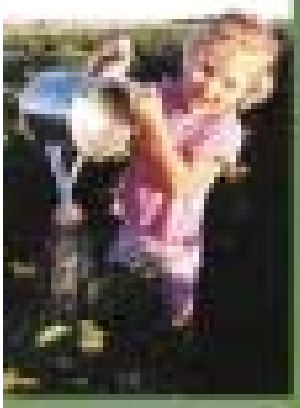

Australian Government

Cotton Research and Development Corporation

Annual Report 2004–05

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Australian Government

Cotton Research and Development Corporation

10 October 2005

Senator Richard Colbeck
Parliamentary Secretary to the Minister
for Agriculture, Fisheries and Forestry
Parliament House
Canberra ACT 2600

Dear Senator Colbeck

It is with great pleasure that I submit the Corporation's Annual Report 2004–05, prepared in accordance with the provisions of section 28 of the *Primary Industries and Energy Research and Development Act 1989* and part 1, section 4 of the *Commonwealth Authorities and Companies Act 1997*.

Under Section 9 of the *Commonwealth Authorities and Companies Act 1997*, the Directors of the CRDC are responsible for the preparation and content of the Annual Report being made in accordance with the Finance Minister's orders. The report of operations has been prepared in accordance with a resolution of the Directors on 5th September 2005.

Yours sincerely

Bridget Jackson
Chair

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A Message from the Chair and Executive Director

Bridget Jackson
Chair

Bruce Finney
Executive Director

Looking back…

The cotton industry and the Corporation continued to be challenged by drought conditions in 2004–05. Despite significantly reduced revenues in recent years the Corporation has been able to use its financial reserves to maintain R&D investments that deliver the outcomes sought in its *Strategic Plan for 2003 to 2008*. This plan focuses R&D effort into six key research programs—People and Knowledge, Integrated Natural Resource Management, Crop Protection, Farming Systems, Plant Breeding and Technology and Value Chain. In early 2005 the Corporation, in conjunction with its industry stakeholder, the Australian Cotton Growers Research Association (ACGRA), critically reviewed R&D progress and outcomes against the plan and its priorities. The review confirmed that the CRDC's R&D programs remain relevant and effectively address the research needs of government and industry.

Other important corporate reviews which took place in 2004–05 included a review of the Corporation's Information Technology processes and security, and a full review of the way in which Intellectual Property (IP) is handled. An outcome of the IP review was the development of a new IP policy and tool kit, which will guide the CRDC team through a number of steps to assist them in forming a judgement as to the nature and risks of IP associated with R&D projects.

Against a background of reduced crop area due to limitations of available irrigation water and low world cotton prices the upside for 2005 was a harvest that produced both record breaking yields and high quality cotton. While the successful season is due to a combination of factors, there is little doubt that the outputs of the CRDC funded CSIRO cotton breeding program have contributed significantly to the economic performance of the industry. The 14 new varieties developed by this program and released in time for the 2004 planting season contained

many new features, including improved yield potential, fibre quality, disease resistance, growth habit, maturity, regional adaptability, and improved biotechnology delivering insect resistance and herbicide tolerance.

During the last decade, the application of innovative biotechnology has provided a foundation for the rapid adoption of integrated pest management (IPM) practices, which have helped the industry to reduce overall insecticide use by 70 per cent over the last decade. Today the latest cotton biotechnology, Bollgard II®, requires 85 per cent less insecticide than conventional cotton. In 2002, The Centre for International Economics (CIE) estimated that the investment in the Breeding Program has resulted in a return of almost $5 billion since 1984 to the Australian cotton industry and that a benefit to cost ratio of 86 has been achieved. The CIE analysis projected benefits of the program out to 2006 and it is now apparent that the assumptions they made on both yield improvement and market share of CSIRO varieties between 2002 and 2005 were conservative.

Over the past ten years, in excess of $6 million has been invested in the research and development of the Best Management Practices (BMP) program—the cotton industry's grower-driven environmental management system. 2004–05 saw continued enhancement and further uptake of BMP across all cotton growing areas. The program has transformed the way in which cotton is grown in Australia and has helped cotton growers identify and reduce environmental risks on their farms, neighbouring properties and downstream. Adoption of BMP has led to improved management of pesticides, improved profitability and has improved relationships within cotton communities. Although the BMP program is voluntary, 96 per cent of growers see it as essential to the future of the industry in Australia, and in 2004–05 around 60 per cent of Australian cotton was grown on BMP-accredited farms. Adoption of BMP has seen the Australian cotton industry recognised internationally as a leader in sustainable cotton production and a model for change by other sectors of Australian agriculture.

Following successful trials during 2003–04, early 2005 also saw an important addition to the range of BMP tools, with the publication and roll out of a new *BMP Land and Water Management* Module. This module will help cotton growers manage land, water and vegetation resources with the aim of protecting and enhancing the natural environment on their farms, improve water use efficiency and at the same time, improve profitability. Implementation of the Land and Water Module will be conducted by Cotton Australia in partnership with a number of catchment management bodies and environmental extension staff.

This year also saw the commencement of a Natural Heritage Trust-funded *Pathways to EMS* project which is examining ways in which BMP can be taken beyond the farm gate. It will investigate market based incentives for increased uptake of the program. This is particularly important at

the present time as the industry is faced with reduced water allocations which may affect its ability to supply its traditional markets. Couple this with increasing international competition and it is evident that the Australian industry needs to take the extra step in order to distinguish its quality BMP produced cotton from commodity type cotton in the global marketplace. It will be very exciting to see how this extremely important project develops in 2005–06, when industry begins to ask itself the fundamental question 'should we brand Australian cotton?'

The environmental benefits which have been brought about as a combined result of BMP, Integrated Pest Management and biotechnology traits for insect control and herbicide tolerance have marked the dawn of a new era for the Australian cotton industry. In 1991, the Australian cotton industry became the first Australian agricultural industry to have its environmental performance externally validated through a comprehensive audit of farming practices. Today, the industry is very different to that which was audited in 1991, and in 2003, 12 years after the first environmental audit, the industry believed it was time to test its environmental performance once again and conducted a second audit.

The 2003 audit found that the industry had achieved high compliance in 75 per cent of the recommendations the original audit had set down, with this having been attributable mostly to the BMP Program, improved water use efficiency and excellence in Integrated Pest Management. All relevant sectors of industry have closely assessed the recommendations of the Second Environmental Audit and have responded with an industry wide action plan—*Taking Responsibility for our Future—The Cotton Industry Response to the Second Environmental Audit*. Senator, the Hon Richard Colbeck, Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry launched the action plan in March 2005.

The economic and environmental success of the cotton industry in Australia can be attributed to a combination of factors, but the early adoption of research outcomes certainly gives the industry a distinct international competitive advantage. CRDC, along with the Cotton CRC, have played a major role in funding and coordinating the National Cotton Extension Network over recent years. The Extension Team work collaboratively with growers and industry personnel to aid the early adoption of research outcomes and to communicate relevant research findings on a regional basis. A major review of Extension, Education and Training was undertaken in early 2005 in conjunction with the Cotton CRC. The aims of the review were to examine opportunities to develop a series of integrated extension, education and training programs, to ensure that extension activities continue to be targeted and that delivery and dissemination of national cotton research outcomes continues to be relevant, practical and timely.

Looking Forward…

The better than anticipated 2005 harvest result has underpinned the Corporation's capacity to invest with research providers to continue the implementation of our strategic R&D priorities during 2005–06. Production is expected to be in the region of 2.9 million bales—0.9 million bales more than budgeted. That said, while the prospects for the 2005–06 crop have improved, with good winter rains in key production areas, drought conditions and low world cotton prices are still with us and the coming year will again be challenging. Consequently, the Corporation continues to remain prudent in its investment decisions to ensure that our government and industry stakeholders gain maximum value for each dollar invested. To achieve this, CRDC is placing an increasing emphasis on doing more with less and seeking co-investment with a wide range of partners so as to collectively gain greater value from our research budgets.

The establishment of the new Cotton Catchment Communities CRC in 2005–06 presents a unique opportunity to co-invest in collaborative research that delivers against both the CRDC and CRC strategic research priorities. CRDC is the largest single investor in the new CRC, with an annual commitment of $4 million, of which $3.9 million is tied to specific research projects. The CRC's new focus on catchments and communities opens opportunities for CRDC to further address its triple bottom line objectives through CRC-related investments, and we expect that this broader focus will result in an enhanced cotton research effort.

The new CCC CRC Board. Front: Di Bentley and Helen Scott-Orr
Middle: Bruce Finney, Dr Gary Fitt, Kathryn Adams and Stuart Higgins.
Back: John Herbert and David Anthony

CRDC will place a greater research focus on achieving high productivity through improvements to yield and fibre quality in 2005–06—ensuring that Australian cotton continues to sell at the high end of the international market in the face of increasing competition. Further investment in biotechnology to address these issues, in addition to farming systems that improve or maintain quality and an increased investment portfolio in

post farm gate processing, will all ensure that Australian cotton remains a premium product.

Increased investment in the management of key natural resources used in the farming system is another R&D focus. The industry is successfully reducing its dependence on pesticides, but environmental challenges remain and the Corporation will place an even greater emphasis on improving water use efficiency, further research into the our understanding of deep drainage and implications for the water balance.

The staff and Board of the CRDC very much look forward to fostering effective and productive relationships with all of our government and industry stakeholders.

The CRDC Board, 2004–05

Bridget Jackson
Chair

Bruce Finney
Executive Director

CRDC's year at a glance

Corporate Highlights

- CRDC's new Executive Director, Mr Bruce Finney, took up his position in September 2004 upon the retirement of Mr Ralph Schulzé after 14 years at the helm of the Corporation.
- A restructure of the Corporation's research management team saw Mr Bruce Pyke take on the newly created role of General Manager—Research and Extension.
- Other Director and staff changes included the appointment of Simon Smalley as Government Director on the CRDC Board, Dallas Gibb as Research Program Manager and Julie Burt as Communications Manager.

Dallas Gibb and Julie Burt

- Senator, the Hon Richard Colbeck launched two new cotton industry publications: *Second Environmental Audit–Cotton Industry Response and Best Management Practice—Land and Water Management Module* in May 2005.

Senator, the Hon Richard Colbeck launches
Taking Responsibility for Our Future

– The CRDC Board adopted its first Board Charter—a comprehensive resource to guide policy, procedures and responsibilities for Directors and staff.

– CRDC Directors and senior staff held a joint strategic planning session with the Australian Cotton Growers Research Association (ACGRA) in February to ensure that CRDC's R&D program continues to address the research needs and concerns of growers and other industry sectors.

The 2004–05 ACGRA Executive—Harley Bligh, Glen Fresser, John Watson, Hamish Millar and Paul McVeigh (absent Ben Stephens)

– CRDC completed external reviews of Information Technology, Occupational Health and Safety and Intellectual Property as well as a major review into Extension, Education and Training.

Did you know... On a global scale, Australia normally grows about three per cent of the world's cotton but is the third largest exporter of cotton in the world. (Source—CA, 2005)

Triple Bottom Line Highlights

Tracking Environmental Performance

Output—Sustainable production systems and catchments

- Estimated 60 per cent of 2005 crop produced under the Cotton Best Management Practices (BMP) program. (Source—CA, 2005)
- BMP Land and Water Management module developed and published—50 growers commenced module since its publication in March 2005. (Source—CA, 2005)
- Industry launched *Taking Responsibility for our Future*—its response to the Second Environmental Audit.
- Adoption of Bollgard II® varieties has led to significant reduction in pesticide use, up to 85 per cent, and improved the environmental performance of the industry. (Source—CCA , 2005)

Progress Towards Environmental Objectives

Environmental Objectives	Targets	Progress Towards Targets 2004–05
Industry-wide adoption of improved integrated insect pest management systems.	A 50 per cent reduction in 2004 quantities of insecticide used by 2008.	31 per cent reduction in insecticide use from 2003–04 to 2004–05. (Source—CCA, 2005)
Industry-wide adoption of improved integrated weed management systems.	A 20 per cent reduction in 2004 quantities of residual herbicide used by 2008. Continued decline in riverine contamination by herbicides used only in cotton production.	Declines in herbicide contamination in rivers correlate with changes in herbicide use as a result of increased planting of Roundup Ready® varieties. Indications from 2003–04 show an overall decline in riverine herbicide contamination. Figures for 2004–05 are yet to be collated.
Increased adoption of BMP that meets legal requirements, industry benchmarks and catchment scale targets	80 per cent of cotton production audited against BMP by 2007.	Initial figures indicate 60 per cent of 2005 crop audited against BMP Minimum Certification Standards and 44 per cent of cotton farms have had either a BMP audit or a *Pre Certification Assessment*. (Source—CA, 2005)
Improved Water Use Efficiency (WUE).	A 20 per cent improvement in farm WUE against the 2004 median by 2008.	CRDC currently co-ordinating collection of benchmark data for 2003–04 and 2004–05 seasons.

Tracking Economic Performance

Output—Profitability and international competitiveness

- Australian cotton has consistently achieved premium prices compared to its competitors due to its high quality.
- CSIRO new seed varieties have resulted in a return of almost $5 billion to the Australian cotton industry since 1984, with a benefit to cost ratio of 86:1. (Source—CIE, 2002)
- Australian irrigated cotton farms have the world highest yields for a major producer—with a 22 per cent increase in cotton yield comparing average yields for 1995–2000 with average yields for 2001–2005 (Source—Cotton Yearbook, 2005)
- CSIRO seed varieties now hold a 25 per cent share of the US cotton seed market. (Source—CSD, 2005)
- CRDC income from commercial royalties in 2004–05 is estimated at $1.6 million and represents 14 per cent of annual income.

Progress Towards Economic Objectives

Economic Objectives	Targets	Progress Towards Targets 2004–05
Improved yield (through improved management and breeding of higher yielding, disease, insect and herbicide tolerant cotton varieties).	A ten per cent improvement in cotton yield per hectare (2 per cent annual or ten per cent over five years).	Australian cotton farms have the world's highest yields for a major producer—with a 22 per cent increase in cotton yield comparing average yields for 1995–2000 with average yields for 2001–2005. (Source—Cotton Yearbook, 2005)
Improved cotton fibre quality that meets market and spinner needs.	Evidence of continuous improvement in five key parameters measured in spinning mill benchmark surveys by 2007. Evidence that prices for Australian cotton remain above those for competitive cotton growths.	15 fibre characteristics of Australian cotton were measured in 2003 during a CSIRO Textile and Fibre technology Cotton Mill Benchmark Survey. A further mill survey is expected in 2006. Australian cotton remained one of the top prices listed for the highest category of upland cotton on the Liverpool *Cotton Outlook* 'A' index during 2004–05. (Source—Cotton Outlook, 2005)

Increased profitability through better whole farm management	Evidence that profit margins are maintained or improving over time (2003–08 annual and trends over time).	Ongoing drought conditions in many growing areas and current low prices have impacted on whole farm profitability. Annual and long term economic performance is captured through the annual Boyce & Co. Cotton Comparative Analysis. In 2004–05 this study indicated improved variety performance and management practices were partially off-setting the impact of reduced cotton areas.

Tracking Social Performance

Output—Empowered people and communities

- External evaluation of appropriateness of Extension Team roles, responsibilities and management structure carried out during major review of extension, education and training.
- Wincott (Women in Cotton) had 70 members in 2004–05 and over 160 women attended four field and training days.
- Over 600 copies of searchable edition of COTTONpak CD Rom distributed. (Source—Cotton CRC, 2005)
- Reduced environmental footprint of cotton helping to rebuild community perceptions of industry. (Source—Roy Morgan, 2005)

Progress Towards Social Objectives

Social Objectives	Targets	Progress Towards Targets 2004–05
Improved skills and qualifications of people at all levels of the industry.	Between 2003 and 2008: – At least 15 new Postgraduates working in areas of high priority future need; – At least ten new post-doctoral positions working in areas of high current need; – 80 per cent of cotton growers having attended a relevant training course in OH&S, IPM or Water Management.	11 new Postgraduate students funded and commenced since 2002–03. 2 new Post Doctoral positions funded and commenced since 2002–03. 479 participants attending OH&S courses; over 200 industry personnel attending Integrated Pest Management Course, including 43 in 2004–05; 250 Hydrologic users trained through workshops since 2003; and 146 cotton industry personnel completed alternative irrigation techniques training in eight locations in 2004–05.

Healthy and resilient communities in cotton producing regions.	Objective to be reached through combination of targeted areas: – A reduction in the cotton industry's environmental footprint (eg. reduced pesticide use, improved water use efficiency, reduced greenhouse gas production); – Contribution to career opportunities in cotton producing regions; – At least a ten per cent reduction in cotton farm related injuries; – Improved industry economic viability.	Bollgard II® contributing to an 85 per cent reduction in insecticide usage compared with conventional cotton. Additional investment committed to on going collaborative project to benchmark greenhouse gas emissions. 4 Wincott training and field days held to improve capacity of women in the cotton industry. Over $10 million of CRDC funded research and extension activities creating career opportunities in cotton producing areas. Outcomes of Farmsafe course to be assessed in 2005–06. 22 per cent increase in yields with lower chemical inputs helped to maintain returns in a low price market. (Source—Cotton Yearbook, 2005)
Adoption of research outcomes that is leading to improved and more sustainable management practices.	At least five adoption evaluations conducted per year by members of the National Cotton Extension Team.	Knowledge Management in Cotton and Grain Irrigation evaluation completed. Evaluation of Bollgard II® perceptions competed. Refuge management evaluation completed. Nutrition focus groups competed and Fibre Quality. Extension team evaluations completed.

Did you know... The cotton industry generates, on average, over $1.5 billion per year in export revenue, is one of Australia's largest rural exports and underpins the viability of many rural communities. (Source—ABS, 2004)

Financial Highlights

Revenue

The CRDC's revenue is drawn from two main sources. Cotton farmers pay a levy of $2.25 for each 227 kilogram bale of cotton. The Australian Government matches expenditure of levies on eligible R&D, capped at 0 .05 per cent of the gross value of production or to cumulative levy receipts, whichever is the lesser. Royalties from the sale of domestic and international planting seed, interest on investments and research project refunds make up the balance of CRDC's income.

The 2004–05 financial year saw a marked improvement in CRDC's financial position when compared to budget due to a better than expected crop size.

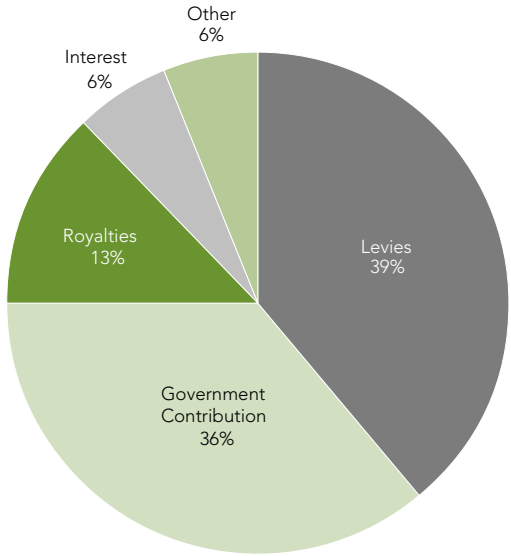
Cotton levy revenue is collected at the point of ginning—when cotton has been picked and delivered to cotton gins which then separate the cotton lint from the seed. This occurs from March to September of each calendar year. Cotton levy revenue in any financial year is therefore drawn from two consecutive cotton crops.

The $2.9 million revenue improvement over budget is a direct result of the 2003–04 crop being 1.7 million bales (budget: 1.25 million) and receiving levy receipts equivalent to 1.34 million bales (budget: 1.0 million bales) from the 2004–05 crop at 30 June 2005.

Total revenue for 2004–05 was $11.9 million, comprising:

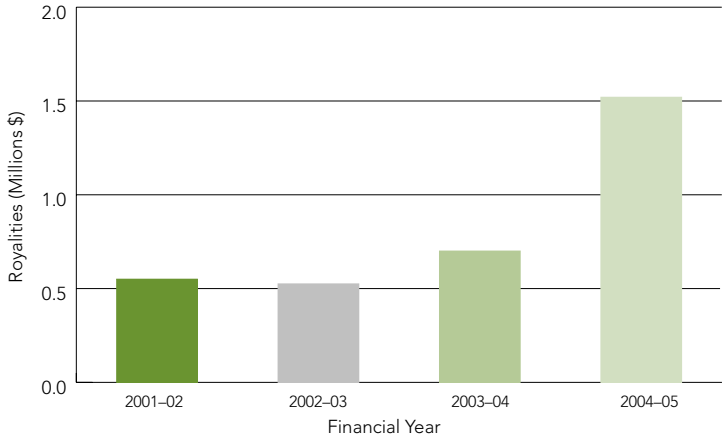
- $4.6 million from industry levies or around 50 per cent of total receipts at 30 June 2005.
- $4.3 million of Australian Government matching of expenditure of levy money, which was capped when the expenditure reached the .05 per cent of gross value of production of the cotton industry.
- $1.6 million from royalties from the sales of CSIRO seed varieties. The benefits of a larger 2004–05 crop size coupled with increased plantings of Bollgard II® has flowed through to royalty payments which are $215,000 more that budgeted. Royalties now account for almost 14 per cent of CRDC's revenue.
- $0.7 million from interest. Whilst interest revenue for 2004–05 was above budget it is slightly below the levels for the previous year due to the decline in reserves brought about by the $2.7 million deficit recorded for 2003–04.
- $0.7 million from other sources. This includes project refunds and external grant revenue.

Figure 1: CRDC's 2004–05 Revenue



A significant trend over recent years has been the increasing importance of sources of revenue other than Government contributions or industry levies. The importance of royalties from cotton varieties bred by CSIRO with CRDC co-investment, continued to increase, and accounted for almost 14 per cent of revenue in 2004–05 compared to eight per cent in 2003–04.

