Australian Government

Cotton Research and Development Corporation

CRDC ANNUAL REPORT

2012–13

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Cotton Research and Development Corporation
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Australian Government

Cotton Research and Development Corporation

Cotton Research and Development Corporation

Annual Report

2012–2013

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

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.

Key research partners 2012–13

Cotton growers
Rural Research and Development Corporations
CSIRO
Universities
Cotton Australia
Cooperative Research Centres (CRCs)
NSW Department of Primary Industries
Queensland Department of Agriculture, Fisheries and Forestry
Other State Government Departments
Crop Consultants Australia
Agribusinesses

Values CRDC embraced to execute its Strategic Plan 2008–2013

- Leadership & Commitment
- Innovation & Impact
- Rigorous, transparent, accountable results
- Connectedness & integration

Underlying our values

Implement our objectives and outcome using a triple bottom line framework for planning, implementation and reporting:

Economic	Profitability and International Competitiveness
Environmental	Sustainable Production Systems and Catchments
Social	Empowered People and Communities

LETTER OF TRANSMITTAL

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.

Australian Government
Cotton Research and Development Corporation

7 October 2013

The Hon. Barnaby Joyce MP
Minister for Agriculture
Parliament House
Canberra ACT 2600

Dear Minister

It is with great pleasure that I submit the Corporation's Annual Report for 2012–13, 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 was approved by a resolution of the Directors on 23 September 2013.

Yours sincerely

Mary Corbett
Chair

Board of Directors

Mary Corbett (Chair*)
Bruce Finney (Executive Director)
Richard Haire
Hamish Millar
Michael Robinson
Cleave Rogan
Lorraine Stephenson

** Mike Logan was Chair until 12 August 2013*

TRACKING THE STRATEGIC R&D PLAN 2008–2013

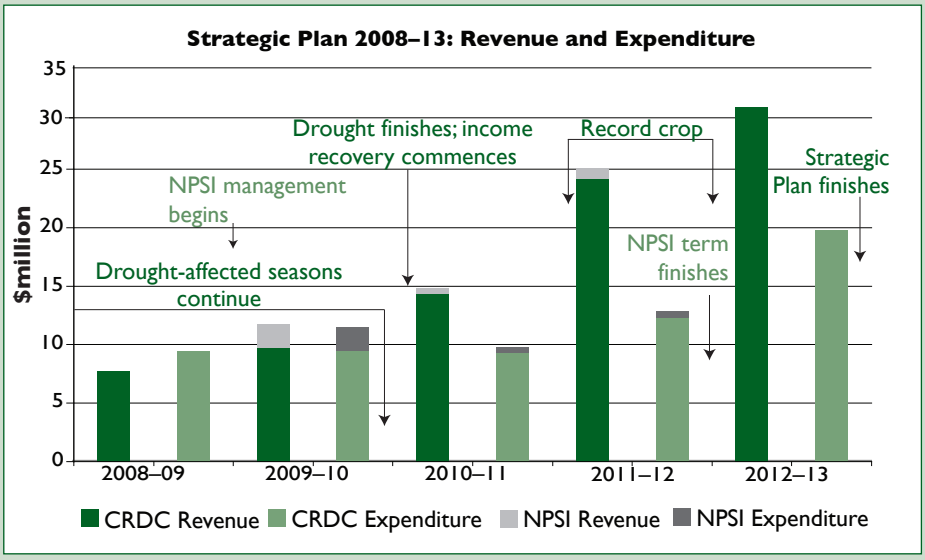
	2008–09	2009–10	2010–11	2011–12	**2012–13**
Cotton Crop Size (millions of bales)	1.45	1.71	3.956	5.28	**4.41***
			$ million		
Total Revenue	7.681	11.736	14.824	25.353	**30.915**
Industry levies	2.374	3.433	4.576	9.532	**11.801**
Australian Government	2.436	2.997	5.677	9.529	**11.523**
Royalties	1.610	1.897	2.789	3.145	**3.971**
Interest	0.740	0.568	0.805	1.401	**1.726**
National Program for Sustainable Irrigation (NPSI)	n/a	1.98	0.399	1.293	**n/a**
Other	0.521	0.856	0.587	0.453	**1.894****
Expenditure total	9.408	11.501	9.812	13.717	**19.301**
Cotton RD&E activities	7.882	7.855	8.063	10.682	**15.632**
Total equity position	10.29	10.530	15.54	27.317	**38.931**

* ABARES estimate, *Agricultural Commondities September 2013* ** Includes grant income

CRDC people	2008–09	2009–10	2010–11	2011–12	**2012–13**
Full-time employees	7	7	7	7	**12**
Part-time employees	1	1	1	1	**2**
Parental leave					**1**
Total CRDC staff	8	8	8	8	**15**

Operating Statistics*	2008–09	2009–10	2010–11	2011–12	**2012–13**
Number of new projects	44	57	66	128	**201**
Number of continuing projects	62	50	42	50	**61**
Projects finalised	61	58	45	117	**142**
Total number of R&D projects managed	106	107	108	178	**262**

* Excludes NPSI program



CONTENTS

Navigating this report

The Executive Summary will give you a good overview of our operations, including our financial performance.

The rest of the report provides information in greater detail. This includes how we addressed the goals and objectives in our five-year Strategic R&D Plan as expressed in our Annual Operating Plan 2012–13, as well as how we incorporated the R&D priorities of our principle stakeholders.

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

FROM THE CHAIR AND EXECUTIVE DIRECTOR

"The quest for sustainable competitive advantage"

A growing industry

The 2012–13 season has seen the production of a third consecutive national cotton crop exceeding four million bales. After the prolonged impact of drought, followed by disastrous flood events in recent seasons, the industry, on the whole, enjoyed favourable seasonal conditions. This contributed to record yields, for both irrigated and dryland crops, as well as the lowest ever level of quality discounts. Prices reached average levels by harvest time, with the 2012–13 crop expected to contribute over two billion dollars in export earnings and significant flow-on benefits to rural, regional, state and the national economies.

The industry enjoyed ongoing growth on the back of above average water availability, particularly in southern NSW where production has more than doubled in recent years. Farmers, and the industry's ginning, classing and shipment infrastructure have responded remarkably to the challenges that have come with what only a few years ago was an unimaginable level of production. The resilience and capacity of the industry to adapt has been inspirational.

For CRDC, 2012–13 was the final year of operation under the five-year Strategic R&D Plan and the first year of cotton industry research since the cessation of the Cotton CRC. It was opportune that this change occurred during a period of resurgence in cotton production and CRDC's investment capacity. As in the previous year, CRDC significantly increased the scale and scope of its investment, in collaboration with industry and research organisations. This investment ensured important R&D capacity was sustained and, most importantly, supported further industry performance improvements in productivity, market competitiveness, environmental performance, and improved energy and water use efficiency. In parallel steps, CRDC grew its highly capable R&D team to support effective management.

In August 2012, CRDC commenced an industry joint venture in research extension with Cotton Australia and grower-owned cooperative, Cotton Seed Distributors Ltd. Within this venture, CRDC is responsible for managing

Bruce Finney and Mike Logan

development and delivery for the adoption of best practices and technologies across the cotton industry. This collaboration has seen the recruitment of new regional development officers, whose roles are aligned with technical specialists and the industry *my*BMP program in conducting extension campaigns to improve R&D communication, practice change and industry preparedness for biosecurity threats or natural disasters.

The year also saw an ongoing commitment to the Cotton Innovation Network, as we continued to progress the agenda for improving cotton RD&E through prioritisation and enhanced collaboration. Similarly, CRDC instigated a number of reviews, including its first ever organisational performance review. The recommendations from these reviews are guiding actions such as Information and Communications Technology (ICT) upgrades and improvements to portfolio investment analysis, stakeholder engagement, training and team development.

Looking to the future

The cotton industry enters 2013–14 with a positive outlook for water availability, cotton prices and thus a forecast for a fourth consecutive national cotton crop exceeding four million bales.

On the back of these circumstances, CRDC is well positioned to get on with the business of implementing its new five-year Strategic R&D Plan, which will take us through to 2018. The new plan builds upon the direction of the prior plan in responding to the challenges to the cotton industry's profitability, sustainability and competitiveness. It does so with a capacity and

commitment to increase investment in research that could potentially transform the Australian cotton industry as it seeks to achieve its vision for the future.

In August 2013, then Minister for Agriculture, Fisheries and Forestry, the Hon. Joel Fitzgibbon MP, advised of the appointment of Dr Mary Corbett as CRDC's Chair. We welcome Mary to this role, with confidence that the next year will be another year full of achievements.

Finally, we wish to acknowledge the importance of the strong partnership between the Australian Government and cotton industry which enables CRDC's role of investing in RD&E for what is a world leading industry.

Mike Logan
Chair

Bruce Finney
Executive Director

A new Chair for CRDC

In the middle of August 2013, Mike Logan handed over the Chair of CRDC after six years in the position. Mary Corbett, who had been a non-executive Director of CRDC since October 2008 and the Board's Vice-Chair since 2011, has been appointed as his successor. Dr Corbett has over 17 years' experience as a company director, particularly in the fields of education and training, and rural, food and medical research.

CRDC owes much to Mike Logan for his six years of service. When he assumed the position in 2007, the cotton industry was still mired in drought. This meant a reduced income for our research activities and great challenges in preserving the core research effort and retaining the people who carried out the research. His experience on the boards of Land and Water Australia, the CRC for Irrigation Futures and Cotton Australia, combined with his long record of exemplary environmental management in his own cotton farming enterprise, brought specific expertise and knowledge that aided in addressing these issues.

Mike's term as Chair saw the development of a more strategic organisation and industry. For the Australian cotton industry, this included the development of Vision 2029 and recognition of new opportunities for marketing the sustainability and qualities of Australian cotton. For CRDC it meant ensuring a successful transition in cotton RD&E with the cessation of the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC), development of a new, ambitious five-year Strategic R&D Plan and ensuring effective governance.

Mike has steered our organisation successfully through these difficult challenges and new opportunities with skill and aplomb. The Board and staff—as well as the wider cotton industry—thank him for his support and guidance and wish him well for the future.

Dr Mary Corbett

THE YEAR'S HIGHLIGHTS

R&D Highlights

Growing the cotton

A tick for the industry's environmental commitment

The third industry-wide environmental assessment undertaken by the cotton industry since 1991 found the industry has been transformed substantially since 2003—through production practices, the cotton farming system and farm planning and management. The report singled out considerable improvements in growers' water use, chemical and natural resource management, particularly through the adoption of new technology. See page 40.

Development & Delivery Joint Venture

A partnership with Cotton Australia and Cotton Seed Distributors has delivered an industry extension model that is improving industry practices, R&D communication and industry responsiveness to emerging or emergency issues.

The new partnership has supported the establishment of a CottonInfo Team, led by CRDC's Ian Taylor and including new Regional Development Officers and technical specialists, supported by the industry *my*BMP program. In its short time of operation, the CottonInfo Team has already delivered key industry crop and pest management publications and new apps (applications) for smart phones and tablet devices. See page 56.

Launch of *The Australian Cotton Water Story*

The Australian Cotton Water Story, launched at the 16th Australian Cotton Conference in August 2012, documents the huge gains made through R&D over the past decade: a 40 per cent improvement in cotton water productivity, accompanied by cotton yields that are two-and-a-half times the world average for quality cotton.

The future viability of cotton farmers depends on making good decisions about water use every day. The new book gives water resource managers fingertip access to best science to manage this complex issue.

The Australian Cotton Water Story was launched at the 16th Australian Cotton Conference in August 2012 by CRDC Chair Mike Logan, former Cotton CRC CEO Philip Armytage, and Cotton Australia CEO Adam Kay. See page 38.

Climate change—mitigation and adaptation

CRDC was successful with four Australian Government climate change-related grant applications totalling more than $3.3 million over periods ranging from two to four years. The grants are part of the Australian Government Clean Energy Future Plan, with three awarded under the Carbon Farming Futures program, administered by the Department of Agriculture, Fisheries and Forestry and one an Energy Efficiency Information Grant, administered by the Department of Resources, Energy and Tourism.

The grants will enhance CRDC's extensive program tackling climate change and related issues. See pages 18 to 22.

Processing the cotton

Showcasing Australian innovation in our major market

Currently, cotton mills are unable to measure accurately the fineness and maturity of cotton: qualities that are of great importance in producing premium fabric. CRDC investments in CSIRO-developed post-harvest technologies promise to solve the problem and benefit the Australian industry's marketing of fine, long staple cotton.

A major symposium in October 2012 in Nanjing, eastern China, with CRDC as a sponsor, showcased Cottonscope (which measures fineness and maturity accurately) and Cottonspec (offering accurate prediction of final yarn quality traits). More than 150 representatives of China's leading cotton mills and supply chain businesses pronounced the event a great success. See page 29.

A marker of environmental difference

CRDC-supported PhD student Francois Visser has devised a prototype carbon calculator that allows growers to develop a measure of their on-farm greenhouse gas emissions, based on international reporting standards. The outcome may well be a special mark that can be used on selected cotton bales and promoted to brand owners interested in promoting low carbon cotton products. See page 26.

Our people—our future

Defining the industry's workforce needs

Regional case studies in Emerald/Springsure in Queensland and the Gwydir Valley in NSW demonstrated the difficulty of recruiting suitable staff for positions in agriculture, identifying workforce gaps of between 16 and 20 per cent. Staff attraction was more difficult at Emerald, where competition from the mining sector was strong. Researchers identified four aspects that could form the basis of a workforce development strategy for the cotton industry. See page 49.

A Workforce Development Forum—the third in 18 months—in Moree in March 2013 shared information about current and planned R&D and initiatives in developing a sustainable workforce for the cotton industry. It helped to define areas where CRDC and Cotton Australia could do more to help the industry deal more effectively with the challenges and opportunities in workforce development and allowed workforce researchers to share their findings with both organisations. See page 50.

Creating our future through capacity building and education

CRDC invests heavily in education and capacity building, which has dual significance: aiding succession planning for our future R&D capability and ensuring our industry members can maintain and enhance their competitive edge in innovation and leadership. In previous years these investments have included post-doctoral fellowships, as well as scholarships for post-graduates and undergraduates, the University of New England Cotton Production Course, the Field to Fabric Course and Australian Rural Leadership Program.

With the closure of the Cotton CRC on 30 June 2012, opportunities arose for CRDC to expand or continue a number of their highly successful projects and programs. A small Primary Industry Centre for Science Education PICSE) co-investment by CRDC and the Cotton CRC grew into a full activity centre for the cotton industry in 2012–13 and the CRC's very successful Summer Scholarship/Honours program and the Cotton Production Course continued under CRDC auspices. CRDC also continued a successful partnership with Cotton Australia to ensure a membership of the Primary Industries Education Foundation (PIEF) continued.

Aboriginal traineeships meeting with success

A pilot training scheme overseen by CRDC as part of the Australian Government Caring for our Country Initiative joined the Aboriginal Employment Strategy school traineeships, also supported by CRDC, to assist young Aboriginal people in the Narrabri and Wee Waa districts to attain their educational and career goals. Four young men have undertaken the new traineeships, which aim to enable participants to gain skills and experience for employment within the cotton industry or natural resource management. See page 58.

Taking R&D to the grassroots

CRDC's capacity building Grassroots Grants program took R&D out into cotton valleys spread from central Queensland to southern NSW, with Cotton Grower Associations (CGA) conducting projects in 2012–13 that provided a wide range of skills and knowledge to CGA members or local communities. The opportunity was seized with great enthusiasm, with projects ranging from documenting more than 40 years of irrigation in Queensland's central highlands to a public awareness campaign on the emerging cotton industry in southern NSW.

Grants in the Walgett and Lower Namoi, and Macquarie valleys enabled growers and future industry leaders to see for themselves innovative practices and the latest research, and gain an understanding of industry organisations and the work they carry out on behalf of the industry. See pages 35 and 53.

The CRDC Board in 2012–13: Back row: Lorraine Stephenson, Michael Robinson, Cleave Rogan, Mary Corbett Front row: Bruce Finney, Mike Logan, Hamish Millar, Richard Haire

Corporate highlights

Organisational performance review

CRDC commissioned ACIL Tasman to undertake its first ever external review of organisational performance. The reviewers concluded:

> *'CRDC is a significant and respected organisation in cotton RD&E, whose actions are consistent with the PIERD Act, aligned with its Strategic Plan and the priorities of industry and government.'*

CRDC adopted recommendations for improving performance monitoring, evaluation and reporting framework, engagement with stakeholders and human resource management.

Finalisation and approval of the 2013–18 Strategic R&D Plan

The new five-year plan for investment in research, development and extension (RD&E) responds to the challenges arising for the Australian cotton industry's profitability, sustainability and competitiveness but with a sharper focus, increased commitment of resources and greater ambition for future outcomes.

The plan connects insights into changes in society with those of the cotton sector and identifies the critical importance of responding with better knowledge sharing and even stronger relationships between farmers, industry and customers. The importance of these audiences has been recognised in the design of the plan, which consists of three R&D programs—*Farmers, Industry* and *Customers.* Complementing the R&D programs are two integrating programs—*People* and *Performance,* which recognise the interdependencies of issues within the R&D programs as well as responding to stakeholder and corporate requirements for improvement to the efficiency and effectiveness of operations.

New staff meeting expanded responsibilities

CRDC has always had great people working together to successfully invest in R&D that delivers benefits to cotton growers, the industry and community. In 2012–13, we welcomed eight new permanent staff as we ramped up the capacity to manage significant increases in the scale and scope of CRDC activity.

This year also saw the formal recognition of 15 and 20-year anniversaries of service for Dianne Purcell and Bruce Pyke, respectively.

General manager for R&D investment appointed

Of particular note is the appointment in March 2013 of Dr Paula Jones, who leads the R&D team as General Manager—R&D Investment. Paula brings experience in science, leading research strategy and management, having worked at the University of Exeter. Most recently, she was the Chief Operating Officer of the Cotton CRC, in which role she was awarded the cotton industry's Researcher of the Year in 2012. Previous R&D General Manager, Bruce Pyke, will offer Paula support through 2013, as he moves towards retirement in 2014.

New Research Deed completed

CRDC completed a 15 month process of reviewing its head funding agreement, in discussion with its research partners and informed by a review of CRDC's policy for intellectual property management and the work of the Primary Industries Standing Committee (PISC) RD&E Committee for standardised research agreements and intellectual property management.

FINANCIAL SUMMARY

Revenue

Total revenue for 2012–13 was $30.915 million. Revenue was $6.585 million (27 per cent) above budget of $24.330 million. The 2012–13 above average crop combined with the record crop in 2011-12 has boosted revenue from levies, Australian Government contributions and royalties. From the 2011-12 crop of 5.337m bales 77 per cent of the levies were received in 2012–13.

The Australian Government contributions in 2012–13 were capped at 0.5 per cent of the three-year average gross value of production, as it was lower than the levies collected in the year. Below historical average cotton prices in 2012–13 impacted the gross value of production.

The Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) *Agricultural Commodities September 2013*, estimated lint production for the 2012–13 season to be 1,002,000 tonnes (4.41 million bales), which is 0.41 million bales higher than the CRDC 2012–13 budget of 4.0 million bales.

Total revenue of $30.915 million for 2012–13 comprised:

- Industry levy revenue of $11.801 million, which includes $9.251 million (77 per cent) of the 2011–12 crop and $2.550 million (28 per cent) of the 2012–13 estimated crop.
- Australian Government contribution of $11.523 million. Australian Government matching of expenditure was capped at 0.5 per cent of the gross value of production of the cotton industry.
- $3.971 million in royalties from the sale of CRDC-funded CSIRO seed varieties, which was $0.485m above budget.
- Interest revenue of $1.726 million was 38 per cent above budget, due to additional revenue under CRDC management.
- Other revenue of $1.884 million, which includes external grant revenue and project refunds. External grants included Caring for our Country $0.318 million, Carbon Farming Initiative $0.225 million, third party project contributions of $0.100 million and projects transferred from the Cotton CRC of $0.713 million.

Revenue 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 a three-year rolling average of 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 Primary Industries (Excise) Levies Act 1999 and the Primary Industries Levies and Charges Collection Act 1991.
- Royalties from the sale of domestic and international planting seed, interest on investments, external grant revenue and research project refunds make up the balance of Corporation income.

Expenditure

Total expenditure for 2012–13 was $19.301 million, which was $0.398 million (two per cent) below budget. Research expenditure in CRDC's three strategic research programs and research-related corporate activities was $16.729 million, $0.699 million below budget. Other areas of expenditure for the Corporation included employees and operational expenditure.

Financial position

CRDC reported a net surplus of $11.614 million for 2012–13 against a budgeted surplus of $4.630 million, due to the higher percentage of 2011-12 levies received in 2012–13, Australian Government matching contributions, increased royalties and $1.356 million in unbudgeted external grants revenue. In addition, expenditure did not exceed budget.

Cash reserves managed by CRDC have increased from $26.205 million at 30 June 2012 to $39.261 million at 30 June 2013.

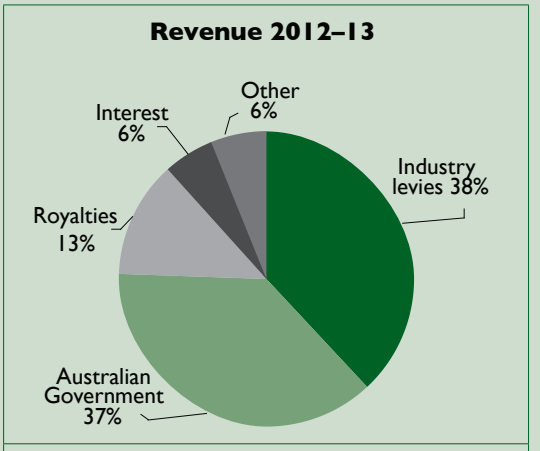
The Corporation's total equity position of $38.931 million at 30 June 2013 is an increase of $11.614 million from the previous year. CRDC considers the reserves held at the 30 June 2013 are sufficient given its activities and seasonal fluctuations.

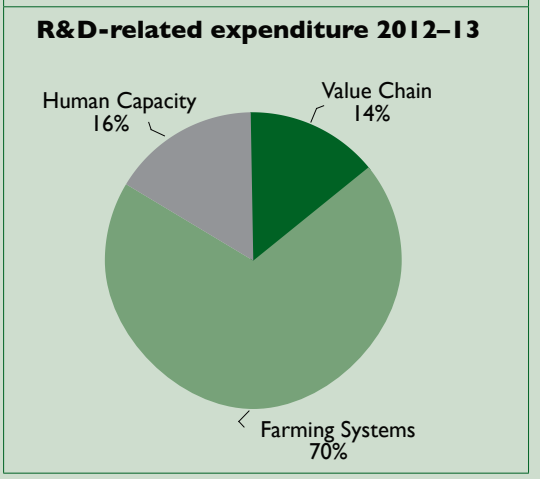
Outcome 2012–13

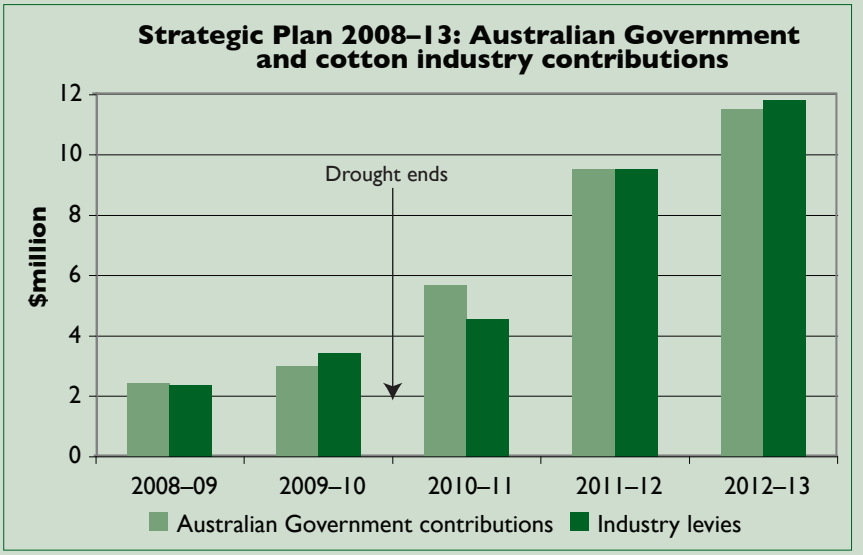
'Adoption of innovation that leads to increased productivity, competitiveness and environmental sustainability through investment in research and development that benefits the Australian cotton industry and the wider community.'

Total Budgeted Revenue:	$24 330 000
Total Actual Revenue:	$30 915 679
Total Budgeted Cost of Outputs:	$19 699 798
Total Actual Cost of Outputs*:	$19 301 446

*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.







R&D Program Breakdown*

	Value Chain	Farming Systems	Human Capacity	Total
Number of projects	23	102	99	224
Program expenditure	$2.097m	$10.325m	$2.446m	$14.868m

*Excludes Cotton CRC projects and corporate research activities supporting R&D planning and adoption

The Coming Year

Forecast revenue

Water availability and commodity prices are the significant factors in forthcoming cropping decisions. In the cotton growing regions, most Queensland water storages are near full capacity levels due to high rainfall during summer while NSW water storages on average are near 50 per cent capacity. The price for cotton has continued to trade below historical average levels, which may lead to some crop substitution. Australian cotton production for 2013–14 is forecast to be similar to 2012–13.

The Corporation has forecast a $1.230 million operating surplus for 2013–14. This reflects revenue of $21.627 million and expenditure of $20.397 million. Industry levy revenue and Commonwealth contributions will continue to be drawn from two crop seasons, 2012–13 and 2013–14.

The size of industry levies and Government contributions is heavily reliant upon crop production, which is budgeted to be 3.5 million bales for 2013–14. The Corporation expects that the Australian Government contributions will be based on matching industry levy revenue.

Forecast expenditure

Budgeted expenditure for 2013–14 is $20.397 million, an increase of $1.096 million over the 2012–13 actual expenditure. CRDC's increased capacity to invest in R&D continues to attract research and scholarship funding applications. In the previous two years the Corporation worked closely with research organisations to rebuild the cotton industry's research capacity which had been reduced during the drought period. The forecast expenditure for the next two years for RD&E is budgeted at $17 million each year.

OPERATING CONTEXT

The Australian cotton industry

From small beginnings in the 1970s, the modern Australian cotton industry has grown to be Australia's seventh largest agricultural industry. Over 99 per cent of the crop is exported and has generated, on average, over one billion dollars in export earnings each year. The gross value of the 2011–12 crop was a record—almost three billion dollars. The 2012–13 season produced a record crop of 5.3 million bales, grown on some 583 000 hectares, on 1 250 farms. Indications are that it will have a gross value greater than two billion dollars.

The average cotton farm provides jobs for eight people. In 2012, cotton provided employment for 8 000 people across northern NSW and southern Queensland alone. The industry supports more than 150 regional communities in NSW and Queensland.

The Australian cotton industry is highly productive and yields high quality cotton—two and a half times the world average for the past 20 years. Over the past decade, the industry has increased its water use efficiency by 40 per cent and reduced its use of insecticides by 90 per cent.

In recent years, new cotton varieties, and favourable weather and market conditions, have seen an expansion in southern NSW cotton growing regions, reaching as far south as the Victorian border. At the same time, CRDC research projects are exploring the viability of cotton growing in the Burdekin region in tropical Queensland.

The industry's vision for a sustainable future

In 2009, the Australian cotton industry developed a vision for the future that encompassed improved industry performance, collaboration and capacity, using a twenty-year time frame to ensure a longer-term focus. In 2011–12 and 2012–13, CRDC analysed ways in which its RD&E program could advance the vision. Vision 2029 was also central to formulation of the Strategic R&D Plan 2013–18.

Element	Achieving	Where CRDC invested 2012–13
Differentiated	World leading supplier of an elite quality cotton highly sought in premium markets	• 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	• Solutions to production constraints • Optimising inputs, processes and improving environmental performance. • Supporting a best-practice framework
Tough	Resilient and equipped for future challenges	• Solutions to production constraints • The capacity to adapt to climate impacts • Protection from biosecurity threats
Successful	Exciting new levels of performance that transform productivity and profitability of every sector of industry	• 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	• Measuring and communicating performance
Capable	An industry that retains, attracts and develops highly capable people	• Determining future capacity needs • Skills and leadership • The industry D&D team

The National RD&E Framework

The National RD&E Framework facilitates greater coordination among the Australia and state governments, CSIRO, RDCs, industry and university sectors to better harmonise their roles in RD&E related to primary industries and assure that they work together effectively to maximise net benefits to Australia. The Cotton Sector RD&E Strategy, which was formally approved in 2011 by the Primary Industries Ministerial Council, is part of the Framework.

For full information about the Framework, see www.npirdef.org. For information about the role of CRDC in relation to the Cotton Sector RD&E Strategy, see Efficiency and Effectiveness on the following page.

Cotton Australia

Cotton Australia is CRDC's industry representative organisation under the *Primary Industries and Energy Research And Development Act 1989* (PIERD Act). Established in 1972 (as the Australian Cotton Foundation), Cotton Australia merged with the Australian Cotton Growers Research Association in 2008 to provide a united voice for cotton growers across research, stewardship, natural resource management and cotton production issues.

As the peak industry representative body, Cotton Australia's membership comprises all Cotton Grower Associations, cotton processors and some service industry members. It is funded through a voluntary grower levy of two dollars on each bale of cotton produced. Its head office is located in Sydney, with regional offices in Narrabri, Brisbane and Toowoomba. The Board of Directors sets policy and strategic direction. It is chaired by Lyndon Mulligan, a cotton grower from the Gwydir Valley in north west NSW, and consists of 10 elected directors who are growers and/or ginners.

Cotton Australian commenced its new Strategic Plan, 2013–17 in July 2013. It can be found at www.cottonaustralia.com.au.

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.

During the period of CRDC's Strategic Plan 2008–2013, Cotton Australia advisory panels reflected on the R&D programs—Value Chain, Farming Systems and Human Capacity—and addressed each of the CRDC Strategic Research Priorities under those programs.

Members' representatives are asked to nominate specific areas of research interest and are then allocated to the appropriate advisory panel. These panels consider relevant research applications in detail and report their views to the organisation as a whole at the annual research review meeting. These views are conveyed to CRDC staff, who also attend the annual meeting.

