitivity analysis has used 140 basis points as a reasonable representation of the continued volatility in the economy.

Sensitivity analysis of the risk that the entity is exposed to for 2012

	Risk variable	Change in risk variable %	Effect on	
			Profit and loss \$	Equity \$
Interest rate risk	Interest	+1.40%	338,797	338,797
Interest rate risk	Interest	-1.40%	(338,797)	(338,797)

Sensitivity analysis of the risk that the entity is exposed to for 2011

	Risk variable	Change in risk variable %	Effect on	
			Profit and loss \$	Equity \$
Interest rate risk	Interest	+1.75%	241,315	241,315
Interest rate risk	Interest	-1.75%	(241,315)	(241,315)

Note 17: Reporting of Outcomes

The Corporation is structured to meet one outcome:

“Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.”

Note 17A: Net Cost of Outcome Delivery

	Outcome 1	
	2012	2011
	\$	\$
Expenses	13,717,047	9,812,342
Income from non-government sector		
Industry Contributions	9,531,898	4,575,879
Royalties	3,144,994	2,789,277
Interest	1,401,196	804,851
Other	1,746,120	977,054
Total	15,824,208	9,147,061
Other own-source income	-	-
Net cost/(contribution) of outcome delivery	(2,107,161)	665,281



APPENDICES



APPENDIX ONE

SELECTION COMMITTEE REPORT

Christine Hawkins
Presiding Member
Cotton Research and Development
Corporation
Board Selection Committee

31 July 2012

Senator the Hon. Joe Ludwig
Minister for Agriculture, Fisheries and
Forestry
Parliament House
CANBERRA ACT 2600

Dear Minister

In accordance with the requirements of Section 141 of the Primary Industries and Energy Research and Development Act 1989 (the PIERD Act), I write to inform you of the activities of the Cotton Research and Development Corporation (CRDC) Selection Committee during the year 1 July 2011 to 30 June 2012.

The term of the existing directors expired on 30 September 2011. I commenced the selection process upon my appointment as the Presiding Member of the Selection Committee in accordance with your letter of 27 May 2011.

The Committee's nominations for six directors were provided to your office on 29 August 2011.

Details of the operation of the Selection Committee and the process conducted by the Committee are outlined in the following report.

Yours sincerely

Ms Christine Hawkins
Presiding Member

Selection Committee Report

Establishment of Selection Committee

The CRDC Selection Committee was established under the PIERD Act for the purpose of nominating to you six persons for appointment as directors of the CRDC.

On 27 May 2011, you appointed me as the Presiding Member of the CRDC Board Selection Committee for the period ending 30 June 2012. On 11 July 2011, following nominations made by Cotton Australia, as the CRDC's representative industry organisation, you appointed the following persons to the Selection Committee:

- Mr David Anthony, Chairman and CEO, Auscott
- Mr Simon Corish, Director, Cotton Australia
- Ms Joanne Grainger, Vice-President, Queensland Farmers Federation
- Mr Andrew Watson, Chairman, Cotton Australia

Selection Process

At the commencement of this process, I consulted with CRDC Chairman, Mr Mike Logan, and Executive Director, Mr Bruce Finney, on the strategic direction of the organisation, current and emerging industry issues, particular challenges facing the industry and CRDC's role in contributing to solutions or participation in resolving these issues. I also consulted with senior executives of the Australian Government Department of Agriculture, Fisheries and Forestry. The Committee discussed in detail the skills and experience that were likely to be required to deal with the organisational and industry challenges likely to emerge over the next three years.

The board positions were advertised in national and regional newspapers, as well as through a wide range of electronic media, industry and professional organisations. In addition, the advertising process was enhanced by searches of relevant databases to ensure that the widest



possible field of candidates was identified. Cotton Australia was also invited to nominate candidates for consideration.

The advertisements called for written applications against the criteria specified in the PIERD Act, which included cotton production, processing or marketing, management or conservation of natural resources, science and technology or technology transfer, environmental and ecological matters, economics and finance, administration of research and development, business management, sociology and public administration.

The Committee sought candidates who also had a sound understanding of corporate governance and the role and responsibilities of directors, as well as good communications skills and the capacity to represent the CRDC to its stakeholders. In addition it was considered important that applicants understood the research and development environment in Australia, industry structures and, importantly, the role of the Australian government as a stakeholder in the CRDC.

In total, 85 applications were received and considered by all members of the Selection Committee. A meeting was held on 21 July 2011 to agree on a list of suitable candidates for interview. In developing the list of candidates for interview, the Selection Committee took into account the core selection criteria contained in the PIERD Act, as well as other criteria agreed to be important, including a level of industry experience and strategic skills that would be useful in supporting and supplementing CRDC's management in dealing with the range of issues outlined above.

The Selection Committee unanimously agreed to interview 16 candidates, of whom five were women. Interviews were conducted on 4 and 5 August 2011 at the Qantas meeting rooms at Brisbane airport. Referee checks were carried out after the interviews in respect of the candidates selected by the Committee for nomination.

Board appointments

Upon completion of the selection process the CRDC Selection Committee reported to you with 6 nominations for your consideration in accordance with section 130 of the PIERD Act. You confirmed the following appointments, in accordance with the nominations made by the Selection Committee, for a three-year term commencing 1 October 2012:

- Dr Mary Corbett, Queensland
- Mr Richard Haire, Queensland
- Mr Hamish Millar, Queensland
- Mr Cleave Rogan, Queensland
- Dr Michael Robinson, NSW
- Dr Lorraine Stephenson, Queensland.

Following notification on 14 September 2012 of your appointment of the directors, I disbanded the Selection Committee in accordance with section 129 of the PIERD Act.

Expenses

The following expenses (excluding GST) were incurred in the selection process:

Advertising	\$14,427
Secretarial expenses	\$6,108
Fees for Chair: time fees and travel expenses	\$10,742
Travel and Accommodation for Selection Committee members	\$8,688
Travel expenses for candidates interviewed	\$9,470
Total expenses	\$49,435



APPENDIX TWO

MEASURING PERFORMANCE

I. Operation Sunlight

Operation Sunlight is the Government's reform agenda to improve the openness and transparency of public sector budgetary and financial management and to promote good governance practices. In accordance with Australian Government requirements, these Key Performance Indicators formed part of CRDC's Portfolio Budget Statement (PBS) for 2011–12.

Deliverables 2011–12		
<ul style="list-style-type: none"> • Add value to the Australian cotton industry with premium products in improved routes to market. • Encourage the use of cotton in a highly productive farming system with improved environmental performance achieved. • Promote a culture of innovation and learning. 		
Key Performance Indicators		
KPI	2011–12	Measure of Success
Coverage of Best Management Practices systems across Australian cotton industry	60 per cent	Not achieved. As at 30 June 2012 myBMP has 270 active growers, 46 039 practices have been checked, 198 farms have been certified to level one and 21 farms to level 2; 12 farms have been fully audited. Measures are underway to further promote the benefits to growers of the program and address concerns about involvement that are not applicable but linger from the previous BMP program.
Industry productivity growth per hectare per annum	3 per cent	Achieved. (Average production per hectare has increased by some 20 per cent in the past five years).
PISC cotton sector RD&E Plan implemented	Yes	Achieved. The resulting Cotton Innovation Network held its inaugural meeting in February 2012 and is fostering collaboration in cotton R&D and guiding its future RD direction through implementation of the Cotton Sector RD&E Plan.

2. Towards the Strategic Plan outcome 2011–12

Program One VALUE CHAIN

Investments	AOP KPIs	Measure of Success
STRATEGIC OBJECTIVE 1 Develop contemporary knowledge and intelligence about products, markets and supply		
Benchmarking value for Australian Long Staple cotton and Australian Extra-long Staple cotton	Benchmarking study established and results evaluated by industry	Achieved.
A new project to research value chain sustainability and competitive advantage for Australian cotton	Initial definition of key sustainability measures for Australian cotton	Partially Achieved. Alignment of industry BMP programs assessed against International BCI Initiative and other sustainable assessment programs.
Communication and discussion of mill survey results with the industry	A more knowledgeable and competitive industry	Achieved.