Figure 2: CRDC Royalties Income



Expenditure

Total 2004–05 expenditure of $12.6 million was three per cent above the amount forecast.

– Research expenditure on CRDC's six strategic research programs and research related corporate activities was $11.1 million, which represented almost 90 per cent of the overall expenditure for the year.

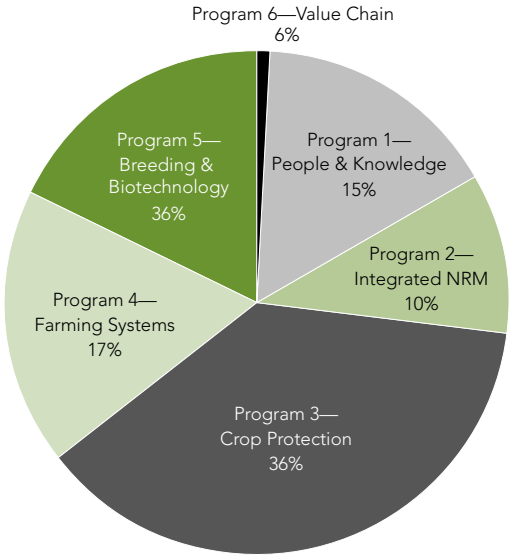
– Other areas of expenditure for the Corporation included employees and operational expenditure.

R&D Program Breakdown*

	People and Knowledge	Integrated Natural Resource Management	Crop Protection	Farming Systems	Plant Breeding and Biotechnology	Value Chain	Total
Number of projects	41	17	41	29	18	8	154
Program Expenditure	$1.50 million	$1.05 million	$3.73 million	$1.79 million	$1.70 million	$0.59 million	$10.36 million

*Excludes Australian Cotton CRC untied cash contribution of $0.35 million

Figure 3: 2004–05 R&D Program Expenditure



Financial position

The Corporation reported a net deficit of $670,031 (budget defecit $3.2 million). The improved crop sizes and its flow on effect to levy revenue, Commonwealth contributions and royalty income, were the predominate reason for the improved position. Cash reserves held to counter fluctuations resulting from drought and other factors beyond the Corporation's control were drawn upon to fund the deficit for the year.

The Corporation's total equity position at 30 June 2005 was $12.9 million, five per cent less than 2003–04 ($13.6 million) and 17 per cent less than 2002–03 ($15.6 million).

The gradual decline in equity reflects the impact of drought on revenue streams whilst maintaining research project expenditure at sustainable levels. Reserves have been utilised to supplement the Corporation's research investment and operational needs over the past three years. The equity : expenditure ratio for 2004–05 was 102 per cent. Thus the corporate policy of 75 per cent equity to expenditure has been achieved.

Triple Bottom Line Outcome and Outputs

Outcome

A more sustainable, profitable and competitive cotton industry providing increased environmental, economic, and social benefits to regional communities and the nation

Total Budgeted Revenue: $9,022,500
Total Actual Revenue: $11,947,448
Total Budgeted Cost of Outputs: $12,203,488
Total Actual Cost of Outputs: $12,617,479

Output 1: Economic	Output 2: Environmental	Output 3: Social
Profitability and international competitiveness	**Sustainable production systems and catchments**	**Empowered people and communities**
Actual Revenue: $ 5,072,415 Budgeted Cost: $5, 185, 225 Actual Cost: $5,356,884	Actual Revenue: $4,315,870 Budgeted Cost: $4,410,176 Actual Cost: $ 4,557,910	Actual Revenue: $ 2,559,163 Budgeted Cost: $2,608,087 Actual Cost: $ 2,702,685

Note: 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 contribute to one or more of the three Outputs. Total research expenditure for each Output is then calculated, with the remaining expenditure attributed to the Outputs on a pro-rata basis.

The coming year

The Corporation's forecast operating deficit of $1.2 million for the forthcoming year reflects continuing constraints on revenue streams whilst sustaining research investments.

Revenue

The 2004–05 crop, harvested and ginned from March to September 2005, is expected to produce around 2.9 million bales, 0.9 million bales higher than the pre-season forecast. Levy receipts to be received from this crop will have a positive influence on revenue streams when compared to budget ($1.5 million). However, levy revenue for the forthcoming year is also dependent upon the size of 2005–06 crop to be planted September to October 2005. Industry estimates suggest a 2005–06 size of two million bales based on water availability and prices currently being at levels below cost of production.

Low prices and production are also anticipated to affect the amount of Commonwealth contributions. The .05 per cent of gross value of production three year rolling average trigger is expected to limit Commonwealth contributions to $4.1 million.

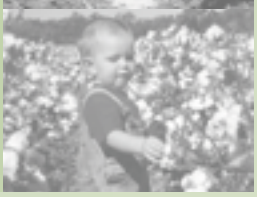
Expenditure

The Corporation will continue its policy of maintaining a critical mass of the research effort during 2005–06. Total expenditure is budgeted at $13 million with $11.3 million focusing on research and adoption activities. Reserves will therefore be required to fund the forecast operating deficit of $1.2 million.

Did you know... Depending upon seasonal conditions around 15 per cent of Australian cotton is now dryland—grown using only natural rainfall. (Source—Cotton Australia, 2005)

Tracking CRDC's Position

	2002–03 $ millions	2003–04 $ millions	2004–05 $ millions
Cotton Crop Size (millions of bales)	1.7	1.5	2.9 (estimated)
Revenue Total	$16.17	$9.94	$11.95
Industry levies	$7.14	$2.58	$4.58
Commonwealth matching funds	$7.28	$4.77	$4.32
Royalties	$0.61	$0.82	$1.64
Interest	$0.80	$0.75	$0.70
Other	$0.34	$1.02	$0.71
Expenditure Total	$15.62	$12.6	$12.62
Research and Extension Activities	$14.40	$11.34	$11.11
Financial Assets	$16.00	$13.45	$14.3
CRDC People			
Number of Employees—total	12	12	12
Number of Employees—full time equivalent	10.8	9.7	11
Operating Statistics			
Number of new R&D proposals received	108	78	52
Number of new R&D proposals approved	45	31	31
Number of continuing projects approved	95	111	70
Number of commissioned projects approved	22	12	21
Total number of R&D Projects managed	165	154	122
Total number of final reports received	75	41	11
This figure includes			
Total number of scholarship applications received	18	9	12
Total number of new scholarships awarded and commenced	6	2	3
Total number of travel grant applications received	24	8	15
Total number of travel grants awarded	10	7	12



About CRDC

About CRDC

Our Vision

A globally responsible cotton industry.

Our Mission

Invest and provide leadership in research, innovation, knowledge creation and transfer.

We aim to achieve this through:

A Triple Bottom Line approach to planning, implementation and reporting that seeks to ensure economic, environmental and social benefits for the Australian cotton industry, cotton valley communities and the Australian people; and

An holistic, integrated and systematic approach to research and development.

Our Outcome

A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation.

We aim to achieve this by:

- Making greater use of commissioned R&D;
- Seeking multidisciplinary approaches and integrated outcomes;
- Increasing co-investment and partnerships;
- Sharpening evaluation of projects;
- Using a triple bottom line framework for reporting outcomes;
- Broadening our range of research providers; and
- Enhancing our communications with industry and the community.

By working with our key research partners:

- Cotton growers;
- CSIRO;
- Universities;
- The Cotton Catchment Communities Cooperative Research Centre;
- Other Cooperative Research Centres;
- Rural R&D Corporations;
- The Cotton Consultants Association; and
- Agribusinesses.

And by addressing the research priorities of our key stakeholders:

- The Australian people, represented by the Australian Government;
- Cotton growers and industry, represented by the Australian Cotton Growers Research Association.

Who we are

CRDC are based in Narrabri, New South Wales—the heart of one of Australia's major cotton growing regions. The Corporation is a research and development partnership between the Australian cotton industry and the Australian Government.

Did you know... Around 70 per cent of Australia's cotton is grown in New South Wales, with the majority of the remainder grown in Queensland. (Source—Cotton Australia, 2005)

What we do

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

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

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

CRDC researchers are actively involved in the dissemination of research results, working with the CRDC-supported National Cotton Extension Team.

Our corporate standards

Under its Statement of Principles, the Directors and staff of the Corporation:

- are committed to excellence and productivity;
- are committed to providing the highest levels of accountability to stakeholders;
- will act legally, ethically, professionally and responsibly in the performance of their 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 contractual consultants, external program coordinators and research providers;
- promote active, honest and effective communication;

– are committed to the future of rural and regional Australia;
– comply with and promote best practice in corporate governance;
– are committed to meet all statutory obligations and accountability requirements in a comprehensive and timely manner.

The Australian Cotton industry

Every day, across the world, people wear cotton clothing and use cotton products. Cotton is the most widely produced natural fibre in the world and represents about 40 per cent of the world textile market.

The cotton industry in Australia is relatively small—there are about 1200 cotton farmers, with around 70 per cent of Australia's cotton grown in New South Wales, and the majority of the remainder grown in Queensland.

Cotton growing areas of Australia

Today's cotton farms are typically 500 to 2000 hectares, highly mechanised, capital intensive, technologically sophisticated and require high levels of management expertise. The average yield for irrigated cotton is 1800 kilograms per hectare—the highest in the world. These figures can be attributed almost entirely to improved cotton breeding and better crop management systems, which have been achieved with a reduced impact on the environment.

The economic and environmental health of the industry can be largely attributed to high quality collaborative research and development, much of it coordinated and funded by CRDC. Combine this culture of innovation and continuous improvement with practical implementation and willingness to adopt new ideas by growers, and you have an industry which is very quick to pick up and act upon new research outcomes.

The cotton industry is geographically concentrated. Whilst this delivers a number of efficiencies, it also makes the industry as a whole, more susceptible to drought than other agricultural sectors which are grown over a more dispersed area. Drought or marginal conditions have prevailed over the cotton growing area in the past few seasons.

The Australian cotton industry operates in an environment of intense global competition and must, therefore, continually improve operational efficiency, environmental sustainability and quality of the product if they are to remain competitive. That is why the continued R&D effort of the CRDC, in conjunction with its government and industry stakeholders, remains of paramount importance to the industry and an essential tool in maintaining and enhancing the security of international markets.

The 2005 Harvest and Beyond

The Australian cotton industry has faced difficult drought affected conditions in recent seasons, but 2005 saw a very welcome improvement for the majority of cotton growing areas.

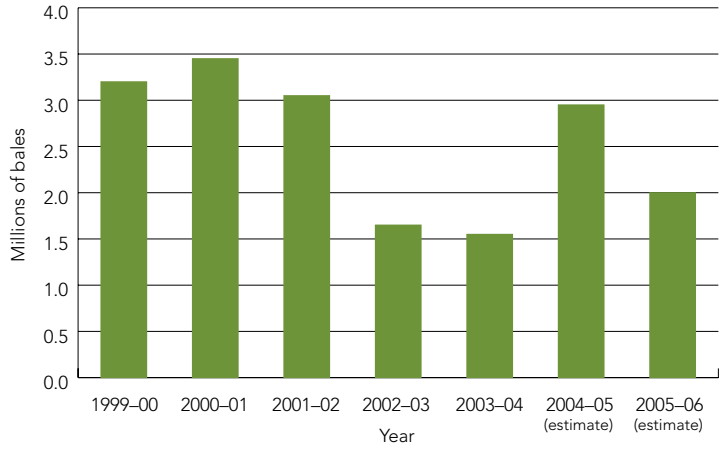
More cotton was planted in both New South Wales and Queensland compared to the previous year. Good rainfall and high temperatures during the growing season then dry conditions before and during harvest

Did you know... Of all major cotton growing countries in the world, Australia uses its water most efficiently.

increased yields. The 2005 harvest figure is expected to be around 2.9 million bales, which is nearly double last year's crop and an increase on CRDC's 2005 estimate of two million bales.

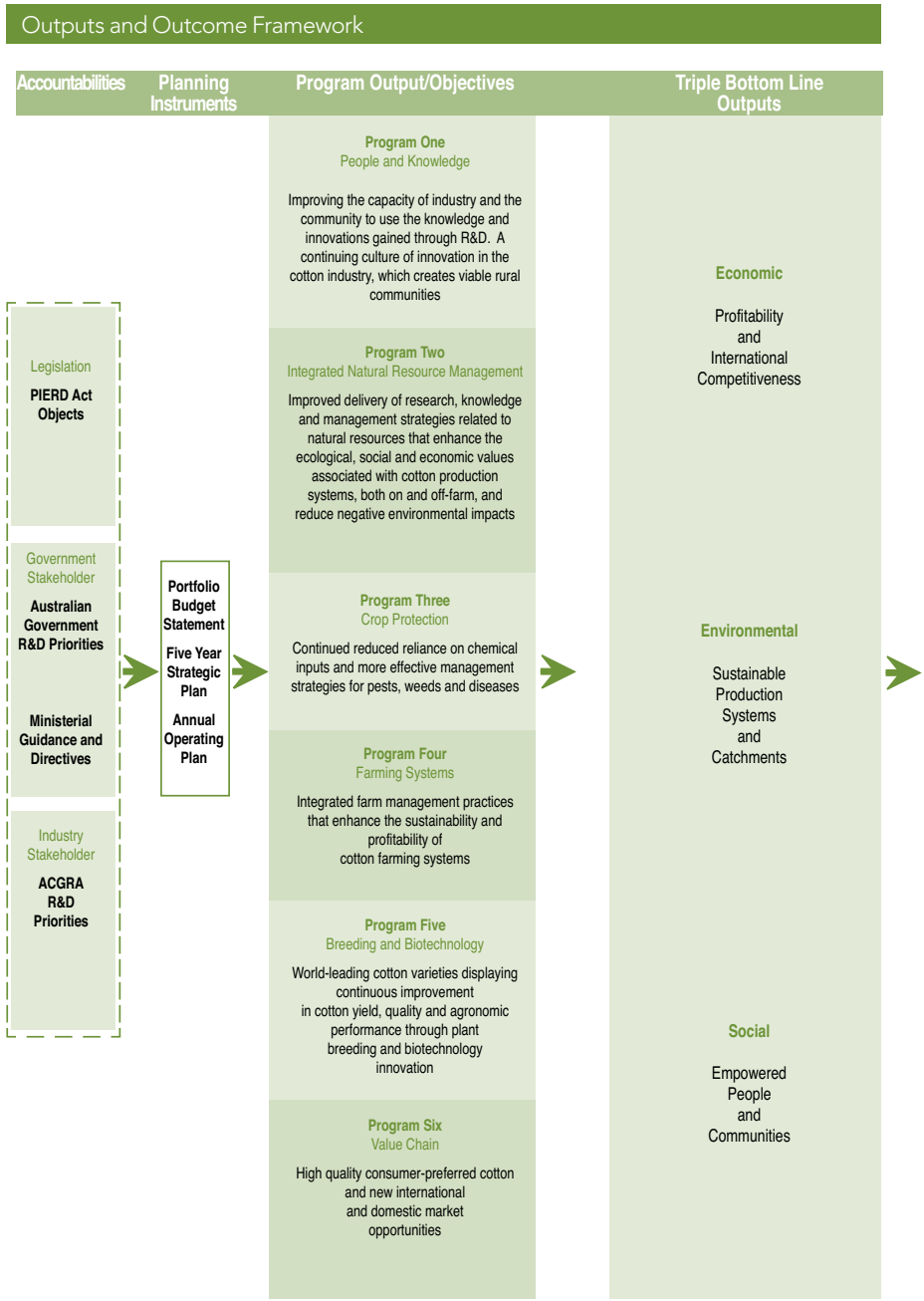
Although the drought has eased in some valleys, a lack of water in major catchments, combined with international prices below the historical average, will continued to have a significant impact upon future cotton production. The forecast production of two million bales for the 2005–06 crop remains well below the pre-drought five-year average of 3.2 million bales.

Figure 4: Total Cotton Production



Did you know... Almost 60 per cent of the 2004–05 crop was produced using the cotton Best Management Practices (BMP) program and 96 per cent of cotton farmers see BMP as essential to the industry's long-term viability. (Source—Cotton Australia, 2005)

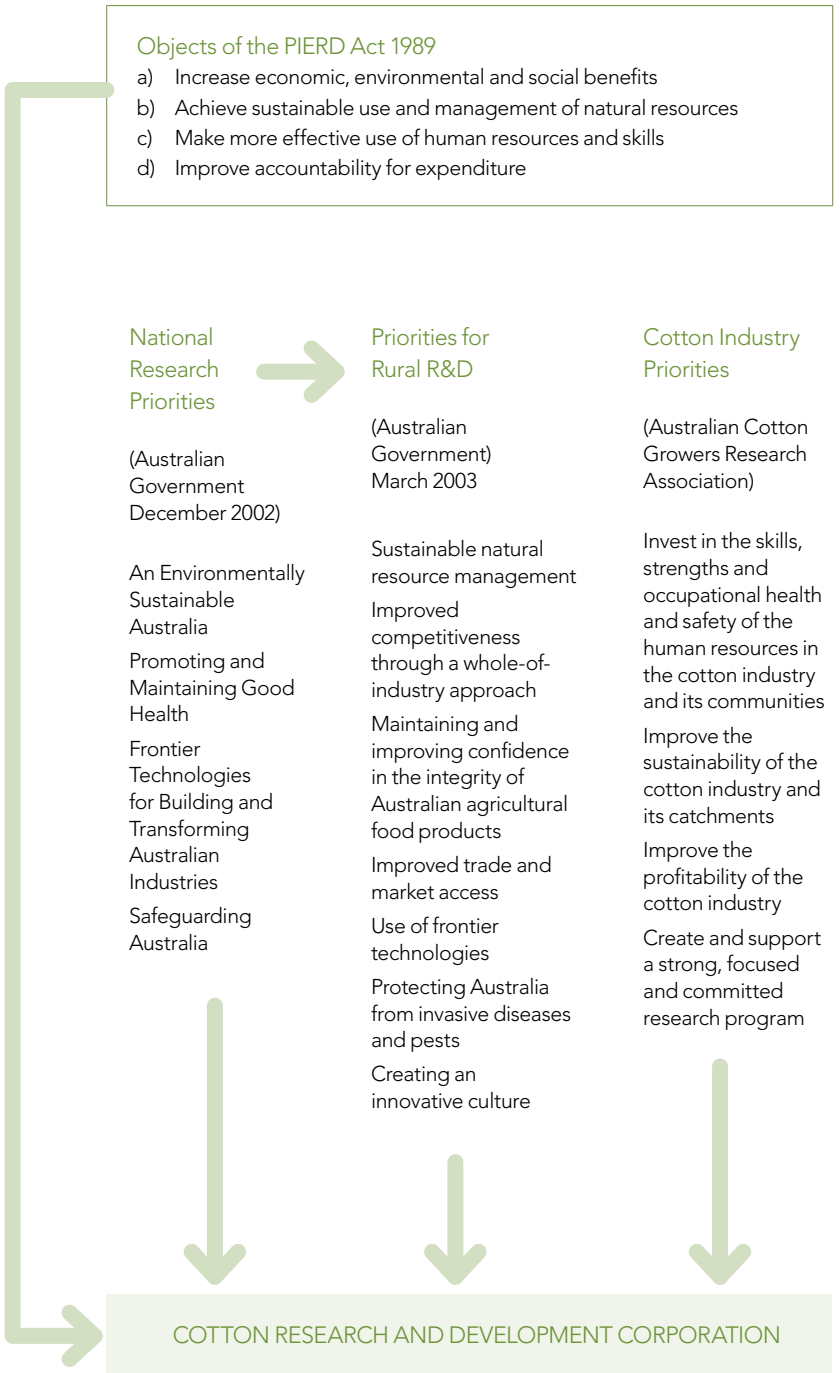
Diagram 1: Our Strategic Elements



Outputs and Outcome Framework

Triple Bottom Line Objectives	Key Targets	OUTCOME
Evidence that tools and knowledge products are contributing Employment of people in R&D Improved relative economic returns of cotton crops Increased returns per megalitre of water Increased yields per hectare and per megalitre of water Evidence of management options and farming practices that reduce costs or improve profitability Evidence that new cotton varieties are increasing yield, improving fibre quality and potential returns Improved fibre quality to reduce financial discounts received by growers Increased market opportunities evidenced by market analysis of pricing demand for Australian cotton in the world market	A 10% improvement in cotton yield per hectare by 2008 Evidence of continuous improvement in 5 key parameters measured in spinning mill benchmark surveys Evidence that prices for Australian cotton remain above those for competitive cotton growths in 2005 and 2007 Evidence that profit margins are improving over time: 2003 – 2008, both annually and trends over time	**A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation**
Reduced chemical inputs Improved water use efficiency Increased adoption of BMP Broader environmental coverage of BMP and recognition in the market place EMS evaluated as a farm management tool Improved trends in landscape and catchment indicators such as salinity, water quality and biodiversity Benchmark soil health and improved nutrient recovery Published refereed science on environmental impacts of new transgenic technology Benchmarked greenhouse gas emissions, energy use and climate change impacts	A 50% reduction in 2004 quantities of insecticide used by 2008 A 20% reduction in 2004 quantities of residual herbicide used by 2008 Continued decline in riverine contamination by herbicides used only in cotton production by 2008 80% of cotton growers audited against BMP Minimum Certification Standards by 2007 A 20% improvement in farm WUE against the 2004 median by 2008	
Improved skills and qualifications of people at all levels of the industry Scholarships to students Study exchanges and conference support for people at all levels of the industry Improved OH&S performance in workplaces and reduced health and injury risks Employment of people in R&D, including age, gender trends and location More women in key industry roles Capacity building activities with industry, schools, universities and community groups that improve social capital Evidence of proactive stewardship of transgenic and conventional technology Collaborative links and partnerships established to improve knowledge exchange into and out of the industry High quality cotton (lint and seed) that meets market needs and consumer preference Improved perception of cotton production by the community	Between 2003 and 2008: At least 15 new Postgraduates in areas of high priority future need At least 10 new Post-doc positions in areas of high current need 80% of cotton growers having attended a relevant training course in OH&S, IPM or Water Management Healthy and resilient communities in cotton producing regions through: A reduction in the cotton industry's environmental footprint (e.g., reduced pesticide use, improved water use efficiency, reduced greenhouse gas production) Contribution to career opportunities in cotton producing regions At least a 10% reduction in cotton farm-related injuries Improved industry economic viability At least 5 adoption evaluations conducted per year by members of the National Cotton Extension Team	

Diagram 2—Stakeholder Research Priorities



Australian Government Research Priorities

In December 2002, the Prime Minister released National Research Priorities which are:

- An environmentally sustainable Australia;
- Promoting and maintaining good health;
- Frontier technologies for building and transforming Australian industries; and
- Safeguarding Australia.