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, Queensland Farmers' Federation, and NSW and Queensland Irrigator Councils.

Further information on Cotton Australia can be found at www.cottonaustralia.com.au.

EFFICIENCY AND EFFECTIVENESS OF OPERATIONS

1. The Cotton RD&E Strategy

The Cotton Sector RD&E Strategy—part of the National Primary Industries RD&E Framework (see www.npirdef.org)— is a major efficiency and effectiveness tool for CRDC and the industry's research and extension effort. 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.

RD&E Priorities

The strategy establishes five cotton RD&E priorities, which will contribute to the cotton industry's vision of 'carefully grown, naturally world's best':

Better cotton plant varieties—lifts on-farm performance and product value

Improved farming systems—sustainable production delivers quality cotton

People, businesses and communities—proudly developing cotton and sustaining regional communities and environments

Product and market development—competitive advantage through differentiation

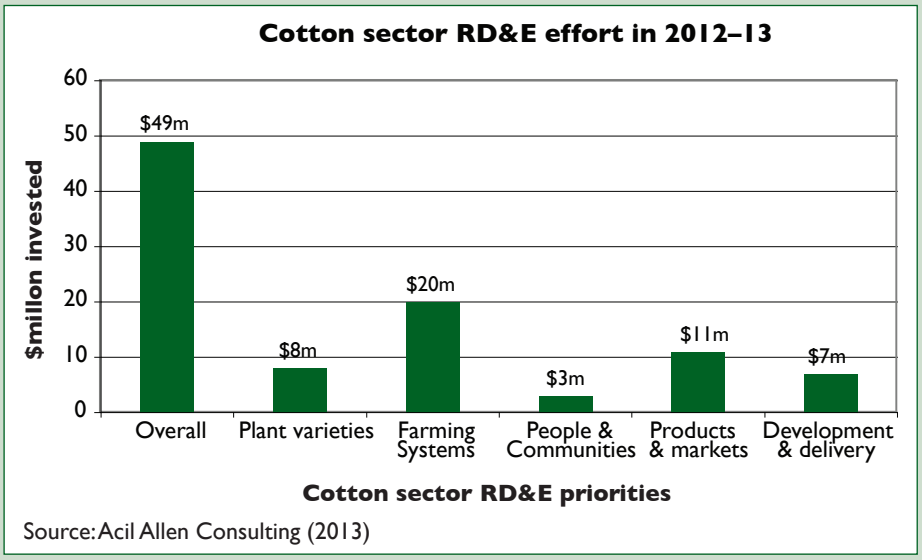
Development and delivery—maximising the potential of research through extension.

Implementation

Responsibility for implementation of the strategy rests with the Cotton Innovation Network, which is independently chaired and 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.

The strategy outlines how the key RD&E organisations will work together, through the Cotton Innovation Network (the Network), to improve the quality and efficiency of RD&E over the next 10 years by coordinating:

- Strategy and investment across cotton and with other sectors—to maximise focus and leverage
- Research pathways to define what RD&E is needed and ensure it is sound and aligned
- Development and delivery—to ensure adoption of research is optimised
- Capability—to ensure capacity is maintained and developed



Source: Acil Allen Consulting (2013)

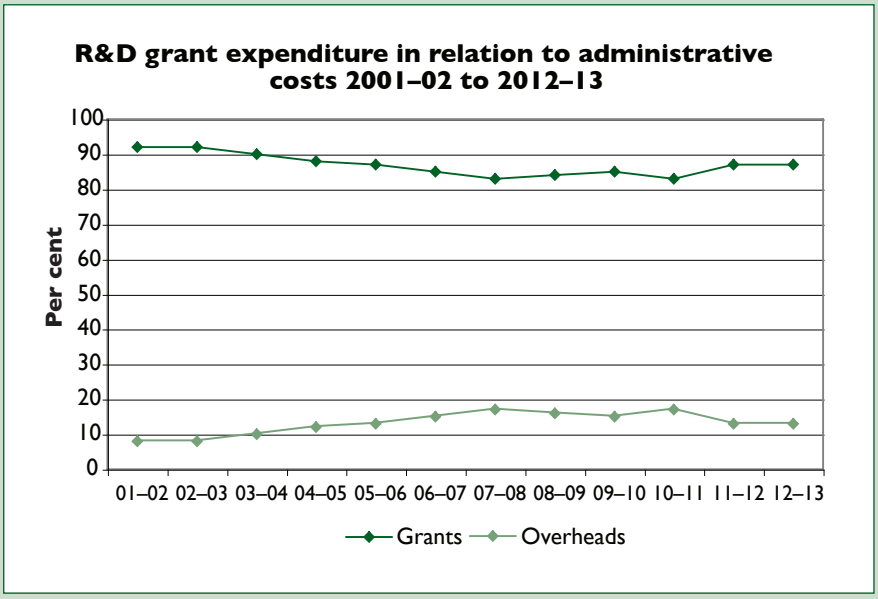
The Network has focused on developing a deeper and shared understanding of how these functions occur and where the opportunities for improvement lie. It has mapped what RD&E is needed against current effort, using 2012–13 as a reference year. The level of RD&E investment is greatest within farming systems and increasing emphasis is being given to plant varieties, product and market development (to increase the value of the crop) and development and delivery (to support grower adoption and adaptation). CRDC's involvement extends to greater than 80 per cent of the effort, with all the major RD&E organisations playing a significant role in at least two, and in many cases more, priorities. This highlights the integrated nature of cotton RD&E and its critical reliance on the continued commitment and involvement of all parties.

In summary the strategy is working effectively to ensure cotton RD&E remains well focused and organised with a strengthening ability to collaboratively solve problems and sharpen RD&E in areas where we can do better.

2. 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.

Within this context, a resurgent industry and the cessation of the Cotton CRC in June 2012 mean CRDC has doubled the scale of its operations in the last two years and broadened the scope of its operations, with the commencement in August 2012 of a joint venture for development and delivery (extension) with industry. CRDC sought and received strong support from government and industry stakeholders prior to committing additional resources to this joint venture, including additional staff members.



Throughout, CRDC has sought to maintain an appropriate balance between administrative efficiency and effectiveness in outcomes from investment in RD&E.

During 2012–13, CRDC commissioned its first ever comprehensive external review of organisational performance. The review identified opportunities for improvement in the organisation's performance framework for investment analysis, stakeholder engagement and human resource management with respect to implementing a new 2013–18 Strategic R&D Plan.

As a consequence of the review, CRDC has embedded performance as a key integrating program within its next Strategic R&D Plan, developed and begun implementing an ICT Strategy to improve the project management information system, documented control and communication systems, and commenced an external review of its communication strategy, resourcing, policies and procedures.

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. By example, CRDC commenced a review of its primary funding agreements and intellectual property policy in alignment with PISC initiatives and whole of government directions.

CRDC strives to ensure it meets the information needs of its stakeholders. One important aspect of this is reporting documents and CRDC's performance was acknowledge for the second consecutive year with CRDC Annual Report 2011–12 winning an award in the Institute of Public Administration Australia (ACT Division) 2013 Annual Report Awards.

Delivering return on investment

One of CRDC'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 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.

CRDC is placing increased focus on monitoring and evaluation through its new 2013–18 Strategic R&D Plan to ensure CRDC and industry can capture and demonstrate the impact of investment in RD&E.

Collaboration and Cooperation

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 PISC, particularly in relation to climate change, soils and water, human capacity, 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 maximising 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 was highly effective in partnering in over 80 per cent of the R&D projects conducted in the cotton sector in 2012–13. Collaboration extended from participation in national cross-sectoral collaborations, the industry joint venture in development and delivery to, at the local level, the continuation of an Aboriginal school–based traineeship program, developed by CRDC with assistance from the Aboriginal Employment Strategy.

The table on the following page summarises CRDC collaboration with other RDCs. Many of these initiatives are covered more fully in Report of Operations—Research and Development, beginning on page 25.

Collaboration with Rural R&D Corporations 2012–13

Theme, Program or Project	Nature of Collaboration
Council of Rural RDC Chairs	Collaboration with all RDCs in communication, coordination and collaboration between RDCs at the broadest level.
Communications Managers	Using cross-RDCs communication opportunities to promote our rural industries and R&D achievements.
Business managers	Cooperation with all RDCs to improve administration, contracts, program management systems and IP management in alignment with the Council of RDCs harmonisation project. 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 managements systems.
Climate change	During 2012–13, 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.
Development of a Life Cycle Inventory for Australian Agriculture—AusAgCI	During 2012–13, 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.
Collaborative Partnership for Farming and Fishing Health and Safety	CRDC renewed its co-investment with the Rural Industries, Grains, Sugar and Fisheries RDCs in a new five year partnership which began in 2012–13 aimed at improving the physical and mental health of farming and fishing workers and their families and the safety of the environment and work practices in these. Managed by RIRDC the new partnership is known as the Primary Industries Health and Safety Partnership.
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 invested in parallel to deliver spray application management training workshops to growers and agronomic advisors in the respective industries.
Insecticide resistance monitoring and management	CRDC and GRDC continued to co-invest in R&D to monitor resistance in *Helicoverpa armigera* and *Helicoverpa punctigera* to a range of pesticides commonly used on both crops.
Shared weed management issues	CRDC continued to collaborate directly with GRDC on the important issue of glyphosate resistance management. A joint development and delivery-focused project initiated in 2011–12 continued into 2012–13 with an emphasis on fallow management of weeds in particular.

Theme, Program or Project	Nature of Collaboration
Education	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, University of Southern Queensland, University of the Sunshine Coast and Flinders University. 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 Horizon Scholarships. The program is managed by RIRDC. CRDC currently supports eight Horizon undergraduate scholars.

COTTON AND CLIMATE CHANGE

Responding to a changing climate

A key focus of CRDC R&D is to give cotton farmers the best chance to adapt to changes in the conditions in which they grow their crops and reduce their greenhouse gas emissions. A SWOT (strengths/weaknesses/opportunities/threats) analysis showed that the industry has built significant capacity to address a range of climate-related challenges through its Best Management Practices (BMP) system, right through the value chain.

A workshop co-convened by CRDC and the Climate Change Research Strategy for Primary Industries (CCRSPI) in 2009 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, along with current and planned actions by CRDC to address each priority.

R&D addressing climate change

Industry priority	CRDC actions/activities 2012–13	Planned actions
	Productivity-related priorities	
Nitrogen use efficiency	CRDC has continued to invest in research that investigates cropping systems to reduce the amount of nitrogen fertiliser required, and management options to reduce total nitrogen requirements and/or improve nitrogen use efficiency.	CRDC was successful in a grant application under the Australian Government's Carbon Farming Futures *Filling the Research Gap* program, to look at nitrous oxide emissions from the surface of irrigation waters, and losses to deep ground water. It is anticipated this work will lead to the identification of potential irrigation management strategies to improve nitrogen use efficiency.
De-nitrification inhibitors	No current research is taking place.	Research on de-nitrification inhibitors has been addressed in grain and livestock systems under the National Nitrous Oxide Research Program. The outcomes are expected to inform the potential for using inhibitors in cotton systems. The nitrogen use efficiency demonstration trials being established by the Regional Development Officers will include de-nitrification inhibitors as one of the treatments in the latter period of the trial program.
Resource use efficiency (energy, water): relationship to carbon (See above for Nitrogen use efficiency)	Water Use Efficiency (WUE): Benchmarking WUE on irrigated cotton farms is continuing. Data collection has been undertaken to establish water use efficiency benchmarks for the 2012/13 season.	The Cotton Development and Delivery team has developed its plans for 2013–14. Key priority areas will include nitrogen, energy and water use efficiency.

Industry priority	CRDC actions/activities 2012–13	Planned actions
Resource use efficiency (energy, water): relationship to carbon *(continued...)*	Energy Use Efficiency: A continuing National Centre for Engineering in Agriculture (NCEA) project conducted further detailed assessments of energy use on cotton farms in 2012–13 and is developing benchmarks for energy use for a range of representative cotton farming systems. In 2012, CRDC commissioned a small new project with the NCEA to develop EnergyCalc Lite, a simpler energy calculator available on the internet or via a tablet app, which enables growers to assess their on farm energy use and for those using *my*BMP to have the relevant BMPs ticked off automatically. EnergyCalc Lite is now available on the app store for iPads. A project supported by CRDC trialled a Pump Efficiency Monitor and showed that large energy and cost savings are achievable. The grower involved was able to reduce their fuel cost by $105,000, a 58 per cent improvement in fuel efficiency. Significant savings are possible for individual operators and the industry collectively. CRDC continues to invest in research into alternative energy sources for cotton farmers, e.g. biodiesel derived from cotton seed oil, ethanol from cotton gin trash.	A grant received by CRDC from the Department of Resources, Energy and Tourism under its Energy Efficiency Information Grants program will allow the industry to employ an Energy Technical Specialist who will lead the development of updated resources and materials regarding how to improve energy use efficiency on cotton farms. The Energy Technical Specialist will also train the Regional Development Officers in how to undertake on-farm energy assessments, for example by using EnergyCalc Lite. The Regional Development Officers will provide support to growers on using EnergyCalc Lite and improving energy use efficiency. Benchmarking data and case study information collected and developed by the project will be used to support the on-going promotion of best practices for energy efficiency.
	Life Cycle Assessment (LCA) CRDC is contributing to a RIRDC initiative that is developing a Life Cycle Inventory (LCI) for Australian agricultural practices. This project commenced in 2011–12 and is due to be completed in late 2013.	The US cotton industry has completed an LCA for cotton from cradle (farm) to grave (garment disposal) for cotton garments made from US, Indian and Chinese cotton, and they have expressed interest in including Australian data in an updated LCA. The LCI will provide the basis for participating in any such expanded-scope LCA.

Industry priority	CRDC actions/activities 2012–13	Planned actions
Plant physiology under changed climate scenarios	A postgraduate project continued in 2012–13 to address this information gap. It has been measuring the response of cotton to changes in temperature, moisture and vapour pressure deficit. The outputs will be used to improve CSIRO's cotton crop simulation model, OZCOT. New projects commenced in 2012–13 which aim to assess the future impacts of climate change and extreme weather events on the cotton industry.	Similar work to that being conducted in the post-graduate project will be initiated in larger controlled-climate chambers, which will allow the investigation of the effectiveness of management strategies in response to changed crop growth patterns. Outputs from this research could influence the selection of future traits in cotton cultivars, and the identification of effective adaptation strategies. It is anticipated that the outcomes from the research assessing the future impact of climate change and extreme weather events will include adaptation options for a future climate and best management practices to deal with the effects of extreme weather events on soil health. .
Communication-related priorities		
Benefit of downscaling of climate models (to what level do we need to drill down?)	CRDC held discussions with the Managing Climate Variability (MCV) program, and committed to joining the program from 2013/14 for 3 years.	Participation in the MCV Program will allow CRDC to identify opportunities for additional investment by CRDC to include cotton farming-specific requirements that will leverage the investments of MCV. CRDC has received funding from the Australian Government's Carbon Farming Futures *Extension & Outreach* program for a project that will include a focus on identifying and promoting to cotton farmers suitable weather forecasting tools. The selection of the most appropriate tools will be enhanced by an MCV project that will investigate the economic value of using Predictive Ocean Atmosphere Model for Australia (POAMA) forecasts for crop decision making by cotton and grain farmers.

Industry priority	CRDC actions/activities 2012–13	Planned actions
Promotion of relevant *my*BMP modules 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 the revised BMP system, *my*BMP, has been undertaken with an expectation that it will heighten the demand for information and training on energy use efficiency over time as more growers use the system in their business. The Energy Efficiency Information grant and the Extension & Outreach grant will help support a focused campaign to update and promote this module to cotton farmers. CRDC continued to support a PhD student based at the University of Queensland to review international cotton carbon calculators, and to develop a Carbon Footprint calculator tailored to Australian conditions.	*my*BMP 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. 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. The Carbon Technical Specialist appointed under the Carbon Farming Futures Extension & Outreach program grant received by CRDC will support industry Regional Development Officers.
Collaboration across industries	CRDC participates in CCRSPI (Climate Change Research Strategy for Primary Industries). 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 the Australian Cotton Research Institute (ACRI), Narrabri.	CRDC was successful in a grant application under the Carbon Farming Futures *Filling the Research Gap* program, to look at nitrous oxide emissions from the surface of irrigation waters, and losses to deep ground water. CRDC will participate in the National Agricultural Nitrous Oxide Research Program (NANORP) as part of this project. CRDC will also continue to support research that investigates the levels of nitrous oxide emissions from cotton farming systems, and will ensure the data from this work is contributed to NANORP.
Adoption strategies—collaboration	The new Development and Delivery Joint Venture between CRDC, Cotton Australia and Cotton Seed Distributors includes 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 *my*BMP.	The CottonInfo team has been formulated as part of the joint venture and is managed by CRDC. The team has developed its plans for 2013–14; key priority areas include nitrogen, energy and water use efficiency, as well as Integrated Pest Management (IPM).

Industry priority	CRDC actions/activities 2012–13	Planned actions
	Biophysical-related priorities	
Soil carbon-nitrogen interaction	CRDC continues to invest in research looking at rotation crops and tillage systems to maintain and enhance soil carbon. Recent results indicate that the addition of a corn crop into the rotation may, as well as improving soil carbon at depth, also have a range of related benefits including disease suppression and improved cotton yield.	CRDC will invest in a project that seeks to 'close the carbon balance' in irrigated cotton farms, in particular identifying the contribution of irrigation water to soil carbon, and the extent to which irrigation both provides and removes soil carbon from the field.

Climate-related grants

CRDC applied for and received four grants under the Australian Government Clean Energy Future Plan in 2012–13, with most commencing in 2013–14:

Energy Efficiency Information Grants

(Department of Resources, Energy and Tourism)

Improving energy efficiency on Australian cotton farm ($500,411 over 2 years)

This project will allow the industry to appoint an Energy Technical Specialist (through NCEA), who will oversee industry efforts to improve energy efficiency: in particular, to lead the provision of training to the Development and Delivery (D&D) CottonInfo team and industry advisors, revisions to the energy module of *my*BMP, and the conduct of on-farm energy audits and benchmarking.

Carbon Farming Futures Grants

(Department of Agriculture, Fisheries and Forestry)

Indirect emissions of nitrous oxide from broad-acre irrigated agriculture ($677,884 over 3 years)

This project will see CSIRO investigate the extent of nitrous oxide emissions from the surface of water throughout the irrigation cycle under a range of management practices, to i) determine their significance to overall emissions and ii) support the development of appropriate best management practices to reduce them.

Carbon farming in the Australian cotton industry
($1,374,700 over 4 years)

This project will allow the industry to appoint a Carbon Technical Specialist to develop information and training on carbon farming. It has an extensive range of partners: the D&D Joint Venture, Cotton Australia, CSIRO, University of New England (UNE), NSW Department of Primary Industries (NSW DPI,) Queensland University of Technology (QUT), GRDC and Queensland Alliance for Agricultural and Food Innovation (QAAFI).

Determining optimum N strategies for abatement of emissions for different irrigated cotton systems
($769,535 over 3 years)

The focus of this grant is on testing / validating the findings from research conducted at the ACRI in Narrabri, Moree and the Liverpool Plains, through a close collaboration of local growers, researchers and the CottonInfo team; the funding will support a Project officer to oversee the conduct of the trials, and the monitoring of emissions from the trial treatments (inclusion of robust monitoring was mandatory).

RESEARCH ACTIVITIES

Contents

INCORPORATING STAKEHOLDER PRIORITIES

PROGRAM ONE **VALUE CHAIN**

Goal

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

Outcome

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

Strategic Plan 2008–13 inputs

	2008–09	2009–10	2010–11	2011–12	2012–13
Number of projects	18	20	32	25	23
Expenditure	$0.959	$1.185m	$0.887m	$1.387m	$2.097

Performance

Performance has been assessed against two sets of criteria: the Key Performance Indicators submitted in the 2012–13 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2012–13. See page 120 for 'Measuring Performance'.

Key R&D activities 2012–13

The value chain context

Australia's cotton future lies at and near the top end of the market: ensuring high quality cotton is grown and processed for maximum quality and identifying and exploiting specific markets that make the best use of it and pay the best prices.

CRDC continues to be a key driver of the Australian cotton industry's Premium Cotton Initiative (PCI), which involves partnerships across the cotton value chain to secure higher value markets for Australian premium cotton varieties. The PCI brings together CSIRO-bred varieties with a range of superior fibre qualities with new textile processing knowledge, Best Management Practices across the value chain and fibre measurement tools developed with CRDC investments.

Various aspects of the PCI dominate this R&D program and its five research objectives.

Lower carbon equals cooler cotton

An increasing number of international brand owners have a growing interest in sourcing products with a low carbon footprint, or products that have been assessed under approved greenhouse gas (GHG) assessment methods. CRDC-supported PhD student Francois Visser may have come up with an answer.

Francois has devised a prototype carbon calculator that allows growers to develop a measure of their farms GHG emissions, based on international reporting standards for GHG emissions. The outcome may well be a mark that can be used on selected cotton bales and promoted to brand owners interested in promoting low carbon cotton products.

He will refine the tool over the next 12 months, with the support of Queensland University of Technology's Dr Peter Grace and his group, with selected cotton farms included as case studies.

Once finalised, the tool could be used to calculate the change in GHG emissions. The opportunity exists to use the calculator for assessment of individual growers or industry base GHG emissions.

Francois is seeking to develop and trademark a distinctive name for the calculator and has proposed that this mark be jointly owned by the industry.

OBJECTIVE 1

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

A sustainable value chain: what does it mean and how is it measured?

Research to achieve this objective is on track, with a project conducted by the University of Technology, Sydney developing a decision and value matrix of the Australian cotton value chain. This includes determining the flow of information for on-farm sustainability practices across the supply chain and evaluating which on-farm sustainability indicators are valued by downstream customers (retailers and consumers) to assist farmers to identify a marketing point of differentiation. The project has also developed an analytical model for water performance measurement to support *my*BMP users in measuring water sustainability performance at the farm level for their water-related decision making, control and reporting.

The research team is planning two separate industry meetings in 2013–14 to ensure that the last year of their work is informed by robust industry feedback.

The project is also developing a Strategy Process Model, with a focus on identifying triggers to changes in stakeholder needs, to provide a tool to assess the competitive advantage of using and modifying sustainability indicators.

Understanding our key markets

Leading on from a survey of international mills, CRDC commissioned a review of cotton world markets to identify international growth markets and key mills, and brand owners and retailers that operate across these markets.

The key findings define the challenges that lie ahead for the Australian industry with improved cotton yields across India, Pakistan and China and increased competition from man-made fibres expected to limit the growth of global cotton exports. The end of 2012 saw a record stocks-to-use ratio of approximately 74 per cent: in other words, the surplus raw cotton at

the end of the season. Depending on Chinese cotton import policies, this is expected to place considerable downward pressure on cotton demand and pricing.

China—our principal market—faces cost of production increases at a time when significant investments have been made to increase mill efficiency in India and Vietnam. As a result, mills in China are expected to focus increasingly on supplying selected premium fabrics and garments. This will drive demand for particular quality fibre types, which suits the strategies pursued under CRDC's just completed five-year plan.

In addition, premium markets have demonstrated greater resilience within the European Union and United States markets than have general apparel sales. These regions dominate existing premium garment markets, representing more than 72 per cent of sales. In addition, the increase in disposable income across urban Chinese and Indian consumers has resulted in significant growth in sales of apparel in their high-end retailing department stores and specialty shops. In 2011, sales by selected premium domestic brand owners in China increased by 31.2 per cent.

The world textile and apparel marketplace has become increasingly eco-conscious. Major brands have responded by setting out sustainability plans and a number of organisations have developed standards relating to sustainable production. CRDC is working with Cotton Australia to build on previous R&D in this area by developing a future strategy to support the promotion of Australian cotton for its quality and ecological credentials, obtained through the industry's BMP program.

OBJECTIVE 2

Develop improvements in current products

The hairy issue of spinning

A new spinning technology, Nu-Torque, is under evaluation for production of high quality yarns. Four rovings (fibre prepared for spinning) with different blend ratios of extra long staple cotton (ELS) and long staple upland cotton (LS) were prepared by CSIRO, and sent to University of Polytechnic in Hong Kong for the commercial spinning trial.

The yarn developed had a 22.2 per cent twist reduction, while retaining good tenacity (strength) and reduced hairiness, compared with the conventional yarns with normal twist level. The Nu-Torque knitted fabrics have smooth surface and lower 'twistiness', with better bursting strength.

The work demonstrates convincingly that the Nu-Torque spinning technology can improve the hairiness of single yarns significantly. Outcomes will help refine benefits of using high quality fibres for the new spinning technology and enable Australian cotton to be promoted for use with such technology as part of the promotion of premium fabrics.

Assessing the importance of elongation

Cotton samples of different elongation are been processed into two combed yarn counts at two twist levels, using CSIRO's industry-scale pilot plant. The outcomes from this work will help determine the impact of elongation on yarn and fabric quality. This will provide evidence for prioritising fibre elongation as a measurement in assessing cotton quality, particularly within quality mills. It may also provide breeding programs with critical evidence as to why elongation should be considered as a key assessment criterion for future variety development.

Studies of the tensile properties (strength) of a wide range of current and new Australian cotton varieties have been conducted. New cotton varieties under development from the CSIRO breeding program were selected, representing the current extremes in fibre elongation. In addition, 10 international cotton samples were selected from a partner mill on the basis of their fibre elongation values. The 10 international samples comprised three US (San Joaquin Valley), five Australian and two Xinjiang cottons. Data is currently being developed for the selected cottons.

Outputs from this research will be valuable across a range of CRDC projects, including the development of Cottonspec, low twist assessment and cotton/wool blends.

Predicting yarn quality

The aim of the CSIRO-developed Cottonspec is to allow mills to use Australian cotton for high

count yarn production, thus increasing demand for Australian cotton in the production of premium fabrics. The technology was promoted to leading mills at a seminar in China in October 2012 (see opposite page).

The latest upgrade of Cottonspec occurred in May 2013. Validation trial results have demonstrated that the software's prediction power has been greatly improved with the upgraded algorithms. Further, the results of validation trials using a separate spinning database have shown that for yarn evenness and tenacity, the predicted yarn quality values are highly correlated to the measured values and prediction errors are small.

CRDC is in discussion with CSIRO regarding commercialisation of the technology.

Assessing on-farm impacts on fibre quality

Previous research has made it clear that high quality fibre is truly a 'field to fabric' issue. A major investment by CRDC is assessing the impact agronomic management has on fibre quality, spinning, and final yarn and fabric quality.

A range of research has been conducted under this investment, relating to specific agronomic decisions and assessing cotton varieties and the impact of maturity and defoliation dates on micronaire (fibre fineness) and neps (short, tangled bunches of fibre that have an adverse impact on spinning). In addition, work is continuing to develop an online tool that should form part of the CottASSIST web tool suite to predict seasonal micronaire. Assessment of the model against existing data sets has shown that the research team must improve the correlation between its prediction and measured outcomes.

Research has also targeted the development of a fibre quality index (FQI), found to provide a valued assessment of yarn quality. When the more sophisticated Cottonscope measures were used instead of micronaire, the relationship between FQI genotype rankings and rankings for yarn strength improved. Information is now sought on how the FQI may be used by growers and/or merchants in assessing crop quality, how it relates to Cottonspec prediction models and how, if at all, it may be used by mills.

OBJECTIVE 3

Facilitate the development of novel products

Assessing new fabrics and their markets

The end of 2013 should see completion of a commissioned project with Deakin University that is identifying the key threats and major opportunities for Australian cotton in traditional and premium cotton markets, and defining future R&D needs for these markets. CRDC expects the project to identify both opportunities for future post-farm gate R&D investment and potential collaborators for innovative fabric design. It will also provide valuable intelligence about the future direction of man-made fibres.

Collaboration with growers has seen specially selected premium Australian Long Staple (ALS) cotton shipped to collaborative mills in China and Thailand. A number of international mills have been approached to conduct the spinning trials, so data can be gathered on the performance of the cotton in production of selected fabrics.

Cotton and wool: a collaboration to benefit both industries

A collaborative project with Deakin University, CSIRO and Esquel Textiles (China) to design thermal cotton/wool fabrics using Australian premium cotton and premium wool fibre is on track. Discussions have been held with the Esquel team on fibre selection and the five blend ratios to be used for yarn and fabric production, with 100 per cent cotton to be used as the control standard. The project will investigate options for a range of new fabric designs that may include cotton, wool and a new man-made fibre, thermostat, developed by DuPont. Yarn and fabric samples are currently being made at Esquel.

A number of meetings have also been held with Australian Wool Innovation (AWI) to explore opportunities for a joint product and market development initiative. It is proposed that AWI and CRDC, together with other industry partners, develop a joint initiative to develop a

Showcasing Australian innovation

A meeting with representatives from Chinese mills that are major customers for Australian cotton fibre has helped to improve Australian growers' future in marketing fine, long staple cotton and open doors to improved productivity gains.

CRDC was a sponsor of the meeting, held in Nanjing, in eastern China: the site of a high concentration of cotton mills. The event provided an important information exchange on premium CSIRO-bred cotton varieties, and post-harvest technologies developed by CSIRO Materials Science and Engineering (CMSE).

According to CMSE's Dr Stuart Gordon, a large focus of the symposium was to familiarise mill representatives with CSIRO-developed Cottonspec.

'Cottonspec provides accurate prediction of what a good cotton mill can expect to produce in yarn quality using a particular cotton,' Dr Gordon says.

'This provides a level of certainty to mills that just has not been available before. The main benefit to Australian cotton growers is increased demand for premium long staple Australian cotton via the association it provides between fibre quality and mill demand for high quality yarn.'

The mills recognised the value in Cottonspec as a tool for benchmarking their yarn quality, predicting the quality of yarn from a new mix of raw fibre in lieu of actual spinning trials and reviewing the management of raw cotton buying.

There is also an interest across the cotton industry in knowing the fineness and maturity values of premium fibre and the interest from Chinese mills reflects this. Mills that are spinning premium yarns are interested in examining or using another CMSE-developed technology, Cottonscope. Distinguishing between premium fine fibre and fibre that is fine because it is immature is important to mills and Cottonscope is the first instrument to measure these qualities quickly and accurately.