Investments	AOP KPIs	Measure of Success
A continuation of the Premium Cotton Initiative, including spinning trials	PCI project results extended and promoted to international spinners	Achieved.
Further trial market developments with mills and brand owners to evaluate the competitive advantages of Australian cotton	Trial cotton and cotton/wool blend products tested in Australian and international markets	Partially Achieved. New project established to assess cotton-wool blends.
STRATEGIC OBJECTIVE 2 Develop improvements in current products		
Development of low twist, fine count yarns and fabrics from Australian long staple upland cotton	Low twist, fine count yarns tested and evaluated	Achieved.
Ongoing evaluation of Cottonspec for predicting yarn quality	Cottonspec evaluated in international mills	Achieved.
Continued study of agronomic management to optimise textile performance	Extension of results to industry demonstrating best practice in agronomic management to maintain high quality	Achieved.
A continuation of the Premium Cotton Initiative, including spinning trials	PCI project results extended and promoted to international spinners	Achieved.
Further trial market developments with mills and brand owners to evaluate the competitive advantages of Australian cotton	Trial cotton and cotton/wool blend products tested in Australian and international markets	Partially Achieved. New project established to assess cotton-wool blends.
STRATEGIC OBJECTIVE 3 Facilitate the development of novel products		
Communication and discussion of mill survey results with the industry	Gaps and opportunities discovered for further investigation	Achieved.
Continued investigation of cotton and cotton/wool blend fabrics	Trial cotton and cotton/wool blend products tested in Australian and international markets	Partially Achieved. New project established to assess cotton wool blends.
The commissioned project (investment directly above) may create opportunities to partner with others to develop novel products	Opportunity for new partnerships completed	Partially achieved. Following collaborative discussions with R&D providers a number of new project applications have been developed with a focus on novel products.
STRATEGIC OBJECTIVE 4 Advance cotton product processing		
Review ginning R&D for future investment opportunities Preliminary investigation of gin blending	Review of current and future ginning R&D investment opportunities completed. Gin blending results evaluated with industry	Partially Achieved. Review of ginning R&D incomplete. Gin blending trials terminated.
A continuation of industrial testing and commercial development of moisture and contamination sensors	Reports demonstrating commercial potential for improved moisture and contamination sensors	Achieved.



Investments	AOP KPIs	Measure of Success
Implementation of Ginning BMPs	Facility audits demonstrating increased adoption of ginning BMPs in Australian cotton gins	Achieved.
Ongoing support for the adoption of BMPs for the classification of cotton	Industry support of audits to demonstrate standards of Australian classing facilities are maintained at the highest level	Achieved.
Warehousing and Despatch BMPs and initial development of cotton harvest BMPs	Implementation of warehousing BMPs demonstrated and first draft harvest BMPs developed	Warehousing BMPs achieved. Harvest BMPs not achieved.
STRATEGIC OBJECTIVE 5 Develop objective measurement of Australian cotton fibre		
Several investments will contribute to this key tactic area: e.g., Premium Cotton Initiative and the validation of Cottonspec	Improved integration of tools and methods to demonstrate textile qualities and values of Australian fibre	Achieved.
Commercialisation of Cottonscope II (an instrument combining the Cottonscan and SiroMat instruments)	Commercialisation pathway for both instruments established	Partially achieved. Trialled internationally and was exhibited at Barcelona International Textile Manufacturers Association meeting and Bremen International Cotton Conference in 2011–12.

Program Two FARMING SYSTEMS

Investments	AOP KPIs	Measure of Success
STRATEGIC OBJECTIVE 1 Build the industry's understanding of climate and natural resource challenges		
Continued support for work under the Climate Change Research Strategy for Primary Industries (CCRSPI)	CCRSPI continues to provide strategic direction and coordination of this cross-sectoral issue	Achieved.
A new project to investigate the next generation of rural landscape governance in Australia	A PhD student identified to conduct a cotton case study	Achieved.
A continuing investigation to improve prediction of cotton growth and production in a changing climate	PhD student reports showing satisfactory progress	Achieved.
A continuing project to improve capacity to assess greenhouse gas emissions from broadacre irrigated cropping systems	Progress reports identifying the scale of greenhouse gas emissions	Achieved.
An ongoing project developing a Protocol for Assessing On-Farm Energy Use and Associated Greenhouse Gas Emissions and a new project to study alternative energy sources on cotton farms	On-farm energy use documented at case study sites and options for alternative energy identified	Achieved.



Investments	AOP KPIs	Measure of Success
A new post-doctoral project to study how cotton farmers can take advantage of potential future ecosystems markets	Progress report identifying ecosystems services potentially eligible for future markets	Partially Achieved (due mainly to a small delay to the commencement of the project).
STRATEGIC OBJECTIVE 2 Enhance the capacity of the industry to adopt resilient and adaptive farming systems		
A continuing project to establish a social, economic and environmental performance information repository and reporting framework for the cotton industry	Key performance data sources identified and collected	Achieved.
Ongoing and new work to benchmark cotton water use efficiencies and energy efficiencies for a range of irrigation systems	Reports benchmarking water use efficiencies and development of data.	Achieved.
Continuation of the Crop Consultants Australia Post-Season Survey series	Survey results analysed and reported to industry	Achieved.
A commissioned project to conduct the 3 rd Environmental Audit of the cotton industry	Audit conducted and reported to industry and other stakeholders	Partially Achieved. The bulk of the study and initial reporting was conducted in the 2011-12 year. Finalisation is expected by August 31, 2012.
Ongoing support for completion of the Burdekin cotton feasibility study	Annual reviews to report progress and completion of a final report containing advice on implementation and uptake of research	Achieved.
A new project to investigate applying plant-based measurements for irrigation in water limited environments	Project established with co-investment from collaborators in the USA; post-doc identified	Not Achieved. CRDC was not able to reach a satisfactory co-funding arrangement with international collaborators for the project.
A continuing project to investigate optimal irrigation of cotton via real-time adaptive control	Project progress reports demonstrating application of real-time adaptive control systems	Achieved.
A new project to investigate management of carbon in cotton-based farming systems	Progress reports demonstrating the opportunities for improved management and sequestration of carbon in cotton farming systems	Achieved.
Ongoing research into the development of dynamic deficits – matching irrigation to plant requirements in a variable climate	Reports showing the potential for dynamic deficits to improve water use efficiencies	Achieved.



Investments	AOP KPIs	Measure of Success
Ongoing research to define critical soil nutrient concentrations in soils supporting irrigated cotton in northern NSW and Queensland	A final report containing advice on implementation and uptake of research that identifies the range of critical soil nutrient concentrations in cotton growing soils developed and key methods for adoption identified and delivered	Achieved.
A continuing project to encourage cotton systems that are nutrient-efficient and promote healthy soil	Evidence that the knowledge to improve nitrogen use efficiency is being adopted by the industry	Partially Achieved. The 2010-11 CCA report indicates that more cotton growers are using soil and leaf testing to determine N requirements. However, many growers are still not achieving N optimisation to the level that this research shows is possible. Future industry Development and Delivery activities will need to include and ongoing campaign to encourage N optimisation more broadly.
Ongoing support to build cotton and grain industry capacity for continual improvement of pesticide application and drift management	Evidence that drift damage incidents are declining	Achieved.
STRATEGIC OBJECTIVE 3 Protect industry from biosecurity threats		
New projects to increase surveillance and preparedness for endemic and exotic viral diseases of cotton	Progress reports identifying risks from viral diseases	Achieved.
Continuing research projects for improving management of cotton diseases and disease surveillance	Reports on annual disease survey results communicated to industry	Achieved.
A continuing project to investigate IPM for Silverleaf whitefly and emerging pests in central regions	Progress reports providing evidence that Silverleaf whitefly management is improving in central cotton regions	Achieved.
A new research project to improve the management of mirids, stinkbugs and mealybugs in Bollgard II	Progress reports with recommendations for improved management of mirids, stinkbugs and mealybugs	Achieved.
A continuing project to provide Silverleaf whitefly resistance monitoring	Annual reports with resistance results provided to industry	Achieved.
A new research project to provide sustainable chemical control of mirids, aphids and Two Spotted Mite in cotton	Resistance results reported at least annually and implications for maintaining ongoing control analysed	Achieved.