Following their release, the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry wrote to the Corporation in March 2003 advising of revised Government priorities for rural research and development. These rural R&D priorities are:

- Sustainable natural resource management;
- Improving competitiveness through a whole of industry approach;
- Maintaining and improving confidence in the integrity of Australian agricultural food products;
- Improved trade and market access;
- Use of frontier technologies;
- Protecting Australia from invasive diseases and pests; and
- Creating an innovative culture.

Both sets of Government research priorities have been integrated into the CRDC Strategic Plan 2003–08 and the Annual Operating Plan 2004–2005. The interaction between Government research priorities and the R&D priorities of the cotton industry are shown in Diagram 2.

Did you know... Under normal conditions, over 400,000 hectares of land is under cultivation for cotton—producing about three million bales of cotton each year. (Source—Cotton Australia, 2005)

How CRDC is Addressing Government Research Priorities

National Priority: An environmentally sustainable Australia

Rural Priority: Sustainable natural resource management

CRDC programs and strategies addressing these priorities

Program Two—Integrated Natural Resource Management

Program Four—Farming Systems

Program Five—Plant Breeding and Biotechnology

CRDC Strategic Plan Objectives	Progress Towards Measures of Success	Key Outputs and Achievements in 2004–05
Industry-wide adoption of improved integrated insect pest management systems Industry-wide adoption of improved integrated weed management systems Increased adoption of BMP that meets legal requirements, industry benchmarks and catchment scale targets Improved Water Use Efficiency	– Increased adoption and broader environmental coverage of the Cotton BMP program – An evaluation of environmental management systems as a farm and natural resource management tool – Improved trends in landscape and catchment indicators such as salinity, water quality and biodiversity. – Project and funding links with other catchment and landscape programs related to biophysical targets and sustainability – Publication of refereed environmental impact research in scientific journals related to new transgenic traits Benchmarked greenhouse gas emission and potential climate change impacts	Around 60 per cent of 2005 crop was produced to BMP standards. (Source—Cotton Australia, 2005); launch and adoption of the BMP Land and Water Management Module. Industry action plan for implementation of recommendations from Environmental Audit published and implementation commenced through industry organisations. Declines in herbicide contamination in rivers correlates with changes in herbicide use as a result of increased planting of Roundup Ready® varieties. Completion and publication of research into the habitat value of native planted and natural vegetation for beneficial insects and integrated pest management for transgenic varieties.

National Priority: Promoting and maintaining good health
Rural Priority: Maintaining and improving confidence in the integrity of Australian agricultural, food, fish and forestry products

CRDC programs and strategies addressing these priorities

Program One—People and Knowledge

Program Three—Crop Protection

Program Five—Breeding and biotechnology

Program Six—Value Chain

CRDC Strategic Plan Objectives	Progress towards Measures of Success?	Key Outputs and Achievements in 2004–05
To develop new international and domestic market opportunities (through enhancing traits such as nutritionally improved cottonseed oil) Healthy and resilient communities in cotton producing regions	– Release of varieties with appropriate seed characteristics – *See NRP One (see page 30)* – OH&S performance of industry workplaces is improving	14 new varieties released by CSIRO breeding team in 2004–05 and eight new varieties in 2005–06 containing improved fibre quality, disease resistance, growth habit, maturity, and regional adaptability. 131 participants completed the Farmsafe Australia premium discount scheme for cotton growers. CRDC continues to co-fund the Farm Health and Safety joint venture with other rural R&D Corporations.

Did you know... Since the introduction of Roundup Ready® varieties, residual herbicide levels have been reduced by an average of 45 per cent.

National Priority: Frontier technologies for building and transforming Australian industries
Rural Priority: Use of frontier technologies

CRDC programs and strategies addressing these priorities

Program Three—Crop Protection

Program Four—Farming Systems

Program Five—Breeding and biotechnology

CRDC Strategic Plan Objectives	Progress towards Measures of Success?	Key Outputs and Achievements in 2004–05
World-leading cotton varieties displaying continuous improvement in cotton yield, quality and agronomic performance through plant breeding and biotechnology innovation Improved integrated management of major pests, weeds and diseases … and responsible management of transgenic technology	– Evidence that CRDC's biotechnology investments are delivering industry or community benefits – Evidence of the reduced time to introduce genes into cotton varieties – Continued fundamental research on cotton agronomy and explore the interactions of different components for both conventional and transgenic varieties – Ensure the benefits of transgenic crop technology are maximised through responsible management based on sound scientific risk assessment – Market reports on the demand for Australian cotton lint and seeds – Release of varieties with appropriate fibre and seed characteristics.	80 per cent of 2004–05 plantings are CSIRO developed new varieties. Full suites of the major commercial conventional (non-GM) varieties now available with current commercial transgenic traits. On going evaluation of the Bollgard II® and Roundup Ready® Crop Management Plans. Mill customer surveys continued to provide feedback on cotton fibre quality.

National Priority: Safeguarding Australia
Rural Priority: Protecting Australia from invasive diseases and pests

CRDC program and strategies addressing these priorities

Program Three—Crop Protection

Program Five—Breeding and Biotechnology

CRDC Strategic Plan Objective	Progress towards Measures of Success?	Key Outputs and Achievements in 2004–05
This aspect is covered under the broader objective of: Improved integrated management of major pests, weeds and diseases …	– Reduced distribution, presence and impact of diseases – Monitor resistance levels with an aim to either avoid or keep resistance levels in pests and weeds at manageable levels – Transgenic crop surveys and reports on performance, management and risk assessment	Rate of spread of disease of major cotton diseases generally slowing down; doubling in F-rank of major commercial varieties from 1995–2005. CRDC-funded research provided comprehensive field monitoring of insecticides and miticides. 30 industry researchers, extension personnel, growers and consultants attended CRDC's Research and Extension in Resistance workshop in June 05.

Did you know… there are about 1200 cotton farmers in Australia – representing 450 to 500 farming enterprises. (Source—Cotton Australia, 2005)

Rural Priorities: Improving competitiveness through a whole of industry approach; and improved trade and market access

CRDC programs and strategies addressing these priorities

Program Five—Breeding and Biotechnology

Program Six—Value Chain

CRDC Strategic Plan Objectives	Progress towards Measures of Success?	Key Outputs and Achievements in 2004–05
Improved cotton fibre quality that meets market and spinner needs Improved yield (through improved management and breeding of higher yielding, disease, insect and herbicide tolerant cotton varieties) Increased profitability with better whole farm management and innovative precision agricultural systems	– Evidence that new cotton varieties are increasing yields and potential returns to the industry – Evidence that Australian cotton varieties are meeting the needs of our major textile and oilseed markets – Market reports on the demand for Australian cotton lint and seed – Release of varieties with appropriate fibre and seed characteristics – Evidence of improved practices that preserve fibre quality. Extension of the cotton BMP program to post-farm gate issues – Improved ginning practice measured by ginning data – Proportion of the crop objectively measured by HVI increased. Release of new fibre measurement technology – Number of unsold stocks accumulated and increased relative premium of Australian cotton, compared to competitors. Demonstration of value-added developments in Australia	EMS pathways project commenced. Extension of BMP to post-farm gate sectors opens up potential opportunities for differentiating Australian cotton in the market place. Cotton Field to Fabric training course developed and ready for delivery in 2005–06. Fibre to Fabric Quality Workshops held in all major cotton growing areas. Research projects to reduce damage in the ginning process on track. Trials in 2003–04 led to positive, albeit small, changes in cotton fibre length and trash properties. SIROMAT work in 2004–05 focused on improving calibration and building duplicate instruments for inter-laboratory trials.

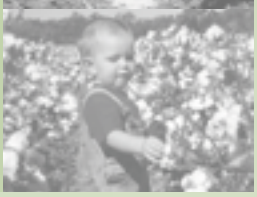
Rural Priority: Creating an innovative culture

CRDC program and strategies addressing this priority

Program One—People and Knowledge

CRDC Strategic Plan Objectives	Progress towards Measures of Success?	Key Outputs and Achievements in 2004–05
Improving the capacity of industry and the community to use the knowledge and innovations gained through research and development. A continuing culture of innovation in the cotton industry, creating viable rural communities. Adoption of research outcomes that is leading to improved and more sustainable management practices	– Evaluation of outcomes of activities conducted by the extension team – Evidence of improved skills and qualifications of researchers, extension and technical personnel, administrators, consultants and growers – Women in key industry roles – Evidence that the use of decision support systems is leading to the adoption of research outcomes and improved practices – Evidence that the use of information packages and tools is leading to the adoption of research outcomes and improved practices – Implementation of outcomes in partnership with a variety of research and development providers	Evaluation of appropriateness of Extension Team roles, responsibilities and management structure carried out during major review of extension, education and training. 43 participants completed the 2004–05 Integrated Pest Management course;131 participants completed the Farmsafe Australia premium discount scheme for cotton growers; 4 new postgraduate scholarships; and 11 travel grants awarded in 2004–05. 70 members of Wincott in 2004–05 and over 160 women attended four field and training days. Over 600 copies of searchable edition of COTTONpak CD Rom distributed; almost 800 copies of the Second Edition of the Integrated Pest Management guidelines distributed; over 500 copies of WATERpak distributed during the year in response to direct requests.

Did you know... Today's cotton farms are typically 500 to 2000 hectares, highly mechanised, capital intensive and technologically sophisticated.



Report of Operations: Research

Program One: People and Knowledge

Objective

To improve the capacity of industry and the community to use the knowledge and innovations gained through research and development. A continuing culture of innovation in the cotton industry, creating viable rural communities.

Number of projects	41
Compared with 2003–04	37
Expenditure in 2004–05	$1,514,366
Compared with 2003–04	$1,676,184

Strategies	Measure of Success
Support and coordinate a highly trained, efficient and effective cotton extension team.	Evaluation of outcomes of activities conducted by the extension team.
Foster the professional development of innovative and highly trained researchers, extension and technical officers, administrators, consultants and growers.	Evidence of improved skills and qualifications of researchers, extension and technical personnel, administrators, consultants and growers.
Foster the development of opportunities for women in the cotton industry.	Women in key industry roles.
Continue to develop a variety of effective decision support systems that support the implementation of research and extension outcomes and shorten the time to adoption.	Evidence that the use of decision support systems is leading to the adoption of research outcomes and improved practices.
Support the on-going development of information packages and tools that consolidate and disseminate research outcomes.	Evidence that the use of information packages and tools is leading to the adoption of research outcomes and improved practices.
Promote safe, healthy workplaces through the adoption of appropriate Occupational Health and Safety work practices.	The OH&S performance of industry workplaces is improving.
Facilitate effective coordination and partnerships with research and development providers, industry and community organisations.	Implementation of outcomes in partnership with a variety of research and development providers.

Outcome

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

People and Knowledge

The success of the cotton industry in Australia can be attributed to a combination of factors, one of which is undoubtedly the capacity and the capability of its workforce and communities to continually improve and to acquire new skills and knowledge. Supporting people to conduct the research and transfer the outcomes remains a high priority for CRDC.

Strategy

Support and coordinate a highly trained, efficient and effective cotton extension team

Thanks to early adoption of research outcomes, the Australian cotton industry receives a distinct international competitive advantage. CRDC, along with the Cotton CRC, play a major role in funding and coordinating a National Cotton Extension Network consisting of seven Industry Development Officers (IDOs), a Water Extension Officer, an Integrated Pest Management Training Coordinator, National Extension and Evaluation Specialist, and a newly created, externally funded, four person Environment Extension Team. The Extension Team works collaboratively with growers and other industry personnel to aid the early adoption of research outcomes. Senior CRDC research program staff have continued to provide leadership in the planning and coordination of extension network activities, including the Cotton CRC technology transfer and education program and the extension focus teams.

The National Cotton Extension Network

A major review of Extension, Education and Training was undertaken in early 2005 in conjunction with the Cotton CRC. The aims of the review were to examine opportunities to develop a series of integrated extension, education and training programs and to ensure that, at a regional level, extension activities can be effectively targeted and that delivery and dissemination of national cotton research outcomes is relevant, practical and timely.

Issues examined in the review included:

- Leadership and program coordination;
- Structural positioning of IDOs;
- Industry support for IDOs;
- IDO roles and responsibilities;
- IDO locations;
- Research and Extension linkages;
- Decision Support Systems;
- Human Resource Management; and
- Grower training programs.

Implementation of the recommendations from the review will lead to new opportunities for improved network co-ordination and management of the Extension Team with the new CCC CRC during 2005–06.

The Extension Review Team: Hamish Millar, John McKenzie, Jeff Coutts and Bruce Roberts

Some of the findings of the review were communicated during the *Annual Cotton Extension Team Workshop* which was held during early July 2005. This annual meeting of Extension Team members is an important occasion for team members and extension focus groups to share progress, highlights and lessons learned, as well as plan for the forthcoming year. The ongoing important role identified for the IDOs, and the important role expected of the new CCC CRC in leading,

coordinating and managing outcomes from the Extension Team over the next seven years were just some of the issues discussed at the workshop.

During the Annual Cotton Extension Team Workshop the extension team leadership committee's award of Extension Team Achiever of the year was awarded to David Larsen whose support to the whole team as Technology Resource Centre Manager over many years was recognised. A particular highlight of David's great work in 2004–05 was the production of a new COTTONpaks CD containing all of the written information paks as well as the Cotton BMP Manual and the Land and Water module. The CD is searchable, making it a great tool for those wanting a quick and easy method to access information.

Knowledge is fundamental to improving the effectiveness of the Extension Team, and the competitiveness, responsiveness and levels of innovation that we see in the cotton industry. A National Program for Sustainable Irrigation (NPSI) project —Knowledge Management in Cotton and Grain Irrigation—which examined the use of knowledge and information in the cotton and grains industry, was completed in November 2004 and a full report of its findings published. This collaborative project examined the way in which information and knowledge about water management and water use efficiency is being used and managed in irrigated cotton regions and the key factors influencing decision making.

Water use efficiency extension activities were further enhanced during 2004–05 further field validation and industry-wide training workshops for the use of the irrigation management tool—HydroLOGIC. A new Water Use Efficiency Officer was appointed and based in Gunnedah, and IDOs and other members of the broader Cotton Extension Team also played an important role in working with Cotton Australia field staff to provide technical support for the delivery of the new BMP Land and Water Management Module.

Existing links with regional catchment management bodies in Queensland and New South Wales strengthened the environmental extension effort further during the year, with a specific focus on integrated area wide management approaches to Natural Resource Management (NRM) being developed. This will allow environmental management to address broader farm and catchment scale NRM issues with the overarching aim of enabling environmental management to be taken beyond the farmgate.

Cotton growers had an opportunity to get closer to their spinning mill customers during a series of *Fibre to Fabric Quality Workshops* in February 2005. These workshops were a collaboration between CRDC, the Cotton CRC and CSIRO Textile and Fibre Technology, and were

conducted at ten different cotton growing locations in New South Wales and Queensland. The focus of the workshops was to highlight results from an international mill survey and explain to growers the importance attached to individual fibre properties by spinners. The workshop was designed to make growers aware of the significance of fibre quality issues and to provide advice to combat fibre quality problems during production and harvesting.

Scientists, growers, consultants and Extension Team members gathered at the CRDC Research and Extension in Resistance Workshop in June 2004, to review recent developments in resistance research, examine research needs to support both insecticide and transgenic crop resistance management strategies in cotton and provide direction for future extension needs and activities in resistance in 2005–06. Findings and recommendations from the workshop will be integrated into forthcoming research and extension management plans.

Measure of success

Evaluation of outcomes of activities conducted by extension team

- Evaluation of appropriateness of Extension Team roles, responsibilities and management structure carried out during major review of extension, education and training.
- Fibre Quality Extension Team visited all major cotton growing areas—seminars were well attended and well regarded by growers and industry personnel with over 230 attendees in nine locations. Evaluation of questions comments and feedback from these meetings was used to develop the Cotton Field to Fabric training course.
- Cotton Extension Team successfully supporting Cotton Australia in delivery of BMP Land and Water module which over 50 growers commenced in 2004–05.
- Completion and evaluation of NPSI project—*Knowledge Management in Cotton and Grain Irrigation* and the second stage of the project commenced.

Strategy

Foster the professional development of innovative and highly trained researchers, extension and technical officers, administrators, consultants and growers

A well trained, informed and empowered workforce is essential if the Australian cotton industry is to remain at the cutting edge of production and quality. That is why CRDC continues to invest in the training, education and capacity building of industry personnel to ensure that

they have the appropriate skills and knowledge to continue to have the capacity to be world leaders in sustainable cotton production.

Training and education

The *Integrated Pest Management* (IPM) training course continued to be delivered in 2004–05. In total, forty-three people completed the IPM course in 2004–05. This course is delivered by a CRDC-funded IPM Training Coordinator, but involves a range of cotton researchers in delivering specific components of the course. It has proved to be an excellent means of delivering research information to growers and providing direct feedback to researchers from growers about managing insect pests.

Overhead irrigation training for the National Water Extension Team was developed in response to grower demand for independent information about overhead irrigation systems. As a direct result of this training, further workshops were held in all major cotton growing areas for growers and consultants. In total eighty–five growers and twenty consultants responsible for 45,000 and 26,000 Hectares respectively attended the workshops.

A CRDC funded researcher, Dr Mike Bange, was awarded a Fulbright Scholarship in 2004—an educational exchange program which aims to further mutual understanding between Australia and the USA. During his visit to the USA, Dr Bange studied the development of sustainable cropping systems through the identification, delivery and implementation of new decision tools to assist crop management. His studies presented an opportunity to conduct collaborative research with Texas A&M University and the USA Department of Agriculture (Florida), to identify techniques that may contribute to the overall sustainability of the rural sector in both the USA and Australia.

Over the years, CRDC's investment in gene technology has been integral to the economic and environmental sustainability of the cotton industry. It does, however, raise intellectual property issues which all sectors of the industry must grapple with. To assist some key industry representatives digest these complex issues, CRDC hosted two days of workshops and lectures in September 2004 for leading growers, consultants and extension personnel.

A CRDC-funded, CSIRO delivered, *Field to Fabric* training course was developed in early 2005. This much anticipated course aims to inform growers about the range of fibre properties which can be positively or adversely affected by agronomic, picking and ginning practices. The course was piloted in August 2005, and it is expected that further delivery opportunities will occur in 2005–06.

The twelfth ACGRA Australian Cotton Conference, which took place in August 2004, was arguably the most successful to date and, despite drought conditions facing the industry, the number of delegates was very high. CRDC once again sponsored industry personnel and community members to attend the conference as a training and development opportunity and contributed almost $10,000 towards attendance.

CRDC's Research and Extension General Manager, Bruce Pyke, at the twelfth Australian Cotton Conference

CRDC continued to fund postgraduate scholarships in 2004–05 for students undertaking scientific research relating to cotton or broader natural resource management research. The number of CRDC funded post-graduates has declined over recent years due to pressures placed on resources caused by prevailing drought conditions. The Corporation also assisted researchers with travel grants for research related overseas travel expenses in order to increase knowledge and capacity within the industry.

CRDC-funded postgraduates

Capacity Building and Leadership

CRDC continued to financially support Wincott in 2004–05, and will continue support at a reduced level in 2005–06 as the organisation becomes self-supporting.

Wincott

Funded by CRDC, Wincott is an organisation for women involved in the cotton industry, which aims to provide support, information and resources to encourage and empower women to attain skills, confidence and to have an informed voice in the agricultural sector. Wincott holds several field and training days throughout the year.

Wincott ladies enjoy a relaxed and informative day at Dirranbandi

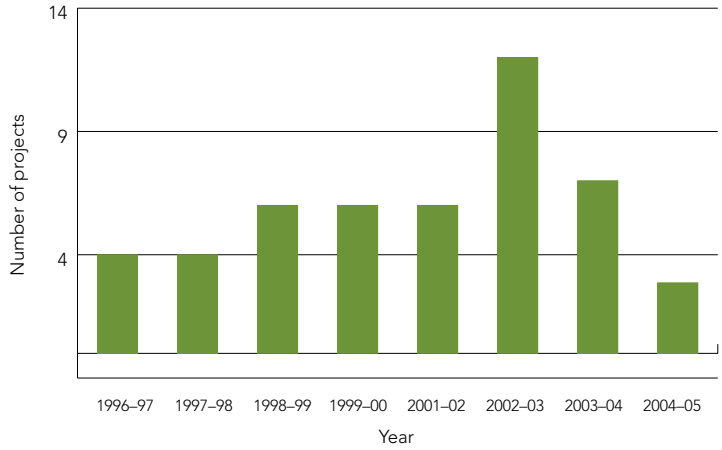
CRDC sponsored a cotton grower from Emerald, Ms Alicia Dunbar, to participate in the Australian Government Department of Agriculture, Fisheries and Forestry Industry Partnerships Initiative Program Corporate Governance for Rural Women. As part of the initiative, Ms Dunbar undertook an Australian Institute of Company Directors course, which assisted in the development of skills knowledge and networks required to better communicate ideas within the cotton industry. For the duration of the course, Ms Dunbar was mentored by Ms Bobbie Brazil—the Chair of Land and Water Australia and a former CRDC Director.