The interest in Cottonspec and Cottonscope is especially pleasing to CRDC, which has invested in development and refinement of these technologies over several years.

The symposium was instigated by the Australian industry and other sponsors were CSIRO, the Australian Government Department of Agriculture, Fisheries and Forestry and the Australian Cotton Shippers Association.

new range of cotton/wool garments that could be promoted across the key markets of China, North America and Europe. Where appropriate, partners will also be selected based on their interest in promoting sustainable environmental practices. This would provide leverage for promotion of programs such as cotton's BMP program and related programs in the wool industry.

New partnership mills and possible brand owner partners are also in prospect across a range of projects, including the Nu-Torque low twist yarn project, ALS spinning trials and Cottonspec trials.

OBJECTIVE 4

Advanced cotton product processing

The cost of production is the most critical issue for a cotton producer in determining net income. Harvesting and ginning contribute almost a quarter of the total cost of producing cotton and CRDC R&D seeks to make these processes more efficient and more effective in retaining the quality of the cotton lint.

Seeking R&D opportunities to improve ginning

CRDC has received the report from a ginning review, conducted by CSIRO. Its initial recommendations centre on advances in ginning efficiency (through reducing costs) and preservation of quality. The review identified several key areas to consider for future research: delivery systems across the gin, optimising drying and moisture restoration, and settings for new cotton varieties. An improvement in quality increases the grower's return on investment and areas identified for future research include contamination management and detection systems, improved lint cleaning and pre-cleaning systems and reducing damage caused in the gin stand.

CSIRO is conducting research into improvements in spinning efficiency, yarn and fabric quality that can be achieved from cotton processed by a roller gin, compared with a saw gin (where a set of round saws rotates at a high speed between parallel metal ribs).

CSIRO CMSE has conducted premium spinning trials using selected bales of ALS saw and roller ginned cotton. International studies indicate that significant premiums may be achieved from roller ginned Upland cotton, the type of cotton principally grown in Australia. CSIRO's assessment of the fibre samples bears this out, with roller ginning produced cotton that was longer, more uniform, and with less short fibre and nep (short, tangled fibres) content. The challenge is, first, to optimise the efficiency of the roller gins and, second, to ensure that any premiums gained through processing the cotton in a roller gin exceed the additional cost. This being the case, a large-scale switch to this technology in Australia is a longer-term prospect but a promising one to pursue.

CSIRO has also assessed the impact of lint cleaning on cotton yield. Processing with CSIRO's gin has shown that the use of two lint cleaners may reduce final turnout by up to six per cent. This project is continuing to validate the impact of pre-cleaning in management and use of lint cleaners.

The use of inline grade monitors has increased across the ginning sector. These units automatically measure raw cotton parameters needed for improving control of the ginning operation. Given the potential impact of these units, it is important the industry has confidence in their accuracy, particularly as preliminary research by CSIRO indicated significant deviations from the classing grade of the bale run. CRDC has developed a project with CSIRO to compare commercial inline leaf grade monitors with HVI (High Volume Instrument) and classer values, so as to provide a clear and transparent evaluation of their accuracy.

Ginning and classing under the BMP microscope

During the 2012 season, 87 per cent of operational gins were audited against BMP Ginning guidelines and a range of issues identified. These include labour shortages that cause reduced quality assurance monitoring, a lack of training on leaf grade assessment, unsatisfactory record keeping and issues with equipment accuracy. The BMP Handbook for Ginning was updated in March 2013 following the audits, working with the Australian Cotton Ginners Association and the Australian Cotton Shippers Association. This will form the basis for auditing in 2013.

The BMP Handbook for Classing was also updated extensively in March 2013. It was used to determine the compliance of classing facilities in a BMP check test program that commenced in April 2013, with three check tests completed. Auditing commenced in June 2013.

From trash to treasure

Improving management of the trash left after cotton harvesting is an important economic and environmental issue. A scoping study has reported that the trash contains a relatively high holocellulose content, with the major component being sugar-based molecules. This suggests it is an ideal feedstock for bioprocessing into sugars and ethanol. Investigations into the optimisation of pre-treatment process using high temperature and pressure reactors have been initiated.

OBJECTIVE 5

Facilitate the development of objective measurement of Australian cotton fibre

Progressing commercial opportunities for Australian technologies

CRDC has invested in the development of novel spinning software technology, Cottonspec by CSIRO. It is designed to improve mill efficiency by offering an accurate prediction of final yarn quality traits such as strength and evenness, based on raw fibre inputs and spinning techniques.

CRDC continues to work with CSIRO in the commercial development of Cottonspec, with China's Entry-Exit Import Quarantine Bureau (EEIQB) expressing strong interest in the technology. As part of a proposed commercial promotion, EEIQB would establish a Cottonspec Support Centre as a point of contact for mills. As a result of its commercial use, mills are expected to request objective fibre data for all bale shipments, which will provide support for the future use of Cottonscope (see page 29 and below) by mills and merchants. The advantage for the Australian industry is the ability to provide this fibre data online at any time, once the shipment order has been confirmed.

Improving HVI assessment through international collaboration

CRDC developed a one-year project to assess HVI assessment of fibre length and strength, in collaboration with the United States Department of Agriculture Cotton Structure and Quality Research Laboratory in New Orleans. This collaboration has led to important new insights about fibre strength biases caused by the length of fibres, then identified the cause of this bias and developed a model and method for correcting it.

CRDC and CSIRO are considering a range of commercial opportunities for Cottonscope, including a proposal by the Jiangsu Academy of Science and Technology for Inspection and Quarantine (JASTIQ). The objective of any final arrangement with JASTIQ or other potential partners will be to ensure that quality mills that use Australian cotton are targeted for any initial promotion of the technology.

In ongoing ginning research, Dario Frigero of Loptex Italia and Dr Andrew Krajewski (CSIRO) are installing Loptex Italia contamination sensors designed to 'see' small contaminants and eject them before they reach the lint cleaner (and bale). This trial was the first time these sensors had been used in a high capacity gin.

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

Strategic Plan 2008–13 inputs

	2008–09	2009–10	2010–11	2011–12	2012–13
Number of projects	62	54	60	73	102
Expenditure	$5.21m	$4.976m	$4.853m	$6.558m	$10.325m

Performance

Performance has been assessed against two sets of criteria: the Key Performance Indicators submitted in the 2012–13 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2012–13. See page 120 for 'Measuring Performance'.

Key R&D activities 2012–13

STRATEGIC OBJECTIVE 1

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

Agriculture in a changing climate

CRDC involvement in the CCRSPI continued in 2012–13, with an RD&E Strategy developed and endorsed by all relevant parties, including the PISC RD&E Committee, and the Council of R&D Corporation Chairs, prior to its submission to the Ministerial Council. The Australian Government Department of Agriculture, Fisheries and Forestry and Rural Industries R&D Corporation (RIRDC) have been nominated as the strategy's 'sponsors' and RIRDC took over responsibility as the host organisation or secretariat for CCRSPI on 1 April 2013.

The University of Western Sydney (UWS) project investigating industry adaptation to extreme weather and climate change has established a glasshouse experiment with a robust experimental design. A good collaborative relationship with researchers at the ACRI is also developing, with a waterlogging/flooding field experiment conducted with the support of CSIRO.

Young researcher investigates cotton growing in a changing climate

One of Australia's innovative young researchers has been working with a scientist from the United States Department of Agriculture (USDA) to improve the quality of research into climate change's effects on cotton in Australia.

Katie Broughton

CRDC PhD student Katie Broughton and USDA cotton physiologist Dr Paxton Payton set up state-of-the-art technology from the US at the Australian Cotton Research Institute, near Narrabri NSW, in early 2013 to measure how Australian cotton responds to water deficits, rising temperature and carbon dioxide levels. Katie travelled to Lubbock, Texas in 2012 to learn to use the equipment, funded by the CRDC Award for the 2012 Science and Innovation Award for Young People in Agriculture, Fisheries and Forestry.

Working with CSIRO's Dr Mike Bange, Professor David Tissue of UWS and Dr Daniel Tan of The University of Sydney, she is now undertaking field studies of how projected climate changes will affect cotton physiology and production with Australian conditions and cotton varieties. The new research at ACRI is using the US whole plant field chambers to modify the environment of the cotton during critical developmental stages.

Katie has had one paper accepted by a peer-reviewed journal, with a second paper in preparation. Her supervisors are extremely pleased with her progress, singling out in particular her tenacity and resourcefulness in ensuring that the experiments were completed.

'This collaboration represents a great opportunity for the cotton community—working in both hemispheres gives us the unique advantage of doubling our research output in a single year.'

USDA cotton physiologist Dr Paxton Payton

A second new project sees researchers from the University of Technology, Sydney assessing climate change impacts and adaptation options in the cotton industry.

Results confirm that applying the economic optimum rate of nitrogen is important, both for profitability of cotton production and for minimisation of emissions of the potent greenhouse gas, nitrous oxide from the soil system. According to the researchers, we have shown it is possible to grow high-yielding cotton crops without producing high emissions. An initial paper prepared for submission highlights some potential key impacts of future (2030) climate scenarios relating to planting timing and the timing of the last harvestable bolls.

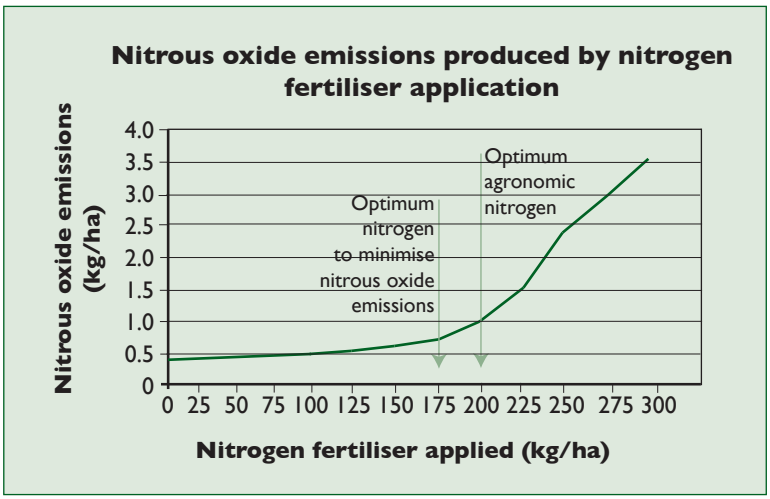
On-farm energy use protocol: measure to manage

A project conducted by the National Centre for Engineering in Agriculture (NCEA) finished in June 2013 and will report fully in September 2013. The project, which developed a good collaborative linkage with the NSW Department of Primary Industries irrigation benchmarking project led by Janelle Montgomery, has enabled energy efficiency of irrigation systems to be considered in addition to water use efficiency. This collaborative work can continue following a successful application by CRDC under the Australian Government's Energy Efficiency Information Grant program, which will enable the NCEA to employ an Energy Technical Specialist to work as part of the cotton industry's CottonInfo team.

Under this project, the energy assessment framework and methodologies developed in previous projects have now been incorporated into *my*BMP via EnergyCalc and the new app, *EnergyCalc Lite*.

A second NCEA project is examining energy use on cotton farms. Despite delays in 2012 following an injury to the lead researcher, the project has been able to analyse engine performance (torque, power and brake-specific fuel consumption), as well as carbon monoxide, carbon dioxide and nitrous oxide emissions from diesel and cottonseed oil/diesel blends.

The project also looked at the performance of fuels made from waste cooking oil and microalgae oil. Laboratory tests using a small diesel motor indicated that the alternative fuels, while having lower emissions than diesel, have losses in torque and increased brake-specific fuel consumption. The tests will be repeated on a commercial diesel engine. The next phase of testing will involve modifying a commercial diesel engine to be able to use coal seam gas, for similar testing.



This graph from CRDC researchers shows the startling effect the application of too much nitrogen fertiliser has on emissions of the greenhouse gas, nitrous oxide.

Energy use answers at the grass roots

CRDC's Grass Root Grants program is tailored for local groups such as cotton grower associations to undertake projects to improve cotton growing and processing. With the award of one of these grants, Tandou Gin near Menindee in far western New South Wales is addressing the important economic and environmental issues of reusable energy sources and gin efficiency.

Because of a particularly hot, low rainfall climate, cotton growing around Lake Tandou concentrates principally on Pima cotton, a fine, long staple cotton capable of producing very high quality fabric. After a five-year hiatus because of drought, Tandou Gin started up again in 2011, using two upland saw gin stands and eight Pima roller gin stands for cotton produced by Tandou Farm.

With cotton ginning relying heavily on LPG (gas) to dry cotton, and the price of LPG rising 90 per cent over the past six years, the gin undertook a feasibility study into using ginning by-products in a biomass burner to offset the cost.

Tandou's Environmental Manager David McClure says Tandou's experience with the Grass Roots Grants program has been very satisfactory.

'The Grass Roots Grant was used to commission an engineer to conduct a feasibility study into installing a biomass burner at the gin,' says Mr McClure.

'The study indicated that a biomass burner can successfully utilise gin trash to provide the necessary heat for most ginning situations. But it also highlighted an important issue: our gin was using more LPG than the industry average to process our crop. Given it was our first year back in the industry for some time, we decided that upgrades and modifications inside the gin were the highest priority. These measures have been very successful and our LPG usage has been greatly reduced.

'Furthermore, the study led Tandou to commit resources to conducting an energy audit over our entire operation in an effort to highlight opportunities for improving energy use.'

While the biomass project is on the back burner for now, there are federal subsidies available for alternative or complementary energy projects that may reduce the capital expenditure required and make the burner more economically viable.

See *Spotlight* magazine, Summer 2012–13 at www.crdc.com.au/spotlight-magazines/.

'I can't remember anybody talking about the cost of electricity as a major input five years ago, but today it is commonly discussed.'

Tandou Environmental Manager, David McClure.

Engaging the community in natural resource management

A literature review of community engagement in natural resource management and its intersection with institutional perspectives of governance and methodology has been completed. PhD student Tanya Howard attended the Next Generation Resource Governance workshop in Iceland in 2012, where she collected data from experts in the field of environmental law and policy, community engagement and natural resource management. Later in 2013, Tanya will be undertaking a comparative analysis of case studies that utilised community engagement as part of their NRM programs, and drawing out the different ways that we can evaluate whether or not the engagement was effective.

University of New England Research Fellow in Ecosystem Management, Dr Rhiannon Smith, is conducting a post-doctoral study into how cotton farmers can take advantage of any future ecosystems markets. Her project is making sound progress, with data collection from some 200 sites in NSW and Queensland. Lab analysis is underway, as is soil sample processing for chemical and carbon analyses. CRDC and the CottonInfo team will work with Rhiannon to extend her results throughout the industry once they are validated.

STRATEGIC OBJECTIVE 2

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

Defining triple bottom line performance information

The reporting year saw updated cotton industry economic, social and environmental data and existing gaps in information defined. A summary table on trends, data confidence, ease of collection, priority and quality of sustainable indicators may provide the basis for a Sustainability Framework for the Australian cotton industry. This work will complement the industry response to the Third Environmental Assessment (see page 40) and made a significant contribution to *The Australian Cotton Water Story* (page 38).

The Crop Consultants Australia annual survey of on-farm practices and attitudes has once more provided important information from consultants to guide future R&D and extension work. Under a new project that establishes interactive grower survey and workshops, Roth Rural and Regional conducted 10 regional priority meetings, with another two planned. Priorities and issues raised at the meetings were drafted and aligned with CRDC's new strategic plan and a communication plan developed.

Advancing efficiency in water and energy use

Projects continued to benchmark cotton water use efficiency, adding energy use benchmarking and assessment to the mix. The NCEA developed a pump efficiency monitor, which, in conjunction with the water use efficiency project, was trialled for the first time at Goondiwindi during the 2012–13 growing season. The trial demonstrated that large energy and cost savings are possible for individual operators and the industry collectively.

Soil health—the building block of a good crop

The industry is rapidly adopting new round module harvesters (the John Deere JD 7760 harvester) and CRDC invested in a project by NCEA to determine its impact, particularly on soils. A scarcity of information on the new technology—and a similar situation on earlier picker technologies—saw a difficult literature review phase conducted. Researchers participated in a small forum in Moree in January 2013 to discuss the new technology, with participating growers and harvest contractors agreeing that data on soil compaction under the 7760 would be valuable. Some of the issues identified at the forum will be followed up in a broader survey of growers. This project will provide an important means of gaining best practice information for the new technology.

A CRDC and GRDC project to advance knowledge and best practice of critical soil nutrient concentrations in soils supporting irrigated cotton in northern NSW and Queensland is managed by GRDC on behalf of both organisations. This research clearly

Community involvement in a sustainable landscape

A project engaging cotton farmers and local communities has been made possible by funding from the Australian Government 'Caring for our Country' initiative. It has three core components: working with landholders to manage natural vegetation and improve biodiversity, an 'Envirostories' schools competition and an Aboriginal Cotton Traineeship program focused on agriculture and environmental rehabilitation (see page 58).

The CRDC team employed a range of strategies to successfully involve communities in better understanding and managing natural areas, each of which has highlighted the value of social engagement in achieving collaborative goals. This resulted in valuable partnerships with natural resource management and community groups.

Across the Namoi, Gwydir, and Fitzroy cotton valleys, activities beneficial to biodiversity were implemented on more than 13,000 hectares of country. Connections made with almost one thousand farmers inspired a new perspective on natural resource management amongst landholders managing hundreds of thousands of hectares.

A wide range of activities under this project included:

- lady beetles, birds and bats workshops, spotlight nights and a kayak wildlife discovery tour on the Namoi (which prompted a number of participants to install nesting boxes to enhance habitat for native birds and bats)
- a 'Pests in the Landscape workshop' in the Gwydir valley that brought together landholders, researchers, and extension agents and was followed by on-farm NRM assessment and benchmarking reports conducted in active cooperation with the farmers.
- workshops in central Queensland on integrated pest management and biodiversity, with landholders eager to learn more about how native vegetation can promote natural predators and reduce the impact of crop pests.

The Envirostories competition attracted strong interest from schools in cotton catchments in NSW and Queensland. The stories explored the concept of sustainable agricultural production from the perspective of country kids, with winning entries published in print and online. CRDC has contributed to production of additional Envirostories booklets in 2013.

We look forward to developing these initiatives on a national scale to improve biodiversity and the management of natural assets beneficial to the ongoing sustainability of the Australian cotton industry.

Dave Carr and Anthony Barlow assess the condition of natural vegetation near Mungindi as part of the 'Caring for our Country' initiative

Cotton and water—a good story to tell

The Australian Cotton Water Story, launched at the 16th Australian Cotton Conference in August 2012, documents the huge gains made through R&D over the past decade.

The new book provides a snapshot of over 80 water research projects from more than 100 researchers and quantifies the improvements in water use over the decade. The Australian cotton industry can demonstrate a 40 per cent improvement in cotton water productivity, accompanied by cotton yields that are two and a half times the world average for quality cotton.

Water use efficiency and quality have been major focuses for both the just completed five-year strategic plan and its predecessor, with a wide range of research projects conducted by a number of organisations, including the now-completed Cotton CRC.

CRDC Natural Resources Manager, Jane Trindall, who was closely involved in water research in her previous role of Catchment Program Manger for the Cotton CRC, points out that nearly $30 million has been invested in cotton water research in the past 10 years, with more than 30 organisations involved. This gives a picture of the breadth of cotton research and the innovation and effort undertaken to better understand this resource and use it wisely.

The future viability of cotton farmers depends on making good decisions about water use every day. The new book gives water resource managers fingertip access to best science to manage this complex issue. For students and those new to the industry, it provides a platform from which they can build their understanding of managing water on cotton farms and—very importantly—their catchments.

Former Cotton CRC CEO Philip Armytage, CRDC Chair Mike Logan and Cotton Australia CEO Adam Kay launch *The Australian Cotton Water Story* at the Australian Cotton Conference in August 2012

indicated that crop yields and water use efficiency in grain crops in parts of the northern grains region are being increasingly constrained by nutrient limitations other than nitrogen. The situation for cotton is much less clear, driven by its inability to effectively utilise concentrated sources of plant-available nutrients like phosphorus and potassium applied as fertiliser.

There is a need to gain a better understanding of the interactions between the cotton root system and the uptake of these nutrients, as well as the most effective application strategies to enable crop recovery of applied fertilisers in both irrigated and dryland systems. These unanswered questions are the focus of new nutrition research contracted in 2012–13. Five cotton experiments, both irrigated and dryland, saw development of a protocol for phosphorus, potassium and sulphur produced and used to establish two farm trials on the Darling Downs, along with two farmer demonstration trials. Raw data analysis confirmed the previous findings about cotton's unresponsiveness to phosphorus and potassium rates. A number of strategies have been proposed to overcome this restraint.

Preliminary analysis of data concerning nutrient and soil management from consultant and grower surveys in 2012–13 shows clearly that while there have been measurable improvements in many practices, still more needs to be done to encourage growers to optimise their crop nutrition management. With highly variable soil and climatic conditions, this is a far from simple task, but it has been taken on as part of the CottonInfo team's 'More Crop per Drop' campaign.

Valuable results have emerged from ongoing research into management of carbon in cotton-based farming systems, with the addition of a corn rotation into the long-term rotation and tillage trial at ACRI, including increased cotton yields, decreased black root rot infestations, increased soil carbon and a more extensive root system. These improvements added up to improved gross margins for the crop. Trash handling is an issue with corn rotation; however, researchers are suggesting that a permanent bed system can be maintained if a system of shredding at harvest, slashing of stubble and root cutting is adopted.

A new project to profile beneficial microorganisms and their manipulation in cotton growing soils to improve cotton growth is examining regional differences in beneficial micro-organisms in soils associated with cotton growing. Ten sites have been established in Queensland, northern-central NSW and central-southern NSW, and sampling has commenced. A PhD student has been recruited to the group to work on a complementary project and has succeeded in attracting an Australian Postgraduate Award.

Cotton's move northwards

Growing cotton in northern Queensland is a very different proposition to other growing areas in Queensland and NSW but potentially provides a useful crop diversification for farmers in the region—principally sugar cane growers. CRDC supported a five-year study in the Burdekin region, which developed an understanding of nitrogen and irrigation practices suitable for use in a coastal reef catchment, and released the findings in a comprehensive document, NORpak.

The study determined that nitrogen loss through leaching in the tropical wet season was a significant issue and a new project in 2012–13 has focused on an intensive small plot trial to examine this issue. Due to the later than usual planting, results were not available in the reporting period; however, visual and early picking results indicate the potential for very significant nitrogen use efficiency gains during high rainfall periods.

Using water efficiently and effectively

A field trial evaluating adaptive control of surface irrigation, conducted in Jondaryan (Queensland) showed that real-time adaptive control treatments applied 24 percent less water and produced 12 percent higher yields than the grower's current practices. The project results have been presented to industry via the Irrigation Australia and Australian Cotton Conferences. In 2012–13, a span of a centre pivot irrigation machine has been fitted with variable-rate irrigation control valves and plant sensors for evaluation of the control strategies on a pressurised irrigation system.

Environmental report card informs future R&D

The third industry-wide environmental assessment undertaken by the cotton industry since 1991 has given the industry a good 'report card'.

The independent assessment was conducted by the Canberra-based consultancy firm, Inovact and overseen by CRDC, working with an industry steering committee. Inovact reviewed available literature, surveyed growers and a broad range of industry and external stakeholders, and quantified the industry's responses to the recommendations in the second environmental audit in 2003. They also ran metropolitan focus groups and visited farms to reach their conclusions.

The assessment found the industry has been transformed substantially since 2003—through production practices, the cotton farming system and farm planning and management. Significant factors include considerable improvements in growers' water use, chemical and natural resource management, particularly through the adoption of new technology.

Based on its assessment findings, Inovact made six recommendations to further advance the cotton industry's environmental stewardship agenda and performance. These covered the broad RD&E strategy, *my*BMP, establishing a more comprehensive industry database, and continuing regular independent environmental assessments and market-based initiatives for sustainably grown cotton. The industry's response to their recommendations will inform environmental priorities for action and strategies for the next five to 10 years, both on the ground and through R&D.

Interestingly, cotton industry and external stakeholders largely agree on environmental management issues. When asked about important environmental priorities for cotton growing over the next three to five years, both groups ranked water use efficiency, greenhouse gas emissions and soil health as the top three priorities.

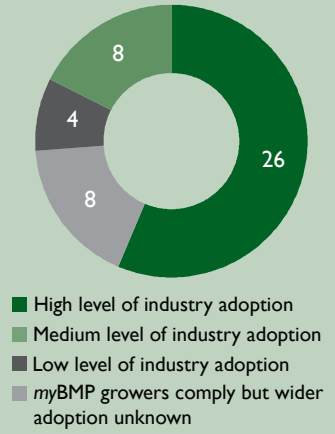
The environmental assessment report card arrived at a critical time for the industry, with both CRDC and Cotton Australia undertaking the process of formulating their new strategic plans. For CRDC, it provided an opportunity to continue the work of the just-completed five-year plan by providing an opportunity to be explicit about the commitment to continuously improving environmental management and performance in cotton growing, with a view to improving information, enabling collaboration and improving the measurement of success for growers, government and the market.

The final assessment report is available from CRDC (info@crdc.com.au), or find more detail in the Summer 2012–13 edition of *Spotlight* magazine at www.crdc.com.au/spotlight-magazines/.

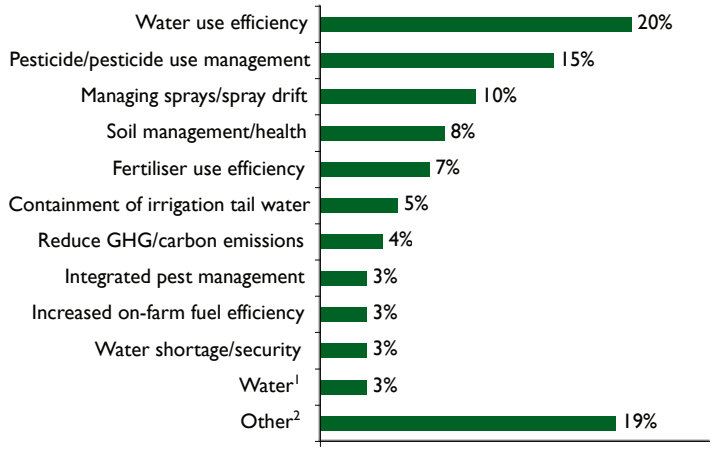
Ken Moore from Inovact Consulting interviewed grower Rodney Grant on his Breeza property as part of the third Environmental Assessment

Cotton Australia Policy Manager Angela Bradburn and cotton grower John Watson, from Boggabri, NSW, sat on the industry steering committee that guided the assessment and subsequent delivery of the final report to industry

Level of adoption of 48 recommendations from 2003 environmental assessment



Grower percentions of the top environmental issues in 2012



1 No further details

2 Many issues, including tillage management, industry reputation, energy cost and efficiency, soil salinity, resistance of weeds and other pests, use of GM varieties, government policy, carbon tax, mining impact on agriculture, reducing water storage evaporation and leakage, improving soil health, protecting native vegetation, soil and leaf monitoring, increased electricity efficiency and implementing BMP practices.

Source: Cotton Grower Environment Performance Survey 2012

Large field experiments were completed over the 2012–13 cotton seasons to increase understanding of the interactions between plant stress and irrigation timings under different row configurations, climatic conditions and irrigation regimes. While data is still being processed and analysed, preliminary indications are that these trials will provide valuable information for farmers and to guide future R&D.

Keeping sprays where they belong

CRDC continued to invest in initiatives to encourage the industry to manage pesticides, particularly herbicides, to reduce off-target drift. The CottonMap project, run by Cotton Australia with contributions from CRDC, continued to receive excellent responses from growers. It enables neighbours to manage spraying better by showing where cotton,

CRDC Farming Systems Program Manager Tracey Leven and NCEA post-doctoral fellow Dr Alison McCarthy inspect one of the real-time adaptive control irrigation systems

which is very sensitive to some hormone-based herbicides, is planted in their locality.

Spray application consultant Bill Gordon manages a CRDC-funded project targeting the professional development of trainers capable of delivering advanced level spray application workshops to growers and consultants. He is also assisting farming communities to work through spray drift problems and has piloted two-day workshops in Chinchilla and Dalby, leading to licencing of commercial spray contractors. Mr Gordon continues to work with the CottonInfo team to create opportunities to better integrate training outcomes from spray application workshops into the cotton industry's Best Management Practices.

The project has also produced an app for tablets and smart phones to assist with spray application calculations. The iSpray band spray calculator is available for free download at the iTunes app store.

*my*BMP evolving and improving

The industry's online *my*BMP system builds on the significant policy outcomes achieved by the paper-based Best Management Practices (BMP) program by giving growers a flexible web-based system with access to the latest industry science and information. Ongoing R&D investments by CRDC seek its continuous improvement.

A continuing project to facilitate linkages between R&D, extension and *my*BMP ensured the CSIRO CottASSIST suite of decision support tools are seamlessly available through the website, with some of the tools improved and a new micronaire prediction tool added. A new project is encouraging agribusiness agronomists to train to promote the *my*BMP system to growers, including use of the website, how-to-do assistance and farm certification.

Find extensive information about *my*BMP at www.mybmp.com.au.

STRATEGIC OBJECTIVE 3

Protect industry from biosecurity threats

Surveillance and preparedness the key to R&D

Exotic disease threat surveillance continues as part of the industry-wide survey of the incidence and severity of key endemic diseases. Commercial cotton crops across NSW and Queensland were inspected and the incidence and severity of diseases documented, along with the field history, ground preparation, cotton variety and other factors at each of the surveyed fields.

These surveys, which have been conducted for 30 years in NSW and 11 years in Queensland, also provide 'proof of absence' for high priority exotic diseases. In 2012–13, there were no detections of any priority disease threats, including the two viral threats to cotton, Cotton Leaf Curl Disease and Blue Disease.

With support from CRDC, Cotton Australia conducted biosecurity training in June 2013 for 10 participants, including the new CottonInfo regional team. This has provided the industry with capacity in each region to recognise and respond to biosecurity issues.