Investments	AOP KPIs	Measure of Success
A continuing project to support the commercialisation of, and develop new applications for, fungal insecticides against cotton pests	Progress reports demonstrating commercial potential for fungal biopesticides	Achieved.
A continuing project to provide resistance monitoring of <i>Helicoverpa</i> spp. to Bt cotton	Resistance results reported regularly and implications discussed with industry	Achieved.
Ongoing research projects for managing weeds and herbicides in a genetically modified cotton farming system	Reports demonstrating improved management opportunities for weeds in GM systems	Achieved.
A new project to revisit the ecology of <i>Helicoverpa punctigera</i> in relation to migration, over-wintering and implications for Bt resistance	PhD student identified, project established	Achieved.
A continuing project to examine ways to improve management of cotton refuges within the BMP framework	PhD student reports demonstrating satisfactory progress	Achieved.
Ongoing research to enhance the efficiency of Bt refuge crops within a changing cotton environment	Reports showing options for improving refuge efficiency	Achieved.
Ongoing research into the flight characteristics of <i>Helicoverpa</i> spp. in relation to the efficacy of transgenic cotton refuges	Interim reports showing satisfactory progress	Achieved.

Program Three HUMAN CAPACITY

Investments	AOP KPIs	Measure of Success
STRATEGIC OBJECTIVE I Identify, understand and plan for future industry capacity needs		
A new project supporting the ongoing activities of the Professional Development Officer (Cotton)	New skills delivery systems and tools identified, tested and implemented	Achieved. Project has progressed satisfactorily in year one of this three-year project.
A new project to establish a workforce development plan for the cotton industry for sustained competitive advantage	Project established and interim results reported	Partially Achieved. The project has been established. Because the starting date was later than originally anticipated, interim results are not yet available.



Investments	AOP KPIs	Measure of Success
A continuing project to study the relationship between the cotton industry and cotton communities 1996–2006	A final report identifying implications for demographic information to be used to support planning for the industry's future human resource skilling needs	Achieved.
A new project to establish a workforce development plan for the cotton industry for sustained competitive advantage	Progress report identifying key data required to develop improved workforce plans in cotton regions	Achieved.
A continuing project to develop an on-farm environmental resources survey	Survey results reported to the industry	Achieved.
STRATEGIC OBJECTIVE 2 Improve human resource development and capacity		
A new project to enable an educational tour of adaptiveness and innovation in other rural industries	Tour undertaken, results shared with cotton industry stakeholders	Achieved.
A new project to identify the value added by vocational education training in the cotton industry	Project established, results evaluated and reported	Achieved
Ongoing testing and implementation of eLearning opportunities for BMP farms	eLearning tools tested and evaluated	Achieved.
A new project to review and update cotton farm safety resources and potential links to the myBMP system	Project established and existing resources reviewed	Partially achieved. The project was established, but with a delayed start.
Ongoing support for capacity building incentives through schools programs and courses and undergraduate scholarship programs	Scholarships offered and awarded	Achieved.
Ongoing support for the Cooperative Partnership for Farming and Fishing Health & Safety	Progress against the partnership strategic plan reported	Achieved.
Establishment of a new collaborative project in the cotton/northern grain growing zone to manage resistance to Group L, M and I herbicides	Collaborative project with GRDC and commercial partners established and working with cotton and grain growers	Achieved.



Investments	AOP KPIs	Measure of Success
A new program to establish small grower-driven projects with local Cotton Grower Associations (CGAs)	Projects established with CGAs	Achieved.
STRATEGIC OBJECTIVE 3 Enhance capacity to innovate		
Implementation of campaign-based initiatives within the Development and Delivery (D&D) team to deliver on key target areas for R&D adoption	Campaigns established to meet all key target areas of the D&D team	Achieved.
A new project to facilitate linkages between research, extension and the industry's myBMP system New funding to commission projects and provide resources for the Development & Delivery and myBMP programs	myBMP modules are reviewed as required Improved resources to support the adoption and myBMP frameworks established	Achieved. Achieved.
Ongoing support for the St George/Dirranbandi Cotton Extension Officer	Key farming systems extension framework targets being met	Achieved.
A new project to provide support to deliver regional extension in Queensland farming systems – central Queensland	Key biosecurity extension framework targets are being met	Achieved.
Ongoing support to deliver regional extension in Queensland farming systems – Darling Downs	Key nitrogen use extension framework targets being met	Achieved.
A commissioned project to plan the promotion of R&D results and outcomes at the 16th Australian Cotton Conference 2012	Evaluation of conference showing a high level of satisfaction by growers	Partially achieved. Preparations on track, Conference to be held in August 2012.
Support and planning for the fourth annual Big Day Out field day to highlight the 2011 Cotton Innovator of the Year awardee	Big Day Out field day held; highlights documented for <i>Spotlight</i> and <i>Australian Cottongrower</i> magazines. High grower participation and positive feedback received	Not achieved. It was mutually agreed with the 2011 Cotton Innovator of the Year awardee that a Big Day Out event was not appropriate because of the off-farm nature of his award.



APPENDIX THREE

AUSTRALIAN GOVERNMENT PRIORITIES

National Research Priorities

Four National Research Priorities (NRPs) were issued by the Australian Government in 2002, and enhanced and refined in 2003. Not all the Australian Government National Research Priorities' associated goals are applicable to the work of the Corporation. The following are the associated goals that are relevant to our 2011–12 R&D program:

- A *An environmentally sustainable Australia*
 - A1 Water – a critical resource
 - A2 Transforming existing industries
 - A3 Overcoming soil loss, salinity and acidity
 - A5 Sustainable use of Australia's biodiversity
 - A7 Responding to climate change and variability
- B *Promoting and maintaining good health*
 - B4 Strengthening Australia's social and economic fabric

- C *Frontier technologies for building and transforming Australian industries*
 - C2 Frontier technologies
 - C4 Smart information use
 - C5 Promoting an innovation culture and economy
- D *Safeguarding Australia*
 - D3 Protecting Australia from invasive diseases and pests

Rural Research and Development Priorities

The Australian Government issued five revised rural research and development priorities in May 2007 and all are addressed below.

Contribution of 2011–12 outputs

Australian Government Priorities		CRDC R&D outputs 2011–2012
Rural R&D Priorities	NRP goals (see above)	
Productivity and Adding Value Improve the productivity and profitability of existing industries and support the development of viable new industries	B4	<p>Supported ongoing R&D cross-sector partnerships which addressed climate change, natural resource management, irrigation, farm health & safety and encouraged the development of future scientists.</p> <p>Consolidated new collaborations with GRDC addressing productivity, weed control and climate change preparedness in cotton-grains systems.</p> <p>Extended farming systems innovations to farmers, facilitating production efficiencies with an emphasis on resource management (soils, water, fertiliser, energy and carbon) and environmental performance.</p> <p>Undertook further testing and commercialisation of novel biopesticides for key cotton and grains pests.</p> <p>Further enhanced the Best Management Practices program to integrate planning, risk management and benchmarking with development of skills, knowledge and adoption of research outputs throughout the value chain.</p>

Australian Government Priorities		CRDC R&D outputs 2011–2012
Rural R&D Priorities	NRP goals (see above)	
<p>Supply Chain and Markets</p> <p>Better understand and respond to domestic and international market and consumer requirements and improve the flow of such information through the whole supply chain, including to consumers.</p>	B4	<p>Maintained and improved international market access opportunities.</p> <p>Further improved industry awareness and preparedness for major biosecurity threats, particularly Silverleaf whitefly, <i>Solenopsis mealybug</i>, <i>Helicoverpa</i> spp. and viruses.</p> <p>Continued to improve market intelligence and customer feedback on Australian cotton's competitive advantage.</p> <p>Further developed and facilitated post-farm gate best practices for harvest, classing, ginning, transport, storage and handling.</p> <p>Further enhanced the Best Management Practices program (as above).</p> <p>Continued to develop collaborative R&D partnerships with Australian cotton shippers and overseas cotton spinning mills and domestic brand owners to facilitate opportunities for using newly developed Australian premium quality cotton, innovations in objective fibre measurement and textile processing knowledge.</p>
<p>Natural Resource Management</p> <p>Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable</p>	A1; A2; A3; A5; A7	<p>Supported ongoing R&D cross-sector partnerships addressing climate change, natural resource management, irrigation, and biodiversity, and encouraged the development of future natural resources scientists.</p> <p>Enhancement of the Best Management Practices system (as above).</p>
<p>Climate Variability and Climate Change</p> <p>Build resilience to climate variability and adapt to and mitigate the effects of climate change</p>	A7	<p>R&D investments in biosecurity as well as cropping systems for improved nitrogen, energy and water use efficiency that will increase farm businesses' climate change preparedness and reduce greenhouse gas emissions.</p> <p>Extended farming systems innovations to farmers, facilitating production efficiencies with an emphasis on resource management (soils, water, fertiliser, energy and carbon) and environmental performance.</p> <p>Consolidated new collaborations with Grains RDC addressing productivity and climate change preparedness in cotton and grains farming systems.</p> <p>Scoped the potential impacts of climate change on textile production and markets.</p> <p>Supported ongoing R&D cross-sector partnerships addressing climate change, natural resource management, irrigation and biodiversity, and encouraged the development of new scientists in these areas.</p>