Measure of success

Evidence of improved skills and qualifications of researchers, extension and technical personnel, administrators, consultants and growers

- 43 participants completed the 2004–05 Integrated Pest Management course.
- 131 participants completed the Farmsafe Australia premium discount scheme for cotton growers.
- 3 new postgraduate scholarships and 12 travel grants awarded in 2004–05.
- Industry Development Officers and Consultants completed training in overhead irrigation.
- 146 cotton industry personnel completed training in alternative irrigation techniques across eight locations.
- Alicia Dunbar, a cotton grower from Emerald, completed a Corporate Governance for Rural Women course.
- Cotton *Field to Fabric* training course developed and ready to be delivered in 2005–06.
- The CRDC continued to contribute towards industry and community attendance at the 2004 Australian Cotton Conference.

Figure 5: Number of new CRDC-funded post-graduate projects commenced



Strategy

Foster the development of opportunities for women in the cotton industry

CRDC continued to fund the Women in Cotton Network, Wincott, in 2004–05 and expects to continue support at a reduced level in 2005–06 as the organisation becomes self-supporting through wider membership and other forms of sponsorship. The network caters for all levels of knowledge and confidence, from women who wish to increase their knowledge of cotton growing and the cotton industry through to women who may wish to undertake a broader role within the industry or in the wider agricultural sector. Wincott held four workshops and field days in 2004–05, which were attended by over 160 women from all walks of cotton life. In addition to funding, CRDC provides logistical support and advice for Wincott activities.

Thirteen Wincott members received funding from the Australian Government Office for Women in March 2005 to attend the Australian Partnerships in Cotton course held in Narrabri. The course offered participants an opportunity develop their communication and presentation skills as well as being an excellent networking opportunity.

Membership levels of Wincott remained steady in 2004–05 with over seventy members, and Wincott continued to distribute its starter kit to all new members, which gives an excellent overview of the industry structure, research and production information and provides links to existing industry resources.

Within the CRDC, women hold nine of the thirteen positions. CRDC supports these staff members in upgrading their skills and developing their careers, and this includes participation in Wincott events.

Measure of success

Women in key industry roles

- 70 members of Wincott in 2004–05 and over 160 women attended four field and training days.
- 13 Wincott members attended Australian Partnerships in Cotton course.
- Almost 70 per cent of CRDC staff are women; Ms Bridget Jackson is Chair of CRDC and Ms Kathryn Adams a Director.
- Six of the 9 National Cotton Extension Network positions funded by CRDC were held by women in 2004–05.
- Ms Christine Campbell is Chair of the Australian Cotton Industry Council and a Director of Cotton Australia; there are three women Board Directors on the CCC CRC; and Mrs Joanne Grainger is a Director of Cotton Australia.

Strategy

Continue to develop a variety of effective decision support systems that support the implementation of research and extension outcomes and shorten the time to adoption

CRDC together with the Australian Cotton CRC and CSIRO, commissioned the development of a five to ten year business plan for cotton decision support systems. The study reported in November 2004 and recommended several modifications to the way in which decision support tools are delivered in order to ensure effective utilisation of available technologies and ease of use for growers and consultants.

CRDC also commissioned Cotton Consultants Australia (CCA) to include questions relating to the use of decision support tools in their annual survey of members and cotton growers. In addition, the CCA was commissioned to hold regional focus group meetings of growers and consultants to gain further insight into the industry's needs and requirements for decision support tools.

The CRDC-funded and CSIRO-developed *Early Season Diagnostic Tool* became a valuable addition to the cotton growers' production toolbox in 2004–05. The tool is a graphical tool that compares Day Degrees (DD) accumulated with the number of Squaring Nodes (SN) per plant, or the number of Nodes Above White Flower (NAWF) per plant, and compares that to a target line representing the crops optimal potential. Since its introduction onto the Australian Cotton CRC website, the tool has received over 5000 hits.

Measure of success

Evidence that the use of decision support systems is leading to the adoption of research outcomes and improved practices

- Over 5000 internet hits on Early Season Diagnostic Tool on CRC website. (Source—Cotton CRC, 2005)
- CRDC continues to utilise the skills of the National Cotton Extension Network to encourage growers and consultants to use available decision support tools and to train them in their use.
- Industry opinion of effectiveness and uptake of decision support systems surveyed by CCA.
- Support and training activities for HydroLOGIC during 2004–05 include 34 growers and consultants attending hands-on workshops at the Australian Cotton Conference and training workshops held in all major cotton growing areas and attended by 74 growers and consultants. This brings the total users trained through workshops to 246 since 2003.

Strategy

Support the on-going development of information packages and tools that consolidate and disseminate research outcomes

A new searchable edition of the Cotton CRC CD Rom, which represents a 'one stop shop' for a number of decision support tools developed by CRDC or with CRDC funding was released in May 2004 The COTTONpak CD contains SPRAYpak, ENTOpak, NUTRIpak, SOILpak, the Australian Dryland Production Guide, Cotton Production during Drought, Integrated Disease Management Guidelines for Cotton, WEEDpak, WATERpak and Managing Riparian Lands in the Cotton Industry. For the first time, the cotton BMP manual, including the new Land and Water module, is also included on the CD. The electronic version of the BMP manual links to relevant sections of the Paks, enabling easier and quicker navigation. During 2004–05, over 600 copies of the CD were distributed.

Research undertaken during the CRDC extension review in 2004–05 revealed that there is strong support for the Paks throughout the industry, and that Paks are seen to provide:

- A framework and process to bring together industry research outcomes;
- A corporate memory for the industry;
- A ready reference source (with a searchable index on the CD version);
- A supplement to the Cotton Course Notes; and
- Technical background for implementing BMP on farm.

The second edition of the Cotton CRC/CRDC Integrated Pest Management (IPM) Guidelines was published in February 2005. The guidelines detail how industry can reduce dependence on insecticides by developing programs that minimise insecticide use through integration of pro-active management tactics, especially the conservation of natural enemies (predators and parasites) to control pests. The new edition of the IPM guidelines is compatible in layout with the IPM module in the BMP manual.

Did you know... The average yield for irrigated cotton is 1800 kilograms per hectare – the highest in the world.

What is IPM?

Integrated Pest Management (IPM) involves using all means of managing pest populations with the aim of reducing insecticide use while maintaining profitability, yield and fibre quality. IPM is a whole year approach to managing pests. This includes management of pests through the cotton growing season, and through the remainder of the year as well.

Cotton crops in Australia are attacked by a wide range of pests, the major ones being *Helicoverpa armigera* (cotton bollworm), *Helicoverpa punctigera* (native budworm), *Creontiades dilutus* (green mirid), *Aphis gossypii* (cotton aphid), *Tetranychus urticae* (two-spotted spider mite) and *Bemisia tabaci* B- Biotype (Silverleaf Whitefly). Control of these pests has largely relied on the use of synthetic insecticides. Over reliance on synthetic insecticides creates problems, such as insecticide resistance (in *H. armigera*, Silverleaf Whitefly, aphids and mites), disruption of natural pest enemies, secondary pest outbreaks and environmental consequences. These problems have cast doubt over the long term viability of the traditional insecticide dominated approach to pest management. In Bollgard II® crops, the need to spray *Helicoverpa* spp. is dramatically reduced. However, these reductions have allowed other pests, formerly controlled inadvertently by sprays targeting *Helicoverpa* spp., to emerge as pests. This includes mirids, green vegetable bugs, aphids and jassids.

Use of insecticides against these pests may disrupt natural enemies, creating outbreaks of mites, whitefly or aphids. Hence, in both conventional (non-transgenic) and Bollgard II® cotton there remains a strong incentive to use IPM to help reduce reliance on insecticides.

Measure of success

Evidence that the use of information packages and tools is leading to the adoption of research outcomes and improved practices

- Over 600 copies of searchable edition of COTTONpak CD Rom distributed. (Source—Cotton CRC, 2005)
- Almost 800 copies of the Second Edition of the Integrated Pest Management guidelines distributed. (Source—Cotton CRC, 2005)
- Over 500 copies of WATERpak distributed during the year in response to direct requests. (Source—Cotton CRC, 2005)
- Review of Extension, Education and Training revealed that Paks are well used and well regarded by cotton growers and consultants.

Strategy

Promote safe, healthy workplaces through the adoption of appropriate Occupational Health and Safety work practices

CRDC continues to contribute to the joint venture Farm Health and Safety R&D program, managed by the Rural Industries Research and Development Corporation (RIRDC) and involving the vast majority of other rural R&D Corporations. This joint research, which was established in 2002, aims to increase the adoption of safe systems of work on farms and to develop health and safety resources for agricultural sectors.

CRDC-funded OH&S training material continued to be utilised in 2004–05. Notes and support documents, developed with funding from CRDC, were used for the *Managing Farm Safety on Cotton Farms* course, run by Farmsafe Australia in association with Workcover in New South Wales. Farmsafe Australia has developed a premium discount scheme for cotton growers in New South Wales to deliver the course and assist farmers to improve their management of on farm OH&S risks. A total of 131 farmers have completed the program. The outcomes of the program will be evaluated in 2005–06.

The ongoing implementation of BMP practices on farms continues to ensure that improvements in issues such as the safe handling and storage of chemicals are addressed; and at a corporate level, CRDC and its employees remain committed to OH&S and to achieving best practice with a focus on continual improvement.

Measure of success

OH&S performance of industry workplaces is improving

– 131 participants completed the Farmsafe Australia premium discount scheme for cotton growers.
– CRDC continues to co-fund the Farm Health and Safety joint venture with other rural R&D Corporations.

Strategy

Facilitate effective coordination and partnerships with research and development providers, industry and community organisations

CRDC was engaged in a number of collaborative programs involving a range of different partners throughout the reporting year. These included, first and foremost, the Cotton CRC—with CRDC investing over $4 million in the CRC in 2004–05, taking CRDC's investment in the CRC over the last six years to over $25 million. CRDC's substantial contribution to the CRC investment portfolio has contributed to the CRC delivering an estimated $510 million in benefits over the past five years, in present value terms, to the Australian cotton industry. A return of $7.08 for each

dollar invested. A 2004–05 independent report found that the CRC had delivered a solid economic return to the Australian cotton industry with considerable flow on impacts throughout the economy. (Source—BDA Group, 2005)

The contribution to the industry from the CRC is set to continue into the future following a successful bid for the establishment of a new Cotton Catchment Communities CRC in 2005–06. CRDC staff and Directors were heavily involved in developing the successful business case for the new CRC and will continue to be involved in the strategic planning and implementation for the new organisation. The Corporation will be a major contributor of funds to new CCC CRC with $28 million being invested over the next seven years.

Preparing for the winning bid. CRDC staff and Board members were heavily involved in developing the successful CCC CRC bid

CRDC staff have played a major role in the development of a culture of communication and collaboration across all aspects of the cotton industry. During 2004–05 CRDC staff and Directors were involved in a number of pivotal industry roles including program leadership within the Cotton CRC, roles in the Australian Cotton Industry Council (ACIC) and support for a number of industry committees providing guidance on a range of key issues.

Measure of Success

Implementation of outcomes in partnership with a variety of research and development providers

- Over 40 research and development partners in 2004–05.
- Over $10 million invested in collaborative research and development projects in 2004–05.
- Benefit cost analysis of first five years of the Cotton CRC demonstrated a 7:1 return on investment.
- CRDC contributed almost $10,000 towards industry and community member attendance at the Australian Cotton conference held in August 2004.
- A joint Cotton Australia and CRDC report into perceptions of the cotton industry will guide communications activities in 2005–06.

CRDC's key partner organisations in 2004–05

Government	Cotton Industry	CRCs	Universities	Private Enterprise	Other RDCs
CSIRO Plant Industry	Cotton Australia	Australian Cotton CRC	National Centre for Engineering in Agriculture	BOYCE Chartered Accountants	Grains Research and Development Corporation
CSIRO Division of Entomology	Australian Cotton Growers Research Association	CRC for Greenhouse Accounting	University of Sydney	Monsanto Australia Ltd	Rural Industries Research and Development Corporation
CSIRO Textile and Fibre Technology	Cotton Shippers and Ginners	CRC for Freshwater Ecology	University of Adelaide	AVCARE	Land and Water Australia
CSIRO Land and Water	Australian Cotton Industry Council	CRC for Irrigation Futures	University of New England	Aquatech	
Australian Government Department of Agriculture Fisheries and Forestry	Cotton Consultants Association	CRC for Australian Weed Management:	University of Queensland	A&A Williams	
Australian Greenhouse Office			Australian National University	Australian Rural Leadership Foundation	
Department of Infrastructure Planning& Natural Resources, New South Wales			University of New South Wales	Shaws Cotton Services	
Murray Darling Basin Commission			Griffith University		
Department of Primary Industries and Fisheries, Queensland			Melbourne University		
Department of Primary Industries, New South Wales			University of Technology, Sydney		

Program Two: Integrated Natural Resource Management

Objective

Improved delivery of research, knowledge and management strategies related to natural resources that enhance the ecological, social and economic values associated with cotton production systems, both on and off farm, and reduce negative environmental impacts.

Number of projects	17
Compared with 2003–04	23
Expenditure in 2004–05	$1,051,182
Compared with 2003–04	$972,226

Strategies	Measure of Success
Incorporate a broader range of environmental issues in the Cotton BMP program, and facilitate their adoption	Increased adoption and broader environmental coverage of the Cotton BMP program
Investigate and evaluate environmental management systems as an industry-led approach to improved natural resource management	An evaluation of environmental management systems as a farm and natural resource management tool
Support multi-disciplinary approaches to developing farm management strategies that complement catchment and landscape outcomes in relation to salinity, water quality and quantity, and biodiversity	Improved trends in landscape and catchment indicators such as salinity, water quality and biodiversity. Project and funding links with other catchment and landscape programs related to biophysical targets and sustainability. Improved perception of cotton production by the community
Facilitate the necessary environmental impact research for any new transgenic traits introduced into cotton varieties	Publication of refereed environmental impact research in scientific journals related to new transgenic traits
Investigate the potential impact of climate change on cotton production, benchmark the industry's contribution to greenhouse gas emissions, energy use, and develop integrated management strategies to reduce emissions	Benchmarked greenhouse gas emissions, energy use and potential climate change impacts

Outcome

Increased ecosystem health, community wellbeing and economic wealth of cotton growing regions and a reduction on the negative environmental impacts of cotton production systems.

Introduction

Innovations in research and development have brought about a new era of environmental standards and performance in the Australian cotton industry. Natural Resource Management has been a major strategic focus for CRDC over recent years, with an increased R&D effort in a range of areas from field to catchment scale. It is this approach, coupled with willingness by growers to adopt new technologies and new practices, which has lead to far reaching improvements in pesticide use and pest management, as well as improvements in water use efficiency, vegetation and land management, waste recycling and disposal, wildlife management and biodiversity.

What is BMP?

BMP stands for Best Management Practices. It's the Australian cotton industry's commitment to continuous improvement focused on reducing the impacts of cotton farming on the natural environment, neighbours, workers and the community. The BMP program is a co-ordinated industry effort, with CRDC managing the development and Cotton Australia managing implementation. The BMP program is one of the biggest tasks the cotton industry has ever undertaken and sets an example for the rest of the rural sector. Combining sound science and practical farm management, BMP is a tool for growing cotton under best practice. So far, over 95 per cent of the industry has been introduced to BMP via a practical "how-to" BMP Manual that has been distributed to growers and training seminars conducted on how to use it. A BMP Co-ordinator oversees the adoption of BMP at the grass-roots level. While there is a long way to go in achieving full adoption of BMP on every farm, there has been a hastening of positive change in cotton farming practices over the last few years.

Best Management Practices helps cotton growers:

- Identify and manage environmental risks
- Create a safe workplace for staff
- Design cotton farms that minimise environmental impact
- Use pesticides in a safe and responsible manner
- Use all available options to control pests
- Minimise usage and recycle water
- Store and handle chemicals safely.

Strategy

Incorporate a broader range of environmental issues in the Cotton BMP program and facilitate their adoption

Cotton production relies on the sustainable use of land and water. Soils, water and crops need to be managed so that the farm is profitable into the future, and so that the risk of any adverse environmental impacts is minimised. Sustainable management of land and water requires growers to be familiar with the resources on their farm, and to use those resources within their capacity.

Over $6 million has been invested in the research and development of the cotton BMP Program over the past ten years. As part of this investment, CRDC has placed a particular focus on the development of the BMP manual and auditing system for cotton growers. Many other industry and government organisations are committed to the BMP process, and this was evident in 2004–05 with several New South Wales and Queensland catchment management bodies expressed their support for the BMP program.

Further evidence of support for the BMP program has been recognised through a number of amendments to the *Queensland Water Act 2000* during early 2005. This included a provision to accredit industry developed farm management systems. This brings the cotton industry one step closer to having the BMP program recognised against the Land and Water Management Plans required by the Queensland Government.

Following successful trials during 2003–04, early 2005 saw the publication and roll out of a new *BMP Land and Water Management* Module. The purpose of this module is to help cotton growers manage land, water and vegetation resources with the aim of protecting and enhancing the natural environment on their farms, improve water use efficiency and at the same time, improve profitability. Implementation of the Land and Water Module will be conducted by Cotton Australia in partnership with CRDC, a number of catchment management bodies and environmental extension staff within the new CCC CRC.

Measure of Success

Increased adoption and broader environmental coverage of the Cotton BMP program

- Launch and adoption of the BMP Land and Water Management Module—50 growers commenced module since its publication in March 2005. (Source—Cotton Australia, 2005)
- 40 per cent of cotton farms currently in BMP audit process. (Source—Cotton Australia, 2005)
- Around 60 per cent of 2005 crop was produced to BMP standards. (Source—Cotton Australia, 2005)

– Ammendments to the *Queensland Water Act 2000* brings the cotton industry closer to having the BMP Program recognised against Queensland Government Land and Water Management Plans.

Strategy

Investigate and evaluate environmental management systems as an industry-led approach to improved natural resource management

In 1991, the Australian cotton industry became the first Australian agricultural industry to have its environmental performance externally validated. This was done through a comprehensive audit of cotton production that provided recommendations to improve environmental performance and reduce impacts. Today we have a very different industry to that audited in 1991. By 2003, 12 years after the first environmental audit, the industry believed it was time to test its environmental performance once again and conducted a second audit to see how far it had progressed. The 2003 audit found that the industry had achieved high compliance in 75 per cent of the recommendations the 1991 audit had set down, with this having been attributable mostly to the BMP Program, improved water use efficiency and excellence in Integrated Pest Management. All relevant sectors of industry have closely assessed the recommendations of the Second Environmental Audit and have responded with an industry wide action plan—*Taking Responsibility for our Future*—which was published in early 2005 and launched by Senator, the Hon Richard Colbeck.

Taking Responsibility for our Future: The Australian Cotton Industry Action Response to the Second Australian Cotton Industry Environmental Audit 2003

Implementing an environmental management system does not, in itself, guarantee improvement in environmental performance. Recognising that it is vital to measure natural resource management outcomes at both farm and catchment scale, CRDC co-invested in the Watermark Project with the Murray Darling Basin Commission.

The long term purpose of the *Watermark—Environmental Stewardship Project* is to identify a voluntary, user-friendly and flexible system that can be applied by landholders to continuously improve environmental management at the farm level that links to catchment management outcomes, and is compatible with farm business development. For CRDC the project provides a framework for advancing the industry's BMP program towards a catchment scale. This has become more achievable with the release of the BMP Land and Water Management module. The project has highlighted the need to establish strong partnerships between industry and catchment bodies so that agreed performance standards for natural resource management can be developed.

Measure of success

An evaluation of environmental management systems as a farm and natural resource management tool

- Industry action plan for implementation of recommendations from Environmental Audit published and implementation commenced through industry organisations.
- *Watermark—Environmental Stewardship Project* will evaluate how desired natural resource outcomes can be achieved through adoption of environmental management systems and how Catchment Management targets can be linked to the BMP program.

Strategy

Investigate the potential impact of climate change on cotton production, benchmark the industry's contribution to greenhouse emissions and energy use and develop integrated management strategies to reduce emissions.

CRDC contributed additional funds to a joint project with the CRC for Greenhouse Accounting, the Cotton CRC and the Australian Greenhouse Office during the reporting year to enhance measurement of greenhouse gas production from nitrogenous fertilisers in irrigated cotton systems. The Corporation anticipates the development of a tool during 2005–06 to help the industry calculate the production of nitrous oxide, the main contributor to greenhouse gases in cotton production, based on the type and quantity of nitrogenous fertiliser applied. The overall aim is to develop a simple greenhouse calculator that can be used by growers to estimate and thereby better manage emissions.

A joint CRDC and Greenhouse Accounting CRC project was boosted further with additional funding from the Australian Greenhouse Office. As a result of the funding, equipment was constructed for the 2004–05 season which allowed automated real time analysis of greenhouse (CO_2, N_2O and CH_4) emissions from cotton growing systems and contributed further to the first such detailed assessment of cotton in the world. The

data generated will also be used in conducting a life cycle analysis of cotton production in Australia.