Reniform nematodes, a significant pest of cotton around the world, were identified in Theodore and Emerald (in one field) in central Queensland, causing stunted cotton across a number of farms. Losses in badly affected areas have been estimated at 30 percent. CRDC has commissioned QDAFF to conduct

more extensive surveys to relate population to damage and make initial management investigations.

Collaborating with CSIRO, QDAFF identified five new natural field hosts and one experimental host of cotton bunchy top virus. This informs preventative management, with communications to growers and consultants highlighting the importance of weed control in managing disease risks. Regional maps developed following the surveillance and mapping of feral cotton across Queensland will aid biosecurity contingency planning. Up to half the plants contained cotton bunchy top, presenting a high risk to the following cotton crop. Fortunately, other findings confirmed the low level of 'weediness' of cotton in the environment.

CRDC was a major support of a QDAFF workshop on the epidemiology and management of whitefly-transmitted virus, which also involved the grains and vegetable industry and included participation of researchers from Spain, Egypt, Pakistan and the US. The workshop identified future opportunities in methodologies for surveillance and opportunities for cross-sectoral collaboration to improve early detection. It also provided important input for the ongoing development of the industry's cotton leaf curl disease contingency plan and led to a CRDC investment in May 2013 in a study to assess the feasibility of transgenic resistance for this virus.

Silverleaf whitefly have a significant impact on the price growers receive for their cotton, depositing sticky honeydew that affects fibre

Linda Smith (QDAFF), Beth Cooper (NSW DPI), Karen Kirkby (NSW DPI), John Lehane (QDAFF), Peter Lonergan (NSW DPI), and Stephen Allen (CSD) assessed the incidence and severity of diseases present on 160 commercial cotton crops across NSW and Queensland. These surveys inform research, as well as providing proof of absence for high priority exotic diseases.

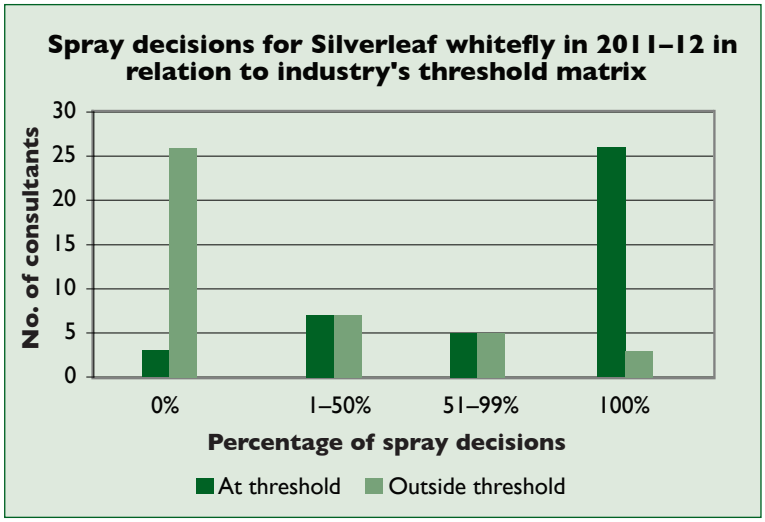
processing. Results from initial experiments into this honeydew have been presented at industry events and ongoing work will further clarify the influences of temperature and rainfall on the rate and extent of breakdown of the honeydew. Management guidelines are on track for release to industry in 2014–15.

Green vegetable bug continues to be a problem for the industry. In 2011–12, it was the only pest where a high reliance on preventative and suppressive tactics for its management meant the majority of consultants were unable to conserve beneficial insects on at least 50 percent of hectares.

The Solenopsis mealy bug causes severe drops in yield if it occurs early in crop development. Field surveys indicate that it is widespread in Queensland, with the first outbreak in cotton outside the Queensland central highlands occurring on the Darling Downs in early 2013. Evaluation of insecticides as control options are continuing but have not yet identified any effective products that do not disrupt beneficial insects. Communication with the industry has been directed towards improving farm hygiene.

The Cotton Insecticide Resistance Management Strategy has been reviewed for the upcoming growing season but required only minor changes as resistance monitoring programs for *Helicoverpa* spp., aphids, spider mites and Silverleaf whitefly have recorded very little change. Successful completion of a feeding bioassay as an alternative method for detecting resistance to IPM-compatible chemistries will complement the move towards a more biochemical and molecular-based approach for measuring resistance frequencies to broad-spectrum chemicals.

CRDC has continued working towards the establishment of a Centre for Biopesticides and Semiochemicals research. During the reporting year, its governance structure, science collaboration and interest in cross-sector engagement have been explored and work is ongoing. CRDC is also supporting commercialisation of the fungal biopesticide, DAT511. The NSW Department of Primary Industries continues to work towards the completion of a regulatory package and discussions continue regarding the involvement of a commercial partner.



The 2011–12 CCA Survey results indicated that the majority of cotton consultants did not need to make any spray decisions for Silverleaf whitefly during the season. As this graph shows, there continues to be high use of the industry's spray threshold recommendations where control is required.

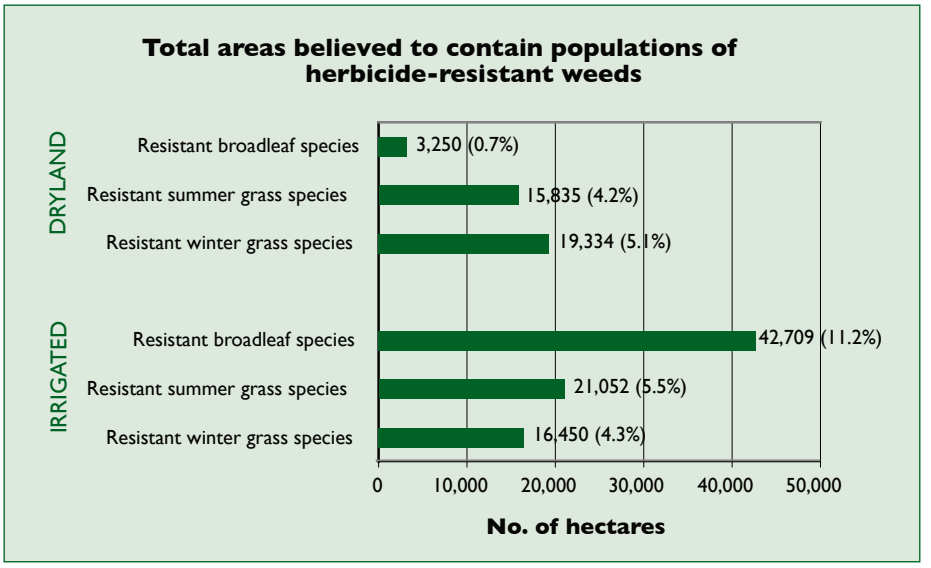
Tackling weeds head-on

The 2012–13 season saw many instances of cotton crops damaged by herbicides. In part, this was due to the expanding range of herbicides being used in the farming systems to manage hard to control species but also to the unpredictable rates of residue breakdown in the soil in response to below average rainfall during winter and spring 2012. In a CRDC project, NSW DPI research agronomist, Graham Charles, has assisted several growers to understand the type of damage, and the likelihood and degree of crop recovery that can be expected, which has attracted very positive feedback from the growers involved. While in some instances the news was not good, the process for stepping through what has happened and how to expect the crop to behave has been helpful in resetting the path for crop management decision-making.

New weed identification resources are being developed, and should be available online in mid-2014. The redevelopment of the CRDC website and ongoing development of the *my*BMP website include design attributes that will increase accessibility of the industry's voluminous electronic weed management resources.

Industry researchers came together with Cotton Australia's Advisory Panel representatives and commercial representatives to discuss research findings presented at the Global Herbicide Resistance Conference (Perth, February 2012). In summary, global experiences with, and investigations of, herbicide resistance are showing that there is great diversity in the way species evolve resistance, that nearly all herbicides have at least one weed with documented resistance, multiple resistances within weeds are becoming much more common and migration of resistant populations across the landscape is also very common. The meeting flagged investigation of non-herbicidal management tactics as requiring increased research priority.

Projects to improve weed management and minimise resistance to key herbicides made good progress, including in the integration of cotton and grains weed management best practices. New studies are testing seed characteristics of 11 key weed species to understand the



The figures in this graph are from the CRDC-funded CCA survey of the 2011–12 growing season, which covered 380,000 hectares in total. As well as showing the hectares believed to contain herbicide-resistant weeds, it shows the percentage of the total survey hectares that they represent. The results of the survey indicate that many cotton consultants believe they are routinely managing weed populations in relation to herbicide resistance.

environmental factors driving their emergence and determine the influence management tactics can have on seed bank longevity.

Confirmed cases of glyphosate resistance in Awnless barnyard grass— common to cotton farms— has made this species a focus of recent research efforts. Assessment of management tactics for resistant populations has progressed, leading to the publication of a fact sheet detailing alternative knockdown and residual herbicide options.

Preserving important technology

The *Bt* genes in Bollgard II cotton that provide resistance to cotton's greatest pest, *Helicoverpa* spp., have allowed the industry to reduce its use of insecticides by 90 percent in recent years. Preserving the efficacy of this important technology has been a major part of CRDC's research effort since the introduction of cotton varieties carrying these genes. Key findings from the 2012–13 *Bt* resistance monitoring activities have been reported to the industry via an electronic newsletter and several industry forums. Field data collection is underway to develop a resistance management plan (RMP) for the upcoming third generation technology, Bollgard III®, through inclusion in resistance evolution modelling undertaken by the technology provider, Monsanto.

Ongoing research into the flight characteristics of *Helicoverpa* spp in relation to the efficacy of *Bt* cotton refuges continues to progress satisfactorily, despite huge challenges from extreme weather events. Results from flight mill studies show differences in flight capacity between *Bt*-resistant and susceptible moths and these differences are now being explored.

PhD candidate, Kristian Le Mottee, has continued with laboratory studies of *Helicoverpa punctigera* diapause (slowdown in metabolism) and obtained useful results from two studies of *H. punctigera* overwintering in inland Queensland. His project requires some revisions of methodology because of low populations and high mortality in local field studies and may require an extension to allow another season of local overwintering work. While not part of the original project milestones, this work integrates well with the study of overwintering in *H. punctigera*.

CRDC has provided ongoing support for completion of a study into the feasibility of establishing cotton growing in the coastal dry tropical Burdekin region in Queensland, with promising results. One of the issues that must be overcome is the loss of nitrogen early in the growing season, due to high rainfall. The project has developed management options to address this and other issues specific to the region. This photograph shows the region's principal crop, sugar cane, growing in the background. See further information on page 39.

PROGRAM THREE **HUMAN CAPACITY**

Goal

A culture of innovation and learning

Outcome

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

Strategic Plan 2008–13 inputs

	2008–09	2009–10	2010–11	2011–12	2012–13
Number of projects	25	33	35	80	99
Expenditure	$0.874	$0.951	$1.072	$1.842m	$2.446

Performance

Performance has been assessed against two sets of criteria: the Key Performance Indicators submitted in the 2012–13 Portfolio Budget Statement and a range of measures defined in the Annual Operating Plan 2012–13. See page 120 for 'Measuring Performance'.

Key R&D Activities 2012–13

The human capacity challenge

The Australian cotton industry has long shown itself eager to take hold of the latest research and development findings to grow and process the best possible crops. This has made the need for educated, knowledgeable and committed people—growers, processors and staff at all levels—even more vital as the industry moves into an increasingly research-driven future.

Agricultural industries face competition, particularly from the mining industry, in attracting high quality staff and the Human Capacity program has faced significant challenges to think and act creatively during the period of the five-year Strategic Plan. Five years ago, for example, growers would not have anticipated their reliance on backpackers in the harvest season but this is one of the new realities. How can this best be done? How can the industry offer attractive careers at all levels? How can we maximise the potential of people within the industry? These are the challenges that have been addressed.

STRATEGIC OBJECTIVE 1

Identify, understand and plan for future industry capacity needs

Pinning down workforce needs—the recipe for success

Two studies gauged the interest of a range of agribusinesses to become involved or actually support a coordinated industry program to encourage and attract more young professionals to the cotton industry.

The first study, a web-based Cotton Industry Skills and Benchmarking system (http://agskills.com.au) has been developed and tested. It allows self-assessment in a wide range of relevant skills based on Units of Competence from the Agriculture, Horticulture and Conservation Training Package (Agrifood Skills Australia, 2011) and aligns to current industry best practice. Farm managers can not only assess their own skill levels but also develop profiles of the skills of their staff. The system also has the capacity to collate anonymous, industry-wide data on skill levels and deficiencies, providing information for new training programs or initiatives.

The second study, a commissioned report, defined the industry's professional personnel succession and professional development issues and the extent of expected professional personnel shortages facing the agribusiness sector of the cotton industry over the next five years. It articulated the need for a strategy to address these and related issues.

As part of a follow up project, 'round table' discussions with key industry personnel defined the highest priorities, providing a strong basis for future action (see the table on this page). In June 2013, several key agribusiness leaders showed support for the establishment of a focused industry initiative to deal with the highest priority issues identified, as well as strongly indicating a willingness to contribute with financial or in-kind support, or both. During the 2013–14 year, CRDC will work with Cotton Australia and interested parties in the agribusiness sector to develop this initiative.

Blueprint for the future: the top 10 'round table' strategic priorities

Ranking	
1	Attract more of the right people, especially young people
2	Mentoring for young people
3	Ensure universities structure courses to provide graduates who are more job-ready
4	Increase cotton industry skill levels
5	Position the cotton industry as employer of choice
6	Professional development in technology and online-based applications
7	Increase the value of the Australian Cotton Conference and Crop Consultants Australia training
8	Address structural issues such as pay, training, professional development and overseas professionals
9	Support specific industry technical training
10	Maximise regional training opportunities

Workforce development for a sustained competitive advantage

The CRDC project *Innovative work—Cotton workforce development for sustained competitive advantage* is progressing well, with analysis of fieldwork data from Emerald/Springsure in Queensland and Gwydir in NSW, and the labour market analysis and local workforce surveys all underway.

The case studies showed workforce gaps of between 16 and 20 per cent. Both regions reported using backpackers as an available source of short-term employees to help fill some gaps and where this did not meet needs, the existing workforce tended to work longer hours to get things done. Some of the larger cotton growing operations utilised retention strategies in an attempt to ensure they met the needs of their more skilled staff.

The research uncovered a mismatch between what employers consider important and what employees value. While employers tend to favour formal strategies such as paying above award wages, employees value a respectful relationship with their employer and working conditions that include flexibility around hours and family responsibilities, and enough time off. These findings suggest that if employers were to better understand the perspective of their employees, it could lead to insights that bring strategies with mutual appeal.

The research team identified four aspects that could form the basis of a workforce development strategy for the cotton industry:

1. Identification of a sustainable source of labour that already has, or has the capacity to acquire, necessary skills and employees who understand and accept the physical and social demands of working in the cotton industry
2. Building a critical mass of good practice in employment relations and establishment of a culture of innovation and excellence in this area to improve job design, management of work across seasons, and retention. This would include sharing good practice examples widely, within and outside the industry

Defining how best to help

CRDC convened a Workforce Development Forum—the third in 18 months—in Moree in March 2013 to share information about current and planned R&D and initiatives in the cotton workforce space. It brought together a group of individuals committed to unravelling steps to developing a sustainable workforce. The forum canvassed areas where CRDC and Cotton Australia could do more to help the industry deal more effectively with the challenges and opportunities in workforce development and allowed workforce researchers to share their findings with both organisations—including Cotton Australia's Human Capacity Panel members, who are responsible for considering CRDC's proposed research projects in this area.

Below: Cotton Australia Education Coordinator Sophie Davidson, CRDC Human Capacity Program Manager Bruce Pyke, Cotton Australia Macintyre Regional Manager Bec Fing and research analyst Gail Power of The University of Sydney's Workplace Research Centre work through issues at the meeting in Moree

3. Over the longer term, development of skill and career pathways for workers within the industry that take account of technical improvements in cotton production and the ongoing trend toward capital deepening and automation
4. Development of national and regional capacity to coordinate and take action and link to government initiatives.

The project has now headed south, where the cotton industry is expanding rapidly, with a third case study commencing in June 2013 in the Lachlan/Murrumbidgee region.

The intent after this phase is to consider regional action groups and although this is not expected to take place until 2014, principal researcher, Dr Ruth Nettle, has identified an opportunity to learn from workforce planning and development in the dairy industry, to fast-track some capacity in the cotton sector. This involves several cotton industry representatives attending a dairy workshop in which Dr Nettle is involved in Melbourne in December 2013.

Although the dairy situation is quite different to cotton, the governance and local industry coordinator roles it uses are expected to be important in cotton. The workshop would provide an opportunity for people in the cotton industry who could play this role at a local and national level in the future to gain first-hand experience of what it may involve. CRDC will work with Dr Nettle and Cotton Australia to maximise this opportunity.

German backpacker, Wiebke Herrmann, found work in the Gwydir Valley via word of mouth—common, according to the workforce study commissioned by CRDC to examine workforces in the Emerald and Gwydir regions.

Heath Estens, shown here with Wiebke, has been using backpackers on his mixed cotton/citrus farming operation just north of Moree and says 'we wouldn't survive without them.'

Wiebke worked in both the orchard and cotton sides of the business and stayed on for the 2013 cotton harvest.

Encouraging young people into the industry

During the year CRDC invested in several initiatives focused at school and undergraduate levels:

- The Primary Industries Education Foundation (PIEF) to which CRDC contributes part of a cotton industry membership with Cotton Australia
- The Primary Industries Centre for Science Education (PICSE), under which additional funding has seen the commencement of a cotton-focused activity centre
- A part-time Education Officer based at the Australian Cotton Research Institute to continue a range of initiatives with schools developed under the former Cotton CRC
- Five new Horizon Scholarships for undergraduate students (see page 62).
- Six Summer Scholarships for undergraduate students to work with existing researchers or research organisations.

CRDC was a foundation sponsor of the research-based 16th Australian Cotton Conference, held in August 2012. Leading up to the conference, CRDC and Cotton Australia increased its level of support for sponsorship and encouragement for high school and undergraduate students to attend. As a result, approximately 60 students took part in a well-structured program developed by Cotton Australia's Education Coordinator, Sophie Davidson, supported by CRDC-funded Trudy Staines. The students not only experienced the conference events but also took part in their own workshop, enabling them to meet a number of researchers and industry representatives, discussing aspects of the industry and the many career opportunities that exist within it.

Find further information on the conference on page 61.

High school students from Calrossy, Tamworth, get a taste of the research-driven Australian cotton industry at the Australian Cotton Conference in August 2012. With CRDC funding, Wincott was able to organise for students from four schools to attend the conference.

Surveying on-farm environmental resources

In 2011, the Women's Industry Network—Cotton (Wincott) undertook the Women in Cotton Environmental Survey as a project for CRDC. As a follow-up, Wincott conducted an electronic survey at the Australian Cotton Conference in August 2012, with 54 women respondents: 46 per cent professional advisers, 43 per cent involved on-farm and 11 per cent not involved on the farm.

The new survey revealed that the most significant issue affecting farm businesses was seen as the rising costs of farm inputs, then the price of cotton and farm labour issues. Almost all had undertaken one or more environmental measures on-farm.

The next step for the ongoing survey is to analyse the industry-wide survey responses and conduct focus groups in three different cotton regions, to enrich understanding of what is happening on-farm and the motives for undertaking environmental stewardship programs.

STRATEGIC OBJECTIVE 2

Improve human resource development and capacity

Taking R&D to the grassroots

During the year, CRDC once again offered Cotton Grower Associations (CGAs) the opportunity to apply for a grant of up to $10,000 under the Grassroots Grants program to enable them to run a capacity building project for the benefit of their members or community.

As the table below shows, the projects covered a wide spectrum and enabled local cotton industries to gain valuable skills and knowledge.

See page 35 for a detailed look at a completed Grassroots Grant that enabled Tandou Gin, near Menindee, to make valuable energy savings.

Safe practices in a safe environment

A revision of all existing Workplace Health and Safety resources and the updating or development of new induction and safety guides for harvest have been completed, in consultation with an industry steering committee.

Grassroots Grants 2012–13	
CGA	Project
Upper Namoi	Capacity building via a soil nutrition workshop.
Macquarie	Macquarie Cotton Growers' momentum continues: a series of skills and knowledge events for growers.
Dawson Valley	Teacher attendance and travel to the Field to Fabric course.
Lower Namoi	Capacity building at the Cotton Fibre Expo.
Central Highlands	Central Highlands irrigation history book: documents the 40-plus years of irrigation made possible by the Fairbairn Dam and Emerald Irrigation Scheme.
Lachlan and Murrumbidgee	An afternoon of cotton—a public awareness campaign of the emerging cotton industry in southern New South Wales.
Dawson Valley	Travel for Mike and Debbie Austin to the Australasian Pacific Extension Network International Conference (Christchurch) to present a paper *All for one and one for all: the story of 'Harcourt' and the Dawson Valley cotton growers.* This documents the proactive response to devastating floods in 2010–11 using *my*BMP and support from incentive funding provided by CRDC, the Fitzroy Basin Association and the Australian Government.
Walgett and Lower Namoi	Future industry leaders excursion: enabling a group of young cotton growers to learn more about their industry and encourage them to become active in industry organisations.

The new resources were piloted with growers in May and June 2013, then revised and uploaded to the *my*BMP site. Further piloting of the resources on the site will take place early in the 2013–14 financial year and final revisions, if required, will be completed after sign off by the steering committee.

During the year CRDC, RIRDC, FRDC, SRDC and GRDC established a new joint venture, the Primary Industries Health and Safety Partnership (PIHSP), with RIRDC managing the program. CRDC has participated in all previous RDC collaborative health and safety programs: an involvement stretching back more than a decade. While there have been significant improvements, the agriculture, forestry and fishing industries recorded the highest fatality rates of any industry in 2010–11, with 17.64 deaths per 100,000 workers: nine times the overall Australian fatality rate. Clearly, more must be done to encourage safer Australian farm and fishing workplaces.

Although the PIHSP is a small program, it will seek to have a significant influence over future improvements to primary industry workplace health and safety (WHS) by strategic investment under three key objectives:

- To understand the various elements that influence WHS in the primary industries, the interactions between them and how they influence WHS outcomes
- To identify the barriers that lead to poor WHS outcomes
- To identify and implement approaches that will deliver positive WHS outcomes within the primary industries.

Ginning training courses aid handling of record harvests

Two large crops in a row saw the cotton ginning sector experience problems maintaining the training of the many new staff they needed to help process this record production. In response, CRDC commissioned CSIRO to initiate training courses for ginners.

Because ginning courses, once conducted by New South Wales TAFE, ceased during the drought, CSIRO invited US experts to run courses in 2013 and 2014, covering the two main types of US ginning equipment used in Australia. In February 2013, an expert from ginning equipment manufacturers, Lummus, conducted two five-day intensive ginning courses with 20 staff from 10 ginning companies. Feedback from the participants has been excellent. The next courses will be presented in January/February 2014 in Narrabri and Warren, focusing on Continental Eagle equipment.

Getting the complete picture

The Field to Fabric course, conducted by CSIRO CMSE, with CRDC support, is designed to give a better understanding of how the cotton industry's segments operate and relate to one another. It covers global perspectives, variety selection, agronomy, fibre properties, harvesting, ginning, classing, marketing, yarn manufacture, fabric formation, dyeing, finishing and printing, and environmental issues. This enables participants to return to their own regions and spread the holistic message about high quality cotton.

2012–13 saw two well-attended courses conducted at CSIRO CMSE's Geelong site (they have now moved to more modern premises at Deakin University). CRDC sponsored five industry people, mainly growers, to each course. A CRDC Grassroots Grant to the Dawson Valley CGA saw them sponsor three local teachers to attend the course.

CSIRO also conducted a Field to Fabric 'road show', visiting many cotton growing towns to present a range of information about post-farm gate processing and highlight the importance of maintaining fibre quality on the farm.

The Cotton Production Course, offered through the University of New England (UNE), has been available to undergraduate and post-graduate students for the past 15 years. 2012–13 saw a total of 93 students enrolled, including 38 external students, 17 students at the University of Sydney and one at Charles Sturt University. The course lecturer, Brendan Griffiths, also visited the campus of the University of NSW to deliver cotton-specific lectures. Cotton Production and Cotton in the Environment unit course notes are being revised.

Attracting and retaining PhD students

Since 1993, CRDC and three successive Cotton CRCs have invested in over 200 postgraduate scholars, mostly PhD students. Most of these students have gone on to careers in agriculture-related research or research administration and many have established careers in cotton research. Despite this, encouraging students to embark on a career in scientific research has become more challenging in recent years.

In fact, during the reporting year although CRDC was able to successfully support four new PhD students, it has had to hold open three PhD scholarship projects because suitable applicants could not be found.

CRDC believes it has a competitive post-graduate stipend and will negotiate on project operating funding; however, the current reality demonstrated that further steps may need to be taken to encourage good quality students. In 2012–13, CRDC commissioned a small study to identify whether a more dynamic PhD program that produces multi-skilled industry-ready PhD graduates could be developed. The report from the project highlighted eight aspects—ranging from a dedicated PhD coordinator to structured professional development plans for students—that could be considered by CRDC if it decides to offer a more structured program for post-graduates. Commissioned funds have been allocated in 2013–14 for some of these initiatives.

Dr Rhiannon Smith demonstrates that it not only the students but also the cotton industry that receive great benefits from a strong PhD program, attracting highly able students.

Rhiannon began her association with CRDC with a PhD scholarship, studying the benefits of establishing and managing native vegetation on cotton farms.

She is now a Research Fellow in Ecosystem Management at the University of New England and is conducting a CRDC post-doctoral study into how cotton farmers can take advantage of any future ecosystems markets.

Cotton Development and Delivery Joint Venture

An exciting new joint venture by CRDC, Cotton Australia and Cotton Seed Distributors (CSD), launched at the 2012 Cotton Conference, is already providing the industry with a substantially revitalised Development and Delivery (D&D) service to take research to the farm as quickly as possible, underpinned by *my*BMP.

The principal goal of the venture is to provide new resources and energy into turning research into best practice. The D&D management committee has built on the already strong skills base of industry technical specialists put in place since the drought, establishing an on-the-ground team of seven, the CottonInfo team. Its members are a key resource for the industry's capacity to respond to emerging or emergency issues, whether at a regional or national level.

The CottonInfo team works to ensure that all growers, consultants and advisors have access to the latest research information and that the information they have is strongly relevant for each region. Of particular note is increased support for growers in southern NSW, where the industry continues to grow in size. Support in the cotton regions includes local trials where necessary to ensure that research outcomes can be better adapted to meet local needs. Team members will provide direct services to growers where this is not already met in the marketplace, streamlining information delivery rather than duplicate existing services.

The new approach to research communication is addressing both immediate and longer-term issues and targets have already been set for high priorities that underpin farm profitability such as water use efficiency, nitrogen use efficiency, energy efficiency, stewardship, pest, weed and disease management, biodiversity and natural asset management at both the farm and landscape scale.

The D&D management team consists of CSD Managing Director Peter Graham and General Manager Steve Ainsworth, Cotton Australia's Policy Manager Greg Kauter, D&D Program Manager Ian Taylor (CRDC), Cotton Australia CEO Adam Kay, and CRDC Farming Systems Program Manager Tracey Leven and Executive Director Bruce Finney

CRDC offered nine half scholarships to industry people seeking to enrol as external students. The lecturer is also supervising two Masters students and collaborating with Michael Williams at UNE in the development of cotton units to be delivered under the Bachelor of Agrifood Science course now under development. This course will herald a new type of dual sector course in which students will commence their studies in the Vocational Education and Training (VET) sector before finishing their degrees in the tertiary sector.

Raising awareness about herbicide resistance

CRDC collaborated with GRDC to address concerns relating to the development of herbicide resistance across northern farming systems. This project formed part of an effort to increase grower awareness of the likely impacts of resistance to their farming systems and worked closely with key researchers based in the north, the GRDC-funded grower solutions groups, Crop Consultants Australia, and land management groups.

Although the project had to be wrapped up early due to the departure of the principal researcher, it had already helped to increase significantly the awareness of herbicide resistance—particularly glyphosate resistance—among both growers and consultants in grains and cotton systems in the northern region. A wide range of events for a total of 784 participants provided management solutions to growers and consultants, enabling them to manage resistant or tolerant weeds species in their farming systems more successfully.

STRATEGIC OBJECTIVE 3

Enhance capacity to innovate

New role for *my*BMP

The *my*BMP website has become the primary information delivery platform for research information to the industry. While *my*BMP is already an excellent information source, the new D&D joint venture will further enhance its capability for information delivery and build in linkages to other sites such that growers and advisors are better supported in their information needs. To deliver against this goal the current content in the *my*BMP modules is being assessed and Best Management Practices reviewed to better define actual best practice and streamline the certification processes. The new *my*BMP website services are being made available sequentially during 2013.

Certification of best practice remains a key goal of *my*BMP and full certification services will continue to be fully supported for farms where growers or managers wish to achieve the highest level of best practice recognition.

The services offered by the CottonInfo team are fully complementary with growers' existing information and knowledge services provided by agribusiness, agronomy consultants, state and federal departments and, importantly, as partners with a number of organisations seeking to leverage and extend the reach of cotton R&D to better meet grower needs.

Find further information on *my*BMP, and D&D activities and achievements at mybmp.com.au.

Training scheme proves life changing for young Aboriginal trainee

Twenty three year old Shane Toomey says that a pilot training scheme, supported by CRDC through the Australian Government's Caring for our Country initiative, has changed his life.

Shane's host organisation for his training was the Australian Cotton Research Institute (ACRI), located between Narrabri and Wee Waa and home to researchers from the CSIRO and New South Wales Department of Primary Industries.

The twelve-month project offers TAFE and farm-based training for Aboriginal people in the Narrabri district in north west New South Wales. Shane has been working towards a Certificate II in Rural Production, combining one day a week at TAFE and four days of on-the-job training. Ten months into his traineeship, the ACRI offered him a permanent job as a farmhand.

'This traineeship has been my first time in agriculture and farming,' Shane says. 'I thought TAFE might be harder but I handled it easily and enjoyed learning and then putting it into action on the farm. It made me realise that I wanted to make a career out of agriculture.