Australian Government Priorities		CRDC R&D outputs 2011–2012
Rural R&D Priorities	NRP goals (see above)	
<p>Biosecurity</p> <p>Protect Australia's community, primary industries and environment from biosecurity threats</p>	D3	<p>Improved industry awareness and preparedness for major biosecurity threats, particularly Silverleaf whitefly, <i>Solenopsis mealybug</i>, <i>Helicoverpa</i> spp. and viruses.</p> <p>Further tested and commercialised novel biopesticides for key cotton and grain pests.</p> <p>Continued surveying for the incidence of endemic diseases and pests and surveillance for the presence of exotic diseases and pests in all cotton growing districts.</p> <p>Undertook R&D investments and activities that underpinned the stewardship of biotechnologies and chemicals.</p> <p>Enhanced the Best Management Practices program to integrate planning, risk management and benchmarking, with development of skills, knowledge and adoption of research outputs for biosecurity.</p>
Supporting the Rural R&D Priorities		
<p>Improve the skills to undertake research and apply its findings</p>	C5	<p>Supported ongoing R&D cross-sectors partnerships addressing climate change, irrigation and farm health & safety, and encouraging the development of future scientists in areas related to the cotton industry and its local environments.</p> <p>Continued support for:</p> <ul style="list-style-type: none"> • School level programs (Primary Industries Centre for Science Education – PICSE) • Undergraduate level programs (Cotton Production Course sponsorship; Undergraduate Studentship Program scholarships); Horizon scholarships • Post-graduate scholarships (PhD and Masters degrees) • Leadership programs (Australian Rural Leadership Program (ARLP) scholarship support; and; Future Cotton Leaders; and PhD scholarships for new scientists. <p>Built on the 'Sustaining Rural Communities Initiative' established by CRDC and the Cotton CRC.</p> <p>Continued to establish networks and collaborations with education providers to develop eLearning and enhance Recognition of Prior Learning opportunities.</p> <p>Further enhanced the Best Management Practices system (as above).</p> <p>Gained an improved understanding of future industry human capacity and R&D capability needs with forums and a commissioned study.</p> <p>Invested in projects and partnerships with Wincott (Women in Cotton), the Aboriginal Employment Strategy and the Future Cotton Leaders program.</p>
<p>Promote the development of new and existing technologies</p>	C2; C4	<p>Further enhanced the Best Management Practices system (as above), with new technologies; invested in new technologies such as EnergyCalc Light.</p> <p>Undertook the final year of management and stewardship of the National Program for Sustainable Irrigation (NPSI) Phase II.</p>

APPENDIX FOUR

ENVIRONMENTAL PERFORMANCE

CRDC has integrated the principles of ecologically sustainable development under s.516A of the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* into its planning framework. This involved developing contributions to Strategic Plan Measures of Success within each program for the broader triple bottom line outputs contained in the CRDC Strategic R&D Plan 2008–2013. In line with this, the Annual Operating Plan 2011–12 was designed to ensure strategic research initiatives that provide measurable environmental, economic and social benefits to the cotton industry and the wider community.

These environmental and social objectives also underpin the economic viability of the industry. Improvements in the efficient use of resources (water, nutritional supplements and chemicals), crop yields per hectare, and efficient farming methods aid the economic performance of cotton growers. A three-year contract with Crop Consultants Australia gathers on-farm information across the industry, which CRDC then analyses and which provides valuable guidance to future R&D directions: in particular, for environmental and economic sustainability.

Some examples of triple bottom line contributions in 2011–12

	Program One	Program Two	Program Three
Environmental	Development of a new moisture monitor will reduce major energy uses in cotton gin.	Range of R&D projects understanding and addressing climate change, including areas such as on-farm energy use, nitrogen fertiliser use and carbon capture. R&D projects to improve water use in different environments.	Continued broadening and updating <i>myBMP</i> , facilitating continuous improvement in environmental risk management through value chain.
Economic	R&D to define and test new market segments for Australian cotton.	Extending the cotton industry: completion of a Burdekin cotton feasibility study on cotton growing in the tropical north. Projects addressing honeydew contamination of cotton bolls, which reduces lint value.	R&D towards sustainable workforce planning for industry and participants.
Social	R&D to increase market opportunities should deliver economic sustainability, bringing benefits to industry participants, their families and communities.	A continuing project to establish a social, economic and environmental performance information repository and reporting framework for the cotton industry. A major program to ensure pest sprays are used appropriately and safely.	Aboriginal Employment Strategy traineeship. Integrated projects to address the industry's culture of innovation and learning. Concept developed for a web portal, Cotton Campus, which would provide web linkages, resources and advice to foster an individual's learning and development.



APPENDIX FIVE

RESEARCH AND DEVELOPMENT PORTFOLIO

Contracted R&D organisations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ARLF	Australian Rural Leadership Foundation
ASA	Australian Society of Agronomy
BCA	Boyce Chartered Accountants
BG	Bill Gordon Pty Ltd
CA	Cotton Australia
CC	Cotton Compass
CCA	Crop Consultants Australia
CIF	CRC for Irrigation Futures
CGA	Cotton Growers Association
CHCGI	Central Highlands Cotton Growers and Irrigators Association
CRC	Cotton Catchment Communities CRC
CRDC	Cotton Research and Development Corporation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CUT	Curtin University of Technology
DAN	NSW Department of Primary Industries
DAQ	Department of Agriculture, Fisheries and Forestry Queensland
DU	Deakin University
DW	DW Consulting Services
Fundbase	Fund Base
FSA	FSA Consulting
GGA	Gary Goucher & Associates
GMW	Goulburn-Murray Water
GRDC	Grains Research and Development Corporation
GSA	Gordon Stone & Associates
IAL	Irrigation Australia Ltd
IC	Inovact Consulting Pty Ltd
JK	John Kent
NCEA	National Centre for Engineering in Agriculture
NCFR	National Centre for Farmer Health
PHA	Plant Health Australia
PICSE	Primary Industry Centre for Scientific Education
POLCRC	Polymers CRC
QTT	Quick Test Technology
RIRDC	Rural Industries Research and Development Corporation
RRR	Roth Regional & Rural
SH	Fund Base
SIAC	Spackman Iker Ag Consulting
SRP	Soils Research Pty Ltd
TAC	Tocal Agricultural Centre
TAS	Taylored Agricultural Systems Pty Ltd
TechMAC	TechMAC Pty Ltd
UA	University of Adelaide
UCQ	University of Central Queensland



UM	University of Melbourne
UNE	University of New England
UNSW	University of New South Wales
UQ	University of Queensland
US	University of Sydney
USQ	University of Southern Queensland
UTS	University of Technology Sydney
UWA	University of Western Australia
WAG	Warden AG Services
WC	Waters Consulting
WCCPS	Walgett Community College Primary School
Wincott	Womens Industry Network Cotton
WVG	WA Vegetable Growers Association Pty Ltd

R&D investments 2011–12

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
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Program One: VALUE CHAIN