Measure of success

Benchmarked greenhouse gas emissions, energy use and potential climate change impacts

- Additional investment committed to on going collaborative project to benchmark greenhouse gas emissions. Data expected in 2005–06.
- CRDC, Australian Greenhouse Office, CRC Greenhouse Accounting undertaking a life cycle analysis of cotton production and manufacturing in Australia.

Strategy

Support multi-disciplinary approaches to developing farm management strategies that complement catchment and landscape outcomes in relation to salinity, water quality and quantity, and biodiversity

The majority of Australia's cotton growing regions remain drought affected, putting the spotlight on the sensitive issue of water supply. As the world's second driest continent, Australia must use its limited water resources wisely. CRDC continues to invest in both research and new technologies to improve water use efficiency. In 2004–05 the Corporation also invested in research assessing catchment water flows and the interaction of surface and groundwater, and investment continues to be made in the development and validation of catchment scale river flow models. This investment will allow assessments of the socioeconomic impacts of changes to water allocations to be analysed.

The 2000 National Salinity Audit highlighted the potential salinity risk for a number of cotton growing regions. Assessment of the impact of changes in water quality on cotton production and soil structure continued to be assessed by the Corporation during 2004–05. Outcomes from this research will help industry more effectively manage changes in water quality.

In the area of deep drainage and salinity, CRDC invested heavily in assessing the risk of salinity in irrigated cotton regions. The work has involved extensive field and sub-catchment soil and electro magnetic surveys. This work will be delivered through a new web based GIS natural resource management service and the information will allow industry and catchment management bodies to prioritise regions and sub-catchments which require future investment to reduce the risk of salinity. In addition to this, two PhD students completed their projects in 2005 in the area of salinity management. These projects *Water Application and Hydrology* and *Hydrological Impacts of Irrigation in the Bourke District* provide

important platforms for future research into salinity management beyond the farm gate.

The Second Workshop of the Northern Murray–Darling Water Balance Group, of which CRDC is a member, was held in Narrabri in November 2004. The workshop brought together a large number of high profile researchers from many research and academic institutions to establish future directions for research in water balance and deep drainage in the northern Murray–Darling Basin. Key areas for future investment include linking deep drainage to catchment impacts and how changes in salinity and farm water use efficiency will impact upon deep drainage.

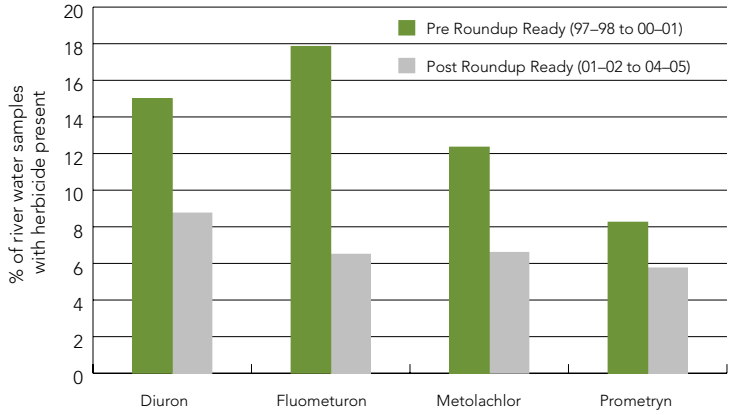
Following the successful launch and extension of the document *Managing Riparian lands in the Cotton industry*—a guide to assist cotton farmers to safeguard and improve the health of rivers and associated waterways on their farms—CRDC continued to focus investment in riparian zone and flood plain management. In particular, collaborative projects were established with several catchment management bodies, including co-investment in NRM extension in conjunction with the Cotton CRC. This collaboration is set to continue with several catchment management bodies subsequently committing investment towards further adoption and extension of on farm NRM activities in 2005–06.

Communicating the adoption of improved NRM practices is an essential part of the industry's commitment to the wider community, and a joint CRDC and Cotton Australia research report into public perceptions of the cotton industry in 2004–05 showed that perceptions of the industry have improved in many areas. However, the report also indicated that further work is needed to raise awareness levels of the industry's environmental performance with a particular focus upon regional and metropolitan communities.

Since 1990, the New South Wales Department of Infrastructure, Planning and Natural Resources (DIPNR), with funding support from irrigators in north–western New South Wales, have conducted an annual water quality monitoring program in the Macintyre, Gwydir, Namoi and Macquarie rivers. This program has regularly detected a number of residual herbicides commonly used by cotton growers as contaminants of these rivers. The figure below shows how the percentage of water samples containing four of the most common "cotton" herbicides contaminants has generally declined in these rivers since the introduction of Roundup Ready® varieties.

Did you know... CRDC funded new seed varieties have resulted in a return of almost $5 billion to the Australian cotton industry since 1984, with a benefit to cost ratio of 86. (Source—CIE, 2002)

Figure 6: Percentage of NW NSW River Water Samples with Herbicide Detected (Pre vs Post Ready Cotton Release)



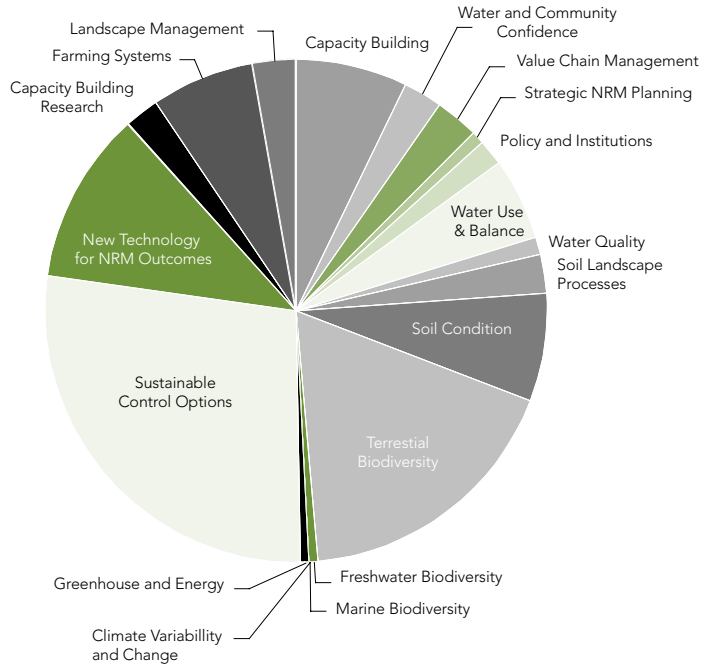
(Source—Based on data from New South Wales Department of Infrastructure, Planning and Natural Resources)

Over a number of years in conjunction with the Cotton CRC the Corporation has invested in the development of an integrated system for remediation of waterborne pesticide residues on cotton farms. The work has focused on assessing the benefits of constructed wetlands on cotton farms for the removal of pesticide residues from irrigation tailwater. Assessments have demonstrated significant pesticide removal, with average reductions of more than 50 per cent for a number of herbicides with greater reductions experienced for some insecticides such as endosulfan. The work will contribute to improved guidelines being developed for the use and management of wetlands on cotton farms.

The performance of herbicide-tolerant Roundup Ready® cotton was the subject of a 2004 University of Sydney report titled *A Snapshot of Roundup Ready Cotton in Australia*. The report concluded that Roundup Ready® cotton provides significant environmental benefits, leading to a reduction in the use of pesticides associated with conventional cotton production.

During the year, the RDCs have jointly developed an improved framework for identification, collaboration, communication and reporting on achievements in the area of NRM under the RDC model. The CRDC has strongly supported this initiative and believes it will not only demonstrate the excellent NRM outcomes being achieved through RDC projects, but also will strengthen future collaboration between all RDCs. Figure 7 demonstrates the array of CRDC NRM and environmental outcome investments as catagorised by the Australian Government Research Priorities framework.

Figure 7: CRDC 2004–05 NRM Investments



To promote and encourage the youth of our community to become involved in the future health of our rivers, CRDC, in conjunction with the Cotton CRC and the Murray Darling Basin Commission (MDBC) held a River Health Conference in August of 2004. More than 350 students from different regions of New South Wales and Queensland attended the event, which received excellent feedback from the students and teachers. A further conference is planned for 2006.

Measure of success

Improved trends in landscape and catchment indicators such as salinity, water quality and biodiversity. Project and funding links with other catchment and landscape programs related to biophysical targets and sustainability. Improved perception of cotton production by the community.

– Declines in herbicide contamination in rivers correlates with changes in herbicide use as a result of increased planting of Roundup Ready® varieties.

– Perceptions of the cotton industry within cotton and regional communities to a range of environmental concerns have improved. (Source—Roy Morgan, 2005)

Strategy

Facilitate the necessary environmental impact research for any new transgenic traits introduced into cotton varieties

The development of genetically modified cotton varieties which result in reduced dependence upon pesticides to combat pests and diseases has been a high priority for CRDC over recent years. The 2004–05 cotton growing season was the second since the general release of Bollgard II® cotton varieties, developed with CRDC funding support and containing two genes of resistance to *Helicoverpa* spp. Not only is there a scientific and agronomic imperative to understand the consequences of biotechnology, it is quite clear that the wider community expects careful use and monitoring of such technologies. The impacts of transgenic crops on soil biology has been identified as a priority by CRDC, and consequently, CRDC funded several projects in 2004–05 which aim to identify any such impacts.

One study assessed cotton root systems of GM cotton. It was found that, in some varieties, the border cells around root caps were reduced in GM cotton. These cells relay messages back to the root meristem and are believed to be important in directing the growth and function of plants roots and may be involved in temporary paralysis of harmful plant parasitic nematodes.

Another study assessing mycorrhizal fungi colonisation of the GM and non-GM varieties showed that there was no significant difference between the GM and non-GM varieties; and a study to better understand the dynamics of rhizosphere microbial communities for cotton varieties showed that different groups of bacteria may be found on GM cotton compared to non-GM cotton. While these projects identified changes in some soil biological processes for GM cotton, it is unclear whether these changes are positive or negative and CRDC is committing further funding to these investigations in 2005–06

With the pest complex of cotton changing since the introduction of transgenic cotton, it is likely the role of generalist predators will become more important in cotton pest management. 2004–05 saw the completion of research into the habitat value of native planted and natural vegetation for beneficial insects and integrated pest management on cotton farms. These studies highlight the importance of managing non-crop vegetation in and surrounding cotton farms at a farm as well as at a catchment scale to maximise the ecosystem service to be gained from biodiversity for on farm pest control.

Measure of success

Publication of refereed environmental impact research in scientific journals related to new transgenic traits

- Continued investment in new projects to understand ecological consequences of new transgenic varieties.
- Completion and publication of research into the habitat value of native planted and natural vegetation for beneficial insects and integrated pest management for transgenic varieties.

Program Three: Crop Protection

Objective

Improved integrated management of major pests, weeds and diseases, reflected by continued reductions in chemical insecticide and residual herbicide inputs to crops; and responsible management of transgenic technology.

Number of projects	41
Compared with 2003–04	48
Expenditure in 2004–05	$3,790,838
Compared with 2003–04	$3,735,427

Strategies	Measures of Success
Improve integrated non-chemical and chemical management of insect and mite pests	Evaluations on the adoption and outcomes of integrated practices, products and technologies, which improve returns, use less chemicals, reduce on and off site environmental impacts as well as any social outcomes
Improve integrated non-chemical and chemical management of weeds	Evaluations on the adoption and outcomes of integrated practices, products and technologies, which improve returns, use less chemicals, reduce on and off site environmental impacts as well as any social outcomes
Develop practices and technologies that reduce the spread and impact of cotton diseases	Reduced distribution, presence and impact of diseases
Ensure the development of resistance is minimised through the design and implementation of resistance management strategies for both insecticides and transgenic technologies	Monitor resistance levels with an aim to either avoid or keep resistance levels in pests and weeds at manageable levels
Ensure the benefits of transgenic crop technology are maximised through responsible management based on sound scientific risk assessment	Transgenic crop surveys and reports on performance, management and risk assessment

Outcome

Continued reduced reliance on chemical inputs and more effective management strategies for pests and weeds.

Introduction

The cotton industry was the first agricultural industry in Australia to move successfully to the commercial use of biotechnology. This has seen the dawn of a new era for crop protection throughout the industry, but has also seen the emergence of new challenges and new opportunities which need to be addressed through a sustained and targeted R&D effort.

History of GM cotton in Australia

In 1996 Australia's first GM cotton, INGARD®, was commercially released. INGARD®, which contains a single gene from the soil bacterium *Bacillus thuringiensis* (Bt), underwent a rigorous testing and approval process by regulatory authorities before it was permitted for release under the Commonwealth regulatory system as the first GM crop in Australia. INGARD® cotton was available between 1996/97 and 2003–04 seasons. During those eight seasons, INGARD® crops required 44 per cent less insecticide and miticide than conventional crops.

To build on the success of INGARD® scientists developed Bollgard II® with even better pest resistance. Bollgard II® was approved for commercial release in 2002 and became available to cotton growers for planting from 2003.

The first genetically modified herbicide tolerant cotton was introduced in 2000 after a period of research and cultivar development under regulatory permits. Roundup Ready® cotton is available both with and without Bollgard II®. There has been a steady increase in the area planted to Roundup Ready® as variety availability has improved.

What is Bollgard II®?

Bollgard II® was developed by inserting two different genes from the soil bacterium *Bacillus thuringiensis* (Bt) into cotton, which built on the single Bt gene that is contained within INGARD®. These genes produce two separate proteins that are toxic to the main insect pest of cotton—*Helicoverpa*—so that when the *Helicoverpa* caterpillars eat the Bollgard II® cotton they die.

In the first two seasons in which Bollgard II® crops were grown, they required 85 per cent less insecticide and miticide than conventional cotton.

Bt has been used as the basis of safe natural insecticides for many years. The Bt genes in Bollgard II®, provided by Monsanto under a licence agreement, have been demonstrated not to harm humans or other animals.

What is Roundup Ready®?

Roundup Ready® cotton contains one copy of the *cp4 epsps* gene, providing tolerance to glyphosate. Glyphosate inhibits this gene and as a result kills weeds and conventional cotton. However, in Roundup Ready® cotton glyphosate can currently only be applied up to the four leaf stage of growth (that is, prior to flowering) to control weeds without affecting yield.

Roundup Ready FLEX® cotton contains two copies of a herbicide tolerance gene, *cp4 epsps*, derived from a common soil bacterium, *Agrobacterium* sp. strain CP4. Roundup Ready FLEX® cotton has prolonged expression of the *cp4 epsps* gene and is tolerant to glyphosate at later stages of growth, the window in which glyphosate can be applied for weed control is longer, giving growers increased flexibility in timing herbicide applications for integrated weed management. Cotton varieties carrying Roundup Ready FLEX® are expected to be available commercially in 2006, subject to regulatory approval.

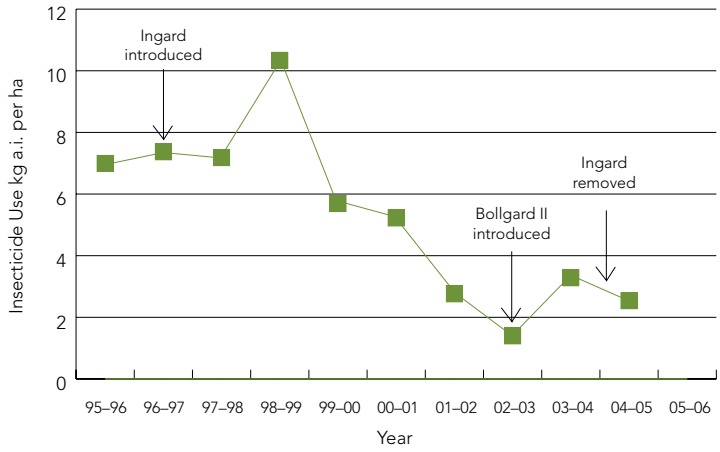
Strategy

Improve integrated non-chemical and chemical management of insect and mite pests

The 2004–05 season saw the introduction and widespread planting of two-gene *Bacillus thuringiensis* (Bt) technology, which is much less likely to allow pest resistance. Over 80 per cent of the crop was a combination of two gene Bt and herbicide resistant cotton in 2004–05. The 14 varieties released in time for the 2004 planting season contained many new features, including improved fibre quality, disease resistance, growth habit, maturity and regional adaptability.

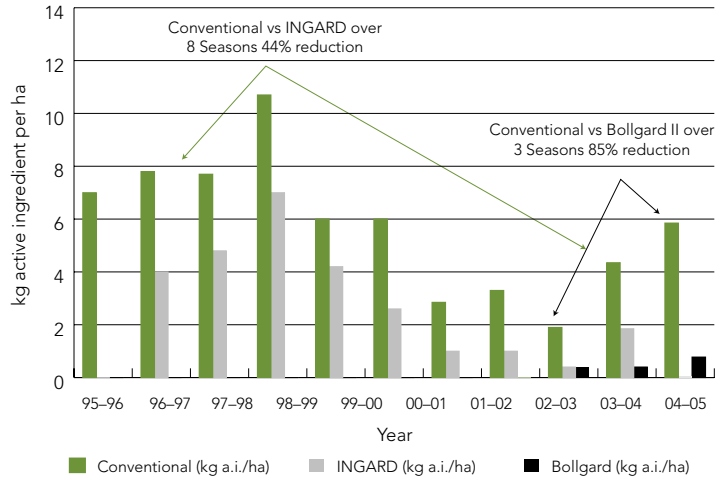
Over the last five years the application of GM Cotton has made a significant contribution to the dramatic reduction in the quantity of pesticides applied per hectare to Australian cotton crops. Prior to 1999/2000, Australian cotton received between seven and 10 kilograms of insecticide active ingredient (ai) per hectare. In the last few seasons pesticides use has reduced by 66 per cent, and the figure is now between two and four kilograms of active ingredient per hectare. In 2004–05 it is estimated that Bollgard II® crops required less than 15 per cent of the insecticide required for conventional crops.

Figure 8: A History of Total Insecticide Use on Cotton (kg active ingredient per ha) (Source: Calculated from CCA and 2005 Market Audits)



However, reduced insecticide spraying of Bollgard II® crops, targeted at *Helicoverpa* spp. is likely to be accompanied by some changes in the timing and intensity of infestations of previously minor pests such as mirids, aphids, mites and Silverleaf Whitefly. Consequently, CRDC increased the level of funding for research into the management of these pests for the 2004–05 year, to ensure that the progress made in the adoption of IPM systems in INGARD® and conventional cotton is maintained for Bollgard II®. In addition, the continued decline in dependence on insecticides has resulted in the resistance frequencies for a range of insecticides used against the major insect pests in cotton remaining stable or declining.

Figure 9: Insectide Use in Conventional, Ingard and Bollgard II Cotton (kg a.i. per ha) (Source—CCA and 2005 Market Audits)



New projects focusing on emerging pests include improving our understanding of the role of predators and parasitoids in the reduced spray environment, development of novel 'soft' options for control including biopesticides and examining the interaction between pest damage and the new Bollgard II® technology.

2004–05 saw the release of the second edition of the Integrated Pest Management Guidelines – a comprehensive resource for the industry wide reduction in dependence on insecticides. The guidelines detail how this can be achieved by developing programs that minimise insecticide use through the integration of proactive management tactics, especially the conservation of natural enemies (predators and parasites) to control pests.

Integrated Pest Management Guidelines—a comprehensive resource for the industry wide reduction in dependence on insecticides

In order to assess industry perceptions of management issues associated with Bollgard II®, the National Cotton Extension Team interviewed sixty cotton growers and consultants before and after the 2004–05 season. The evaluation demonstrated that growers were comfortable with managing insects and mites on Bollgard II®.

"I think the reduction in chemical use in the cotton industry has been one of the great successes over the last decade. We're not getting the [residues] in the rivers now because of that. There are other issues with how much water is extracted and where it is, but the chemical stuff has been a triumph for that industry."

Professor Peter Cullen
SBS Insight, May 31, 2005

Measure of success

Evaluations on the adoption and outcomes of integrated practices, products and technologies, which improve returns, use less chemicals, reduce on and off site environmental impacts as well as any social outcomes.

- Bt transgenic cotton market share increased from 31 per cent in 2003–04 to 78 per cent in 2004–05 resulting in 85 per cent reduction in insecticide usage compared with conventional cotton. (Source—CSD, 2005)
- 43 people attending Integrated Pest Management course in all major cotton growing areas bringing the total attendance to 221 since 2001.
- Almost 800 copies of the Second Edition of the Integrated Pest Management guidelines distributed. (Source—Cotton CRC)
- Industry perceptions of Bollgard II® tested by National Cotton Extension Network.

Strategy

Improve integrated non-chemical and chemical management of weeds

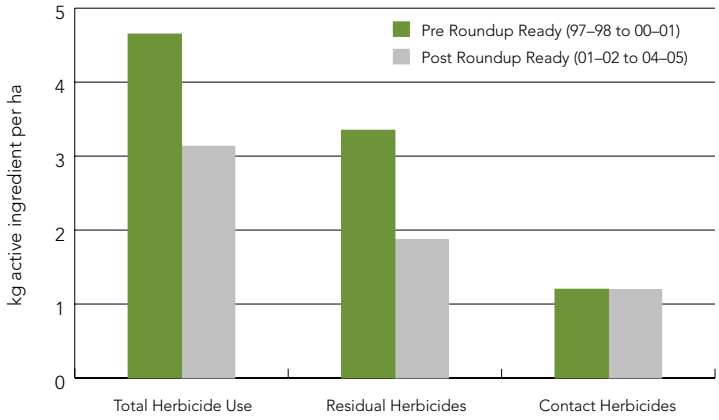
The current weeds program was reviewed in 2003 and continues to focus on problem weeds, the effective management of Roundup Ready® cotton and improved weed management in dryland cotton and grain farming systems.