'I'm sure this job will open new doors for me and give me a chance to continue to work in the cotton industry.'

Shane has a three year old daughter and his partner is expecting another child. He explains that his new job will bring him closer to his dream of buying his own home for his family.

This project is one of twenty nationwide and the first of its kind in Narrabri. CRDC Natural Resource Management Program Manager, Jane Trindall, oversees the program. She explains that

Gus Mason, George Lamb and Shane Toomey during their training

its aim is to enable the trainees to gain skills and experience for employment within the cotton industry and natural resource management, with a nationally recognised qualification.

Shane was one of four Aboriginal trainees, all in their twenties, who took part in the scheme. Their work covered a wide range of farm activities such as fencing, chemical application, occupational health and safety, assisting with the agricultural crop by applying fertiliser, weed control and operating and maintaining machinery.

This program has shown the benefits of a range of local organisations and landholders working together to support CRDC with this project. These included the Narrabri Local Aboriginal Land Council, Australian Business Apprenticeships Centre, New South Wales TAFE, Joblink Plus, Namoi Catchment Management Authority and New South Wales Office of Environment and Heritage.

AES traineeships for high school students

CRDC is supporting three school-based Aboriginal Employment Strategy (AES) trainees in 2013. Tchkalee Booby, from Wee Waa High is undertaking the second year of her traineeship at CRDC, and Tia Smith and Robert Condran began a Rural Skills Certificate II in February 2013, while undertaking Year 11 at Narrabri High School.

The partnership and interaction with the students, CRDC staff, AES, CSIRO researchers, High School Career Counsellors, and the students' families is a positive experience for all who are involved, particularly the young students and their families.

Tchkalee says:

'This traineeship has taught me a lot about myself—how to actually operate in a workplace environment, how to manage and prioritise, how to interact with people and be more self sufficient, and other important things more difficult to list as skills or abilities. It has opened my eyes to the wide range of possibilities when I finish school.

'While completing this traineeship has been good for me personally, the TAFE Business II Certificate allows me to acquire all required units in school to be able to successfully complete my HSC this year. I hope to work in the medical field—ideally as a paramedic, because having a profession where the situation changes every day and you never know what to expect would allow me to help people, whilst continuing to challenge myself.'

In short: other learning initiatives

In 2012–13, a CRDC investment enabled the cotton industry to seek cotton industry membership of the Primary Industries Education Foundation (PIEF). Following discussions with Cotton Australia, it was decided that they were the most suitable organisation to act as the PIEF member. Following a successful first year in 2012–13, CRDC has continued to co-invest with Cotton Australia.

In the interest of encouraging effective coordination and collaboration across the industry, CRDC convened a forum on October 11 that brought together CRDC, Cotton Australia, Cotton Seed Distributors and researchers to discuss virtual media and web platform development and delivery. It provided an opportunity for the new D&D joint venture to be promoted as well as highlight the importance of *my*BMP as a key delivery channel. There was strong support for working towards integration of a range of activities including an industry database, calendar, photo and video libraries, industry statistics and facts and R&D via *my*BMP. Another forum will be held in 2013 to discuss progress.

Leadership programs

- Part sponsorships of Elizabeth Stott and Brooke Summers in the Australian Rural Leadership Program
- Sponsorship of Sandra Hinson in the Peter Cullen Trust Science to Policy Leadership Program 2013
- Support for Cotton Australia's Future Leaders Course
- Sponsored an Australian Government Department of Agriculture, Fisheries and Forestry 2013 Science and Innovation Awards for Young People, awarded to Robert Sharwood
- Supported cotton grower, Andrew Watson, to participate in the Climate Champions program.

Sponsorships and grants

- 2012 Australian Cotton Conference
- Sustaining Rural Communities Conference sponsorship (see below)
- 2013 Australian Cotton Research Conference
- Rotary Youth in Agriculture (Cotton).
- 13 travel grants to conferences and events.

158 delegates, representing a wide variety of organisations, with some 80 per cent from rural NSW, attended the Sustaining Rural Communities conference in Narrabri in June 2013. The concept of resilience is seen as extremely important to rural communities and provided a successful theme for the conference, giving presenters and delegates a concrete topic to build and test ideas to take back to their own communities. CRDC sponsored the conference, in collaboration with the Namoi CMA.

16th Australian Cotton Conference

'Growing better all the time'

The Australian Cotton Conference is a lively grower-attended, research-driven institution within the cotton industry. CRDC has been a major sponsor since its inception and is integrally involved in its planning and execution.

While the breaking of the drought has seen a rapid resurgence in cotton production, the industry—perhaps unique in its widespread commitment to improvement through research and development—is conscious of not resting on its laurels. Like other agricultural sectors, the economics of cotton growing are under pressure, with rising input prices and declining terms of trade.

Conference number 16, in August 2012, returned to full strength after a debilitating decade of drought: 1600 delegates, with eighty speakers, an exhibition of 50 research posters and 75 exhibitors.

Over three days, sessions ranged across economic, environment and social issues confronting the industry: from the latest in weed control and resistance management, to the economics of cotton production. There were sessions on the impact of mining and coal seam gas, connecting young Aboriginal people into the industry, the supply logistics challenges of record crops, a cotton growing master class and a well attended session on dryland cotton.

Cotton Australia director Hamish McIntyre chaired the *Carbon and Energy Costs—a Better Bottom Line* session. As he emphasised, the industry looks forward to future farming systems that incorporate carbon and energy management and provide farmers with an ability to offset the cost of production and receive recognition for good land stewardship. This will build on a range of already available effective solutions for farmers to improve energy use efficiency and best management practices in areas such as soil health and managing crop inputs.

The conference was also a launching point for important new industry partnerships, new publications and initiatives, detailed elsewhere in this report.

Supporting the next generation of leaders

The Horizon Scholarship program was developed by RIRDC, who manage it on behalf of all participating organisation, including CRDC. It is designed for young people who are passionate about agriculture, who have a keen interest in the future of our industries and are ready to expand their networks and learn new skills. They must be studying agricultural, rural, livestock/animal or veterinary or plant science, or agribusiness.

CRDC awarded five new Horizon Scholarships in 2013: to Alana Johnson, Jessica Kirkpatrick, Paul Sanderson and Emily Miller who are studying for a Bachelor of Agriculture and Charlie French who is combining that degree with a Bachelor of Business. They join CRDC's existing Horizon scholars, Billy Browning and Kirsty McCormack.

Bursaries provide the scholarship holders with professional development workshops, annual industry work placements that give students first-hand exposure to modern agricultural practices, and opportunities to network and gain knowledge at a range of industry events.

CRDC scholarship holders at the Horizon Scholars' 2013 workshop: (*back*) Billy Browning, Jessica Kirkpatrick, Paul Sanderson, Charlie French and Emily Miller, and *(front)* Kirsty McCormack, Trudy Staines (Cotton Education Officer) and Alana Johnson.

CORPORATE OPERATIONS

Contents

OUR PEOPLE

BOARD OF DIRECTORS 2012–13

Chair

Mike Logan
(GAICD)

Mike Logan, was initially appointed Chair of CRDC on 13 August 2007, and reappointed for a further three-year term, which he completed on 13 August 2013 (after the end of the 2012–13 reporting year). He was 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 as a non-executive director for a three-year term commencing 1 October 2008 and reappointed for a second term commencing 1 October 2011. She was the Board's Vice-Chair during the 2012–13 reporting year; on 13 August 2013, she was appointed Chair. 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 eleven years experience in rural agriculture. She has an extensive background in both private and public sectors, with specific emphasis on leadership development and governance.

Dr Corbett is Chair of the West Moreton Health and Hospital Board, and Deputy Chair of the Southbank Institute of Technology. She was previously Deputy Chair of the Australian Agriculture Corporation and a Board member of the Sugar Research and Development Corporation and Food Science Australia.

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, Director of the Australian Cotton Industry Council and Chair of Cotton Industry Development in Northern Australia.

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

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 Plant Biosecurity CRC, appointed in March 2013. Previously he was the CEO of FrOG Tech Pty Ltd, a private research company specialising in geological reconstructions and interpretations across a range of sectors, including oil and groundwater, and CEO of GeoSphere Ltd, a specialist geological consulting firm in New Zealand.

Dr Robinson has extensive experience in primary industries and natural resources research, development and extension: he was the Executive Director of Land & Water Australia, Centre Director of the Primary Industries Climate Challenges Centre (a joint venture between DPI Victoria and University of Melbourne), Chair of the National Climate Change Research Strategy for Primary Industries, CEO of the CRC for Greenhouse Accounting, and a member of the National Primary Industries Standing Committee RD&E Extension Subcommittee.

Cleave Rogan
(MAICD)

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

Mr Rogan has been farming and marketing cotton and grains for 30 years. He has acted in an advisory role to CRDC, working on research projects related to biosecurity, insects, weeds, diseases, cotton fibre processing and quality enhancement. Mr Rogan was a director of Cotton Australia and has been an industry representative on various other cotton industry associations and research advisory committees.

Lorraine Stephenson
BSc (Hons), MBA, PhD, (GAICD)

Lorraine Stephenson was appointed to the Board for a three-year term commencing 1 October 2011. She is a member of the Intellectual Property Committee.

Dr Stephenson is the Principal Consultant for Lightning Consulting Services, an independent energy and climate change strategic advisory business. She has over 30 years' experience in the energy sector and has a strategic focus on creating opportunities for Australian businesses and governments to respond to climate change challenges.

Dr Stephenson is the former Chief Clean Energy Advisor to the Queensland Government. She is a member of the Expert Panel on Emissions Intensive Trade Exposed Industries, a member of the NSW Climate Change Council and a nonexecutive director of Good Environmental Choice Australia Ltd.

About the Board of Directors

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

Composition of the Board remained unchanged in 2012–13, with the terms of appointment of current Directors to finish on 30 September 2014. Accordingly, there were no Selection Committee activities during the reporting year.

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 PIERD Act 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.

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.

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. Members undertook training in crisis management in 2012–13.

Responsibilities

The roles and responsibilities of Directors are set out in the Board Charter, which includes a governance statement, 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 2013 and reported to the February Board meeting. The overall Board performance was evaluated as being of a high standard, meeting its charter. The review identified areas for ongoing improvement that have been included in the Board's work plan.

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.

Conflicts of interest

In accordance with Section 131 of the PIERD Act, Directors are appointed based on their expertise and do not represent any particular organisation or interest group.

The Board follows section 21 of the CAC Act 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. No conflicts of interest were identified in 2012–13.

Board Charter

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

Indemnities and Insurance Premiums for Directors and officers

The Board has taken the necessary steps to ensure professional indemnity cover is in place for present and past officers of CRDC, including Directors of the Corporation, consistent with provisions of the CAC Act. The Corporation's insurance cover is provided through Comcover; however, the insurance contract prohibits CRDC from disclosing the nature or limit of liabilities covered. In 2012–13, directors and officers liability insurance premiums of $3,194 were paid and no indemnity-related claims were made.

Board meetings

Board Meeting	Date	Location
2012/04	13 August 2012	Broadbeach, Queensland
2012/05	14–15 November 2012	Moree, NSW
2013/01	5–6 February 2013	Narrabri, NSW
2013/02	13–14 March 2013	Canberra, ACT
2013/03	18–19 June	Geelong, Victoria

Attendances at Board Meetings

Director	Board meeting				
	2012/04	2012/05	2013/01	2013/02	2013/03
Mike Logan *(Chair)*	Yes	Yes	Yes	Yes	Yes
Mary Corbett	Yes	Yes	Yes	Yes	Yes
Bruce Finney	Yes	Yes	Yes	Yes	Yes
Richard Haire	Yes	Yes	Yes	Yes	Yes
Hamish Millar	Yes	Yes	Yes	Yes	Yes
Michael Robinson	Yes	Yes	Yes	Yes	Yes
Cleave Rogan	Yes	Yes	Yes	Yes	Yes
Lorraine Stephenson	Yes	Yes	Yes	Yes	Yes

Board Committees

The Board operated the Audit, Intellectual Property and Remuneration Committees in 2012–13. 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 PIERD Act and section 32 of the *Commonwealth Authorities and Companies Act 1997* (CAC Act), 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.

Richard Haire was Chair of the committee, with Mike Logan and Michael Robinson as members. The Executive Director, Bruce Finney, attended the meetings as an observer. The Audit Committee met five times during 2012–13.

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 with Lorraine Stephenson, Hamish Millar and Cleave Rogan as members. Executive Director, Bruce Finney, attended as an observer. The committee met three times during 2012–13.

Remuneration Committee

The Remuneration Committee advises the Board on the Executive Director's remuneration and senior staff remuneration adjustments. Mike Logan was Chair in 2012–13, with Mary Corbett and Richard Haire as members. The Remuneration Committee met twice during 2012–13.

Attendances at Audit Committee meetings

Member	Date of meeting				
	9 August 2012	7 November 2012	31 January 2013	12 March 2013	14 June 2013
Richard Haire *(Chair)*	Yes	Yes	Yes	Yes	Yes
Mike Logan	Yes	Yes	Yes	Yes	Yes
Michael Robinson	Yes	Yes	Yes	Yes	Yes

Attendances at Intellectual Property Committee meetings

Member	Date of meeting		
	7 November 2012	12 December 2012	31 January 2013
Mary Corbett *(Chair)*	Yes	Yes	Yes
Lorraine Stephenson	No	Yes	Yes
Hamish Millar	Yes	Yes	Yes
Cleave Rogan	Yes	Yes	Yes

Attendances at Remuneration Committee meetings

Member	Meetings	
	26 July 2012	14 June 2013
Mike Logan *(Chair)*	Yes	Yes
Mary Corbett	Yes	Yes
Richard Haire	Yes	Yes

STAFF

Organisational structure at 30 June 2013

CRDC Board of Directors **Chair** Mike Logan			
Executive Director Bruce Finney			
R&D Investment Team	Development & Delivery Program	Communication	Business and Finance Team
General Manager R&D Investment Paula Jones* R&D Managers *Program 1* Dallas Gibb** *Program 2* Tracey Leven* Allan Williams* (Soils, Nutrition and Climate Change) Jane Trindall (NRM) *Program 3* Bruce Pyke*	Manager Ian Taylor* R&D Technical Specialist Susan Maas*	Communication Manager Rohan Boehm*	General Manager Business and Finance Graeme Tolson* Accounting Assistant Heather Martin* Executive Assistant Dianne Purcell* Project Administration Manager Kara Taylor* Project Administration Assistant Amy Withington*

* Employee
** External (contractor)

As at 30 June 2013, Trainee Accountant Elizabeth Eather was on extended leave.

Employment

Staff members are employed under Section 87 of the PIERD Act, which provides that the terms and conditions of employment are to be determined by the Corporation. Including the Executive Director, there were twelve full-time employees and three part-time employees as at 30 June 2013.

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 2012–13

The year saw a number of changes as the organisation expanded the scale and scope of its functions. CRDC entered into a new role in supporting the development and delivery (D&D) of research, in partnership with industry. Susan Maas commenced 2 July 2012, in the position of Technical Specialist and Ian Taylor commenced 10 September as Manager for the D&D Program.

Succession management and increased investment in R&D saw the addition of R&D Managers, with Jane Trindall commencing 17

July 2012 and Allan Williams moving from a consultancy arrangement to employment on 1 January 2013. Paula Jones commenced on 26 November as Strategy Advisor and was appointed General Manager—R&D Investment on 1 March 2013, succeeding Bruce Pyke who had fulfilled this role since the Corporation's inception in 1990.

Some change also occurred in administration. Fiona Mead, Project Administrative Manager, left the Corporation on 31 October 2012 and was replaced by Kara Taylor and Amy Withington (as Project Administration Assistant) on the 1 November 2012. Trainee Accountant, Elizabeth Eather, commenced extended leave on 25 March 2013 and Heather Martin is employed from 6 May 2013 for the period of Elizabeth's leave.

Staff training and development

In 2012–13, the Corporation spent $10,821 on training and $36,898 on recruitment. Areas of direct training activities were intellectual property management, Work Health and Safety, the Field to Fabric course, IT training, CPA workshop and support for a trainee undertaking academic studies in accounting.

Throughout the year, Directors and staff participate in a wide range of Corporation-related activities involving external bodies, 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 as a partnership between the Australian people (through the Australian Government) and the Australian cotton industry (through Cotton Australia—its legislated industry body). It is 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: CRDC was a core participant in the Cotton CRC, which finished its term on 30 June 2012. On behalf of the CRC partners, CRDC is managing CRC projects that are concluding, as well as its intellectual property.

CRDC commenced a joint Development and Delivery venture with Cotton Australia and Cotton Seed Distributors Ltd in August 2012. Further details can be found on page 56 and throughout the report.

Legislation

The PIERD Act

The Cotton Research and Development Corporation began operations in 1990 under the PIERD Act. Our charter under this Act is to invest in and manage a portfolio of research, development and extension projects and programs in order to secure economic, environmental and social benefits for the Australian cotton industry and the community. This is to be conducted in a framework of improved accountability for research and development spending in relation to the cotton industry. The *Primary Industries and Energy Research and Development Amendment Act 2007* amended the PIERD Act in several respects to deliver an enhancement in the governance of Rural R&D Corporations.

PIERD 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.

PIERD Functions

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	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 just-completed CRDC Strategic Plan 2008–2013, which incorporated Australian Government and cotton industry R&D priorities, as well as advice from the Minister and the Department of Agriculture, Fisheries and Forestry.

Function	Application
Preparing an Annual Operating Plan for each financial year	An Annual Operating Plan is submitted to the Australian Government in April each year and implementation proceeds once Government approval is received.
Coordinating and funding R&D activities consistent with current planning documents	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.
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	The Corporation reports formally to the Australian Parliament through its Annual Report. In addition, CRDC 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 and Cotton Australia occurs continually on both a formal and informal basis, as outlined above. Communication with the broader community is a key focus of CRDC's communication activities. 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.
Facilitating the dissemination, adoption and commercialisation of research and development results in relation to the cotton industry	Over more than a decade, the Australian cotton industry benefited from having an industry-wide extension network, supported by CRDC and continually reviewed and modified to suit prevailing conditions. A new joint venture by CRDC, Cotton Australia and Cotton Seed Distributors (CSD), launched in 2012, is providing the industry with a substantially revitalised Development and Delivery (D&D) service to take research to the farm as quickly as possible. The new CottonInfo team is already working to improve responsiveness to grower needs through better communication and regional representation, focusing on delivering research directly to the grower via agronomy consultants and agribusinesses. 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 practices program, *my*BMP. CRDC staff members play a pivotal role in facilitating fast and effective dissemination of CRDC-funded research outcomes. 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.

PIERD 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.

The CAC Act

CRDC has been subject to the *Commonwealth Authorities and Companies Act 1997* (CAC Act) since August 1998. The CAC Act provides enhanced levels of accountability, as well as a planning and reporting framework.

Other legislation

The setting and collection of levies on the cotton industry is enabled by the *Primary Industries (Excise) Levies Act 1999* and the *Primary Industries Levies and Charges Collection Act 1991*.

Responsible Minister

The Corporation is accountable to the Australian Parliament through the Minister for Agriculture, Fisheries and Forestry. During the reporting year, Senator the Hon. Joe Ludwig held that position. The Hon. Joel Fitzgibbon MP became the Minister on 2 July 2013. Following a change of government, the Hon. Barnaby Joyce MP became the Minister on 18 September 2013 and Senator the Hon. Richard Colbeck became Parliamentary Secretary to the Minister.

The Minister's powers and responsibilities, as outlined under various sections of the PIERD Act, include appointing the Corporation's Chair and Directors and, under certain conditions, terminating these appointments; approving the Corporation's Research and Development (Five Year) Plan and Annual Operating Plan and any variations to them; appointing a person as Presiding Member of CRDC's Selection Committee, as well as other members of that Committee; and transferring to CRDC any assets held by the Commonwealth that the Minister considers appropriate and which would assist its performance and function.

Ministerial Directions

No formal ministerial directions were issued in 2012–13; however, the former Minister for Agriculture, Fisheries and Forestry, the Hon. Joe Ludwig, wrote to CRDC on 23 July 2012, enclosing the Australian Government's newly released *Rural Research and Development policy statement.* In his letter, he detailed the Government measures and his expectation of Rural R&D Corporations in relation to those measures.

As at 30 June 2013, CRDC complies with all Ministerial directions, 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 Procurement Rules, National Code of Practice for the Construction Industry and the Australian Government Implementation Guideline for the National Code (Guidelines), Commonwealth Property Management Framework, Australian Government Foreign Exchange Risk Management Guidelines 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.

Research accountabilities

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

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.

CRDC's reporting processes include the presentation of a formal report to its industry stakeholder. Part of this presentation includes an opportunity for questioning and debating Board decisions. Further information on the relationship between CRDC and Cotton Australia can be found on page 12.

The Annual Operating Plan 2012–13 marked the fifth and final year of operation under the framework requirements of the Strategic Plan 2008–2013.

Risk management

CRDC 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.

During 2012–13 CRDC completed its transition from the Protective Security Manual 2005 to the Protective Security Policy Framework 2012. In accordance with Section 28 of the CAC Act, the Corporation has continued to ensure that the general policy order for Protective Security has continued to operate for 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.

Risk Management reviews

Directors and management conducted, commissioned or enacted the following reviews during 2012–13:

Review	Process and/or Outcome
	Corporate reviews
Organisational Performance	ACIL Tasman conducted a review of CRDC's organisational performance in October 2012. The review was to assist CRDC in guiding organisational improvements to efficiency and effectiveness in implementing the 2013–18 Strategic R&D Plan. The Board and management of CRDC accepted the report recommendations for improvement to CRDC's performance framework, stakeholder engagement and human resource management.
WHS Audit	Chasm Resources conducted an audit of CRDC's safety management systems in July 2012. The audit was conducted in accordance with the standard AS/NZS 4801:2001 OH&S Management systems and for compliance with the WHS Act 2011. The Board noted the high level of conformance and continual improvement process at work.
Fraud Control	Nexia Australia conducted an external audit in May 2013. The audit was conducted in accordance with Australian Auditing Standards for the assistance of Directors in evaluating the compliance of CRDC with internal controls.
ICT Strategy	BSR Solutions reviewed CRDC's ICT systems and future needs in June 2013. The review informed the documenting of an ICT Strategy consistent with Commonwealth Government Guidelines and industry best practice. The Board considered and adopted the ICT Strategy.

Review	Process and/or Outcome
Information Security	Oakton Services conducted an external review in June 2013. The review assessed the alignment of CRDC's information security systems and practices with the Protective Security Policy Framework and the Information Security Manual for the assistance of Directors in evaluation the compliance of CRDC with internal controls.
Communications	A review of CRDC communication strategy, resourcing, policies and procedures commenced in 2013 and is ongoing.
R&D strategic reviews	
Northern Basin Water Science	The two-day forum identified short term (to 2015) and long-term (to 2020) R&D gaps. It articulated a vision for a coordinated and targeted science plan with improved networks between basin water scientists, managers and people working in policy.
Environmental Assessment	An independent assessment, coordinated by CRDC and conducted in late 2012, recommended future strategies for environmental performance. The industry will respond formally to the recommendations.
Ginning R&D review	A review conducted and new investment plan for ginning R&D established.

New Research Deed

In 2012–13, CRDC completed a 15 month process of reviewing its head funding agreement. This involved discussion with its research partners and was informed by a review of CRDC's policy for intellectual property management and the work of the PISC RD&E Committee for standardised research agreements and intellectual property management. The new deed was reviewed by the Board's Audit & IP Committees and approved by the full Board.

Intellectual property management

The Corporation reviewed and updated its Intellectual Property (IP) policy and procedures in 2013.

Corporate Planning

In accordance with the PIERD Act and the CAC Act, the Corporation prepares a Strategic (Five Year) R&D Plan, as well as an Annual Operating Plan for each financial year.

CRDC submitted its Annual Operating Plan 2013–14 and new Strategic Plan for 2013–2018 to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Joe Ludwig, on 1 May 2013 and received written advice of approval for both documents dated 24 June 2013.

The Annual Report 2011–12 was submitted to the Minister on 10 October 2012 and his agreement to table the report was dated 19 November 2012. The report was tabled in the House of Representatives on 29 November 2012 and in the Senate on 5 February 2013.

Fraud Control

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 fraud control 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 2012–13.

Service Charter

CRDC does not provide services direct to the public and thus does not have a service charter; however, we have a Board Charter which includes a Governance Statement and a Statement of Principles that embody 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.

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 71.

Significant Events

The Corporation had no significant events in 2012–13, as defined in section 15 of the CAC Act.

Significant Changes in the State of Affairs

CRDC had no significant change in its state of affairs in 2012–13, as defined in section 16 of the CAC Act.

Judicial decisions and reviews by outside bodies

CRDC had no judicial decisions or reviews by outside bodies in 2012–13.

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.

Record of WHS notifiable incidents

Notifiable incidents	2008–09	2009–10	2010–11	2011–12	2012–13
Deaths	0	0	0	0	0
Serious injury or illness (a)	0	0	1	0	0
Dangerous incidents (b)	0	0	0	0	0
Total	0	0	1	0	0

(a) Serious injury or incidents 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.

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

CRDC Work Health and Safety 2012–13: a summary

Legislative reporting requirements Schedule 2 Part 4 of the *Work Health and Safety Act 2011*	Action undertaken 2012–13
Initiatives during the year and outcomes	An independent audit of WHS performance, which informed the review and updating of CRDC's WHS Policy and procedures. An asbestos audit undertaken and management plan completed. Fire warden, evacuation, fire extinguisher, ergonomics training. 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. A flu vaccination program for all staff. Work Health and Safety inductions for new staff, directors and contractors.
Statistics of any notifiable incidents as defined by s.38 of the WHS Act	CRDC had no notifiable incidents in 2012–13.
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 did not receive any Freedom of Information requests in 2012–13. If CRDC receives such a request it will 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 also available at www.crdc.com.au.

Categories of documents held

Category	Nature	Access
Administration	Files	D
Annual Operating 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

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 $727,357, 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 adjacent table.

Contractor	Service provided 2012–13
A & A Williams Pty Ltd	Program management
ACIL Tasman	Strategic advice
Banki Haddock Fiora Lawyers	Legal advice
Business Strategy Review Pty Ltd	ICT strategy
Tracey Byrne-Morrison	Conference management
Yvette Cunningham	Project management
FI Solutions	Software consultants
Helen Wheels HR	Project management
Melanie Jenson	Publication content
Neil Deacon Art Director	Creative advice
Nexia Court & Co	Internal audit services
Pacific Search Partners P/L	Recruitment
Psionic Creative P/L	Software consultants
TechMAC Pty Limited	Program management
Weemalah Writeability	Publication content, editing and design

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.

Payment to representative bodies

The Corporation's industry representative body is Cotton Australia. Their role 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
- Participation in CRDC forums.
- A meeting to receive and discuss the CRDC annual report for the preceding year. This enables the industry representative body to ensure CRDC's activities for that year have met its strategic objectives and to question senior staff on any matters of interest or concern

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 2012–13, CRDC contributed a total of $68,280 to Cotton Australia for the following activities:

- Review of CRDC 2012–13 research reports
- Review of CRDC 2013–14 research applications
- Project support for CottonMap
- Project support for the Primary Industries Education Foundation
- Project support for Horizon Scholarship participants.

FINANCIAL STATEMENTS

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INDEPENDENT AUDITOR'S REPORT

To the Minister for Agriculture

I have audited the accompanying financial statements of Cotton Research & Development Corporation for the year ended 30 June 2013, which comprise: a Statement by the Directors, Executive Director and Chief Finance Officer; the Statement of Comprehensive Income; Balance Sheet; Statement of Changes in Equity; Cash Flow Statement; Schedule of Commitments; Schedule of Contingencies; and Notes comprising a Summary of Significant Accounting Policies and other explanatory information.

Directors' Responsibility for the Financial Statements

The directors of the Cotton Research & Development Corporation are responsible for the preparation of the financial statements that give a true and fair view in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including the Australian Accounting Standards, and for such internal control as is necessary to enable the preparation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

My responsibility is to express an opinion on the financial statements based on my audit. I have conducted my audit in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards. These auditing standards require that I comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Cotton Research & Development Corporation preparation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Cotton Research & Development Corporation's internal control. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the directors, as well as evaluating the overall presentation of the financial statements.