CCI201	Regional Cotton Market Seminar Program	CC	Pete Johnson	1/11/11	30/06/12
CMSE1102	Premium Cotton Initiative spinning trials	CSIRO	Rene Van der Sluijs	1/07/10	30/06/12
CMSE1103	Warehousing and Despatch Best Management Practice	CSIRO	Rene Van der Sluijs	1/07/10	30/06/12
CMSE1201	Identifying the Glass Transition Temperature Behaviour of Australian Cotton	CSIRO	Stuart Gordon	1/07/11	30/06/14
CMSE1202	Preliminary investigation into Gin Blending	CSIRO	Rene Van der Sluijs	1/07/11	30/06/13
CMSE1203	Post Harvest BMP (including Classing/Ginning and Harvesting)	CSIRO	Rene Van der Sluijs	1/07/11	30/06/14
CMSE1204	Australian Cotton Fibre Elongation	CSIRO	Shouren Yang	1/07/11	30/06/13
CMSE1205	Attendance at the International Committee for Cotton Test Methods (ICCTM) Spain	CSIRO	Stuart Gordon	1/09/11	27/09/11
CMSE1206	Student project allowance-fibre/yarn studies	CSIRO	Julie Piquee	1/07/11	20/01/12
CMSE1207	Student project allowance-cotton waste recycling	CSIRO	Sam Elio Ekombo	25/07/11	3/02/12
CMSE1208	Travel:31st International Cotton Conf Germany	CSIRO	Rene Van der Sluijs	18/03/12	30/04/12
CMSE1209	Travel:31st International Cotton Conf Germany & USA	CSIRO	Geoff Naylor	18/03/12	30/04/12
CMSE1210	Further investigation of the effects of Quarantine Treatments on cotton properties focusing on colour	CSIRO	Rene Van der Sluijs	1/01/12	30/06/12
CMSE1214	Australian Cotton Dyeability	CSIRO	Shouren Yang	1/07/11	30/06/12
CRC1004	Agronomic Management to Optimise Textile Performance	CSIRO	Michael Bange	1/07/09	30/06/12
CRC1009	Industrial testing and commercial development of moisture and contamination sensors	CSIRO	Gordon Stuart	1/07/09	30/06/12
CRC1114	Validation of Cottonspec; a program for predicting yarn fibre quality	CSIRO	Shouren Yang	1/07/10	30/06/12



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRDC1212	Post Farm Gate (Warehousing & Transport) BMP Development & Delivery	TechMAC	Dallas Gibb	1/07/11	30/06/12
CRDC1229	Australian Marketing Strategy Project (PCI)	TechMAC	Dallas Gibb, Pete Johnson	1/02/12	30/06/12
CSME1211	CRDC Ginning R&D Review	CSIRO	Andrew Abbott	1/01/12	30/06/12
CSME1212	In House Mill trials of LS Upland Cotton	CSIRO	Rene Van der Sluijs	1/01/12	30/06/12
CSME1213	Comparison of fibre quality from Round and Conventional Modules	CSIRO	Rene Van der Sluijs	1/01/12	30/06/12
DUI102	Development of low twist fine count yarns and fabrics from Australian long staple upland cotton	DU	Xungai Wang	1/07/10	30/06/13
UTS1201	Accounting for value chain sustainability & competitive advantage	UTS	David Brown	1/07/11	30/06/14
UQ1201	Travel: Validating Cotton Sustainability Claims-Travel to Farms and Field Sites	UQ	Francois Visser	1/07/11	30/06/12

Total R&D Investment Program One

\$1,387,047

Program Two: FARMING SYSTEMS

BCAI201	2010/11 Australian Cotton Comparative Analysis	BCA	Phil Achin	1/07/11	30/06/12
BCAI202	2011/12 Australian Cotton Comparative Analysis	BCA	Phil Achin	1/07/11	30/06/12
BGCI001	Building industry capacity for continual improvement of application and drift management	BG	Bill Gordon	1/07/09	30/06/12
CAI201	Bio security Training for growers & agronomists (<i>Training of an industry-wide network in emergency response procedures</i>)	CA	Greg Kauter	1/07/11	30/06/12
CCAI101	<i>Helicoverpa</i> egg collecting in cotton regions to support Bt and insecticide resistance monitoring	CCA	Fiona Anderson	1/07/10	30/06/13
CCAI201	Annual qualitative & quantitative surveys for Australian cotton industry	CCA	Fiona Anderson	15/04/12	30/11/12
CCR1201	CCRSPI Level2 National Climate change Research Strategy for Primary Industries	UM	Alison Kelly (admin)	1/07/11	31/12/12
CHCGI201	CQ Farming Systems limitations Assessment	CHCGI	Ross Burnett	1/06/12	30/09/12
CHCGI201A	CQ Farming Systems limitations Assessment	RRR	Ingrid Roth	1/06/12	30/09/12
CLWI201	Extend the Irrigate WAY irrigation management tools into the cotton industry, Phase 2	CSIRO	John Hornebuckle	1/07/11	30/06/12
CRC1001	The Development of Sustainable Cotton Farming Systems for Coastal North Qld	CSIRO	Steve Yeates	1/07/09	30/06/12
CRC1002A	Diseases of Cotton 10	DAN	Karen Kirkby	1/07/10	30/06/13
CRC1003	Managing Weeds and Herbicides in a Genetically Modified Cotton Farming System	DAN	Graham Charles	1/07/09	30/06/12
CRC1005	Enhancing the efficiency of Bt refuge crops within a changing cotton environment,	CSIRO	Geoff Baker Mary Whitehouse	1/07/09	30/06/12
CRC1006	Dynamic Deficits - matching Irrigation to Plant Requirements in a Variable Climate	CSIRO	Rose Brodrick	1/07/09	30/06/12



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRCI010	CCA Consultants Post Season & Grower Context Surveys (2008/09, 2009/10, 2010/11 seasons)	CCA	Fleur Anderson Amber Dimond	1/07/09	30/06/12
CRCI012	Collective NRM & socio economic scenarios in cotton communities	UQ	Olive Hood	15/08/09	14/08/12
CRCI015	PhD Economic-environmental water trade-offs in the Namoi under climate change and variability	UWA	Alison Wilson	1/04/10	31/03/13
CRCI101	Improving prediction of cotton growth and production in a changing climate	CSIRO	Michael Bange	1/07/10	30/06/13
CRCI102	IPM for Silverleaf whitefly and emerging pests in central regions	CSIRO	Lewis Wilson	1/07/10	30/06/13
CRCI103	Post Grad: Dominic Cross: Improving ways to manage cotton refuges within the BMP framework	CSIRO	Mary Whitehouse	1/07/10	30/06/13
CRCI106	Completion of Burdekin Cotton Feasibility Study	DAQ	Paul Grundy	1/07/10	30/06/12
CRCI109	Ecology of <i>Helicoverpa punctigera</i> revisited: migration, overwintering and implications for <i>Bt</i> resistance	UNE	Peter Gregg	1/07/10	30/06/13
CRCI109A	PhD - Ecology of <i>Helicoverpa punctigera</i> revisited: migration, overwintering and implications for <i>Bt</i> resistance	UNE	Kris Le Mottee	1/07/10	30/06/13
CRCI115	Developing cotton systems that are nutrient-efficient and promote healthy soil	CSIRO	Ian Rochester	1/07/10	30/06/13
CRCI117	Assessing greenhouse gas emissions from broadacre irrigated cropping systems	CRC	Jeff Baldock	1/07/10	30/06/13
CRCI215	Benchmarking furrow irrigation efficiency in the Australian Cotton Industry	CRC	Malcolm Gillies	1/07/11	30/06/12
CRCI218	Biochemical markers of host plant origin in <i>Helicoverpa</i> moths	CSIRO	Ben Greatrex	1/07/11	30/06/12
CRCI219	Cotton CRC Evaluation	CRC	Janine Powell	4/04/11	30/09/11
CRCI220	Substitutes for pupae busting – targeting larvae or moths	UNE	Peter Gregg	1/07/11	30/06/12
CRCI222	Area-wide pest suppression in transgenic landscapes	CSIRO	Nancy Schellhorn	1/07/11	30/06/12
CRDC1207	Building industry capacity to adopt IWM in the cotton/grains farming system through research-client linkages	TAS	Ian Taylor	1/07/11	30/06/14
CRDC1215	Scoping consultants' needs in adopting cotton best practices in southern NSW	WAG	Steve Warden	1/01/12	31/01/12
CRDC1217	3rd Environmental Audit	IC	Ken Moore	13/02/12	2/07/12
CSE0801	Genomics of <i>Helicoverpa armigera</i> insecticide resistance (PhD)	CSIRO	Claire Farnsworth	1/03/09	31/01/13
CSEI103	<i>Bt</i> Resistance Monitoring	CSIRO	Sharon Downes	1/07/10	30/06/11
CSEI201	The characterisation of Vip3A resistance in <i>Helicoverpa</i> spp.	CSIRO	Tom Walsh	1/07/11	30/06/14
CSEI202	Efficacy of Bollgard III cotton against <i>Helicoverpa</i>	CSIRO	Sharon Downes	1/07/11	30/06/14
CSEI203	Late Travel Request - <i>Bt</i> Conference August 2011. Expected Application 11/2/11	CSIRO	Sharon Downes	1/07/11	30/06/12
CSPI104	Applying plant-based measurements for irrigation in water limited environments.	CSIRO	Michael Bange	1/07/11	30/06/14
DANI101	New Tools for IPM I: Development of Fungal insecticides against cotton pests	DAN	Robert Mensah	1/07/10	30/06/13