Genetically modified Roundup Ready® commercial crops became available in limited quantities in 2000. In the past five seasons, there has been an increase in the area of Roundup Ready® cotton planted from less than five per cent of the cotton area in 2000–01 to 53 per cent in 2004–05. Roundup Ready® cotton is now widely used in the cotton industry and is likely to increase with improved Roundup Ready® technology on the horizon. 2004–05 saw further investment from CRDC in the CSIRO breeding program which will support the introduction of second generation Roundup Ready FLEX® varieties in the future.

Did you know… Australia has the world highest yields for a major producer – with a 22 per cent increase over the past five years.
(Source—Cotton Yearbook, 2005)

Figure 10: A Comparison of Herbicide Quantities Used Pre and Post the Introduction of Roundup Ready (RR) Cotton

(Source: CCA 2004 and 2005 Market Audis)



Management practices used for weed control in cotton are broader than herbicide use and it is important that the alternatives to chemicals continue to be used by cotton growers in an integrated system. Integrated Weed Management (IWM) is a proactive weed management system which has a number of important aims:

– To control all weed species at some point in the annual cycle in the farming system using a range of methods but without relying on any one method completely (eg. using herbicides from different modes of action, strategic cultivation, hand chipping, rotation crops);

– To reduce the size of the weed seed bank;

– To improve system sustainability by reducing reliance on prophylactic use of residual herbicides.

The weed management resource WEEDpak, introduced in 2002, continued to be central to weed management extension efforts by the National Cotton Extension Team in 2004–05. WEEDpak has been compiled to be the most complete guide to the principles of IWM yet available to the cotton industry. During the reporting year the weed identification and information section of WEEDpak was updated on the Cotton CRC internet site and in the recent COTTONpak CD. An additional 22 weed image sets have been included, most of the existing 38 weed images on the internet have been improved and updated, the indexes have been updated, and a new seed index has been developed. A further set of 20 weed images and some additional biology/ecology sets have been developed and are currently in the process of being placed on the internet. Further development of WEEDpak is anticipated in 2005–06.

Measure of success

Evaluations on the adoption and outcomes of integrated practices, products and technologies, which improve returns, use less chemicals, reduce on and off site environmental impacts as well as any social outcomes.

- Continued development and adoption of the weed science resource material—WEEDpak and inclusion of WEEDpak in searchable COTTONpak CD.
- Estimated 33 per cent reduction in overall herbicide used and a 46 per cent reduction in residual herbicide following the introduction of Roundup Ready® varieties.
- Increased adoption of Roundup Ready® cotton from less than five per cent of the cotton area in 2000–01 to 53 per cent in 2004–05. (Source—CSD, 2005)
- Second generation Roundup Ready FLEX® trial sites underway in 2004–05 and more planned for 2005–06.

Strategy

Ensure the development of resistance is minimised through the design and implementation of resistance management strategies for both insecticides and transgenic technologies

In the 2004–05 growing season, Bollgard II®, with two insecticidal *Bacillus thuringiensis* (Bt) genes resistant to *Helicoverpa* spp., completely replaced the single resistance gene INGARD®, allowing a larger percentage of insect-tolerant transgenic plantings. This has been made possible by the industry's successful resistance management of the Cry1Ac Bt gene in INGARD® over the past eight seasons. The industry's capacity to manage resistance successfully is underpinned by the extensive research and monitoring program supported by the Corporation. The management of the resistance threat to Bollgard II® was of high priority to CRDC in 2004–05 and a major research project in this area was established with CSIRO Entomology, in addition to the ongoing Bt resistance monitoring project.

During the 2002–03 and 2003–04 growing seasons two field samples collected of *Helicoverpa armigera* were found to carry genes that conferred resistance to Cry2Ab. As only a very small sample of insects was examined, the gene appears to be unexpectedly common (3 in 10,000). These results were surprising as Bollgard II® that expresses Cry2Ab as well as the Cry1Ac toxin had not been generally grown prior to 2004 and consequently there had been almost no recognised opportunity for selection to increase the frequency of the gene. Clearly an unexpectedly high background level of this form of resistance exists in the population. Fortunately, Cry2Ab–resistant insects remain susceptible

to Cry1Ac, the other toxin in Bollgard II®; thus there is no immediate threat to the longevity of that variety of cotton. This important new research into this resistance mechanism will determine if newly-isolated Cry2Ab resistant lines represent a threat to the longevity of Bollgard II®.

Measure of success

Monitor resistance levels with an aim to either avoid or keep resistance levels in pests and weeds at manageable levels

- Over 50 industry personnel attended Research and Extension in Resistance Workshop.
- CRDC-funded research provided comprehensive field monitoring of insecticides and miticides with the following results:

  Helicoverpa armigera

  - No changes detected to resistance to any conventional chemicals or mixed Cry toxin foliar Bt sprays.
  - No increase in detection of a resistance gene to the Bollgard II® *Cry2ab* toxin

  Aphids

  - No major changes in resistance to existing insecticides

  Mites

  - Confirmation of mite resistance to some older synthetic pyrethroid and organophosphate products.

  Silverleaf Whitefly

  - Confirmation that this introduced pest can develop resistance rapidly to all currently available insecticides. This knowledge now underpins resistance management strategies in central Queensland.

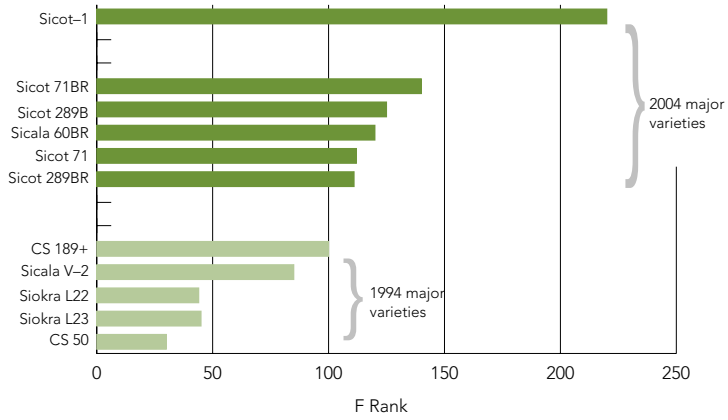
Strategy

Develop practices and technologies that reduce the spread and impact of cotton diseases

Two soil-borne diseases remain particular threats in cotton: Fusarium wilt and Black Root Rot. Good progress is being made with Fusarium wilt through the breeding program, but this is a medium to long term solution. In the shorter term, there has been widespread adoption of improved farm hygiene practices to slow the spread of Fusarium, based on research and extension activities supported by CRDC. Research projects into Fusarium wilt include ecology, field management, novel sources of resistance and conventional breeding objectives.

2004–05 saw the release of 14 new varieties by the CSIRO breeding team. This included the release of the most Fusarium resistant variety to date—Sicot F–1, which has an F-rank of 208 (15) (F rank is a measure of resistance to Fusarium)

Figure 11: F-rank of CSIRO new varities



Precautions must be taken in the field to prevent the spread of Fusarium wilt

Black Root Rot has continued to spread and is now found on most cotton farms. Although it does not have the same dramatic impact on production as Fusarium, it predisposes the crop to increased weed and insect infestations and delayed maturity. This is a particular problem for southern areas with shorter growing seasons. Current cotton cultivars do not offer resistance to this disease, so the 2004–05 R&D effort focused on understanding the pathogen and developing improved management options to reduce the incidence and impact of the disease. CRDC has

funded molecular investigations into the factors that cause the disease as well as field management of the pathogen.

It is important, in the fight against these diseases, that extension personnel and researchers continue to communicate and share information about current and emerging research findings. In order to bolster this further, disease scientists and extension personnel met in Narrabri in June 2005 to discuss research findings and innovations in disease management, with a particular focus on Fusarium wilt and Black Root Rot. Some of Australia's top scientists and CRDC funded postgraduate students presented the latest research outcomes at the Fuscom workshop, and identified opportunities for further research within their project area. The information gathered by CRDC during the strategic planning sessions of the meeting will be integrated into future research planning by CRDC program mangers.

The Fuscom Team

Measure of success

Reduced distribution, presence and impact of diseases

- Over 30 scientists, growers, consultants and extension personnel attended Fuscom disease workshop in June 2005.
- Rate of spread of disease of major cotton diseases generally slowing down.
- Doubling in F-rank of major commercial varieties from 1995–2005. The average F-rank of the five leading varieties in 1995 was 60. The average F-rank of the five leading varieties in 2004 was120.
- The CRDC-funded CSIRO breeding program released the most Fusarium resistant variety to date—Sicot F-1, with an F-rank of 208 (15).

Strategy

Ensure the benefits of transgenic crop technology are maximised through responsible management based on sound scientific risk assessment

In order to improve knowledge of risk management of Roundup Ready®, the Corporation invested in researcher attendance at the University of Guelph, Ontario, Canada, where new approaches to risk assessment and associated knowledge were researched. The visit enabled interaction regarding current CRDC research projects whilst expanding the skills and capabilities of the Australian research community. Confirmation was obtained during the trip for the validity of CRDC's current approach to risk assessment and the plans for future research.

Continued risk assessment in the context of resistance management was one of the subjects under discussion during a gathering of resistance scientists and extension personnel in Narrabri during June 2005. The workshop included a particular focus on future proofing and identification of research opportunities and gaps. The information gathered by CRDC during the strategic planning sessions of the meeting will be integrated into future research planning by CRDC program mangers and will result in a review of the current resistance management plan for Bollgard II® in 2005–06. Professor Richard T Roush, a leading expert in resistance modelling from the University California, was an attendee at the workshop. Professor Roush's visit confirmed that the industry's current resistance management plan for Bollgard II® is adequate and the Professor contributed greatly to detailed discussions about the criteria for the introduction of new insect tolerant transgenics.

Austin McLennan (QDPI), Rick Roush (University of California), Joe Robinson (ACGRA), Andrew Parkes (ACGRA), Mark Hickman (QDPI) at CRDC's Resistance Workshop

Each year, CRDC convenes several meetings of the ACGRA Transgenic and Insect Management Strategy Committee (TIMS), which includes a Bt technical panel involving researchers working on monitoring resistance and understanding the underlying mechanisms involved in resistance. The panel reports back to TIMS, providing advice on known risk of development of resistance in *Helicoverpa* spp. to Bt crops. The current management practices incorporated into the Resistance Management Plan (RMP) for Bollgard II® were viewed to be adequate by TIMS following an evaluation in 2004–05. However, the evaluation also found that industry must ensure that effective refuge crops are maintained if the robustness of the RMP is to be maintained.

Measure of success

Transgenic crop surveys and reports on performance, management and risk assessment

- CRDC convened three meeting of TIMS and several meetings of TIMS sub-committees as part of an on going evaluation of the Bollgard II® and Roundup Ready® Crop Management Plans.
- Researcher attendance at the University of Guelph, Ontario, Canada to evaluate new developments in environmental risk assessment.
- 30 industry researchers, extension personnel, growers and consultants attended CRDC's Research and Extension in Resistance workshop in June 05.

Program Four: Farming Systems

Objective

Integrated farm management practices that enhance the sustainability and profitability of cotton farming systems.

Number of projects	29
Compared with 2003–04	30
Expenditure in 2004–05	$1,795,400
Compared with 2003–04	$2,152,852

Strategies	Measure of Success
Improve water use efficiency on farms using existing and new infrastructure, new tools and technologies	Increased yield per hectare and per megalitre of water and; Improved water use efficiency on farms
Understand salinity, sodicity and deep drainage on farms and develop appropriate farm management strategies to minimise these potential negative processes	Adoption of integrated management options for salinity and sodicity
Strengthen our understanding of soil health and improve crop nutrition management	Benchmark of soil health characteristics and optimise crop nutrition management
Increase profitability with better whole farm management strategies and innovative precision agricultural systems	Improved economic returns to farmers and; Data on changed farming practices including the economic, environmental or social benefits
Continue fundamental research on cotton agronomy and plant physiology and explore the interactions of different components for both conventional and transgenic varieties	Publication of cotton research related to crop physiology and transfer of agronomic knowledge into other research and extension project outcomes

Outcome

A more sustainable and profitable cotton farming system.

Overview

To achieve genuine triple bottom line sustainability, the Australian cotton industry must maintain economic viability for growers through sustainable farming systems. Over recent years, costs of inputs have continued to rise, and it is only with the introduction of new GM varieties and integrated management systems such as those for pests, soils and weeds that the costs of chemical inputs have begun to decline. That said, the ever-increasing costs of land, water, machinery and labour coupled with prevailing drought and declining global prices, mean that the gap between income and expenses remains under pressure.

Strategy

Improve water use efficiency on farms using new and existing infrastructure, new tools and technologies

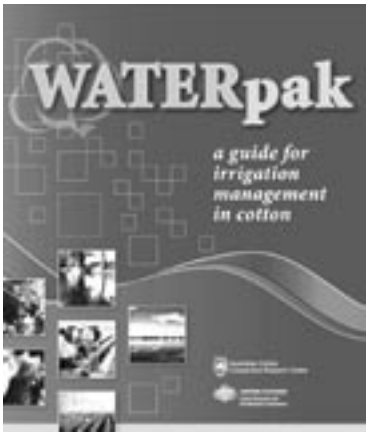
Growers went into the 2004–05 season with limited water supplies and with the prospect of further drought on the horizon. However, predictions indicate that 2004–05 has been a bumper crop, with record breaking yields and excellent quality. All of this, it would seem, has been achieved without corresponding increases in water use per hectare. This would indicate that growers have significantly improved their on farm water budgeting and scheduling techniques over recent years.

Aquatec's Jim Purcell demonstrates the benefits of new WUE tools and technologies

The season's water shortages sharpened the focus on efficient irrigation, both for growers and for CRDC's research, development and extension effort. On average, some 20 per cent of the Australian cotton area is grown using only natural rainfall. Consequently, there is a wealth of expertise in dryland strategies for maximising yield in the face of limited rainfall. Increasingly, irrigated farmers are adopting these agronomic

practices so as to maximise the benefit from natural rainfall as an adjunct to irrigation.

Following the 2003–04 development of WATERpak, a resource package for irrigation management focused on further improvements to water use efficiency, CRDC coordinated the development of a CD version to make WATERpak more accessible and easier to use. In addition to this, WATERpak was included on a new searchable edition of the COTTONpak CD Rom, which represents a 'one stop shop' for a number of decision support tools developed by CRDC or with CRDC funding. During 2004–05, over 600 copies of the combined COTTONpak CD were distributed.



WATERpak—a resource package for irrigation management

While the vast majority of irrigated cotton uses furrow irrigation and considerable research funds have been committed to optimising this method, there is increasing interest in overhead irrigation methods such as lateral move and central pivot systems. In the past, these systems were often viewed as less efficient, but recent research has demonstrated that modern systems can be designed to produce excellent cotton crops. These systems are very water use-efficient and less labour intensive, aiding in one of CRDC's major goals to improve water use efficiency and helping the industry to further meet community expectations on water use.

CRDC continues to be a contributing partner to National Program for Sustainable Irrigation (NPSI). During 2004–05, the cotton extension network conducted the second phase of a NPSI-funded project Knowledge Management in Cotton and Grain Irrigation. This phase of the project aimed to determine how information and knowledge about water management and water use efficiency is being used and managed in irrigated cotton and grains and to identify key factors influencing decision making. To do this, ninety interviews of growers of cotton and grains, consultants, extension workers, government researcher officers and irrigation equipment suppliers were conducted and a stakeholder workshop held to integrate and process the findings. A final report for the project was published in late 2004.

The Cotton Extension Team overhead irrigation training

In May 2005, the CRDC Board met in St George, Queensland, and following the Board meeting a number of Directors and staff inspected a selection of examples of water use efficiency innovations in the local area. In addition to this, the Board attended a water use efficiency field day, sponsored by the Natural Heritage Trust, and held at Keytah Station near Moree.

Measure of success

Increased yield per hectare and per megalitre of water; and improved water use efficiency on farms

- Appointment of a Water Use Efficiency Officer, based in Gunnedah to further enhance the water use efficiency extension effort.
- Continued uptake of support tools such as HydroLOGIC and WATERpak and their inclusion in the searchable COTTONpak CD.
- Increased uptake of commercial water use efficiency services indicates industry commitment to improving on farm water use efficiency.
- 22 per cent increase in cotton yield comparing average yields for 1995–2000 with average yields for 2001–2005. (Source—Cotton Yearbook, 2005)

Did you know... Australian seed varieties now hold a 25 per cent share of the US cotton seed market. (Source—CSD, 2005)

Innovation in Irrigation

An innovative cotton farmer was recognised for water use efficiency improvements in 2004, when 'Keytah', near Moree, was awarded an innovation in irrigation award from The Natural Heritage Trust. Andrew Parkes, Manager of Keytah, believed that he could improve Keytah's water efficiency by ten to 15 per cent on the industry average of ten megalitres per hectare by improving certain aspects of the irrigation process. Accordingly, he adjusted the property's water budget for the 2002–03 season from the normal 10 megalitres per hectare to 8.5 megalitres per hectare. The new water use plans began with changing the position of capacitance probes. Each field was surveyed for clay content (and, therefore, moisture holding capacity) using Electro Magnetic maps and probes were positioned according to average soil type. Andrew also started experimenting with different numbers and sizes of siphons to even out water levels and irrigation times across the fields and conducted tests on the plants watered by single siphons and those watered by double siphons. At the end of the 2002–03 season, the different irrigation techniques that Andrew had put into place saved Keytah nearly three megalitres per hectare, translating into almost 1.6 bales per megalitre. In addition, Andrew also conducted some water saving predictions using a modeling program which found further potential water saving of nearly 1.2 megalitres per hectare, based solely on different irrigation scenarios. Andrew is now inspired to aim for a WUE of two bales per megalitre, which is double the current industry standard

Strategy

Understand salinity, sodicity and deep drainage on farms and develop appropriate farm management strategies

With the prospect of further drought conditions on the horizon, CRDC invested heavily in improving understanding of the water balance. New projects included one which attempts to directly measure drainage under irrigated cotton systems using an equilibrium tension drainage lysimeter; and one which aims to demonstrate that electrical imaging can allow growers to see how the furrow irrigation wetting front progresses through the soil profile and field so that the watering cycle can be optimised to minimise deep drainage. Both of these projects will help growers to better understand the intricacies of furrow irrigation and deep drainage.

Further deep drainage and salinity investments included projects to assess the risk of salinity in irrigated cotton regions. The work has involved extensive field and sub-catchment soil and electro magnetic surveys. This work will be delivered through a new web based GIS natural resource management service and the information will allow the industry and

catchment management bodies to prioritise regions and sub-catchments which require future investment to reduce the risk of salinity.

Another project nearing completion involves the use of a geomorphic framework to explain inter-connection of groundwater with the river, depth to impermeable layers, location of major salt stores in the landscape, and the history of deposition of the various layers underlying cotton fields. Hydrological simulation models are used in conjunction with electro magnetic data to demonstrate dynamic processes such as deep drainage and the lateral flow of groundwater under contrasting soil and climatic conditions. It is anticipated that the framework developed for this project will be applicable to other major cotton growing areas and CRDC will be seeking to follow up on this opportunity in 2005–06.

Further CRDC-funded research continued to focus on long-term farming system sites which investigate and compare a range of crop rotation, irrigation, and soil tillage practices for their impact on sodicity, long-term environmental sustainability and profitability.

Measure of Success

Adoption of integrated management options for salinity and sodicity

- Hydrological simulation models developed with Electro Magnetic data to demonstrate dynamic processes under contrasting soil and climatic conditions.
- NPSI review of progress and co-ordination of deep drainage research in the Northern Darling basin.
- CRDC-funded research and extension focus on investigation and comparison of a range of crop rotation, irrigation, and soil tillage practices for their impact on sodicity and long-term environmental sustainability and profitability.

Strategy

Strengthen our understanding of soil health and improve crop nutrition management

The existing resource for soil management—SOILpak—encompasses a significant amount of research carried out on physical soil management. However, basic industry knowledge and techniques in soil ecology management represents a research gap.

To bolster this understanding, a soil health forum was convened by CRDC in early May 2005. The forum established a Soil Health Review to report on soil health outcomes since the 2001 CRDC Farming Systems Forum on Soil Health. The meeting, which was well attended by growers and researchers, also examined current CRDC-funded research which aims to develop industry benchmarks for soil health. An outcome of this meeting was the commencement of a study interviewing cotton growers

from all major cotton growing areas about soil management with a particular focus on soil biology. This study aims to provide comprehensive background information which can be used during CRDC's proposed review of soil biology and ecology research in 2005–06.

Dr David Nehl, New South Wales Department of Primary Industries and Dr Peter McGee, Sydney University, were both presenters at the CRDC soil health meeting

Soil greenhouse emission studies continued in 2004–05, and lifecycle analysis began as part of an ongoing project funded in conjunction with the Greenhouse Accounting CRC and the Australian Greenhouse Office. Work is expected to provide information which will assist the industry optimise the source and quantity of nitrogen obtained through the balance of applied nitrogen and nitrogen fixed under rotational crops.

Crop nutrition was a major focus of a Farming Systems Forum held in November 2004. The forum was extremely valuable in disseminating information, as well as identifying research gaps. The use of fertilisers, particularly nitrogen, as well as economics, greenhouse gas emissions, decision support tools and rotation crops, were amongst the matters discussed. Findings from the Forum will be integrated into extension strategies for the forthcoming year, and a further Forum planned for November 2005 will focus on precision agriculture.

Measure of success

Benchmark of soil health characteristics and optimise crop nutrition management

- 110 industry personnel attended CRDC Farming Systems Forum on crop nutrition.
- Commencement of study to benchmark and describe current soil management practices on cotton farms with a particular focus on soil health.