GPO Box 707 CANBERRA ACT 2601
19 National Circuit BARTON ACT
Phone (02) 6203 7300 Fax (02) 6203 7777

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 & 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 & Development Corporation's financial position as at 30 June 2013 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
19 September 2013

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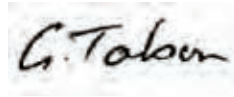
Statement by the Directors, Executive Director and Chief Finance Officer

In our opinion, the attached financial statements for the year ended 30 June 2013 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	Signed	Signed	Signed
			
Dr Mary Corbett Chairperson	Richard Haire Director	Bruce Finney Executive Director	Graeme Tolson Chief Finance Officer
27th August 2013	27th August 2013	27th August 2013	27th August 2013

STATEMENT OF COMPREHENSIVE INCOME

for the period ended 30 June 2013

	Notes	2013 $	2012 $
EXPENSES			
Employee benefits	3A	**1,910,084**	1,306,251
Supplier	3B	**614,382**	443,555
Grants	3C	**16,728,779**	11,930,521
Depreciation and amortisation	3D	**47,464**	35,584
Losses from asset sales	3E	**737**	1,136
Total expenses		**19,301,446**	13,717,047
LESS:			
OWN-SOURCE INCOME			
Own-source revenue			
Interest	4A	**1,725,869**	1,401,196
Rental income	4B	**10,478**	15,000
Royalties	4C	**3,971,210**	3,144,994
Other revenue	4D	**1,884,238**	1,731,120
Total own-source revenue		**7,591,795**	6,292,310
Net cost of (contribution by) services		**11,709,651**	7,424,737
Revenue from Government			
PIERD Act 1989 Contribution	4E	**11,522,788**	9,529,194
Levies and penalties	4F	**11,801,096**	9,531,898
Total revenue from Government		**23,323,884**	19,061,092
Surplus (deficit) attributable to the Australian Government		**11,614,233**	11,636,355
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		**11,614,233**	11,775,593

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

BALANCE SHEET

as at 30 June 2013

	Notes	2013 $	2012 $
ASSETS			
Financial assets			
Cash and cash equivalents	5A	**39,260,782**	26,205,066
Trade and other receivables	5B	**5,763,085**	4,481,513
Total financial assets		**45,023,867**	30,686,579
Non-financial assets			
Land and buildings	6A	**694,412**	690,000
Property, plant and equipment	6B,C	**65,182**	85,298
Intangibles	6D,E	**17,585**	3,875
Other non-financial assets	6F	**–**	7,965
Total non-financial assets		**777,179**	787,138
Total assets		**45,801,046**	31,473,717
LIABILITIES			
Payables			
Suppliers	7A	**161,613**	90,826
Grants	7B	**6,270,194**	3,684,745
Other payables	7C	**95,990**	59,464
Total payables		**6,527,797**	3,835,035
Provisions			
Employee provisions	8A	**341,754**	230,223
Other provisions	8B	**–**	91,197
Total provisions		**341,754**	321,420
Total liabilities		**6,869,551**	4,156,455
Net assets		**38,931,495**	27,317,262
EQUITY			
Reserves		**345,937**	345,937
Retained surplus		**38,585,558**	26,971,325
Total equity		**38,931,495**	27,317,262

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

STATEMENT OF CHANGES IN EQUITY

for the period ended 30 June 2013

	Retained earnings		Asset revaluation reserve		Total equity	
	2013	2012	**2013**	2012	**2013**	2012
	$	$	**$**	$	**$**	$
Opening balance						
Balance carried forward from previous period	**26,971,325**	15,334,970	**345,937**	206,699	**27,317,262**	15,541,669
Adjustment for errors	**–**	–	**–**	–	**–**	–
Adjustment for changes in accounting policies	**–**	–	**–**	–	**–**	–
Adjusted opening balance	**26,971,325**	15,334,970	**345,937**	206,699	**27,317,262**	15,541,669
Comprehensive income						
Other comprehensive income	**–**	–	**–**	139,238	**–**	139,238
Surplus (deficit) for the period	**11,614,233**	11,636,355			**11,614,233**	11,636,355
Total comprehensive income	**11,614,233**	11,636,355	**–**	139,238	**11,614,233**	11,775,593
Transfers between equity components	**–**	–	**–**	–	**–**	–
Closing balance as at 30 June	**38,585,558**	26,971,325	**345,937**	345,937	**38,931,495**	27,317,262

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

CASH FLOW STATEMENT

for the period ended 30 June 2013

	Notes	2013 $	2012 $
OPERATING ACTIVITIES			
Cash received			
Industry levies and penalties		**12,958,210**	8,323,165
Commonwealth contributions		**10,462,148**	8,212,888
Royalties		**3,548,596**	3,432,860
Grants		**1,437,504**	71,763
Novation receipts		**–**	418,333
Interest		**1,281,554**	1,236,522
Novation income interest		**–**	35,568
Net GST received		**817,418**	726,127
Other		**560,464**	395,304
Total cash received		**31,065,894**	22,852,530
Cash used			
Employees		**1,765,672**	1,288,382
Grants		**15,536,369**	9,826,739
Suppliers		**570,733**	301,143
Novation grants paid		**91,196**	1,378,178
Novation suppliers paid		**–**	84,290
Total cash used		**17,963,970**	12,878,732
Net cash from (used by) operating activities	9	**13,101,924**	9,973,798
INVESTING ACTIVITIES			
Cash received			
Proceeds from sales of property, plant and equipment		**–**	–
Total cash received		**–**	–
Cash used			
Purchase of property, plant and equipment		**46,208**	65,210
Total cash used		**46,208**	65,210
Net cash from (used by) investing activities		**(46,208)**	(65,210)
Net increase (decrease) in cash held		**13,055,716**	9,908,588
Cash and cash equivalents at the beginning of the reporting period		**26,205,066**	16,296,478
Cash and cash equivalents at the end of the reporting period	5A	**39,260,782**	26,205,066

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

SCHEDULE OF COMMITMENTS

as at 30 June 2013

	2013	2012
BY TYPE	**$**	$
Commitments receivable		
Sublease rental income	**–**	–
Research grant commitments[3]	**1,149,500**	–
Net GST recoverable on commitments[1]	**1,915,470**	1,069,811
Total commitments receivable	**3,064,970**	1,069,811
Commitments payable		
Other commitments		
Operating leases[2]	**153,561**	12,266
Research grant commitments[3]	**20,916,610**	11,755,656
Total other commitments	**21,070,171**	11,767,922
Net commitments payable by type	**18,005,201**	10,698,111
BY MATURITY		
Commitments receivable		
Operating lease income		
One year or less	**–**	–
Total operating lease income	**–**	–
Other commitments receivable		
One year or less	**1,094,355**	650,329
From one to five years	**821,115**	419,482
Total other commitments receivable	**1,915,470**	1,069,811
Commitments payable		
Operating lease commitments		
One year or less	**74,967**	12,266
From one to five years	**78,594**	–
Total operating lease commitments	**153,561**	12,266
Other Commitments		
One year or less	**11,718,143**	7,141,356
From one to five years	**8,048,967**	4,614,300
Total other commitments	**19,767,110**	11,755,656
Net commitments by maturity	**18,005,201**	10,698,111

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 receivable and payable are Agreements Equally Proportionately Unperformed for research, development and extension contracts.

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

SCHEDULE OF CONTINGENCIES

as at 30 June 2013

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 2012; 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:

- The fair value of land and buildings has been taken to be the market value of similar properties as determined by an independent valuer.
- 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 except when the royalty cannot be measured with sufficient reliability and are recognised based on cash received. CRDC's major agreement in plant breeding royalties with CSIRO ceases at 30th June 2017.

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 2013. 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 scheme 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 held 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 held 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:

Asset Class	*Fair value measured at*
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.

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

	2013	2012
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 2013. 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 (2011–12: 5 years).

All software assets were assessed for indications of impairment as at 30 June 2013.

1.19 Taxation / Competitive Neutrality

The Corporation is exempt from all forms of taxation except Fringe Benefits Tax (FBT), State payroll taxes 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) for 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

	2013 **$**	2012 $
Note 3A: Employee Benefits		
Wages and salaries	**1,531,907**	1,109,266
Superannuation:		
Defined contribution plans	**152,072**	94,416
Defined benefit plans	**37,770**	36,211
Leave and other entitlements	**188,335**	66,358
Total employee benefits	**1,910,084**	1,306,251

	2013 $	2012 $
Note 3B: Suppliers		
Goods and services		
External Parties	**542,631**	393,284
Total goods and services	**542,631**	393,284
Goods and services are made up of:		
Provision of goods – external parties	**58,936**	61,596
Rendering of services – external parties	**483,695**	331,688
Total goods and services	**542,631**	393,284
Other supplier expenses		
Operating lease rentals – external parties:		
Minimum lease payments	**68,957**	48,715
Workers compensation expenses	**2,794**	1,556
Total other supplier expenses	**71,751**	50,271
Total supplier expenses	**614,382**	443,555
Note 3C: Grants		
Public sector:		
Australian Government entities (related entities)	**5,742,554**	1,853,311
State and Territory Governments	**3,694,028**	2,325,356
Universities & Colleges	**3,881,201**	1,164,802
Other Research Institutions	**713,372**	4,158,232
Corporate activities	**1,096,437**	1,111,984
Private sector:		
Commercial entities	**1,601,187**	1,316,836
Total grants	**16,728,779**	11,930,521
Note 3D: Depreciation and Amortisation		
Depreciation:		
Buildings	**13,500**	9,519
Office equipment	**10,238**	10,685
Computer equipment	**14,809**	490
Fixtures & Fittings	**1,260**	4,744
Total depreciation	**39,807**	25,438
Amortisation:		
Intangibles		
Computer Software	**7,657**	10,146
Total amortisation	**7,657**	10,146
Total depreciation and amortisation	**47,464**	35,584
Note 3E: Losses from Asset Sales		
Other Property, plant and equipment:		
Proceeds from sale	**–**	–
Carrying value of assets sold	**737**	1,136
Total losses from asset sales	**737**	1,136

Note 4: Income

	2013 $	2012 $
OWN-SOURCE REVENUE		
Note 4A: Interest		
Deposits	**1,725,869**	1,365,628
Deposits held for NPSI	**–**	35,568
Total interest	**1,725,869**	1,401,196
Note 4B: Rental Income		
Operating lease:		
Other	**10,478**	15,000
Total rental income	**10,478**	15,000
Note 4C: Royalties		
Royalties	**3,971,210**	3,144,994
Total royalties	**3,971,210**	3,144,994
Note 4D: Other Revenue		
Project refunds	**437,771**	233,063
Industry grants	**1,356,167**	495,239
Novation revenue utilised	**–**	942,705
Other revenue	**90,300**	60,113
Total other revenue	**1,884,238**	1,731,120
REVENUE FROM GOVERNMENT		
Note 4E: Revenue from Government		
Department of Agriculture, Fisheries and Forestry:		
PIERD Act 1989 Contribution	**11,522,788**	9,529,194
Total revenue from Government	**11,522,788**	9,529,194
Note 4F: Levies and Penalties		
Industry Levies	**11,799,850**	9,529,194
Penalties	**1,246**	2,704
Total fees and fines	**11,801,096**	9,531,898

Note 5: Financial Assets

	2013 $	2012 $
Note 5A: Cash and Cash Equivalents		
Cash on hand or on deposit	**39,260,782**	26,205,066
Total cash and cash equivalents	**39,260,782**	26,205,066

	2013 $	2012 $
Note 5B: Trade and Other Receivables		
Goods and services:		
Goods and services - related entities	**–**	3,186
Goods and services - external entities	**768,007**	30,215
Total receivables for goods and services	**768,007**	33,401
Department of Agriculture, Fisheries and Forestry		
PIERD Act 1989 Contributions receivable	**3,165,998**	2,105,357
Industry levies receviable	**840,670**	1,997,784
Total receivables from government	**4,006,668**	4,103,141
Other receivables:		
GST receivable from the Australian Taxation Office	**293,998**	94,874
Interest	**694,412**	250,097
Total other receivables	**988,410**	344,971
Total trade and other receivables	**5,763,085**	4,481,513
Receivables are expected to be recovered in:		
No more than 12 months	**5,763,085**	4,481,513
Total trade and other receivables	**5,763,085**	4,481,513
Receivables are aged as follows:		
Not overdue	**5,732,785**	4,476,611
Overdue by:		
0 to 30 days	**350**	–
31 to 60 days	**–**	4,902
61 to 90 days	**–**	–
More than 90 days	**29,950**	–
Total receivables (gross)	**5,763,085**	4,481,513

Note 6: Non-Financial Assets

	2013 $	2012 $
Note 6A: Land and Buildings		
Land:		
Land at fair value	**180,000**	180,000
Buildings on freehold land:		
Work in progress	**–**	–
Fair value	**527,912**	510,000
Accumulated depreciation	**(13,500)**	–
Total buildings on freehold land	**514,412**	510,000
Total land and buildings	**694,412**	690,000

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.

Note 6B: Other Property, Plant and Equipment		
Office equipment:		
Fair value	**60,052**	56,812
Accumulated depreciation	**(29,170)**	(18,945)
Total office equipment	**30,882**	37,867
Computer equipment:		
Fair value	**78,027**	75,089
Accumulated depreciation	**(48,298)**	(33,490)
Total computer equipment	**29,729**	41,599
Fittings and furniture:		
Fair value	**12,598**	12,598
Accumulated depreciation	**(8,027)**	(6,766)
Total fittings and furniture	**4,571**	5,832
Total other property, plant and equipment	**65,182**	85,298

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 $nil (2012:$10,000) and buildings on freehold land $nil (2012:$129,238).

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 (2012–13)

	Land $	Buildings $	Total land and buildings $	Office equipment $	Computer equipment $	Fittings & furniture $	Total other property, plant & equipment $	Total $
As at 1 July 2012								
Gross book value	180,000	510,000	690,000	56,812	75,089	12,598	144,499	834,499
Accumulated depreciation and impairment		–	–	(18,945)	(33,490)	(6,766)	(59,201)	(59,201)
Net book value 1 July 2012	180,000	510,000	690,000	37,867	41,599	5,832	85,298	775,298
Additions	–	17,912	17,912	3,990	2,939	–	6,929	24,841
Revaluations recognised in other comprehensive income	–	–	–				–	–
Depreciation expense		(13,500)	(13,500)	(10,238)	(14,809)	(1,261)	(26,308)	(39,808)
Reclassification:		–	–	–	–	–	–	–
Disposals:								
Gross book value	–	–	–	(750)	–	–	(750)	(750)
Accumulated depreciation and impairment	–	–	–	13	–	–	13	13
Net book value 30 June 2013	180,000	514,412	694,412	30,882	29,729	4,571	65,182	759,594
Net book value as of 30 June 2013 represented by:								
Gross book value	180,000	527,912	707,912	60,052	78,027	12,598	150,677	858,589
Accumulated depreciation and impairment		(13,500)	(13,500)	(29,170)	(48,298)	(8,027)	(85,495)	(98,995)
	180,000	514,412	694,412	30,882	29,729	4,571	65,182	759,594

Note 6C (Cont'd): 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 & equipment $	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)	(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		–	–	(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

	2013 $	2012 $
Note 6D: Intangibles		
Computer software:		
Purchased	**143,832**	122,465
Accumulated amortisation	**(126,247)**	(118,590)
Total intangibles	**17,585**	3,875

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 2013 $	Computer software purchased 2012 $
As at 1 July		
Gross book value	**122,465**	120,830
Accumulated amortisation and impairment	**(118,590)**	(108,444)
Net book value 1 July	**3,875**	12,386
Additions	**21,367**	1,635
Amortisation	**(7,657)**	(10,146)
Net book value 30 June	**17,585**	3,875
Net book value as of 30 June represented by:		
Gross book value	**143,832**	122,465
Accumulated amortisation and impairment	**(126,247)**	(118,590)
	17,585	3,875

Note 6F: Other Non-Financial Assets		
Prepayments	**–**	7,965
Total other non-financial assets	**–**	7,965
Total other non-financial assets - are expected to be recovered in:		
No more than 12 months	**–**	7,965
More than 12 months	**–**	–
Total other non-financial assets	**–**	7,965

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.

Note 7: Payables

	2013 $	2012 $
Note 7A: Suppliers		
Trade creditors and accruals	**161,613**	90,826
Total supplier payables	**161,613**	90,826
Supplier payables expected to be settled within 12 months:		
Related entities	**3,289**	3,114
External parties	**158,324**	87,712
Total	**161,613**	90,826

Settlement was usually made within 30 days.

Note 7B: Grants, Subsidies and Personal Benefits		
Grants:		
Public sector:		
Australian Government entities (related entities)	**1,333,484**	685,781
State and Territory Governments	**2,568,362**	1,458,061
Universities and colleges	**1,079,852**	568,989
Other research organisations	**540,962**	466,984
Private sector:		
Other	**747,534**	504,930
Total grants	**6,270,194**	3,684,745
Total grants, subsidies and personal benefits are expected to be settled in:		
No more than 12 months	**6,270,194**	3,684,745
More than 12 months	**–**	–
Total grants, subsidies and personal benefits	**6,270,194**	3,684,745

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	**39,556**	21,974
Superannuation	**4,491**	2,692
PAYG & FBT	**45,170**	31,081
State payroll tax	**6,658**	3,717
Other	**115**	–
Total other payables	**95,990**	59,464
Total other payables are expected to be settled in:		
No more than 12 months	**95,990**	59,464
More than 12 months	**–**	–
Total other payables	**95,990**	59,464

Note 8: Provisions

	2013 $	2012 $
Note 8A: Employee Provisions		
Leave	**341,754**	230,223
Total employee provisions	**341,754**	230,223
Employee provisions are expected to be settled in:		
No more than 12 months	**218,701**	143,411
More than 12 months	**123,053**	86,812
Total employee provisions	**341,754**	230,223
Note 8B: Other Provisions		
Novation of National Program for Sustainable Irrigation		
Revenue received in advance refundable on termination of management agreement	**–**	91,197
Total other provisions	**–**	91,197
Other provisions are expected to be settled in:		
No more than 12 months	**–**	91,197
More than 12 months	**–**	–
Total other provisions	**–**	91,197

The projects for the National Program for Sustainable Irrigation were completed in June 2012. The unexpended funds in Note 8B were paid to the Partners in 2012–13.

Note 9: Cash Flow Reconciliation

	2013 $	2012 $
Reconciliation of cash and cash equivalents as per Balance Sheet to Cash Flow Statement		
Cash and cash equivalents as per:		
Cash flow statement	**39,260,782**	26,205,066
Balance sheet	**39,260,782**	26,205,066
Difference	**–**	–
Reconciliation of net cost of services to net cash from operating activities:		
Net cost of services	**(11,709,651)**	(7,424,737)
Add revenue from Government	**23,323,884**	19,061,092
Adjustments for non-cash items		
Depreciation / amortisation	**47,464**	35,584
Net write down of non-financial assets	**737**	1,136
Changes in assets / liabilities		
(Increase) / decrease in net receivables	**(1,281,573)**	(2,596,798)
(Increase) / decrease in prepayments	**7,965**	(270)
Increase / (decrease) in employee provisions	**111,531**	12,475
Increase / (decrease) in employee withholdings	**14,559**	2,553
Increase / (decrease) in supplier payables	**70,785**	36,039
Increase / (decrease) in other payable	**21,969**	5,045
Increase / (decrease) in grants payable	**2,585,450**	1,784,383
Increase / (decrease) in novation payable	**(91,196)**	(942,704)
Net cash from (used by) operating activities	**13,101,924**	9,973,798

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 2012-13 Commonwealth contributions were capped to GVP of $11,522,788, leaving a remote contingent receivable of $4.791m for unmatched R&D expenditure.

Note 11: Directors Remuneration

	2013 No.	2012 No.
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	**6**	12
$30,000 to $59,999	**1**	1
Total	**7**	13
Total remuneration received or due and receivable by directors of the entity	**179,796**	180,005

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.

	2013 $	2012 $
Grants to Director-Related Entities		
Queensland Dept. Of Primary Industries & Fisheries		1,007,770
Primary Industries Education Foundation	**25,000**	
University of Queensland		46,780
Grants to director-related entities	**25,000**	1,054,550

Note 13: Senior Executive Remuneration

Note 13A: Senior Executive Remuneration Expense for the Reporting Period

	2013 $	2012 $
Short-term employee benefits:		
Salary	**500,077**	445,806
Annual leave accrued	**44,311**	41,608
Other[1]	**18,550**	29,407
Total short-term employee benefits	**562,938**	516,821
Post-employment benefits:		
Superannuation	**59,437**	53,033
Total post-employment benefits	**59,437**	53,033
Other long-term benefits:		
Long-service leave	**7,521**	20,730
Total other long-term benefits	**7,521**	20,730
Total	**629,896**	590,584

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 $180,000.

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

	as at 30 June 2013				
		Fixed elements			
Average annual reportable remuneration[1]	**Senior Executives No.**	**Reportable salary[2] $**	**Contributed superannuation[3] $**	**Reportable allowances[4] $**	**Total $**
Total remuneration (including part-time arrangements):					
less than $180,000	2	106,853	9,617	–	116,470
$180,000 to $209,999	1	161,314	26,621	–	187,935
$240,000 to $269,999	1	236,897	19,809	–	256,706
Total	**4**				

	as at 30 June 2012				
		Fixed elements			
Average annual reportable remuneration[1]	Senior Executives No.	Reportable salary[2] $	Contributed superannuation[3] $	Reportable allowances[4] $	Total $
Total remuneration (including part-time arrangements):					
less than $180,000	2	144,834	17,155	–	161,989
$210,000 to $239,999	1	216,097	19,095	–	235,192
Total	3				

Notes:

1. 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.

2. 'Reportable salary' includes the following:

   a) gross payments (the Corporation currently does not provide bonuses); and
   b) reportable fringe benefits (at the net amount prior to 'grossing up' to account for tax benefits).

3. 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.

4. '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.

Note 13C: Average Annual Reportable Remuneration Paid to Other Highly Paid Staff during the Reporting Period

The Corporation did not employ any highly paid staff.

Note 14: Average Staffing Levels

	2013	2012
The average staffing levels for the Corporation during the year were:	**12.6**	8.7

Note 15: Remuneration of Auditors

	2013 $	2012 $
Financial statement audit services were provided to the Corporation by the Auditor General.		
Fair value of the services provided:	**13,500**	13,100
Total	**13,500**	13,100

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

Note 16: Financial Instruments

	2013 $	2012 $
Note 16A: Categories of Financial Instruments		
Financial Assets		
Loans and receivables:		
Cash and cash equivalents	**39,260,782**	26,205,066
Trade and other receivables	**768,007**	33,401
Carrying amount of financial assets	**40,028,789**	26,238,467
Financial Liabilities		
At amortised cost:		
Grants payable	**6,270,194**	3,684,745
Other payables	**161,613**	90,826
Carrying amount of financial liabilities	**6,431,807**	3,775,571
Note 16B: Net Income and Expense from Financial Assets		
Loans and receivables		
Interest revenue	**1,725,869**	1,401,196
Net gain/(loss) from financial assets	**1,725,869**	1,401,196

Note 16C: Fair Value of Financial Instruments

	Carrying amount 2013 $	Fair value 2013 $	Carrying amount 2012 $	Fair value 2012 $
Financial Assets				
Cash and cash equivalents	**39,260,782**	**39,260,782**	26,205,066	26,205,066
Trade and other receivables	**768,007**	**768,007**	33,401	33,401
Total	**40,028,789**	**40,028,789**	26,238,467	26,238,467
Financial Liabilities				
Grants payable	**6,270,194**	**6,270,194**	3,684,745	3,684,745
Other payables	**161,613**	**161,613**	90,826	90,826
Total	**6,431,807**	**6,431,807**	3,775,571	3,775,571

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 (2013: $768,007 and 2012: $33,401). 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	Not past due nor impaired	**Past due or impaired**	Past due or impaired
	2013	2012	**2013**	2012
	$	**$**	$	$
Cash and cash equivalents	**39,260,782**	26,205,066	**–**	–
Trade and other receivables	**737,707**	28,499	**30,300**	4,902
Total	**39,998,489**	26,233,565	**30,300**	4,902

Ageing of financial assets that were past due but not impaired for 2013

	0 to 30 days	**31 to 60 days**	**61 to 90 days**	**90+ days**	**Total**
	$	**$**	**$**	**$**	**$**
Trade and other receivables	**350**	**–**	**–**	**29,950**	**30,300**
Total	**350**	**–**	**–**	**29,950**	**30,300**

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

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 2013

	On demand $	within 1 year $	1 to 5 years $	> 5 years $	Total $
Grants payable	–	**6,270,194**	–	–	**6,270,194**
Other payables	–	**161,613**	–	–	**161,613**
Total	–	**6,431,807**	–	–	**6,431,807**

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

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 4.6% as at 30th June 2013. Term deposit fixed interest rates during the year decreased from a high of 6.00% down to 4.35%. Interest rates on term deposits held at the end of the year ranges from 4.35% to 5.10%. 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 120 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 2013

	Risk variable	Change in risk variable %	Effect on Profit and loss $	Effect on Equity $
Interest rate risk	**Interest**	**+1.20%**	**465,519**	**465,519**
Interest rate risk	**Interest**	**-1.20%**	**(465,519)**	**(465,519)**

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

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

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	
	2013 $	2012 $
Expenses	**19,301,446**	13,717,047
Income from non-government sector		
Industry Contributions	**11,801,096**	9,531,898
Royalties	**3,971,210**	3,144,994
Interest	**1,725,869**	1,401,196
Other	**1,894,716**	1,746,120
Total	**19,392,891**	15,824,208
Other own-source income	**–**	–
Net cost/(contribution) of outcome delivery	**(91,445)**	(2,107,161)

APPENDICES

Contents

APPENDIX ONE
MEASURING PERFORMANCE

1. Portfolio Budget Statement performance indicators

The following Key Performance Indicators (KPIs) formed part of CRDC's Portfolio Budget Statement (PBS) for 2012–13.

Deliverables 2012–13

- 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	2012–13	Measure of Success
Coverage of Best Management Practices systems across Australian cotton industry	60 per cent	***Still in progress.*** As at 30 June 2013 *my*BMP has 328 active growers, 112,690 practices have been checked, 29 farms have been fully audited, with a further 34 having requested an audit. The *my*BMP system is also being developed by the CottonInfo team as the main access point for information and management resources for growers.
Industry productivity growth increased per hectare per annum	3 per cent	***Still in progress.*** Average production per hectare has continued to increase annually by 2.5 to 3 per cent averaged over 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 direction through implementation of the Cotton Sector RD&E Plan.
Market opportunities for Australian cotton clearly defined and understood within industry	Report	***Achieved.*** A CRDC-commissioned review of cotton world markets identified international growth markets and key mills, and brand owners and retailers that operate across these markets. This work will be ongoing.
Industry human resource plan developed	Report	***Achieved.*** Project steering committee established and interim results reported and interpreted.

2. Towards the Strategic Plan outcome 2012–13

Program One: VALUE CHAIN

Investments	AOP KPIs	Outcome
Strategic Objective 1		
Develop contemporary knowledge & intelligence about products, markets and supply		
A continuing project to research value chain sustainability and competitive advantage for Australian cotton	Initial definition of key sustainability measures for Australian cotton	***Achieved.***

Investments	AOP KPIs	Outcome
Communication and discussion of mill survey results with the industry	A more knowledgeable and competitive industry	***Achieved.***
A continuation of the Premium Cotton Initiative (PCI), including spinning trials.	Outcomes of mills trials provided to Australian Cotton Shippers and the fibre properties for any new premium cotton class finalised	***Achieved.***
Further trial market developments with mills and brand owners to evaluate the competitive advantages of Australian cotton	Australian premium cotton products and BMP cotton tested in Australian and International markets	***Achieved.***
A new commissioned project to develop *The Australian Premium Cotton Story* for promotion with existing and potential customers	Promotion of the 'Story' to potential buyers of Australian premium cotton. Innovation in traceability of cotton across the value chain investigated	***Not Achieved.*** Delayed pending industry decisions regarding future marketing activities for Australian cotton.
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	***Still in progress.*** Evaluation underway.
A new commissioned project to access fibre elongation across Australian cotton	Competitive advantage and opportunities for improving fibre elongation clearly defined	***Still in progress.*** Selected samples tested and data is currently been developed.
Commercial opportunities of improving cotton seed oil investigated	Business case for development of genetic improvements in cotton seed oil reviewed	***Not achieved.*** Ongoing discussions with Cotton Incorporated and Texas A&M University seeking to overcome third party patent rights issue.
Ongoing evaluation of spinning software for predicting yarn quality	Cottonspec evaluated in international mills and finalised for commercial release	***Achieved.*** Discussions with CSIRO regarding commercialisation details.
Continued study of agronomic management to optimise textile performance with a focus in improving fibre quality traits	Updated best practice guidelines in agronomic management to maintain high quality fibre with a focus on fibre fineness and reducing neps and short fibre content	***Achieved.***
A continuation of the Premium Cotton Initiative including spinning trials	Spinning limits for premium Australian Long Staple (ALS) cotton determined. New fibre classification system developed for ALS cotton	***Achieved.***

Investments	AOP KPIs	Outcome
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, promotion of Australian BMP to mills and brand owners	***Still in progress.*** Fabric blends selected; yarn and fabric samples are currently being made at Esquel by a dedicated project team.
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	Thermal rating system for fabric blends finalised and trial cotton and cotton/wool blend products tested in Australian and International markets	***Still in progress.*** Fabric blends selected; yarn and fabric samples are currently being made at Esquel by a dedicated project team.
A new commissioned project to investigate innovations in spinning yarn and fabric development	Report provided on innovations in fabrics design and related implications and opportunity for use of premium Australian cotton	***Still in progress.*** Project initiated and continues to assess new opportunities.
The above commissioned project may create opportunities with novel products to partner	Opportunity for new partnerships identified	***Still in progress.*** Opportunities identified, partnerships not yet established.
Strategic Objective 4 Advanced cotton product processing		
Review ginning R&D for future investment opportunities	Review conducted and new investment plan for ginning R&D established	***Achieved.***
A new commissioned project to investigate innovations in spinning yarn and fabric development	New innovations in cotton spinning technology reported and related implications and opportunity for use of premium Australian cotton	***Still in progress.*** CRDC working with CSIRO and universities regarding new opportunities for spinning technologies.
Ginning efficiency improvement developed by assessment of the gin stand and monitoring of cotton grade and contamination	Opportunities for improving ginning efficiency evaluated through innovation in design of the gin stand, and leaf grade and contamination sensors	***Achieved.*** Projects on refining and assessing new technologies are on track.
Gin trash management improved	Scoping study on use of gin trash as a feedstock for bioethanol completed	***Achieved.***
Business plan established for commercial development of moisture sensors and contamination sensors	Commercial partners developed for novel moisture sensors	***Still in progress.*** Commercial partners involved in development of contamination sensors. Ongoing discussions are taking place with CSIRO regarding commercial options for the moisture sensors.