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
DANI201	Scholarship: Molecular genetics methods to detect neonicotinoid resistance in cotton aphid	DAN	Kate Marshall	1/07/11	30/06/14
DANI202	Managing carbon in cotton-based farming systems	DAN	Nilantha Hulugalle	1/07/11	30/06/14
DANI203	Sustainable resistance management of mites, aphids and mirids in Australian cotton	DAN	Grant Herron	1/07/11	30/06/14
DANI204	<i>Helicoverpa</i> resistance management & novel method to protect Bollgard II	DAN	Lisa Bird	1/07/11	30/06/14
DAQI001	Defining critical soil nutrient concentrations in soils supporting irrigated cotton in Northern NSW & Qld	GRDC	Mike Bell	1/07/09	30/06/12
DAQI103	Fusarium wilt management	DAQ	Linda Smith	1/07/10	30/06/13
DAQI104	Whitefly resistance monitoring 2010-2013	DAQ	Zara Ludgate	1/07/10	30/06/13
DAQI201	Surveillance and monitoring for endemic and exotic virus diseases of cotton	DAQ	Murray Sharman	1/07/11	30/06/15
DAQI201T	Travel & Laboratory extension to DAQI201	DAQ	Murray Sharman	1/07/11	30/09/11
DAQI202	Cross-industry preparedness for Cotton leaf curl disease	DAQ	Cherie Gambley	1/07/11	30/06/13
DAQI204	Management of mirids, stinkbugs and Solenopsis mealy bug	DAQ	Moazzem Khan	1/07/11	30/06/14
DAQI206	Travel: Disease surveys in commercial cotton in the Ord River Irrigation Area	DAQ	Linda Smith	4/09/11	11/09/11
DWCI201	Waterpak update & my BMP integration	DWC	David Wigginton	1/01/12	31/10/12
FSAI201	Review of water use in the production of cotton and other Fibres using life cycle assessments	FSA	Stephen Weidemann	1/03/12	25/05/12
JKI201	Strategic assessment of national training for pesticide application that support the implementation of DRT's, BMP & IPE	JK	John Kent	1/07/11	30/06/12
NECI101	A Protocol for Assessing On Farm Energy Use and Associated Greenhouse Gas Emissions	NCEA	Craig Baillie	1/07/10	30/06/13
NECI201	The Feasibility and Development of Alternate Energy Sources for Cotton	NCEA	Craig Baillie	1/07/11	30/06/14
NECI202	EnergyCalc Lite Development	NCEA	Craig Baillie	15/04/12	30/06/12
PHAI201	Provision of independent technical and secretarial services NWPPA	PHA	Nicholas Woods	1/07/11	30/06/12
QTTI201	Monitoring Diuron in river water in two Cotton Catchments	QTT	Angus Crossan	16/02/12	20/04/12
RIRDCI102	Developing a National life cycle inventory database for Australian agriculture	RIRDC	Kirsty McCormack Billy Browning	1/07/11	30/06/13
RRRI201	2013 Grower Survey of Cotton Farming Practices & Regional Workshops to Identify Research Issues	RRR	Ingrid Roth	15/04/12	30/11/12
SIACI201	The effect of plant density on yield, profit & boll disorder in CQ Cotton	SIAC	Jamie Iker	4/11/11	30/06/12
UAI101	Post Grad. The use of biological control agents in resistance management of <i>Helicoverpa</i>	UA	Kay Jutamat Anantanawat	1/07/10	30/06/11
UAI201	Extn 03UA001/2 Inducible tolerance to Bt-toxin: significance, mechanism & new management	UA	Mahbub Rahman	1/07/11	30/06/12
UNEI201	Positioning growers to take advantage of future ecosystem service markets	UNE	Rhiannon Smith	1/03/12	1/03/15



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
UNEI202	Next generation rural landscape governance: the Australian dimension	UNE	Tanya Howard	1/07/11	30/06/14
UNEI203	Scoping the potential uses of beneficial micro-organisms for increasing the productivity of cropping systems	UNE	Lily Pereg	1/01/12	15/03/12
UNEI205	Capital Item: Ultra Low Laboratory Freezer	UNE	Lily Pereg	1/05/12	30/06/12
UQ1001	Flight characteristics of <i>Helicoverpa</i> spp in relation to the efficacy of transgenic cotton refuges	UQ	Jason Callander	15/09/09	15/09/12
UQ1203	Improved Integrated Weed Management systems in transgenic farming landscapes	DAQ	Jeff Werth	1/07/11	30/06/14
USQ1101	Optimal irrigation of cotton via real-time adaptive control	NCEA	Alison McCarthy	1/07/10	30/06/13
UTSI202	PhD Mahdi Mousa Ali: Image Processing Method to Estimate Cotton Requirements for nitrogen Fertiliser	UTS	Daniel Tan	1/03/12	28/02/15

Total R&D Investment Program Two

\$6,558,517

Program Three HUMAN CAPACITY

ABAI201	Sponsorship 2012 Science & Innovation Awards	ABARES	Award Recipient	1/07/11	30/06/12
CAI202	Primary Industries Education Web Portal Partnership	CA	Adam Kay	1/07/11	30/06/12
CAI203	16th Australian Cotton Conference	CA	Adam Kay	1/07/11	30/06/12
CAI204	Australian Future Cotton Leaders Program 3 -2012	CA	Jo Eady	1/10/11	30/09/12
CGAI201	Capacity Building via Small Projects for St George CGA Members & Community	CGA	Ed Willis	1/08/11	30/06/13
CGAI202	Pushing the Boundaries II: Agribusiness Careers	CGA	Nigel Corish	1/10/11	30/06/12
CGAI203	Feasibility Study into Utilising a Biomass Burner at Tandou Gin	CGA	David McClure	1/08/11	1/12/11
CGAI204	Encouraging Cotton by Gwydir Valley Cotton Growers Association	CGA	Zara Farrell	1/07/11	30/06/12
CGAI206	Macquarie Cotton Growers Welcome Back Project	CGA	Sharanne Turnball	1/08/11	28/02/12
CGAI207	Measurement tools allowing Walgett Growers to participate in the IrrisAT Project	CGA	Lori Nemec	1/12/11	31/12/11
CGAI208	Up skilling growers in safe chemical use and nurturing teens to be engaged in the cotton industry	CGA	Marie-Louise Offner	1/07/11	30/06/13
CGAI209	Engaging growers in best management practices	CGA	Marie-Louise Offner	1/07/11	30/06/13
CGAI210	Upper Namoi Extension Officer -CGA Project	CGA	Rod Smith Angus Duddy	1/03/12	1/09/13
CRCI007	Cotton Field to Fabric Training Course,	CSIRO	Rene van der Sluijs	1/07/09	30/06/12
CRCI011	Delivering Regional Extension in Qld Farming Systems- Darling Downs	DAQ	Duncan Weir	1/07/09	30/06/12
CRCI016	Primary Industry Centre for Scientific Education	PICSE	David Russell	1/07/09	30/06/12
CRCI018	Adoption of my BMP - General Manager: Best Practice & research implementation	CRC	Ken Flower	1/07/10	31/06/12