Strategy

Continue fundamental research on cotton agronomy and plant physiology and explore the interactions of different components for both conventional and transgenic varieties

With the introduction of Bollgard II® and its rapid adoption, CRDC's research effort is now focusing upon agronomic management and improving understanding of the physiology of Bollgard II® in high fruit retention and high yielding crop situations.

There has been much interest in examining how different Bollgard II® and Roundup Ready® row spacing configurations may affect crop production. In particular, narrow row configurations are of interest to southern cotton growing regions due to the potential advantages in earlier crop maturity during their short season environment. A CRDC-funded PhD study is nearing completion on this topic and will provide an improved understanding of the physiological response of cotton under a range of row spacing situations. In addition to this, new initiatives in Cental Queensland are underway to examine opportunities to modify planting dates as a means of increasing yield using new Bollgard II® technology.

A new project commenced during the reporting year which aims to fill a gap in the development of management strategies in the field to optimise cotton fibre properties. Specifically, this project will initiate targeted research to improve the understanding of the effects of different climate, plant and management factors on fibre properties.

The reporting year marked the first season for almost a decade that CRDC did not invest in cotton research in Northern Australia. While drought in the traditional Eastern production areas has reduced the Corporations capacity to invest in the north in recent seasons, the research effort in these Northern regions, particularly in the Ord and Katherine, has reached a mature stage. The conclusions of the research demonstrate that production in these regions would be commercially viable, however, opportunities for commercial cotton production infrastructure investment would need to exist before it could be grown economically.

Measure of success

Publication of cotton research related to crop physiology and transfer of agronomic knowledge into other research and extension project outcomes

- Crop physiology and agronomic research outcomes communicated to industry through CRDC and trade publications.
- CRDC-funded scientist, Dr Mike Bange, awarded Fulbright Scholarship—an educational exchange program between Australia and the USA.

– Crop physiology and agronomic research communicated to industry during the twelfth Australian Cotton Conference held during 2004. 14 papers were presented with particular emphasis on crop physiology, agronomic research and subsequent crop management and transference of this knowledge.

Strategy

Increase profitability with better whole farm management strategies and innovative precision agricultural systems

CRDC continued to support production of the joint Cotton Comparative Analysis with Boyce Chartered Accountants in 2004–05, helping cotton farmers to benchmark their own operations financially and understand the drivers of profitability in cotton production. The 2004–05 report examines the 2003–04 season which was heavily impacted by prevailing drought conditions. As with most agricultural industries, cotton farmers are price takers on a global market and have suffered from declining terms of trade. Despite the economic gains made as a result of varieties developed by the CSIRO plant breeding program and improved crop management, the gap between costs and profits continues to narrow.

Measure of success

Improved economic returns to farmers; and data on changed farming practices including the economic, environmental or social benefits

– Record yields in many valleys helped to maintain profitability in a time of limited water and low world cotton prices.
– Pesticide use has more than halved—2004–05 figures show 4 to 6 kilograms active ingredient per hectare compared to between 12 to 14 kilograms active ingredient per hectare in 1999–2000.
– The second cotton industry independent environmental audit conducted in 2003 made many positive comments about the industry's environmental performance. The *Industry Response to Second Environmental Audit*, which was published in early 2005, demonstrates the significant level of progress that has been made against environmental targets.
– Community perceptions of the cotton industry demonstrate that views of the environmental performance of the industry have improved, particularly in cotton and regional communities. (Source—Roy Morgan, 2005)

Program Five: Plant Breeding and Biotechnology

Objective

World-leading cotton varieties displaying continuous improvement in cotton yield, quality and agronomic performance through plant breeding and biotechnology innovations.

Number of projects	18
Compared with 2003–04	25
Expenditure in 2004–05	$1,707,466
Compared with 2003–04	$2,008,873

Strategies	Measures of Success
Develop regionally adapted cotton varieties exhibiting improved yield, quality, insect and disease resistance and herbicide tolerance	Evidence that new cotton varieties are increasing yields and potential returns to the industry Evidence that new varieties can produce higher yields with lower inputs of chemicals and improved water use efficiency
Targeted, innovative biotechnology focused on solving production and quality constraints confronting the Australian cotton industry	Evidence that CRDC's biotechnology investments are delivering industry or community benefits
Reduction in time required to introduce improved or novel genes into elite cotton varieties through the development of frontier technologies, without compromising scientific rigour	Evidence of the reduced time to introduce genes into cotton varieties
Continuous monitoring of the signals from cotton textile and oilseed marketplace to ensure Australian varieties maintain a place at the high quality end of the market	Market reports on the demand for Australian cotton lint and seed

Outcome

Continually improving cotton varieties.

Overview

The CSIRO breeding team continues to provide the Australian cotton industry with new varieties displaying higher yield and quality as well as improved insect and disease tolerance and herbicide resistance. The industry's return on investment into crop improvement through plant breeding has been impressive and the contribution made through biotechnology is expected to continue.

The breeding program is one of the most successful of its type in the world. By several measures it is an exceptional research program:

– A return of over $4.9 billion since 1984, with a benefit:cost ratio of 86 and internal rate of return of 34 per cent. (Source—Centre for International Economics, 2002)

– CSIRO conventionally bred and transgenic varieties comprised 80 per cent of planting in Australia in 2004–05. (Source— CSD, 2005)

Sustained funding for this program in the face of severe drought-induced budgetary constraints is testimony to the importance that the Corporation places on the role which the breeding program will play in continuing to keep Australian cotton internationally competitive.

A key member of the CRDC supported CSIRO plant breeding team received a major award in October 2004. Peter Reid was presented with the Sir Ian McLennan Achievement for Industry Award for his work on developing hardier, more productive varieties of cotton suited specifically to Australian conditions. The new cotton varieties Mr Reid helped to develop have been recognised internationally as industry benchmarks in terms of improved yield, disease resistance and fibre quality.

Peter Reid (center) with Dr Jeremy Burdon (CSIRO), Charles Allen (former CSIRO), John Grellman (CSD) Sir Bruce Watson (former MIM Holdings)

Strategy

Develop regionally adapted cotton varieties exhibiting improved yield, quality, insect and disease resistance and herbicide tolerance

14 new CSIRO cotton varieties developed with funding support from CRDC were launched in time for the 2004–05 season. Encompassing Bollgard II®, Bollgard II®/Roundup Ready®, Roundup Ready® and conventionally bred varieties, they contained many new features, including improved fibre quality, disease resistance, growth habit, maturity, and regional adaptability. June 2005 saw the release of eight new CSIRO varieties for the 2005–06 season. The improved characteristics and attributes of the varieties have all been made possible thanks to the sustained investment by CRDC and other partners in the CSIRO breeding program.

Levies cotton farmers pay to support CRDC's research and development program and Commonwealth matching contributions help to fund the CSIRO research that is producing innovative new varieties, and which are marketed in Australia through a grower owned seed distributor—Cotton Seed Distributors (CSD). CRDC then receives return on this investment in the form of royalties, which currently make up around 14 per cent of CRDC's revenue. This revenue is then ploughed back into new research and development.

CSD General Manger, Adam Kay pictured with Peter Corish (National Farmers Federation) and Peter Reid (CSIRO) at the 2004–05 varities launch.

Did you know... New CSIRO-bred varieties have delivered an 11 per cent water use efficiency improvement.

Measure of success

Evidence that new cotton varieties are increasing yields and potential returns to the industry; and evidence that new varieties can produce higher yields with lower inputs of chemicals and improved water use efficiency

- 14 new varieties released by CSIRO breeding team in 2004–05 and eight new varieties in 2005–06 containing improved fibre quality, disease resistance, growth habit, maturity, and regional adaptability.
- Estimated that in 2004–05 Bollgard II® crops required only 15 per cent of the insecticide required for conventional crops. (Source—CCA, 2005)
- Estimated 45 per cent reduction in quantities of herbicide used from 2000–01 to 2004–05 compared to the average for the previous nine seasons. (Source—CCA, 2005)

Strategy

Targeted, innovative biotechnology focused on solving production and quality constraints confronting the Australian cotton industry

The Australian cotton industry remains the only major agricultural industry in Australia to use GM crop protection. The CRDC-funded development and subsequent commercialisation of insect and herbicide tolerant varieties of cotton has led to major reductions in insecticide and residual herbicide use and helped to maintain profitability for cotton farmers in the face of an ever-narrowing gap between costs and income.

Glyphosate herbicide-resistant cotton using Roundup Ready® technology has given cotton farmers a new tool to help manage weeds more efficiently, at less cost and with the use of less residual herbicide. New and improved Roundup Ready® varieties were among the 14 new CSIRO-bred cotton varieties released in time for the 2004–05 season.

In the past five seasons, there has been an increase in the area of Roundup Ready® cotton planted from less than five per cent of the cotton area in 2000–01 to 53 per cent in 2004–05. 2004–05 saw further investment from CRDC in the CSIRO breeding program which will lead to the development of second generation Roundup Ready® varieties in the future which will offer growers even more flexibility in controlling weeds over a longer period of the growing season. There were three trials of second generation Roundup Ready FLEX® varieties in 2004–05 and more are planned for 2005–06.

The 2004–05 season saw the full introduction of Bollgard II® varieties containing two genes of resistance to *Helicoverpa* spp. The Australian cotton industry is the first cotton producing country in the world to make a complete switch from single to double or twin Bt gene varieties. 2004–05 also saw the release of the most Fusarium resistant variety to date—Sicot F-1, which has an F-rank of 209 (F rank is a measure of resistance to Fusarium).

Measure of Success

Evidence that CRDC's biotechnology investments are delivering industry or community benefits

- 80 per cent of 2004–05 plantings are CSIRO developed new varieties.
- Increased F-rank of new varieties including Sicot F-1, which has an F-rank of 209.
- The breeding program has resulted in a 20 per cent improvement in yields without corresponding increases in water use, resulting in an improvement in water use efficiency of around 15 per cent. (Source—Cotton Yearbook, 2005)
- Increased adoption of innovative new varieties and its associated environmental benefits has contributed to an improvement in public attitudes towards the cotton industry. (Source—Roy Morgan, 2005)

Strategy

Reduction in time required to introduce improved or novel genes into elite cotton varieties through the development of frontier technologies, without compromising scientific rigour

2004–05 saw the development of several new varieties which were launched in time for the 2005–06 season. The new varieties completed the suite of Sicot 71, Sicot 80, Sicot 289 and Sicala 43 families containing conventional, Bollgard II®, Roundup Ready® and Bollgard II®/ Roundup Ready® varieties.

Of the 12 varieties within these three families, individual varieties provide potential for high yields, accompanied by desirable length, strength and micronaire parameters, with resistance to bacterial blight, and highly favourable disease rankings for both Fusarium and Verticillium wilt.

Measure of success

Evidence of the reduced time to introduce genes into cotton varieties

– Full suites of the major commercial conventional (non-GM) varieties now available with current commercial transgenic traits;

Conventional Variety	Bollgard II®	Bollgard II® / Roundup Ready®	Roundup Ready®
Sicot 71	Sicot 71B	Sicot 71BR	Sicot 71RR
Sicot 80	Sicot 80B	Sicot 80BR	Sicot 80RR
Sicot 189	Sicot 289B	Sicot 289BR	Sicot 289RR
Sicala 43	Sicala 43B	Sicala 43BR	Sicala 43RR

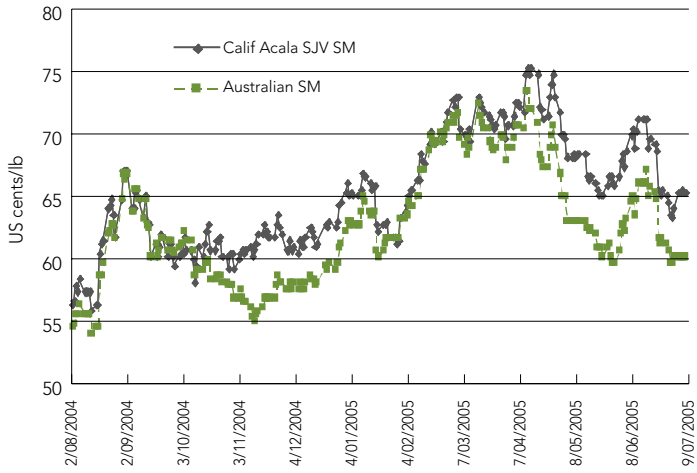
Strategy

Continuous monitoring of the signals from cotton textile and oilseed marketplace to ensure Australian varieties maintain a place at the high quality end of the market

Australian cotton consistently achieved one of the highest prices listed on the Liverpool *Cotton Outlook* 'A' index during 2004–05, a stark demonstration that the CSIRO breeding program is meeting the demands of the international market. Marketed in the US under the Fibermax brand, CSIRO-bred varieties held a 15 per cent share of the US cotton seed market in 2003 growing to 24 per cent in 2004.

From August 2004 to August 2005, Australian cotton compared well against the acala type cotton from the San Joaquin Valley of California (SJV). SJV cotton is a competition benchmark for the Australian industry as a high quality premium cotton type and to have reached a point where Australian cotton is quoted as an equal of SJV for significant periods of the year is a strong result for our industry.

Figure 12: the price of Australian cotton in comparison to SJV



(Source—Cotton Outlook Magazine)

2003–04 saw the commencement of the EMS Fibre Pathways project. The project is an extension of the Cotton industry's BMP Program to the entire production chain with the aim of fostering good natural resource management outcomes through potential market-based incentives. Industry workshops were held in February and October 2004 to gather input into whether industry should take the next steps towards developing a brand for Australian BMP cotton. Further work will be carried out in 2005–06.

A new project which commenced in 2004–05 aims to map and seek to understand the genes involved in fibre initiation and elongation, using state-of-the-art microarray and molecular identification techniques. This work is fundamental to understanding the characteristics that drive fibre quality. It may provide a basis for long-term research into producing cotton cultivars with particular fibre quality-related qualities such as long fibres. This area is a focus of research in other cotton-producing countries such as the United States of America. Australian research in this area is proceeding well and may deliver a competitive advantage in product or intellectual property.

A joint CRDC and Cotton Australia research report into public perceptions of the cotton industry in 2004–05 showed that public attitudes towards GM differed between food and fibre products, and that GM fibre was more acceptable than food. This data demonstrates that oil from modified plants will remain a commercial challenge whilst these perceptions remain. 2005–06 will see further work into the business case for cotton oil.

Measure of success

Market reports on the demand for Australian cotton lint and seed

- Australian cotton performed well against industry SJV benchmark.
- Commencement of the EMS Fibre Pathways project which aims to extend BMP to the entire production chain.

Program Six: Value Chain

Objective

To produce high quality consumer-preferred cotton and develop new international and domestic market opportunities.

Number of projects	8
Compared with 2003–04	5
Expenditure in 2004–05	$590,603
Compared with 2003–04	$258,284

Strategies	Measure of Success
A breeding program that releases varieties with high quality fibre characteristics, which satisfy consumer demand trends. To investigate the use of biotechnology to enhance other traits, for example, nutritionally improved cottonseed oil	Release of varieties with appropriate fibre and seed characteristics
To promote agronomic and management practices, including the Cotton BMP program, which preserve and protect optimal fibre quality characteristics	Evidence of improved practices that preserve fibre quality. Extension of the Cotton BMP program to post farm gate issues
Ginning improvements resulting from research to reduce nep generation and to preserve desirable fibre qualities	Improved ginning practice measured by ginning data
The development of more accurate and repeatable technology of fibre measurement for neps, fineness, maturity and other fibre characteristics and; Support changes to the traditional classing system, which better identifies and rewards superior fibre characteristics	Proportion of the crop objectively measured by HVI increased. Release of new fibre measurement technology
To support efforts to develop new markets and high premiums for Australian raw cotton as well as value adding cotton in Australia	Number of unsold stocks accumulated and increased relative premium of Australian cotton compared to competitors. Demonstration of value added developments in Australia

Outcome

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

Overview

Australian cotton continues to compete at the premium end of the world market. It has achieved this through Australian bred varieties that produce cotton fibre with the strength, length, fineness and maturity sought by spinners, combined with excellent agronomic practices producing consistent high quality and efficient ginning and shipping systems that deliver cotton on time. All of these success factors are underpinned by CRDC-funded research.

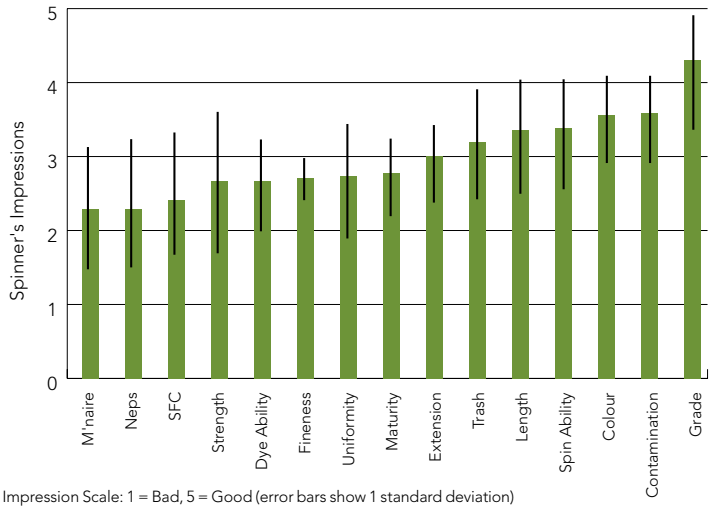
Strategy

A breeding program that releases varieties with high quality fibre characteristics, which satisfy consumer demand trends. To investigate the use of biotechnology to enhance other traits, for example, nutritionally improved cottonseed oil

Australia has traditionally been seen as a producer of high quality cotton, a reputation that needs to be protected. The 2004–05 season saw the release of 14 new CSIRO varieties encompassing transgenic traits and conventionally bred varieties, which contained improved fibre quality, disease resistance, growth habit, maturity, and regional adaptability.

The figure below summarises survey results on how Australian cotton is perceived by spinning companies. The results, although based on a subjective assessment, confirm that Australian cotton is generally rated highly, particularly on the basis of contamination, grade, colour, spinning ability, staple length, trash content and elongation. Feedback also confirms the need to reduce nep counts (short, tangled fibres) and short fibre content found in Australian cotton. The higher micronaire of Australian cotton of the last two to three seasons was also a particular issue with spinning companies, particularly those spinning fine counts. There is an expectation that the 2004–05 crop will have an improved micronaire.

Figure 13: Spinners Impressions of Australian Cotton Fibre Properties



Impression Scale: 1 = Bad, 5 = Good (error bars show 1 standard deviation)

The major by-product of cotton production is cotton seed which is used for stock feed and oil production. Cotton seed oil was traditionally the key vegetable oil used in cooking and margarine products; however, canola oil has replaced much of this market. Biotechnology involving gene silencing has modified cotton seed oil producing healthier oil which can, potentially, compete in the higher quality sector of the market. The key aim of this work has been to produce highly stable oil requiring no hydrogenation or processing. The oil would contain reduced levels of undesirable oils which result in healthier oils for human consumption and potential higher quality stock feed. The project will receive further funding to investigate commercialisation opportunities.

Measure of success

Release of varieties with appropriate fibre and seed characteristics

– 14 new varieties released by CSIRO breeding team in 2004–05 with improved yield and fibre characteristics. Eight new varieties released by CSIRO breeding team in 2005–06.
– Mill customer surveys continued to provide feedback on cotton fibre quality.

Strategy

To promote agronomic and management practices, including the Cotton BMP program, which preserve and protect optimal fibre quality characteristics

Cotton growers had an opportunity to get closer to their spinning mill customers during a series of Fibre to Fabric Quality Workshops in February 2005. These workshops were a collaboration between CRDC, the Cotton CRC and CSIRO Textile and Fibre Technology, and were conducted at ten different cotton growing locations.

A CRDC-funded Cotton Field to Fabric training course was developed in early 2005 and aims to inform growers about the range of fibre properties which can be affected by agronomic, picking and ginning practices. The course was piloted in August 2005, and it is expected that further courses will take place in 2006.

Research has also been conducted to assess the impacts of defoliation and picking on key fibre properties. It was found that late maturing bolls have reduced fibre characteristics increasing the degree of neps. This information will be compiled with other key fibre quality and crop management data to produce a FIBREpak grower manual in the near future.

A joint initiative with CRDC and National Heritage Trust (NHT), the EMS Pathways project is an extension of the Cotton industry's BMP Program to the entire production chain with the aim of fostering good natural resource management outcomes through potential market-based incentives. In 2004–05, draft BMPs for defoliation, harvesting and module building and transport have been developed, and will be trialed during the 2005–06 season, in conjunction with recommended crop management practices for producing a high-quality cotton crop. Further down the supply chain, work has been commissioned to gain an accurate understanding of the actual contaminants being found in Australian cotton, while BMPs for classing have been developed and trialed. The vast majority of classing houses in Australia are undergoing a voluntary audit against the draft classing BMPs.

Measure of success

Evidence of improved practices that preserve fibre quality.
Extension of the Cotton BMP program to post farm gate issues

- EMS pathways project commenced.
- *Cotton Field to Fabric* training course developed and ready for delivery in 2005–06.
- Fibre to Fabric Quality Workshops held in all major cotton growing areas.

Strategy

Ginning improvements resulting from research to reduce nep generation and to preserve desirable fibre qualities

Cotton ginning equipment and processing has changed little in recent years. Australia has one of the most modern and high capacity ginning processing systems in the world but high through-put gins can impart some fibre damage such as neps (short, tangled fibres) and increased short fibre content, each of which is undesirable in the market place. CRDC continues to invest in research to improve ginning equipment to reduce mechanical damage to fibre during the ginning process to ensure fibre quality is maintained throughout processing.