Investments	AOP KPIs	Outcome
Implementation of Ginning Best Management Practices	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.***
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 validation of Cottonspec	An improved capacity to integrate several tools and methods to better demonstrate the textile qualities and values of Australia cotton fibre	***Achieved.***
Options for improving dyeing efficiency developed	Key factors affecting the dyeing of cotton determined	***Not achieved.*** New PhD student to work on dyeability project.
Accuracy of HVI fibre strength evaluated	Fibre length evaluated for its impact on fibre strength measurements	***Achieved.***
Integrated promotion of technologies that help differentiate Australian cotton	Business case for fibre measurement and spinning software technologies refined for promotion to merchants and mills	***Still in progress.*** Business case has been developed, but requires refinement for selected markets and commercial partners.
Commercialisation of Cottonscope; an instrument combining the instruments Cottonscan and Siromat	Commercialisation pathway for the instruments reviewed	***Achieved.***

Program Two: FARMING SYSTEMS

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 continues to provide strategic direction and coordination of this cross-sectoral issue	***Achieved.***
A continuing PhD project to investigate the next generation of rural landscape governance in Australia	Key issues for a cotton case study are identified	***Achieved.***
A continuing investigation to improve prediction of cotton growth and production in a changing climate	Student reports presenting satisfactory progress	***Achieved.***

Investments	AOP KPIs	Outcome
Two new projects to assess the impact of climate change on cotton industry capacity to adapt as well as to plan and respond for extreme events	Reports documenting potential impacts of climate change and extreme weather events and working towards understanding the industry's adaptive capacity	***Achieved*** despite delayed start to one project.
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 associated with cotton farming rotations.	***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 in case study sites and options for alternative energy identified	***Achieved.***
A continuing post-doctoral project to study how cotton farmers can take advantage of potential future ecosystems markets	Progress reports identifying ecosystems services potentially eligible for future markets	***Still in progress.*** Project still in data collection phase but making good progress despite flooding in 2012 and 2013.
New projects leading to enhanced capability to focus on extension of carbon farming and ecosystem services	Extension of carbon farming and ecosystem services knowledge in addition to demonstration of opportunities for cotton production systems in the Carbon Farming Initiative	***Achieved.***
Strategic Objective 2 Enhance the capacity of the industry to adopt resilient and adaptive farming systems		
A continuing project that populates a social, economic and environmental performance information repository coupled with a reporting framework developed for cotton industry use	Key performance data sources identified and collected	***Achieved.*** Full report due in September 2013.
Ongoing and new work that benchmarks cotton water use and energy efficiencies under a wide range of current irrigation practices	Reports benchmarking water use efficiencies and development of data	***Still in progress.*** Project to benchmark cotton water use efficiency commenced.
A water irrigation demonstration site maintained for Life Cycle Assessment (LCA) and other benchmarking analysis	Water LCA report completed. Irrigation system comparisons promoted to growers and advisors to promote uptake	***Still in progress.*** LCA scoping study reviewed; CRDC concluded investment in LCAs should only be considered following finalisation of RIRDC-managed AusAgLCI project.

Investments	AOP KPIs	Outcome
Continuation of the Crop Consultants Association Post Season Survey Series together with a new project that establishes more interactive grower surveys and workshops	Survey and workshop results analysed and reported to industry	***Achieved.***
New projects to measure soil structural impacts as well as extend best practice for new cotton harvesters	Reports showing soil impacts and new management advice and knowledge products developed and delivered	***Still in progress.*** As the project was in its first year in 2012–13, the focus has been on refinement of soil impact measurement capacity before developing advice products to growers.
Finalisation of the Third Environmental Assessment of the cotton industry	Assessment report delivered to industry and other stakeholders. Action plan to address deficiencies developed in response to findings	***Achieved.***
A new project to investigate cotton diversification in Northern Queensland and other tropical areas of Australia	Reports highlighting cotton performance in northern Queensland and other tropical area cropping systems	***Achieved.***
A project to investigate applying plant-based measurements for irrigation in water-limited environments	Project established with co-investment from US collaborators, post-doc identified, project established with reports showing potential for water management improvements in water-limiting conditions	***Not Achieved.*** The project was delayed while a suitable post-doctoral fellow was identified. This was achieved in late June 2013 and the project commenced in July.
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 continuing 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. On farm energy use documented at case study sites, tools for energy optimisation decisions developed and taken up. Options for alternative energy sources and energy management identified and communicated via new tools and engagements	***Achieved.*** ***Achieved.*** ***Achieved.***

Investments	AOP KPIs	Outcome
A new project to test a commercial prototype to automate furrow irrigation systems	Results of prototype testing analysed and reported	***Still in progress.*** The project was delayed in order to finalise background IP issues. It commenced in May 2013.
New research into the development of irrigation strategies for limited water environments	Reports showing potential for water management improvements in water-limiting conditions	***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, tools for energy optimisation decisions developed and taken up Options for alternative energy sources and energy management identified and communicated via new tools and engagements	***Achieved.*** ***Achieved.***
Ongoing research, development and delivery to advance knowledge and best practice of critical soil nutrient concentrations in soils supporting irrigated cotton in northern NSW and Queensland	A final report identifying the range of critical soil nutrient concentrations in cotton growing soils	***Achieved.***
Continuing and new projects to encourage cotton systems that are nutrient-efficient and promote healthy soil	Evidence that knowledge for improving cotton nutrition is being developed and best practice is being adopted	***Achieved.***
Building cotton and grain industry capacity for continual improvement of pesticide application and drift management Student engaged to research and create new knowledge concerning cotton plant root growth	Evidence that pesticide application management is improving and drift damage incidents are declining through uptake of best practices and use of tools and information sources	***Not achieved.*** No PhD student identified despite extensive efforts.
Development and packaging of information derived from R&D	New knowledge resources developed for delivery via *my*BMP system	***Achieved.***
Ongoing development, support and enabling of the links with research, extension and *my*BMP facilitation	Improved resources and delivery campaigns to support the adoption and *my*BMP frameworks established A continuing project to facilitate linkages between research, extension and the industry's *my*BMP system	***Achieved.*** ***Achieved.***

Investments	AOP KPIs	Outcome
	New extension-focused projects to manage and deliver knowledge to encourage best management practice	***Achieved.***
Strategic Objective 3 Protect industry from biosecurity threats		
Continuing and new projects to increase surveillance and preparedness for endemic and exotic diseases of cotton, assess biosecurity risks of feral cotton (ratoons and volunteer plants)	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.***
Ongoing biosecurity training for growers and agronomy consultants	Evidence of networks established and prepared for biosecurity incursion	***Still in progress.*** Trainers were trained, providing capacity in each region to extend this knowledge.
A continuing project to investigate IPM for Silverleaf whitefly and emerging pests in central cotton regions	Progress reports providing evidence that Silverleaf whitefly management is improving in central cotton regions	***Achieved.***
A continuing 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.*** Investigations are continuing for further improvement.
A continuing project to provide *Helicoverpa* spp., whitefly, mirids, aphids and Two Spotted Mite insecticide resistance monitoring	Reports with resistance results provided to industry and integrated into the annual Insecticide Resistance Management Strategy	***Achieved.***
A continuing project to support the commercialisation and develop new applications for fungal insecticides against cotton pests	Progress reports demonstrating commercial potential for fungal biopesticides	***Still in progress.*** Work continues for completion of a regulatory package for the fungal biopesticide DAT511. Discussions continue regarding involvement of a commercialisation partner.
A commissioned project to investigate the establishment of a 'Biopesticides Centre'	Business case developed to inform the development of a proposed Biopesticides Centre	***Still in progress.*** Work continues; governance structure, science collaboration and cross-sectoral interest explored.
Continuing and new weeds research projects to improve weed management and minimise weed resistance to key herbicides	Improved weed and herbicide resistance management systems	***Achieved.*** Investigations are continuing for further improvement.

Investments	AOP KPIs	Outcome
A new project to investigate the role of endosymbionants in the regulation of Silverleaf whitefly populations	Progress reports providing evidence of effective cataloguing of endosymbionants associated with Silverleaf whitefly in Australia	***Not achieved.*** Delays in identifying post-doctoral candidate and research partners, further delays in project contracting.
New projects researching weed ecology, weed thresholds for cotton systems and the impacts of herbicides on cotton growth and development	PhD reports demonstrating satisfactory progress. New knowledge of IWM and new weed identification resources integrated into best practice information and advisory systems	***Still underway.*** New weed identification resources are being developed and are expected to be available online in mid-2014. The redevelopment of the CRDC website and ongoing development of the *my*BMP website include design attributes that will increase accessibility of the industry's voluminous electronic weed management resources. The PhD component was ***not achieved***, as the search continues for a suitable scholarship candidate.
Continuing and new projects to provide resistance monitoring of *Helicoverpa* spp. to *Bt* cotton	Resistance results reported regularly and implications discussed with industry	***Achieved.***
Improved resistance management systems for current and developing *Bt* cotton technologies	New resistance management and modelling systems developed	***Still in progress.*** On track for achievement.
Ongoing research into the flight characteristics of *Helicoverpa* spp in relation to the efficacy of *Bt* cotton refuges	PhD student reports demonstrating satisfactory progress	***Achieved.***
Continuing and new research projects for managing weeds and herbicides in a genetically modified cotton farming system	Improved management opportunities for weeds in GM systems identified, promoted and adopted	***Achieved.***
A continuing project to revisit ecology of *Helicoverpa Punctigera* in relation to migration, overwintering 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	Field and experimental work completed, thesis constructed	***Still in progress.*** Findings and their impact on refuge management will be reported in 2013–14.
A new project to profile beneficial microorganisms and their manipulation in cotton growing soils to improve cotton growth	Progress reports showing evidence of soil microorganism surveys from cotton growing regions	***Achieved.*** Investigations are ongoing for further improvement.

Program Three: **HUMAN CAPACITY**

Investments	AOP KPIs	Outcome
Strategic Objective 1		
Identify, understand and plan for future industry capacity needs		
A continuing project to benchmark cotton water use efficiencies and energy efficiencies for a range of irrigation systems	Reports benchmarking water use efficiencies and development of energy use data for different irrigation systems	***Still in progress.*** Project to benchmark cotton water use efficiency commenced (conducted under Program Two—Farming Systems).
A continuing project supporting the ongoing activities of the Professional Development Officer (Cotton)	New skills delivery systems and tools identified, tested and implemented	***Not achieved.*** A change in the role of the Professional Development Officer Cotton within the Queensland Department of Agriculture, Fisheries and Forestry saw some planned professional skills and development activities curtailed in 2012–13. However, the two following investments successfully contributed to this KPI.
A new commissioned project to assist in the gathering of improved industry skills and workforce needs	Survey or other data collection systems to monitor industry skills and workforce needs developed	***Achieved.***
	Data available for improving industry planning and advice for government supported initiatives	***Achieved.***
A continuing project to establish a workforce development plan for the cotton industry for sustained competitive advantage	Project steering committee established and interim results reported and interpreted	***Achieved.***
A continuing project to develop an on-farm environmental resources survey	Survey results reported to the industry	***Achieved.***
New initiatives to encourage and develop young professionals for the cotton industry	PICSE Activity Centre established and integrated with other industry school initiatives and undergraduate scholarship, mentoring and work experience programs	***Achieved.***
Strategic Objective 2		
Improve human resource development and capacity		
A project to review and update cotton farm safety resources and potential links to the *my*BMP system	Project established and existing resources reviewed	***Achieved.***

Investments	AOP KPIs	Outcome
New training projects for ginning and managing cotton for highest quality as well as ongoing tertiary professional development course delivery	Ginning course establishment, ongoing delivery of Field to Fabric courses and further development and delivery of the UNE Cotton Production Course	***Achieved.***
An ongoing program for capacity building projects with local Cotton Grower Associations (CGAs)	New projects established with all willing CGAs	***Achieved.*** Eight successful projects conducted.
Ongoing support for the Cooperative Partnership for Farming and Fishing Occupational Health and Safety	Progress against the partnership strategic plan reported	***Achieved.*** Support has, however, been for the replacement partnership program, the Primary Industries Health and Safety Partnership (PIHSP).
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.***
STRATEGIC OBJECTIVE 3 Enhance capacity to innovate		
Implementation of campaign-based initiatives within the CottonInfo team to deliver on key target areas for R&D adoption	Campaigns established to meet all key target areas of the CottonInfo team	***Achieved.*** Four campaigns by the CottonInfo team devised and underway.
Facilitation of linkages between research, extension and the industry's *my*BMP system New and existing projects providing resources for development and delivery of research results	Best practice modules of *my*BMP reviewed as required with content processed and continually updated Improved resources and delivery campaigns to support the adoption and *my*BMP frameworks established. New relationships and engagements with agribusinesses and services which provide more efficient delivery channels for industry's adoptable R&D	***Achieved.*** Updating is undertaken on a continual basis. While *my*BMP is already an excellent information source, the new D&D joint venture is further enhancing its capability for information delivery and build in linkages to other sites such that growers and advisors are better supported in their information needs.
A new project to comprehensively document and communicate best practice cotton production techniques using video and audio formats	Documentaries planned, prioritised and delivered through multiple channels and integrated into CottonInfo team delivery systems. Results and impacts measured and evaluated on an ongoing basis	***Still in progress.*** Project start delayed to July 2013 due to a recruitment freeze by the Queensland Government. This project will now be reported in the 2013–14 annual report.

Investments	AOP KPIs	Outcome
A new project to identify and promote adoptable R&D at the 16th Australian Cotton Conference 2012	Evaluation of conference showing a high level of satisfaction from growers and advisors	***Achieved.*** 1,586 delegates and overwhelmingly positive feedback post-conference. Successful student program.
Development of a new format for the Cotton Big Day Out field day to highlight grower-led innovation	Cotton Big Day Out field day held; highlights documented and delivered through multiple channels. Strong grower participation and positive feedback received	***Not achieved.*** The Big Day Out was held each year at the farm of the Innovative Cotton Grower of the Year: a category that has been redefined by Cotton Australia and no longer addresses this need sufficiently. The Strategic R&D Plan 2013–2018 addresses this issue explicitly.

APPENDIX TWO
AUSTRALIAN GOVERNMENT PRIORITIES

National Research Priorities

The National Research Priorities (NRPs) that are were issued by the Australian Government in 2002, and enhanced and refined in 2003. They will be phased out by 30 June 2014 and replaced by new priorities.

The following are the goals associated with these NRPs that were relevant to CRDC's 2012–13 R&D program:

A An environmentally sustainable Australia

- A1 Water—a critical resource
- A2 Transforming existing industries
- A3 Overcoming soil loss, salinity and acidity
- A4 Reducing and capturing emissions in transport and energy generation
- 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

- C1 Breakthrough science
- C2 Frontier technologies
- C3 Advanced materials
- 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 listed and addressed below.

Contribution of CRDC's 2012–13 outputs and outcomes

Australian Government Priorities		CRDC R&D outputs 2012–2013
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	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 Consolidated new collaborations with GRDC addressing productivity and climate change preparedness in cotton and grains farming systems, including weeds. Extended R&D to farmers of farming systems innovations for improved production efficiencies, with a focus on resource management (soils, water, fertiliser use, energy use and carbon), as well as environmental performance. Undertook further testing and commercialisation of novel biopesticides for key cotton and grains pests. 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.

Australian Government Priorities		CRDC R&D outputs 2012–2013
Rural R&D Priorities	NRP Goals *(see above)*	
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	B4	Maintaining and improving international market access opportunities. Further improved industry awareness and preparedness for major biosecurity threats, particularly Silverleaf whitefly, Solenopsis mealybug, *Helicoverpa* spp., aphids, mites and viruses. Continued to improve market intelligence and customer feedback on Australian cotton's competitive advantage. Facilitated post-farm gate best practices for harvest, classing, ginning, transport, storage and handling. Further enhanced the Best Management Practices system to integrate planning, risk management and benchmarking with development of skills, knowledge and adoption of research outputs throughout the value chain. 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.
Natural Resource Management Support effective management of Australia's natural resources to ensure primary industries are both economically and environmentally sustainable	A1; A2; A3; A5; A7	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. Enhancement of the best management practices system (as above).
Climate Variability and Climate Change Build resilience to climate variability and adapt to and mitigate the effects of climate change	A7	Undertook R&D investments in biosecurity, as well as cropping systems for improved nitrogen, energy and water use efficiencies that will increase farm businesses' climate change preparedness and reduce greenhouse gas emissions. Extended farming systems innovations to farmers, facilitating production efficiencies with an emphasis on resource management (soils, water, fertiliser, energy and carbon) and environmental performance. Consolidated new collaborations with GRDC addressing productivity and climate change preparedness in cotton and grains farming systems. Continued to scope the potential impacts of climate change on textile production and markets. 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.

Australian Government Priorities		CRDC R&D outputs 2012–2013
Rural R&D Priorities	NRP Goals *(see above)*	
Biosecurity Protect Australia's community, primary industries and environment from biosecurity threats	D3	Improved industry awareness and preparedness for major biosecurity threats, particularly Silverleaf whitefly, Solenopsis mealybug, *Helicoverpa* spp., aphids, mites and viruses. Further tested and commercialised novel biopesticides for key cotton and grain pests. 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. Undertook R&D investments and activities that underpinned the stewardship of biotechnologies and chemicals. Enhanced the Best Management Practices system to integrate planning, risk management and benchmarking, with development of skills, knowledge and adoption of research outputs for biosecurity.
Supporting the Rural R&D Priorities		
Improve the skills to undertake research and apply its findings	C5	**Workforce, skills, education** 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. Continued support for school and undergraduate level programs, the Undergraduate Studentship Program and other scholarship systems. Continued support for postgraduate scholarships (PhD and Masters) and leadership programs for a broadly-based response to the cotton industry's future capacity. Built on the 'Sustaining Rural Communities Initiative' established by CRDC and the Cotton CRC with support for a conference in 2013 and supported and activated broader engagements based on that initiative. Continued to support and enhance networks and collaborations with education providers to activate a supply chain approach for the industry's future R&D human capacity. Further enhanced the Best Management Practices system to integrate planning, risk management and benchmarking, with development of skills, knowledge and adoption of research outputs. Invested in projects and partnerships with Wincott, the Aboriginal Employment Strategy, an Aboriginal traineeship pilot training scheme (through the Australian Government's Caring for our Country initiative) and the Future Cotton Leaders program.
Promote the development of new and existing technologies	C2; C4	Further enhanced the Best Management Practices system (as above), with new technologies; invested in new technologies such as the CottonInfo (cotton symptoms) app and the EnergyCalc Lite iPad application.

Composition of Rural Research and Development Priorities attributed to each CRDC R&D Program 2012–13

Rural Research & Development Priorities (RRDP)	Productivity and Adding Value	Supply Chain and Markets	Natural Resource Management	Climate Change and Climate Variability	Biosecurity	Supporting the Priorities		Total
						Innovation Skills	Technology	
Expenditure	**$'000**							
Program 1: Value Chain	755	776	31				535	2 097
Program 2: Farming Systems	2 684	103	1 446	1 136	3 717	413	826	10 325
Program 3: Human Capacity	342	98	220	123	37	1 589	37	2 446
Total	3 781	977	1 697	1 259	3 754	2 002	1 398	14 868

Composition of National Research Priorities attributed to each CRDC R&D Program 2011–12

National Research Priorities (NRP)	An Environmentally Sustainable Australia							Promoting and Maintaining Good Health				Frontier Technologies for Building and Transforming Australian Industries					Safeguarding Australia					Total
	A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	
Expenditure	**$'000**																					
Program 1: Value Chain				33							1 557		341	60	67	39						2 077
Program 2: Farming Systems	523		404		484		1 205				2 783		57	13	670	424			3 762			10 325
Program 3: Human Capacity	25		65		55		146				460				42	1 598			55			2 446
Total	548		469	33	539		1 351				4 800		398	73	779	2 061			3 817			14 868

Note

These tables exclude untied grants and corporate research activities supporting R&D planning and adoption.

APPENDIX THREE
ENVIRONMENTAL PERFORMANCE

Background

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 meant developing contributions to Strategic Plan Measures of Success within each program for the broader triple bottom line outputs contained in the Strategic R&D Plan 2008–2013. In line with this, the Annual Operating Plan 2012–13 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, energy, nutritional supplements and chemicals), crop yields per hectare, and efficient farming methods aid the economic performance of cotton growers. A contract with Crop Consultants Australia gathers information about on-farm practices and attitudes across the industry, which CRDC then analyses and which provides researchers with valuable guidance to future R&D directions.

Our triple bottom line values

Economic Profitability and International Competitiveness

Environmental Sustainable Production Systems and Catchments

Social Empowered People and Communities

Some examples of triple bottom line contributions in 2012–13

	Program One	Program Two	Program Three
Environmental	A PhD project has developed a prototype carbon calculator that allows growers to develop a measure of their greenhouse gas emissions—potentially an extra means of differentiating Australian cotton in an eco-conscious marketplace. A range of projects is extending and refining Best Management Practices through the post-farm gate processing, improving environmental performance in areas such as water and energy use.	A range of R&D projects is providing knowledge on understanding and addressing climate change, including areas such as on-farm energy use, nitrogen fertiliser use and carbon capture. R&D projects are improving water use in different environments. R&D continues to provide knowledge for non-chemical means of controlling pests, weeds and diseases. Continued broadening and updating *my*BMP is facilitating continuous improvement in environmental risk management through the value chain.	Introduction of an industry-wide collaborative Development and Delivery model that guides on-farm best environmental practices through the CottonInfo team. This joint venture is managed by CRDC on behalf of the partners. The Development and Delivery program is making on-line, interactive *my*BMP the principal repository for knowledge and advice for growers.

	Program One	Program Two	Program Three
Economic	A major R&D effort is defining and testing new market segments for Australian cotton. R&D is improving the quality of processes such as ginning, spinning and yarn quality measurement that will assist Australian cotton in the marketplace. A collaborative project is developing and testing fabrics combining high quality cotton and wool, for a potential premium market niche. A successful outcome would provide economic benefits for both industries.	Extending the cotton industry: new project are following up on a Burdekin cotton feasibility study on cotton growing in the dry tropical north. Projects are addressing the honeydew contamination of cotton bolls by Silverleaf whitefly that reduces lint value. The Cotton Comparative Analysis conducted by Boyce Chartered Accountants helped growers benchmark their operations financially against top growers and better understand the drivers of profitability.	R&D towards sustainable workforce planning for the industry and its participants is working to bring greater security and stability to growers and their communities.
Social	R&D is increasing market opportunities that should deliver economic sustainability, bringing benefits to industry participants, their families and communities.	A continuing project is establishing a social, economic and environmental performance information repository and reporting framework for the cotton industry. A major program is ensuring pest sprays are used appropriately and safely. Projects and resources are being supported to develop and maintain safe working environments.	Aboriginal traineeships: school-based Aboriginal Employment Strategy traineeships as part of Higher School Certificate studies; a work and study-based pilot training scheme, supported by CRDC through the Australian Government's Caring for our Country initiative. Investments are made in a range of leadership and educational opportunities.

APPENDIX FOUR
RESEARCH AND DEVELOPMENT PORTFOLIO

Contracted R&D organisations

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
AgVance	AgVance Farming Pty Ltd
ANU	Australian National University
BCA	Boyce Chartered Accountants
BG	Bill Gordon Pty Ltd
BIPL	Blast Industries Pty Ltd
CA	Cotton Australia
CCA	Crop Consultants Australia
CGA	Cotton Growers Association
Cotton CRC	Cotton Catchment Communities Cooperative Research Centre *(ceased operations on 30 June 2012)*
CQU	Central Queensland University
CRC	Cooperative Research Centre
CSFA	Comet Sustainable Farming Association
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAN	NSW Department of Primary Industries
DAQ	Department of Agriculture, Fisheries and Forestry Queensland
Deakin	Deakin University
GRDC	Grains Research and Development Corporation
GSA	Gordon Stone & Associates
GVIA	Gwydir Valley Irrigators Association
Narrabri LALC	Narrabri Local Aboriginal Land Council
NCEA	National Centre for Engineering in Agriculture (University of SQ)
NCMA	Namoi Catchment Management Authority
NENWLNC	New England North West Landcare Network Chairs Inc
PCT	Peter Cullen Trust
PHA	Plant Health Australia
PICSE	Primary Industry Centre for Scientific Education
RIRDC	Rural Industries Research and Development Corporation
RRR	Roth Regional & Rural
SH	Fund Base
SIAC	Spackman Iker Ag Consulting
TAgS	Taylored Agricultural Systems Pty Ltd
Technopak	Technopak Advisors Pty Ltd
UA	University of Adelaide
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
UWS	University of Western Sydney
WAS	Warden Agriculture Services
Wincott	Women's Industry Network—Cotton

R&D investments 2012–13

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
Program One: VALUE CHAIN					
CRDC1301	Yarn Price and Yarn Production Analysis	Technopack	Arindam Saha	5/07/12	30/07/12
UTS1201	Accounting for value chain sustainability & competitive advantage	UTS	David Brown	1/07/11	30/06/14
UQ1306	The development of a web-based carbon footprint calculator for the Australian cotton industry	UQ	Francois Visser	1/01/13	31/12/13
CMSE1201	Identifying the Glass Transition Temperature Behaviour of Australian Cotton	CSIRO	Chantal Denham	1/07/11	30/06/14
CMSE1204	Australian Cotton Fibre Elongation	CSIRO	Shouren Yang	1/07/11	30/06/13
CMSE1305	Commercial Ready Cottonspec	CSIRO	Shouren Yang	1/07/12	30/06/14
CSP1308	Agronomic Management for Better Fibre and Textile Quality	CSIRO	Robert Long	1/07/12	30/06/15
CMSE1307	Verification of Australian Long Staple Upland Cotton Spinning Performance	CSIRO	Rene van der Sluijs	1/07/12	30/06/13
CMSE1308	Effects of cotton cellulose structure & interactions on dye uptake	CSIRO	Shouren Yang	1/07/12	30/06/15
DU1301	Design of Thermal Cotton/wool fabrics made from Australian Fibre	Deakin	Xungai Wang	1/07/12	30/06/15
CRDC1320	Cotton Picker spindle grease based on Cottonseed Oil	Harrison Manufacturing	Gary Honson	1/11/12	30/06/13
DAN1306	Pilot study: Cotton Gin Trash to Bioethanol	DAN	Tony Vancov	1/10/12	31/01/14
DU1102	Development of low twist fine count yarns and fabrics from Australian long staple upland cotton	Deakin	Xungai Wang	1/07/10	31/07/14
CMSE1303	Automated Gin Seed Fingers	CSIRO	Andrew Krajewski	1/07/12	30/06/13
CMSE1312	Cotton Contamination Detection Sensors	CSIRO	Andrew Krajewski	1/07/12	30/06/15
CMSE1313	Comparison of commercial in-line leaf grade monitors with HVI and classer values	CSIRO	Stuart Gordon	1/07/12	30/06/13
DU1302	Scoping study—New developments and opportunities for cotton yarns and fabrics	Deakin	Xungai Wang	1/02/13	30/09/13
CMSE1203	Post Harvest BMP (including Classing/ Ginning and Harvesting)	CSIRO	Rene van der Sluijs	1/07/11	30/06/14
CMSE1310	Scoping study—influence of fibre length on HVI strength measurement	CSIRO	Geoffrey Naylor	1/07/12	30/09/13
Total R & D Investment Program One					**$2,097,164**

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
Program Two: FARMING SYSTEMS					
CCR1201	CCRSPI Level2 National Climate Change Research Strategy for Primary Industries	RIRDC	Craig Burns	1/07/11	31/12/12
CFOC1303	Regional Landcare Facilitator—Gwydir Valley *my*BMP Natural Assess & Carbon Farming Lead	NENWLNC	Sally Dickinson	1/07/12	30/06/13
CRC1015	PhD: Economic-enviromental water trade-offs in the Namoi under climate change and variability	CRC	Alison Wilson	1/04/10	31/10/13
NCMA1301	National Ecosystem Services Leader (part-time)	NCMA	Stacey Vogel	1/07/12	30/06/13
UNE1202	PhD: Next generation rural landscape governance: the Australian dimension	UNE	Tanya Howard	1/07/11	30/06/15
CRC1101	Improving prediction of cotton growth and production in a changing climate	CSIRO	Michael Bange	1/07/10	31/03/14
GRDC1301	Climate champion program—Andrew Watson	GRDC	Tomas Langley	1/07/12	30/06/13
UTS1301	Assessing climate change impacts and adaption options in the cotton industry	UTS	Qunying Luo	1/07/12	30/06/15
UWS1301	Cotton Industry adaption to extreme weather and climate change	UWS	Brajesh K Singh	1/07/12	30/06/15
NEC1201	The Feasibility and Development of Alternate Energy Sources for Cotton	NCEA	Craig Baillie	1/07/11	30/06/14
BCA1301	Boyce CA Cotton Comparative Analysis	BCA	Phil Achin	28/05/13	30/06/14
CCA1201	Annual qualitative & quantitative surveys for Australian cotton industry	CCA	Fiona Anderson	1/07/12	30/06/15
CLW1301	Measuring deep drainage from a cotton/wheat trial	CSIRO	Anthony Ringrose-Voase	1/07/12	30/06/15
CRC1117	Assessing greenhouse gas emissions from broadacre irrigated cropping systems	CRC	Ben Macdonald	1/07/10	30/06/13
DAN1202	Managing carbon in cotton-based farming systems	DAN	Nilantha Hulugalle	1/07/11	30/06/14
DAN1308	Identifying Farming Systems Issues in Western NSW Irrigation	DAN	Tim Weaver	1/10/12	30/06/13
DAN1309	Identifying Farming Systems Issues in Southern NSW Irrigation	DAN	Tim Weaver	1/10/12	30/06/13
DAQ1303	Optimising Energy and Water use Efficiency in the CQ irrigation Sector	DAQ	Lance Pendergast	1/07/12	30/06/13
RRR1201	2013 Grower Survey of Cotton Farming Practices & Regional Workshops to Identify Research Issues	RRR	Ingrid Roth	1/05/12	1/04/13
CA1301	Travel: Brazilian Cotton Farming System Study Tour, Brazil	CA	Greg Kauter	1/04/13	30/07/13
CSP1302	Assisting cotton industry diversification in coastal NQ & tropical Australia	CSIRO	Steve Yeates	1/07/12	30/06/15
DAN1201	Scholarship: Molecular genetic methods to detect neonicotinoid resistance in cotton aphid	DAN	Kate Marshall	1/07/11	30/06/14
NEC1302	Commercial prototype smart automation system for furrow irrigation of cotton	NCEA	Rod Smith	1/01/13	30/03/15