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRCI108	Social, economic, environmental performance information repository and reporting for the cotton industry	RRR	Guy Roth	1/07/10	30/06/13
CRCI110	St. George / Dirranbandi Cot. Ext. Officer.	CRC	Dallas King	1/07/10	30/06/13
CRCI111	Target Lead Pest Management & Macquarie local delivery	CRC	Sally Ceeney	1/07/10	31/06/12
CRCI112	Target Lead Weed Management, New Growers & Southern local delivery	CRC	James Hill	1/07/10	31/06/12
CRCI201	WCRC - 5 Travel Funding	US	Ivan Kennedy	1/11/11	31/12/11
CRCI202	WCRC - 5 Travel Funding	CSIRO	Rene van der Sluijs	1/11/11	31/12/11
CRCI203	WCRC - 5 Travel Funding	US	Daniel Tan	1/11/11	31/12/11
CRCI204	WCRC - 5 Travel Funding	UNE	Lily Pereg	1/11/11	31/12/11
CRCI207	WCRC - 5 Travel Funding	CSIRO	Steve Yeats	1/11/11	31/12/11
CRCI209	WCRC - 5 Travel Funding	CSIRO	Katie Broughton	1/11/11	31/12/11
CRCI210	Beltwide Conference	DAN	Karen Kirkby	1/11/11	31/12/11
CRCI211	WCRC - 5 Travel Funding	CSIRO	Nicola Cottee	1/11/11	31/12/11
CRCI212	National Extension Development and Delivery - Crop Protection	DAQ	Susan Maas	1/07/11	30/06/14
CRCI213	Professional Development Manager (Cotton)	DAQ	Mark Hickman	1/07/11	30/06/14
CRCI214	WCRC - 5 Travel Funding	CRC	Tom Walsh	1/11/11	31/12/11
CRCI216	WCRC - 5 Travel Funding	UQ	Francois Visser	1/11/11	31/12/11
CRCI217	Understanding the value added by vocational training investment in the cotton investment	WC	Warwick Waters	1/07/11	30/06/12
CRCI221	An audit of the workforce skills of aboriginal people in the Gomerai Tribal Nation	CRC	Sally Knight	1/10/11	31/05/12
CRCI223	Sponsorship Cotton CRC Science Forum March 2012	CRC	Philip Armytage	13/03/12	30/06/12
CRCI224	Sponsorship Australian Cotton Water Story - A Research Review Forum Aug 2011	CRC	Philip Armytage	10/08/11	30/06/12
CRDC1201	Dry land cotton growers study tour to USA	CGA	Geoff O'Neill	1/07/10	30/06/11
CRDC1202	Field to Fabric course Sponsorship	CRDC	Johnelle Rogan	1/07/10	31/08/11
CRDC1203	Field to Fabric course Sponsorship	CRDC	Jacques Minnaar	1/07/10	31/08/11
CRDC1204	RaboBank Executive Development Program, Hamish Millar	CRDC	Hamish Millar	21/08/11	3/08/12
CRDC1205	Field to Fabric course Sponsorship	CRDC	Louise Hill	1/07/10	31/08/11
CRDC1206	Field to Fabric course Sponsorship	CRDC	Wal Dunson	1/07/10	31/08/11
CRDC1208	The mechanics of Government and how to influence change - rural women's workshop	CRDC	Barbara Grey	1/07/11	30/06/12
CRDC1209	Sponsorship: AICD course Fleur Anderson	CRDC	Fleur Andersen	1/11/11	30/06/12
CRDC1210	Sponsorship: AICD course Pete Johnson	CRDC	Pete Johnson	1/11/11	30/06/12
CRDC1211	BMP Lead Auditor	RRR	Guy Roth	1/07/11	30/06/13
CRDC1213	Cotton Industry Succession & Prof Dev-A Review of Employer & Industry needs	GSA	Gordon Stone	5/12/11	29/02/12
CRDC1214	Scholarship; UNE Cotton Production Course	CRDC	Helen Crossley	29/02/12	30/06/12
CRDC1216	Australian Society of Agronomy 16th Biennial Conference	ASA	Sponsorship	9/01/12	18/10/12
CRDC1218	Scholarship; UNE Cotton Production Course	CRDC	Christopher Thomas	29/02/12	30/06/12
CRDC1219	Scholarship; UNE Cotton Production Course	CRDC	Tom Farrer	29/02/12	30/06/12
CRDC1220	Scholarship; UNE Cotton Production Course	CRDC	Tom Webb	29/02/12	30/06/12
CRDC1221	Scholarship; UNE Cotton Production Course	CRDC	Malcolm Salisbury	29/02/12	30/06/12
CRDC1222	Scholarship; UNE Cotton Production Course	CRDC	Jim Wark	29/02/12	30/06/12
CRDC1224	Scholarship; UNE Cotton Production Course	CRDC	Kaitlin Rasmussen	29/02/12	30/06/12
CRDC1225	Scholarship; UNE Cotton Production Course	CRDC	Neal Stevenson	29/02/12	30/06/12



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRDC1226	Scholarship; UNE Cotton Production Course	CRDC	Wayne Seiler	29/02/12	30/06/12
CRDC1227	2012 Sponsorship-Sowing the seeds of Farmer Health	NCFA	Sponsorship	9/01/12	19/09/12
CRDC1228	Scholarship; UNE Cotton Production Course	CRDC	Donald Benn	29/02/12	30/06/12
CRDC1230	Enviro-Beat Youth Conference -Sponsorship for 2 remote Schools to attend	WCCPS	Walgett PS	1/03/12	31/03/12
CSP1201	Linking Research, Extension and myBMP - Facilitation	CSIRO	Michael Bange	1/07/11	30/06/14
CSP1202	Travel: Soil System Science Vienna Apr 2012-Braunack	CSIRO	Michael Braunack	20/04/12	28/05/12
DAN1102 (was AAC1101)	Human Capacity Assessment and Benchmarking	TAC	Charlie Bell	1/07/10	30/06/13
DAN1205	Promoting Water Smart Infrastructure Investment in NSW.	DAN	Janelle Montgomery	1/12/11	30/11/14
DAQ1103T	Travel: Fusarium Lab Workshop Italy June 2012-Smith	DAQ	Linda Smith	1/06/12	11/07/12
RIR1101	ARLP Course 17	ARLF	Arthur Spellson	1/07/10	30/06/12
RIR1201	Sponsorship-ARLP Course 19	ARLF	Paula Jones	1/07/11	30/09/13
RIR1202	Sponsorship-ARLP Course 19	ARLF	David Wigginton	1/07/11	30/09/13
RIRDC002	Farm Health & Safety New Joint Venture	RIRDC	Helen Moffatt	1/07/08	30/06/12
RIRDC1001	Investing in Youth Undergraduate Studentship Program (\$10k pa)	RIRDC	Naomi Marks	1/01/10	31/12/14
RIRDC1103	Investing in Youth Undergraduate Studentship Program (\$10k pa)	RIRDC	Rebecca Dunsmuir	1/01/11	31/12/15
RIRDC1201	Investing in 2 x Youth Undergraduate Studentship Program (\$10k pa)	RIRDC	Kristy McKormack, Billy Browning	1/01/12	31/12/15
SHI201	Capacity Building of CGAs in project planning and grant applications.	Fundbase	Sally Hunter	1/07/11	30/06/14
UMI201	Innovative work: Cotton workforce development for sustained competitive advantage	UM	Ruth Nettle	1/07/11	30/06/14
UNE1204	CRC Science Forum Narrabri	UNE	Lily Pereg	19/03/12	30/04/12
USI201	Managing Cotton Farm Safety Review and Update	US	Tony Lower	1/07/11	30/06/14
WIN1101	On-Farm environmental resources survey	Wincott	Barbara Grey	1/07/10	30/06/13
WIN1102	Educational tour of Rural Industries	Wincott	Anne Coote	1/07/10	30/06/13
WIN1201	Travel: Coal seam gas tour to Qld March 2012	Wincott	Anne Coote	1/03/12	30/06/13
Total R&D Investment Program Three				\$1,841,691	
Total Cotton R&D Investment Portfolio 2011–12				\$9,787,255	



CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
Program Four: NATIONAL PROGRAM for SUSTAINABLE IRRIGATION					
UAD25	Long term sustainability of precision irrigation	UA	Rob Murray	1/01/06	30/06/11
GMW5034	Channel evaporation mitigation	GMW	Michelle Winter	1/07/08	31/08/11
UCQ5070	Optimising delivery & benefits of aerated irrigation water	UCQ	David Midmore	1/07/08	1/05/12
QPI5161	Increasing the resilience of Eastern Australian irrigation farm businesses	DAQ	Daniel Rodriguez	1/11/08	30/11/11
POL5067	New technologies to reduce evaporation from large water storages	POLCRC	David Solomon	1/01/10	30/11/11
SRP5026	Soil management for irrigated agriculture	SRP	Bruce Cockroft	1/07/08	1/05/11
CSE5029	Effect of changing irrigation strategies on biodiversity	CSIRO	Sue McIntyre	1/09/08	1/10/11
CIF5121	Managing soil salinity for wine quality	CIF	Robert Stevens	1/06/08	15/05/12
UCW5208	Preparing irrigated agriculture for statutory & climate change	CUT	Mark Gibberd	15/01/09	30/11/11
UNSW5127	Quantifying surface/ground water exchange using thermal and chemical measurements	UNSW	Ian Acworth	1/07/08	15/09/11
GGA1101	Irrigation R&D future options	GGA	Garry Goucher	1/01/11	30/06/11
DAN5027	Tools to manage fertigation technologies in citrus orchards	DAN	Michael Treeby	1/05/08	16/12/11
DAN5162	Water Smart in cotton & grains NSW	DAN	Janelle Montgomery	31/10/08	1/11/11
WVG1001	Upskilling water managers	WVG	John Shannon	1/10/09	1/06/11
IAL1001	NPSI/IAL travel fellowship	IAL	Trevor Le Breton	1/07/10	1/06/11
IAL1103	NPSI/IAL travel fellowship	IAL	Trevor Le Breton	1/07/10	15/11/11
IAL1201	NPSI/IAL travel fellowship	IAL	Trevor Le Breton	1/07/10	30/06/12
USQ1101N	Scholarship	USQ	Samuel Ponce	1/12/10	1/06/11

Total R&D Investment Program Four

\$926,081

Total R&D Investment Portfolio 2011–12

\$10,713,336



APPENDIX SIX

GLOSSARY

AACC	Australian Agricultural Colleges Corporation
AANRO	Australian Agricultural and Natural Resources Online Database
ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ACIC	Australian Cotton Industry Council
ACIPA	Australian Centre for Intellectual Property in Agriculture
ACGRA	Australian Cotton Growers Research Association
ACRI	Australian Cotton Research Institute
ACSA	Australian Cotton Shippers Association
AECL	Australian Egg Corporation Limited
AES	Aboriginal Employment Strategy
ai/ha	Active ingredient per hectare
ALS	Australian Long Staple
ANAO	Australian National Audit Office
ANCID	Australian National Committee on Irrigation and Drainage
AOP	Annual Operating Plan
APL	Australian Pork Limited
App	An application, typically downloaded onto mobile devices such as computer tablets or smartphones
APVMA	Australian Pesticides and Veterinary Medicines Authority
ARLP	Australian Rural Leadership Program
AWAF	Department of Agriculture and Food, Western Australia
AWM	Area Wide Management
Bollgard II®	Cotton varieties contain two genes resistant to <i>Helicoverpa</i> spp.
BMP	Best Management Practices program
BRS	Bureau of Rural Sciences
Bt	<i>Bacillus thuringiensis</i> (crystal protein gene expressed in Bollgard II® cotton varieties)
CA	Cotton Australia
CAC Act	Commonwealth Authorities and Companies Act 1997
CCA	Crop Consultants Australia Inc. (formerly Cotton Consultants Australia Inc.)
CCAA	Cotton Classers Association of Australia
CCRSPI	National Climate Change Research Strategy for Primary Industries
CGA	Cotton Grower Association
Cotton CRC	Cotton Catchment Communities Cooperative Research Centre
CMA	Catchment Management Authority
CMSE	CSIRO Materials Science and Engineering
CPFFH&S	Cooperative Partnership for Farming and Fishing Health and Safety
CPRS	Carbon Pollution Reduction Scheme
CRC	Cooperative Research Centre
Corporation, the	Cotton Research and Development Corporation
CRDC	Cotton Research and Development Corporation
CRRDCC	Council of Rural Research & Development Corporations' Chairs
CSD	Cotton Seed Distributors Ltd (a grower-owned cooperative)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSITC	Commercial Standardisation of Instrument Testing of Cotton
DAFF Queensland	Queensland Department of Agriculture, Fisheries and Forestry. Note: the Australian Government department of the same name is not referred to by an acronym in this publication



DERM	Queensland Department of Environment and Resource Management
DOFD	Australian Government Department of Finance and Deregulation
EIQ	Environmental Impact Quotient
eLearning	On-line learning, training and education
ELS	Extra Long Staple
EM	Electromagnetic conductivity
EPI	Environmental Performance Indicator
ESD	Ecologically Sustainable Development
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
F Rank	Measure of Fusarium wilt resistance
FRDC	Fisheries Research and Development Corporation
GM	Genetically modified
GMAC	Genetic Manipulation Advisory Committee
GOA	Groundrig Operators Association
GRDC	Grains Research and Development Corporation
GWRDC	Grape and Wine Research and Development Corporation
ha.	Hectare
HAL	Horticulture Australia Ltd
<i>Helicoverpa</i> spp.	Cotton's major insect pests (<i>H. armigera</i> and <i>H. punctigera</i>)
Heliothis	Insect pest, more properly known as <i>Helicoverpa</i> spp. (see above)
HRM	Human resource management
HVI	High Volume Instrument
IBP	Industry Biosecurity Plan
ICAC	International Cotton Advisory Committee
IP	Intellectual Property
IDM	Integrated Disease Management
Irrigation deficit	Millimetres of plant-available soil water removed at the time of irrigation
INGARD®	Cotton varieties containing one gene of resistance to <i>Helicoverpa</i> spp. (ceased use in 2004)
IPM	Integrated Pest Management
IRMS	Insecticide Resistance Management Strategy
ISO	International Organisation for Standardisation
IWM	Integrated Weed Management
IWUI	Irrigation Water Use Index
KPI	Key Performance Indicator (measure of success)
LCA	Life Cycle Assessment
LWA	Land and Water Australia (ceased operations in 2009)
micronaire	Measure of fineness and maturity of cotton fibre
MLA	Meat and Livestock Australia
MP	Member of Parliament
NCEA	National Centre for Engineering in Agriculture
NFF	National Farmers' Federation
NHT	Natural Heritage Trust (Australian Government)
NIPI	National Insect Pest Initiative
NPSI	National Program for Sustainable Irrigation
NRM	Natural Resource Management



NSW DPI	NSW Department of Primary Industries (<i>formerly Industry & Investment NSW</i>)
NUEI	Nitrogen Use Efficiency Index
OGTR	Office of the Gene Technology Regulator
OHS	Occupational Health and Safety
PICSE	National Primary Industry Centre for Science Education
PISC	Primary Industries Standing Committee
PIERD Act	Primary Industries and Energy Research and Development Act 1989
Pima cotton	<i>Gossypium barbadense</i> . Related to Egyptian cotton, having extra long and fine staples. Limited Australian production.
QFF	Queensland Farmers' Federation
Queensland DAFF	See <i>DAFF Queensland</i>
QUT	Queensland University of Technology
RDC	Rural Research and Development Corporation
RIRDC	Rural Industries Research and Development Corporation
RMP	Resistance Management Plan
RRDCC	Rural Research and Development Chairs' Committee
SFF	Sustainable Farm Families
SJV	San Joaquin Valley (California): the industry benchmark in the international marketplace
SLW	Silverleaf whitefly
spp.	species
SRDC	Sugar Research and Development Corporation
TIMS Committee	Transgenic and Insect Management Strategy Committee
'Upland' cotton	<i>Gossypium hirsutum</i> . Comprises the vast majority of the Australian cotton crop, with Pima cotton (<i>see above</i>) comprising the remainder
WCRC	World Cotton Research Conference
WFP	Workforce planning
Wincott	Women's Industry Network – Cotton
WUE	Water Use Efficiency



APPENDIX SIX

LEGISLATIVE COMPLIANCE INDEX

Commonwealth Authorities and Companies Act 1997

A. ANNUAL REPORT REQUIREMENTS

Certification	iv
Exemptions from requirements	nil
Standards of presentation	
Constructed in the interests of users	all pages
Freedom from ambiguity and jargon	all pages
Appropriate tables, graphs etcetera	all pages
Enabling legislation	76
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Organisational structure and location	75; inside cover
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Judicial decisions or external reports	nil
Information from subsidiaries	nil
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Revisions to Annual Operational Plan	nil
Entering into of agreements	nil
Entering into of patents	nil
Activities of a company	nil
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Acquisitions and dispositions of real property	nil
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