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
SIAC1301	The effect of plant density on yield, profit and boll disorders in CQ cotton	SIAC	Jamie Iker	20/10/12	30/06/13
USQ1101	Optimal irrigation of cotton via real-time adaptive control	NCEA	Alison McCarthy	1/07/10	30/06/13
CRC1115	Developing cotton systems that are nutrient-efficient and promote healthy soil	CSIRO	Ian Rochester	1/07/10	30/06/13
CRDC1333	Turning around back-to-back cotton fields with efficiency and precision	BIPL	Miles Ellery	7/06/13	30/10/13
CSE1307	Correlating refuge attractiveness with productivity and plant parameters	CSIRO	William Tan	7/01/13	1/03/13
CSP1104	Applying plant-based measurements for irrigation in water limited environments	CSIRO	Michael Bange	1/07/11	30/06/14
CSP1305	Irrigation Strategies in a limited water environment	CSIRO	Rose Brodrick	1/07/12	30/06/15
CSP1306	The potential for biodegradable film to improve cotton establishment in cool regions	CSIRO	Michael Braunack	1/07/12	30/06/13
CSP1307	Scholarship: Developing best management practices for the use of Mepiquat Chloride (PIX) in Southern cotton growing regions	CSIRO	Gabrielle Saliba	1/12/12	1/02/13
DAN1307	Scholarship: Root Growth of cotton under monoculture	DAN	Camille Coleman	30/10/12	30/03/13
GVIA1302	Grower led research in irrigation system comparisons in the Gwydir Valley	GVIA	Zara Lowien	1/07/12	1/08/14
NEC1101	A Protocol for Assessing On Farm Energy Use and Associated Greenhouse Gas Emissions	NCEA	Craig Baillie	1/07/10	30/06/13
NEC1301	Assessing the impacts of new harvesting technologies on cotton	NCEA	John Bennett	1/07/12	30/06/15
NEC1303	Testing simple models of pesticide runoff in Northern Agriculture	NCEA	Monia Anzooman	19/11/12	14/06/13
UNSW1301	Three-dimensional digital soil mapping of soil sodicity across an irrigated cotton growing field in the lower Namoi	UNSW	John Triantafilis	7/01/2013	1/03/2013
UQ1302	Developing soil testing and fertiliser response guidelines to manage P, K and S fertility for irrigated and dryland cotton cropping systems	UQ	Mike Bell	1/07/12	30/06/17
UQ1303	Capital Item: Retsch SM300 grinding mill	UQ	Mike Bell	1/07/12	30/06/17
UTS1202	PhD: Image processing method to estimate cotton requirements for nitrogen fertiliser	UTS	Mahdi Mousa Ali	1/03/12	30/06/15
DAN1302	Building the Cotton Industry Knowledge Hub	DAN	David Larsen	1/07/12	30/06/15
DAN1304	Namoi Regional Cotton Development and Delivery Officer	DAN	Peter Verwey	1/07/12	30/06/15
NEC1202	EnergyCalc Lite Development	NCEA	Craig Baillie	15/4/12	30/6/12
UNE1201	Positioning growers to take advantage of future ecosystem service markets	UNE	Rhiannon Smith	1/03/12	1/03/15
DAQ1201	Surveillance and monitoring for endemic and exotic virus diseases of cotton	DAQ	Murray Sharman	1/07/11	30/06/15

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
DAQ1202	Cross-industry preparedness for Cotton leaf curl disease	DAQ	Cherie Gambley	1/07/11	30/06/13
CA1201	Biosecurity training for growers & agronomists (Training of an industry-wide network in emergency response procedures)	CA	Greg Kauter	1/07/11	30/06/14
DAQ1301	Assessing the incidence & biosecurity risk of feral cotton plants in Queensland landscape	DAQ	Paul Grundy	1/07/12	30/06/13
UNE1303	Microbial solutions for sustainable cotton and soil health management	UNE	Lily Pereg	1/07/12	30/06/15
UNE1305	PhD: Sarah Cooper—Microbial tools for advancing the management of soil and seedling health in cotton production systems	UNE	Sarah Cooper	1/02/13	1/02/16
CRC1002A	Diseases of Cotton X—one year extension	DAN	Karen Kirkby	1/07/12	30/06/13
CRC1102	IPM for Silverleaf whitefly and emerging pests in central regions	CSIRO	Lewis Wilson	1/07/10	30/06/13
CRC1103	PostGrad: Dominic Cross: Improving ways to manage cotton refuges within the BMP framework	CSIRO	Mary Whitehouse	1/07/10	30/06/13
CSE0801	Genomics of *Helicoverpa Armigera* insecticide resistance (PhD)	CSIRO	Claire Farnsworth	1/3/09	31/1/13
CSE1103	*Bt* Resistance Monitoring	CSIRO	Sharon Downes	1/7/10	30/6/13
CSE1202	Efficacy of Bollgard III cotton against *Helicoverpa*	CSIRO	Sharon Downes	1/07/11	30/06/14
CSE1306	Managing *Bt* resistance, *H. Punctigera* movements & cotton planting windows	CSIRO	Geoff Baker	1/07/12	30/06/15
CSP1303	Identification of beneficials attacking Silverleaf whitefly and green vegetable bug	CSIRO	Lewis Wilson	1/04/13	30/06/15
DAN1101	New Tools for IPM 1: Development of Fungal insecticides against cotton pests	DAN	Robert Mensah	1/07/10	30/06/13
DAN1305	Updating and expanding Weedpak in support of the cotton industry & *my*BMP	DAN	Graham Charles	1/07/12	30/06/15
DAQ1103	Fusarium wilt management	DAQ	Linda Smith	1/07/10	30/06/13
DAQ1104	Whitefly resistance monitoring 2010-2013	DAQ	Zara Ludgate	1/07/10	30/06/13
DAQ1204	Management of mirids, stinkbugs and Solenopsis mealybug	DAQ	Moazzem Khan	1/07/11	30/06/14
DAQ1304	Major Capital : Nikon SMZ800 Stereo Microscope	DAQ	Linda Smith	1/05/13	30/06/13
UA1101	PostGrad. The use of biological control agents in resistance management of *Helicoverpa*	UA	Kay Anantanawat	1/7/10	30/6/13
UNE1301	Substitutes for pupae busting-commercial scale trials of moth busting	UNE	Peter Gregg	1/07/12	30/06/15
UQ1203/ DAQ1203	Improved Integrated Weed Management systems in transgenic farming landscapes	DAQ	Jeff Werth	1/07/11	30/06/14
UQ1305	Viruses, vectors and endosymbionts: Exploring interactions for control	UQ	Sharon van Brunschot	1/03/12	30/06/16

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
BGC1301	Increasing capacity to deliver accredited drift management workshops	BGC	Bill Gordon	1/07/12	30/06/15
CA1304	Cotton Map	CA	Greg Kauter	1/07/12	30/06/13
CCA1101	*Helicoverpa* egg collecting in cotton regions to support *Bt* and insecticide resistance monitoring	CCA	Fiona Anderson	1/07/10	30/06/13
CRC1109	Ecology of *Helicoverpa Punctigera* revisited: migration, overwintering and implications for *Bt* resistance	UNE	Peter Gregg	1/07/10	30/06/13
CRC1109A	PhD—Ecology of *Helicoverpa Punctigera* revisited: migration, overwintering and implications for *Bt* resistance	UNE	Kris Le Mottee	1/07/10	30/04/14
CRDC1207	Building industry capacity to adopt IWM in the cotton/grains farming system through research-client linkages	TAgS	Ian Taylor	1/07/11	30/06/14
CSE1201	The characterisation of Vip3A resistance in *Helicoverpa* spp.	CSIRO	Tom Walsh	1/07/11	30/06/14
CSE1302	Area-wide pest suppression in transgenic landscapes: Implications for IRM	CSIRO	Cate Paull	1/07/12	30/06/15
CSE1304	Managing *Bt* resistance and induced tolerance with effective refuge crops in preparation for Bollgard III	CSIRO	Mary Whitehouse	1/07/12	30/06/15
DAN1203	Sustainable resistance management of mites, aphids and mirids in Australian cotton	DAN	Grant Herron	1/07/11	30/06/14
DAN1204	*Helicoverpa* resistance management & novel method to protect Bollgard II	DAN	Lisa Bird	1/07/11	30/06/14
PHA1301	Cotton industry response to APVMA Spray Drift Assessment and Product Label Review.	PHA	Nicholas Woods	1/07/11	30/06/13
SC1301	National Cotton Extension Development & Delivery-stewardship of biotechnologies	Sally Ceeney	Sally Ceeney	1/07/12	30/06/15
UA1201	Extn 03UA001/2 Inducible tolerance to *Bt*-toxin: significance, mechanism & new management	UA	Mahbub Rahman	1/4/12	31/12/12
UNE1306	The characterisation of triacylglycerides as plant biomarkers in *Helicoverpa* moths	UNE	Ben Greatrex	28/3/13	30/6/14
UQ1001	Flight characteristics of *Helicoverpa* spp in relation to the efficacy of transgenic cotton refuges	UQ	Jason Callander	1/3/10	29/2/2014
UQ1301	Can genetic diversity predict the potential for emergent glyphosate resistance?	UQ	James Hereward	1/07/12	28/08/15
UQ1304	Global Herbicide resistance challenge international conference Perth WA	UQ	James Hereward	17/02/13	22/03/13
R & D Investment Program Two					$10,325,097

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
Program Three: HUMAN CAPACITY					
DAN1102	Human Capacity Assessment and Benchmarking	DAN	Charlie Bell	1/07/10	30/06/13
WIN1101	On-Farm environmental resources survey	Wincott	Barbara Grey	1/07/10	30/06/13
CFOC1301	Caring for our Country—Aboriginal trainees	Narrabri LALC	Sally Knight	1/07/12	1/04/13
CFOC1302	Developing workshops and grower groups for CFOC Project	Blue Dog Agribusiness	Elizabeth Alexander	1/06/12	30/06/13
CFOC1304	Caring for our Country project	CGA	Lizzie Bradford	1/06/13	30/10/13
CFOC1305	Caring for our Country project	CSFA	Lester Anderson	1/06/13	30/10/13
CSE1305	Developing Education Capacity in the Australia Cotton Industry	CSIRO	Trudy Staines	1/07/12	30/06/15
GSA1301	Cotton Industry Succession & Prof Dev-Engaging cotton agribusiness sector-to seek buy-in to the Strategy	GSA	Gordon Stone	8/8/12	30/11/12
GSA1302	Cotton Industry Succession & Prof Development Strategy: Agribusiness roundtable	GSA	Gordon Stone	1/05/13	30/06/13
SH1301	Field testing a prototype Cotton Skills Benchmarking System	Sally Hunter	Sally Hunter	28/9/12	16/11/12
UM1201	Innovative work: Cotton workforce development for sustained competitive advantage	UM	Ruth Nettle	1/07/11	31/12/14
UT1301	Cotton Industry Young Professionals Program	PICSE	David Russell	1/01/13	31/12/15
RIRDC1301	Collaborative Partnership Primary Industries Health & Safety	RIRDC	Simon Winter	28/8/12	30/6/17
SH1201	Capacity Building of CGAs in Project planning and grant applications.	Sally Hunter	Sally Hunter	1/07/11	30/06/14
WIN1102	Educational tour of Rural Industries	Wincott	Anne Coote Barb Grey	1/07/10	30/06/13
DAN1205	Promoting Water Smart Infrastructure Investment in NSW.	DAN	Janelle Montgomery	1/12/11	30/11/14
CA1201	Australian Future Cotton Leaders Program 3	CA	Jo Eady	1/07/11	31/08/12
CA1303	Primary Industries Education Foundation (PIEF) membership	CA	Adam Kay	1/07/12	30/06/14
CMSE1301	Cotton Field to Fabric Training Program	CSIRO	Rene van der Sluijs	1/07/12	30/06/14
CMSE1302	Cotton Ginning Training Program	CSIRO	Rene van der Sluijs	1/07/12	30/06/15
CMSE1304	Travel Beltwide Cotton Conference Texas USA Jan 2013	CSIRO	Robert Long	6/01/13	20/02/13
CMSE1309	Travel Beltwide Cotton Conference Texas USA Jan 2013 & ext 3 month visit	CSIRO	Geoff Naylor	7/01/13	17/05/13
CMSE1311	Travel: Australian Cotton Technology Symposium & Information Exchange in Nanjing China	CSIRO	Shouren Yang	26/10/12	30/11/12
CRDC1308	UNE 2013 Cotton Production Course	CRDC	Amy Billsborough	1/01/13	31/12/15
CRDC1309	UNE 2013 Cotton Production Course	CRDC	John de Wit	1/01/13	31/12/15
CRDC1310	UNE 2013 Cotton Production Course	CRDC	Paul Lehmann	1/01/13	31/12/15

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRDC1311	UNE 2013 Cotton Production Course	CRDC	Janelle Montgomery	1/01/13	31/12/15
CRDC1312	UNE 2013 Cotton Production Course	CRDC	Sam Simons	1/01/13	31/12/15
CRDC1313	UNE 2013 Cotton Production Course	CRDC	Annette Longworth	1/01/13	31/12/15
CRDC1314	UNE 2013 Cotton Production Course	CRDC	Sally Dickinson	1/01/13	31/12/15
CRDC1317	UNE 2013 Cotton Production Course	CRDC	Mathew Milner	1/01/13	31/12/15
CRDC1318	UNE 2013 Cotton Production Course	CRDC	Alice Devlin	1/01/13	31/12/15
CRDC1319	Sponsorship—Rotary Youth in Cotton Camp	CRDC	Rebecca Byran	1/05/13	30/05/13
CRDC1322	Sponsorship: 2013 Australian Cotton Research Conference, 8-11 September 2013	CSIRO	Mary Whitehouse	8/09/13	11/09/13
CSP1301	Travel: International Congress Entomology, Daegu South Korea August 2012	CSIRO	Lewis Wilson	18/08/12	26/09/12
CSP1304	Travel: Beltwide Cotton Conference Texas USA Jan 2013	CSIRO	Michael Bange	7/01/13	20/02/13
DAN1301	Travel: Attend International Congress of Entomology at Daegu, South Korea Aug-12	DAN	Robert Mensah	17/08/12	26/09/12
DAN1310	Travel: International Fusarium Workshop in Kansas USA	DAN	Peter Lonergan	20/06/13	29/08/13
NEC1304	Travel: 2013 Australian Life Cycle Assessement	NCEA	Guangnan Chen	15/07/13	18/09/13
PCT1301	Sponsorship: Peter Cullen Trust Science to Policy Leadership Program 2012	PCT	Sandra Hinson	17/09/13	15/11/13
PCT1302	Sponsorship: Peter Cullen Trust Science to Policy Leadership Program 2013	PCT	Sandra Hinson	1/06/13	30/06/14
RIR1301	Sponsorship Aust Rural Leadership Program Course 20—Elizabeth Stott	RIRDC	Elizabeth Stott	1/05/13	30/09/14
RIR1302	Sponsorship Aust Rural Leadership Program Course 20—Brooke Summers	RIRDC	Brooke Summers	1/05/13	30/09/14
UNE1302	Cotton Production Course	UNE	Brendan Griffiths	1/07/12	30/06/15
US1201	Managing Cotton Farm Safety Review and Update	US	Tony Lower	1/05/12	30/06/15
WIN1302	Travel: Coalition conference, 18-21 Feb 2013	Wincott	Kate Schwager	1/01/13	28/02/13
CSE1301	Travel: Australian Cotton Conference Broadbeach QUEENSLAND Aug 2012 Trudy Staines	CSIRO	Trudy Staines	13/8/12	17/9/12
WIN1301	Exposure of High School Students to the Cotton Industry via the 2012 Cotton Conference	Wincott	Kate Groves	13/7/12	17/10/12
RIRDC1103	Investing in Youth Undergraduate Studentship Program ($10k pa)	RIRDC	Rebecca Dunsmuir	1/01/11	31/12/15
RIRDC1201	Investing in Youth Undergrad Studentship Program—Horizon Scholarships 2012 ($20,000 p.a.)	RIRDC	K McCormack & B Browning	1/01/12	31/12/15

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
RIRDC1302	Horizon Scholarship 2013: Jessica Kirkpatrick	RIRDC	Jessica Kirkpatrick	30/04/13	31/12/16
RIRDC1303	Horizon Scholarship 2013: Charlie French	RIRDC	Charlie French	30/04/13	31/12/16
RIRDC1304	Horizon Scholarship 2013: Paul Sanderson	RIRDC	Paul Sanderson	30/04/13	31/12/16
RIRDC1305	Horizon Scholarship 2013: Alana Johnson	RIRDC	Alana Johnson	30/04/13	31/12/16
RIRDC1306	Horizon Scholarship 2013: Emily Miller	RIRDC	Emily Miller	30/04/13	31/12/16
CRC1108	Social, economic, environmental performance information repository and reporting for the cotton industry	RRR	Guy Roth	1/07/10	30/06/13
CRDC1315	Sponsorship of 2-day Training in video production techniques course	Vision21	Rick Woolley	26/02/13	27/02/13
CSE1303	Travel: Entomological Society of America Conference Knoxville USA Nov 11-14 2012	CSIRO	Cate Paull	10/11/12	15/12/12
DAN1303	Travel: Soil Science Conference Hobart Dec 2012	DAN	Tim Weaver	2/12/12	30/01/13
DAQ1302	Australian cotton production and best practice documentaries	DAQ	Paul Grundy	1/07/12	30/06/15
UNE1304	Travel: EGU2013 Conference-Soil System Science Vienna April 7-12th 2013	UNE	Lily Pereg	4/04/13	22/05/13
CGA1210	Extension Officer Upper Namoi CGA-Agvance Farming	AgVance	Kirrily Blomfield	30/10/12	30/06/13
CRC1110	St. George / Dirranbandi Cot. Ext. Officer	Western Rivers	Dallas King	1/07/10	30/06/13
CRC1212	National Extension Development and Delivery—Crop Protection	DAQ	TBA	1/07/11	30/06/14
CRDC1211	BMP Lead Auditor	RRR	Guy Roth	1/07/11	30/06/13
CRDC1302	Supporting the adoption of agronomy best practices for cotton production by cotton consultants in Southern NSW	WAS	Steve Warden	15/11/12	31/03/13
CRDC1321	8 Envirostory books	Peek Design	Trudy Staines	21/03/13	30/12/13
CRDC1328	Building Capacity of cotton farm employees: employer driven staff development	Waters Consulting	Warwick Waters	28/05/13	30/06/14
CSP1201	Linking Research, Extension and *my*BMP—Facilitation	CSIRO	Michael Bange	1/07/11	30/06/14
WIN1303	Wincott Calendar	Wincott	Sally Dickinson	30/07/12	30/12/12
CGA1301	Capacity Building via a soil nutrition workshop for the Upper Namoi CGA	CGA	Kirrily Blomfield	1/02/13	30/06/13
CGA1302	Macquarie Cotton Growers Momentum Continues	CGA	Claire Jenkins	14/02/13	31/05/13
CGA1303	Attendance to Field to Fabric Course x3	CGA	Bronwyn Christensen	16/06/13	20/06/13
CGA1304	Capacity building at the Cotton Fibre Expo	CGA	Mandy Gilmore	30/03/13	30/06/13
CGA1305	Central Highlands Irrigation History Book	CGA	Tracey Geddess	20/09/12	31/08/14

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CGA1306	An afternoon of cotton	CGA	Kieran O'Keeffe	1/05/13	30/11/13
CGA1307	All for one and one for all	CGA	Mike & Debbie Austin	25/08/13	29/09/13
CGA1308	Future Industry Leaders Excursion (Lower Namoi & Walgett CGAs)	CGA	Geoff Hunter	30/06/13	31/10/13
CRDC1303	Sponsorship Field to Fabric Course Sept 2012	CRDC	Tony Bailey	28/08/12	30/10/12
CRDC1304	Sponsorship Field to Fabric Course Sept 2012	CRDC	Robbie Cunningham	28/08/12	30/10/12
CRDC1305	Sponsorship Field to Fabric Course Sept 2012	CRDC	Georgina Krieg	28/08/12	30/10/12
CRDC1306	Sponsorship Field to Fabric Course Sept 2012	CRDC	Tom Arnott	28/08/12	30/10/12
CRDC1307	Sponsorship Field to Fabric Course Sept 2012	CRDC	Chris Durkin	28/08/12	30/10/12
CRDC1324	Sponsorship: A Devlin—Field to Fabric Course June 2013	CRDC	Alice Devlin	17/06/13	30/08/13
CRDC1325	Sponsorship: J Hamparsum—Field to Fabric Course June 2013	CRDC	John Hamparsum	17/06/13	30/08/13
CRDC1330	Sponsorship: D Ingram—Field to Fabric Course June 2013	CRDC	Danni Ingrim	17/06/13	30/08/13
CRDC1331	Sponsorship: R Lindert—Field to Fabric Course June 2013	CRDC	Rebecca Lindert	17/06/13	30/08/13
CRDC1332	Sponsorship: R Ingram—Field to Fabric Course June 2013	CRDC	Robert Ingram	17/06/13	30/08/13
ABA1301	2013 Science and Innovation Awards for Young People	ABARES	Robert Sharwood	1/07/12	30/06/14
R&D Investment Program Three					$2,446,432
Cotton R&D Investment Portfolio					$14,868,693

Program Four: COTTON CATCHMENT COMMUNITIES CRC

03CRC003 1.01.58	PostGrad: Ali Getachew—Genetic factors involved in pathogenicity of *Thielaviopsis basicola* towards cotton	UNE	Lily Pereg	1/07/07	30/06/12
1.02.25	PostGrad: Jay Dhungal—Field aspects of multigation—ferigation and oxygation	CQU	Peter Gregg	1/01/08	31/12/12
1.03.44	PostGrad: Tim McLaren—Improving P & K nutrition and fertiliser use efficiency in depleted or sodic Vertosols	UNE	Chris Guppy	1/07/09	1/10/12
1.04.15	Post Grad: Brooke Sauer –An assessment and evaluation of current PA tools: commercial broadacre applications to the irrigated and rain-fed cotton and grains industry in northern NSW and southern Queensland	UNE	Chris Guppy	30/08/07	31/12/13

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
1.1.50	PostGrad: Chris Carr—Optimising the establishment, persistence and impact of *Trichogramma pretiosum* in NSW	UNE	Nick Reid	1/01/07	31/12/12
2.02.04	PostGrad: Kathryn Korbel—Robust and sensitive indicators of groundwater health and biodiversity	UTS	Grant House	31/01/06	30/06/12
2.02.13	PostGrad: Dawit Berhane—transmission losses in semi-arid rivers, a loss or a gain	UNSW	Willem Vervoort	1/01/07	31/12/12
2.02.21	PhD: Andrew McCallum—The impact of climate change on surface water groundwater resources: Maules Creek	UNSW	Martin Anderson	1/01/10	31/12/12
2.04.13	Post Grad: Oliver Robertson—Spatial ecology of woodland birds in cotton landscapes	UQ	Clive McAlpine	11/02/08	30/06/12
3.01.05	An integrated assessment of the Socio Economic impacts of climate change, technology and water policy drivers in cotton catchments	ANU	Tony Jakeman	1/01/10	30/06/13
3.01.07	PostGrad: Madelein Hartley—The legal framework for economic-environmental water trade-offs in the Namoi under climate change & viability	UWA	Alex Gardener	1/06/10	30/11/13
3.02.02	PostGrad: Donna Moodie—Inclusive engagement and development: an indigenous perspective of community, business and sustainable development	UQ	Helen Ross	1/03/07	30/06/13
3.02.26	An audit of the workforce skills of aboriginal people in the Gomeroi Tribal Nation	Consultants	Various	1/07/11	30/06/13
3.04.17	CCCCRC Primary schools EnviroStories competition	Peak Designs	Peter Coleman	1/04/12	31/12/12
CRC1001 1.04.17	The development of sustainable cotton farming systems for coastal north Queensland	CSIRO	Steve Yeates	1/07/09	30/06/12
CRC1003 1.01.64	Managing weeds and herbicides in a genetically modified cotton farming system	DAN	Graham Charles	1/07/09	30/09/12
CRC1012 3.03.06	PostGrad: Olive Hood—Collective NRM and socio-economic scenarios in cotton communities	UQ	Christine King	18/08/09	27/02/13
CRC1015 3.01.06	PostGrad: Alison Wilson—Economic environmental water trade-offs in the Namoi under climate change and variability	UWA	David Pannell	12/04/10	31/10/13
CRC1101 1.04.06	PostGrad: Katie Broughton—Improving prediction of cotton growth and production in a changing climate	CSIRO	Michael Bange	1/07/10	30/06/13
CRC1102 1.01.30	IPM for Silverleaf whitefly and emerging pests in central regions	CSIRO	Lewis Wilson	1/07/10	30/06/13

CRDC No.	Project Title	Research Organisation	Principal Researcher	Start Date	Cease Date
CRC1103 1.01.35	PostGrad: Dominic Cross—Better management of cotton refuges within the BMP framework	CSIRO	Mary Whitehouse	1/07/10	30/06/13
CRC1106 1.04.14	Completion of Burdekin Cotton Feasibility Study	DAQ	Paul Grundy	1/07/07	30/08/12
CRC1109 1.01.31	Ecology of *Helicoverpa Punctigera* revisited: implications for *Bt* resistance	UNE	Peter Gregg	1/07/10	30/06/13
CRC1109A 1.01.33	PostGrad: Kris Le Mottee—Ecology of *Helicoverpa Punctigera* revisited: implications for *Bt* resistance	UNE	Peter Gregg	1/05/11	30/06/14
CRC111 1.01.04	PostGrad: James Hereward—Is the source of mirids in cotton derived from local dispersal?	CSIRO	Paul De Barro	1/03/06	31/07/12
CRC1115 1.03.30	Developing cotton systems that are nutrient-efficient and promote healthy soil	CSIRO	Ian Rochester	1/07/10	30/06/13
CRC1117 1.04.19	Assessing greenhouse gas emissions from broadacre irrigated cropping systems	CSIRO	Bennett Macdonald	1/07/10	30/06/13
CRC1212 5.01.40	National Extension Development and Delivery—Crop Protection	DAQ	Susan Maas	1/07/11	30/06/14
CRC1213 5.01.39	Professional Development Manager (Cotton)	DAQ	Mark Hickman	1/07/11	30/06/14
CRC1215 1.02.28	Benchmarking furrow irrigation efficiency in the Australian Cotton Industry	USQ	Malcolm Gillies	1/07/11	31/08/12
CRC1222 2.04.20	The role of *Bt* cotton in pest suppressive landscapes	CSIRO	Nancy Schellhorn	1/08/09	30/06/12
CRC139 1.03.24	PostGrad: Meredith Errington—Nutrient redistribution within cotton plants	US	Daniel Tan	1/03/07	31/03/13
RRR1301 5.05.14	Communication of the Cotton Catchment Communities CRC science portfolio	RRR	Guy Roth	16/05/12	30/04/13
R & D Investment Program Four					$713,372

Program Five: NATIONAL PROGRAM FOR SUSTAINABLE IRRIGATION

NPSI	PISC Water use in Agriculture Strategy	RRR	Guy Roth	1/07/12	30/06/13
R & D Investment Program Five					$50,277

Total R & D Investment Portfolio 2012–13	$15,632,342

APPENDIX FIVE
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
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 cotton
ANAO	Australian National Audit Office
ANCID	Australian National Committee on Irrigation and Drainage
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
AWM	Area Wide Management
Bollgard II®	Cotton varieties contain two genes resistant to *Helicoverpa* spp.
BMP	Best Management Practices program
BRS	Bureau of Rural Sciences
Bt	*Bacillus thuringiensis* (crystal protein gene expressed in Bollgard II® cotton varieties, resistant to *Helicoverpa* spp.)
CA	Cotton Australia
CAC Act	Com*monwealth Authorities and Companies Act 1997*
CCA	Crop 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
CottonInfo team	Team of Regional Development Officers and technical specialists formed under the Development and Delivery Joint Venture, managed by CRDC
CMA	Catchment Management Authority
CMSE	CSIRO Materials Science and Engineering
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
CVCB	Cooperative Venture for Capacity Building
DAFF	Australian Government Department of Agriculture, Fisheries and Forestry *(became the Department of Agriculture on 18 September 2013)*
D&D	Development and Delivery
DECCW	NSW Department of Environment, Climate Change and Water
DERM	Queensland Department of Environment and Resource Management

DOFD	Australian Government Department of Finance and Deregulation
EIQ	Environmental Impact Quotient
e-Learning	On-line learning, training and education
EM	Electromagnetic conductivity
EPI	Environmental Performance Indicator
ESD	Ecologically Sustainable Development
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
FH&SJV	Farm Health & Safety Joint Venture
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
HAL	Horticulture Australia Ltd
ha.	Hectare
Helicoverpa spp.	Cotton's major insect pests (*H. armigera* and *H. punctigera*)
Heliothis	Insect pest, more properly known as *Helicoverpa* spp. (see above)
HVI	High Volume Instrument
IBP	Industry Biosecurity Plan
ICAC	International Cotton Advisory Committee
ICT	Information and Communications Technology
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 *Helicoverpa* spp. *(ceased use in 2004)*
IPM	Integrated Pest Management
IRMS	Insecticide Resistance Management Strategy
ISO	International Organisation for Standardization
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)*
MLA	Meat and Livestock Australia
MP	Member of Parliament
NCEA	National Centre for Engineering in Agriculture, University of Southern Queensland
neps	Short, tangled fibres that have an adverse impact on spinning
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	New South Wales
NSW DPI	NSW Department of Primary Industries
NUEI	Nitrogen Use Efficiency Index
OGTR	Office of the Gene Technology Regulator
PICSE	National Primary Industry Centre for Science Education
PIHSP	Primary Industries Health and Safety Partnership
PISC	Primary Industries Standing Committee
PIERD Act	*Primary Industries and Energy Research and Development Act 1989*
Pima cotton	*Gossypium barbardense*. Related to Egyptian cotton, having extra long and fine staples. Limited Australian production.
QAAFI	Queensland Alliance for Agricultural and Food Innovation
QDAFF	Queensland Department of Agriculture, Fisheries and Forestry
QFF	Queensland Farmers Federation
QUT	Queensland University of Technology
Ratoons	Plants that grow from the roots of previously harvested plants that have survived over winter
RD&E	Research, Development and Extension
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	*Gossypium hirsutum*. Comprises the vast majority of the Australian cotton crop, with Pima cotton *(see above)* comprising the remainder
Volunteer cotton	Cotton that has grown as a self-down weed
WHS	Workplace Health and Safety
Wincott	Women's Industry Network—Cotton
WUE	Water use efficiency

APPENDIX SIX
ANNUAL REPORT LIST OF REQUIREMENTS

Commonwealth Authorities and Companies Act 1997

A. ANNUAL REPORT REQUIREMENTS	
Certification	iii
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	72
Other applicable legislation	74; 75; 77; 78; 136
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