In addition to removing trash, saw lint cleaners in gins also degrade fibre qualities that are sought by spinning mills. In 2003–04, CSIRO Textile and Fibre Technology initiated modifications to a controlled-batt saw lint cleaner at a commercial gin in Narrabri in order to reduce fibre breakage and damage, and improve cleaning ability. The modifications in 2003–04 led to positive, albeit small, changes in cotton fibre length and trash properties. The system was modified again in 2004–05 in an attempt to improve the fibre quality effects further. Data from 2004–05 trials is still being collected.

CRDC Director, Simon Smalley, and Queensland Cotton's Craig Patterson discuss ginning improvements

Measure of success

Improved ginning practice measured by ginning data

– Research projects to reduce damage in the ginning process on track. Trials in 2003–04 led to positive, albeit small, changes in cotton fibre length and trash properties.

Strategy

The development of more accurate and repeatable technology of fibre measurement for neps, fineness, maturity and other fibre characteristics; and support changes to the traditional classing system, which better identifies and rewards superior fibre characteristics

Differentiating between cotton fibre with uniform micronaire and that with varying micronaire would require an ability to distinguish between fineness and maturity in testing—an ability that does not exist at present. CRDC has funded research for over ten years on this subject, believing that a successful outcome will be a great gain for the Australian industry. CSIRO Textile and Fibre Technology, supported by CRDC funding, is developing equipment which can differentiate between maturity and fineness, using both Sirolan-Laserscan and polarised light microscopy.

With funding from CRDC, CSIRO has now developed SiroMat, an instrument based around the automation of the older polarised light microscopy test for fibre maturity. Based on cell wall thickness, cotton fibres transmit different interference colours under crossed polar lenses. Researchers have demonstrated that these colours vary directly with the fibre maturity or degree of cell wall thickening, with mature fibres appearing yellow and immature fibres blue and orange. Work in 2004–05 focused on improving calibration and building duplicate instruments for inter-laboratory trials. A new project in 2005–06, will prepare SiroMat for commercialisation.

Cotton fibre fineness and maturity are key fibre quality parameters which are not adequately measured in the current HVI system. With funding from CRDC, CSIRO has developed a patented technology and instrument called Cottonscan has been designed specifically to rapidly measure the average fibre fineness and maturity of a cotton sample. To date three prototype instruments have been manufactured and some preliminary inter-machine testing has been undertaken. The results of this testing was presented and well received at the USA Beltwide Cotton Quality conference in January 2005.

A two year project is currently underway which aims to further develop the Cottonscan technology and undertake independent inter-laboratory trials of the technology in both Australia and overseas with a view to obtaining international acceptance of the technology and instrument as a recognised technique for determining cotton maturity and fineness at HVI speeds.

An international Committee for Standardisation of Instrument Testing of Cotton (SCITC) is seeking to institute a single, agreed and scientifically valid measurement of fibre maturity. CRDC has supported this concept for a number of years and an Australian participant is present on the committee; however, indications are that international agreement on the

process, how it is conducted and how disputes will be resolved will take a number of years to reach.

Measure of success

Proportion of the crop objectively measured by HVI increased.
Release of new fibre measurement technology

- SiroMat work in 2004–05 focused on improving calibration and building duplicate instruments for inter-laboratory trials. A business case will prepare SiroMat and Cottonscan for commercialisation.
- Presentation of Cottonscan at USA Beltwide Cotton Conference was well received by international audience.

Strategy

To support efforts to develop new markets and high premiums for Australian raw cotton as well as value adding cotton in Australia

A major project—EMS Pathways—commenced in 2004, and aims to extend the cotton industry's BMP Program to the entire production chain to create a complete environmental and quality assurance supply chain program. It is anticipated that the project will create a point of market differentiation that can provide a market incentive for higher levels of adoption of the BMP Program. International surveys are showing that consumers are getting more interested about where and how the products they buy are derived. One in five European consumers say they would be willing to pay for products that are socially and environmentally responsible. The Industry's BMP program has the opportunity to develop an Australian cotton crop that can be promoted as environmentally responsible. CRDC held two industry workshops in 2004–05 to seek industry input into the direction and progress of the EMS project. A further workshop was held in July 2005 and asked the question 'should we brand Australian cotton?' Work will continue on this project in 2005–06.

The major objective of the 2005 Export Market Development mission to Indonesia was to promote Australian cotton amongst traders and spinners, particularly after the supply constriction resulting from the previous two years of drought. Despite some concerns from Indonesian spinners regarding the relatively high cost of Australian cotton and the high nep and short fibre content, Australian cotton remains in high demand in the Indonesian market.

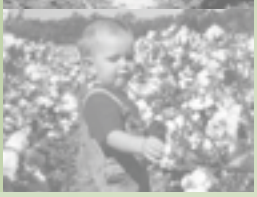
The perception of Australian cotton quality held by overseas spinners has been measured by CTFT as part of the Australian Cotton CRC Mill Survey project. Results of the survey were reported at the seminar for spinners and traders, held as part of the mission.

Measure of success

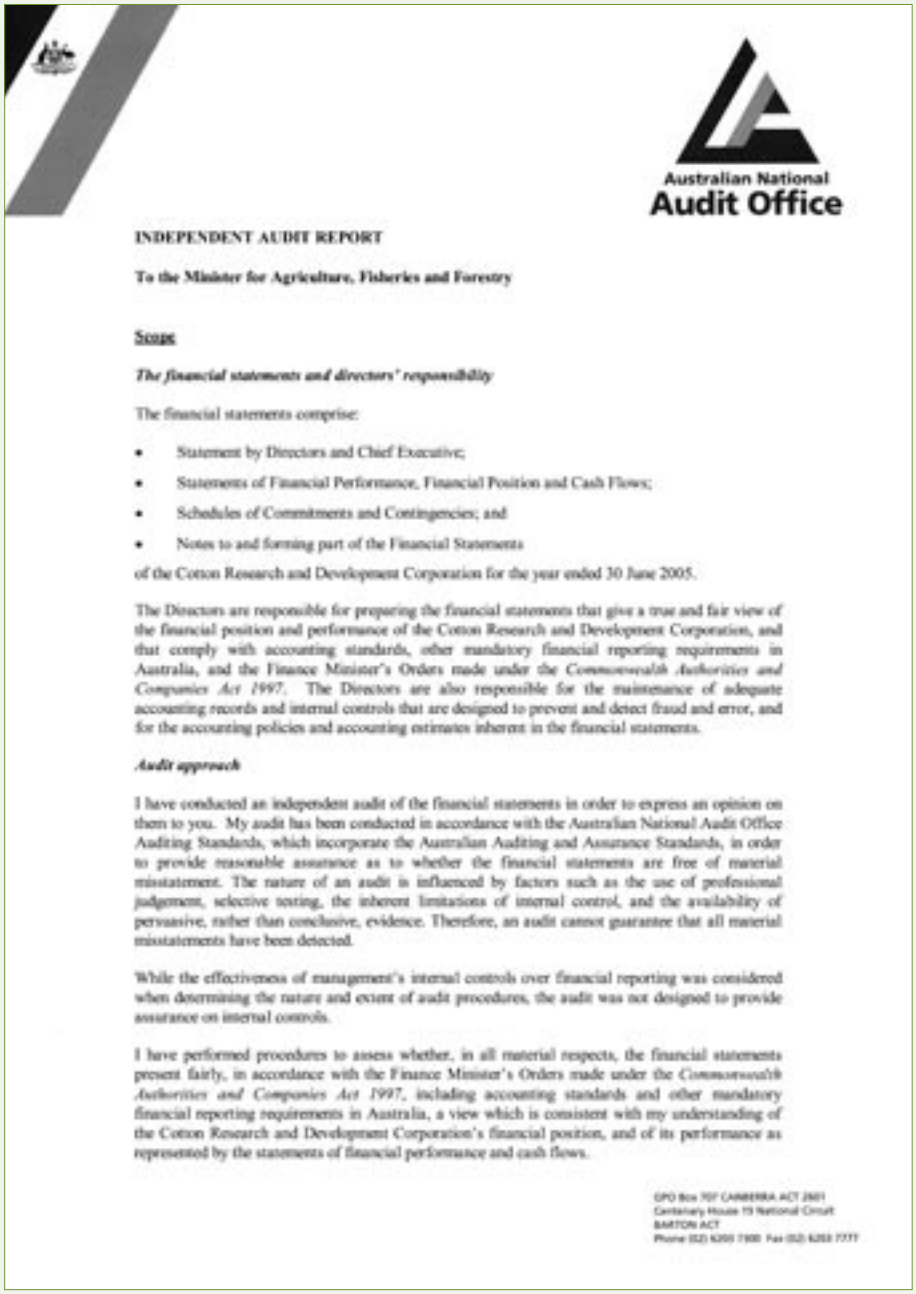
Number of unsold stocks accumulated and increased relative premium of Australian cotton compared to competitors.
Demonstration of value added developments in Australia

– Extension of BMP to post-farm gate sectors opens up potential opportunities for differentiating Australian cotton in the market place.

Did you know... Bollgard II® varieties have led to significant reduction in pesticide use, up to 85 per cent, and improvement in the environmental performance of the industry.



Financial Statements



Australian National
Audit Office

INDEPENDENT AUDIT REPORT

To the Minister for Agriculture, Fisheries and Forestry

Scope

The financial statements and directors' responsibility

The financial statements comprise:

- Statement by Directors and Chief Executive;
- Statements of Financial Performance, Financial Position and Cash Flows;
- Schedules of Commitments and Contingencies; and
- Notes to and forming part of the Financial Statements

of the Cotton Research and Development Corporation for the year ended 30 June 2005.

The Directors are responsible for preparing the financial statements that give a true and fair view of the financial position and performance of the Cotton Research and Development Corporation, and that comply with accounting standards, other mandatory financial reporting requirements in Australia, and the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*. The Directors are also responsible for the maintenance of adequate accounting records and internal controls that are designed to prevent and detect fraud and error, and for the accounting policies and accounting estimates inherent in the financial statements.

Audit approach

I have conducted an independent audit of the financial statements in order to express an opinion on them to you. My audit has been conducted in accordance with the Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing and Assurance Standards, in order to provide reasonable assurance as to whether the financial statements are free of material misstatement. The nature of an audit is influenced by factors such as the use of professional judgement, selective testing, the inherent limitations of internal control, and the availability of persuasive, rather than conclusive, evidence. Therefore, an audit cannot guarantee that all material misstatements have been detected.

While the effectiveness of management's internal controls over financial reporting was considered when determining the nature and extent of audit procedures, the audit was not designed to provide assurance on internal controls.

I have performed procedures to assess whether, in all material respects, the financial statements present fairly, in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*, including accounting standards and other mandatory financial reporting requirements in Australia, a view which is consistent with my understanding of the Cotton Research and Development Corporation's financial position, and of its performance as represented by the statements of financial performance and cash flows.

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

The audit opinion is formed on the basis of these procedures, which included:

- examining, on a test basis, information to provide evidence supporting the amounts and disclosures in the financial statements; and
- assessing the appropriateness of the accounting policies and disclosures used, and the reasonableness of significant accounting estimates made by the Directors.

Independence

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

Audit Opinion

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

(a) have been prepared in accordance with the Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*; and

(b) give a true and fair view of the Cotton Research and Development Corporation's financial position as at 30 June 2005 and of its performance and cash flows for the year then ended, in accordance with:

(i) the matters required by the Finance Minister's Orders; and

(ii) applicable accounting standards and other mandatory financial reporting requirements in Australia.

Australian National Audit Office

Ron Wah
Senior Director

Delegate of the Auditor-General

Canberra
26 August 2005

COTTON RESEARCH & DEVELOPMENT CORPORATION
STATEMENT BY DIRECTORS AND CHIEF EXECUTIVE

In our opinion, the attached financial statements for the year ended 30 June 2005 have been prepared 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*.

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

The Statement is made in accordance with a resolution of the directors.

Signed	Signed	Signed	Signed
Bridget Jackson	R.Browne	Bruce Finney	Robin Logan
Chair	Director	Executive Director	Business Manager
26 August, 2005	26 August, 2005	26 August, 2005	26 August, 2005

COTTON RESEARCH & DEVELOPMENT CORPORATION
STATEMENT OF FINANCIAL PERFORMANCE
for the year ended 30 June 2005

	Notes	2005 $	2004 $
REVENUE			
Revenues from ordinary activities			
Revenue from Government	5A	**4,318,349**	4,765,000
Interest	5B	**702,904**	754,906
Revenue from sale of assets	5C	**1,586**	4,400
Reversals of previous asset write-downs	5D		27,192
Industry Contributions	5E	**4,575,830**	2,579,347
Other Revenues	5F	**2,348,779**	1,808,260
Revenues from ordinary activities		**11,947,448**	9,939,104
EXPENSE			
Expenses from ordinary activities			
Employees	6A	**1,108,806**	953,900
Suppliers	6B	**340,848**	264,185
Grants	6C	**11,110,882**	11,347,593
Depreciation and amortisation	6D	**33,157**	43,343
Write-down of assets	6E	**17,710**	8,693
Value of assets sold	5C	**6,076**	3,883
Expenses from ordinary activities		**12,617,479**	12,621,597
Operating surplus/(deficit) from ordinary activities		**(670,031)**	(2,682,493)
		(670,031)	(2,682,493)
Net credit to asset revaluation reserve		**4,512**	26,861
Total Revenues, Expenses and Valuation Adjustments Recognised Directly in Equity		**4,512**	26,861
Total Changes in Equity other than those resulting from transactions with the Australian government as owner		**(665,519)**	(2,655,632)

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

COTTON RESEARCH & DEVELOPMENT CORPORATION
STATEMENT OF FINANCIAL POSITION
As at 30 June 2005

	Notes	2005 $	2004 $
ASSETS			
Financial Assets			
Cash	12B,19	**3,668,609**	2,109,553
Deposits at Call	12B,19	**7,750,068**	8,830,462
Receivables	7	**2,837,923**	2,511,365
Total financial assets		**14,256,600**	13,451,380
Non Financial Assets			
Land and buildings	8A	**350,000**	330,000
Infrastructure, plant and equipment	8B	**111,921**	153,253
Total non-financial assets		**461,921**	483,253
Total Assets		**14,718,521**	13,934,633
LIABILITIES			
Provisions			
Employees	9	**161,212**	176,930
Total provisions		**161,212**	176,930
Payables			
Suppliers	10A	**79,283**	66,180
Grants	10B	**1,258,144**	59,790
Other payables	10C	**311,893**	58,226
Total payables		**1,649,320**	184,196
Total Liabilities		**1,810,532**	361,126
NET ASSETS		**12,907,989**	13,573,507
EQUITY			
Reserves	11	**31,373**	26,861
Accumulated surpluses	11	**12,876,616**	13,546,646
Total Equity		**12,907,989**	13,573,507
Current assets		**14,256,600**	13,451,380
Non-current assets		**461,921**	483,253
Current liabilities		**1,723,979**	319,159
Non-current liabilities		**86,553**	41,967

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

COTTON RESEARCH & DEVELOPMENT CORPORATION
STATEMENT OF CASH FLOWS
for the year ended 30 June 2005

	Notes	2005	2004
		$	$
OPERATING ACTIVITIES			
Cash received			
Commonwealth Contributions		**4,018,184**	4,765,000
Levies		**4,628,583**	3,123,973
Interest		**579,984**	838,789
Net GST recovered from ATO		**1,286,470**	1,246,799
Other		**2,510,055**	1,874,631
Total cash received		**13,023,276**	11,849,192
Cash used			
Employees		**(1,121,426)**	(939,086)
Suppliers		**(552,587)**	(236,505)
Grants		**(9,906,774)**	(11,504,862)
Net GST paid to ATO		**(934,314)**	(1,240,404)
Total cash used		**(12,515,101)**	(13,920,857)
Net cash from or (Used by) operating activities	12A	**508,175**	(2,071,665)
INVESTING ACTIVITIES			
Cash received			
Proceeds from sale of plant and equipment		**1,586**	4,400
Total cash received		**1,586**	4,400
Cash used			
Purchase of property, plant and equipment		**(31,099)**	(8,650)
Total cash used		**(31,099)**	(8,650)
Net cash from investing activities		**(29,513)**	(4,250)
FINANCING ACTIVITIES			
Cash received		**-**	-
Cash used		**-**	-
Net Cash From or (Used By) Financing Activities		**-**	-
Net Increase / (Decrease) in Cash Held		**478,662**	(2,075,915)
Cash at the beginning of the reporting period		**10,940,015**	13,015,930
Cash at the End of the reporting period	12B	**11,418,677**	10,940,015

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

COTTON RESEARCH & DEVELOPMENT CORPORATION
SCHEDULE OF COMMITMENTS
As at 30 June 2005

	Notes	2005 $	2004 $
BY TYPE			
Capital Commitments		-	-
		-	-
Other Commitments			
Operating leases		**67,464**	74,974
Research grant commitments		**21,650,615**	14,509,886
Total other commitments		**21,718,079**	14,584,860
Commitments Receivable		**1,974,371**	1,325,896
Net Commitments By Type		**19,743,708**	13,258,964
BY MATURITY			
Operating lease commitments			
One year or less		**57,826**	39,426
From one to five years		**9,638**	35,548
Total Operating Lease Commitments		**67,464**	74,974
Research Grant commitments			
One year or less		**11,942,222**	10,530,667
From one to five years		**9,708,393**	3,979,219
Total Research Grant Commitments		**21,650,615**	14,509,886
Commitments Receivable		**1,974,371**	1,325,896
Net Commitments By Maturity		**19,743,708**	13,258,964

NB: Commitments are GST inclusive where relevant. Recoveries due from the ATO in relation to commitments payable are disclosed as commitments receivable

Operating leases included are effectively non-cancellable and comprise of agreements for the provision of motor vehicles for senior executives.
As at 30 June 2005, other commitments comprise amounts payable under grants agreements in respect of which the recipient is yet to perform the services required or meet eligibility conditions.

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

COTTON RESEARCH & DEVELOPMENT CORPORATION
SCHEDULE OF CONTINGENCIES
As at 30 June 2005

	Notes	2005	2004
		$	$

The Cotton R&D Corporation has no contingent assest or liabilities to be tabled, however remote receivables are reported in Note 13

COTTON RESEARCH AND DEVELOPMENT CORPORATION
NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS
for the year ended 30 June 2005

Note 1: Summary of Significant Accounting Policies

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

The statements have been prepared in accordance with:

- Finance Minister's Orders (being the *Commonwealth Authorities and Companies Orders (Financial Statements for reporting periods ending on or after 30 June 2005)*);
- Australian Accounting Standards and Accounting Interpretations issued by the Australian Accounting Standards Board; and
- Urgent Issues Group Abstracts.

The Cotton Research and Development Corporation's Statements of Financial Performance and Financial Position have been prepared on an accrual basis and are in accordance with historical cost convention, except for certain assets, which, as noted, are at valuation. Except where stated, no allowance is made for the effect of changing prices on the results or the financial position.

Assets and liabilities are recognised in the Corporation's Statement of Financial Position when and only when it is probable that future economic benefits will flow and the amounts of the assets or liabilities can be reliably measured. Assets and liabilities arising under agreements equally proportionately unperformed are however, not recognised unless required by an accounting standard. Liabilities and assets that are unrecognised are reported in the Schedule of Commitments and the Schedule of Contingencies other than unquantifiable or remote contingencies, which are reported at Note 13.

Revenues and expenses are recognised in the Corporation's Statement of Financial Performance when and only when the flow or consumption or loss of economic benefits has occurred and can be reliably measured.

1.2 Revenue

The revenues described in this Note are revenues relating to the core operating activities of the Corporation.

Revenue from the sale of goods is recognised upon the delivery of goods to customers.

Interest revenue is recognised on a time proportionate basis that takes into account the effective yield on the relevant asset.

Revenue from disposal of non-current assets is recognised when control of the asset has passed to the buyer.

Revenue from the rendering of a service is recognised by reference to the stage of completion of the contract to provide the service. The stage of completion is determined according to the proportion that costs incurred to date bear to the estimated total costs of the transaction.

Receivables for goods and services are recognised at the nominal amounts due less any provision for bad and doubtful debts. Collectability of debts is reviewed at balance date. Provisions are made when collectability of the debt is judged to be less rather than more likely.

Revenues from Government

The full amount of the government grant revenue, appropriated to the Department of Agriculture, Fisheries and Forestry (DAFF) and forwarded to the Corporation for the year is recognised as revenue.

1.3 Employee Benefits

Benefits

Liabilities for services rendered by employees are recognised at the reporting date to the extent that they have not been settled.

Liabilities for wages and salaries (including non-monetary benefits), annual leave and sick leave are measured at their nominal amounts. Other employee benefits expected to be settled within 12 months of the reporting date are also measured at their nominal amounts.

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

All other employee benefit liabilities are measured as 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, 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 work of an actuary as at 30 June 2005. The estimate of the present value of the liability takes into account attrition rates and pay increases through promotion and inflation.

Superannuation

Employees of the Corporation are members of the Public Sector Superannuation Scheme. The liability for their superannuation benefits is recognised in the financial statements of the Australian Government and is settled by the Australian Government in due course.

The Corporation makes employer contributions to the Australian Government at rates determined by an actuary to be sufficient to meet the cost to the Government of the superannuation entitlements of the Corporation's employees.

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

1.4 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 benefits incidental to ownership of leased non-current assets. In operating leases, the lessor effectively retains substantially all such risks and benefits.

Where a non-current asset is acquired by means of a finance lease, the asset is capitalised at the present value of minimum lease payments at the beginning of the lease term and a liability 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 basis which is representative of the pattern of benefits derived from the leased assets.

1.5 Borrowing Costs
No borrowing costs were incurred by the Corporation during the year.

1.6 Grants
Most grant agreements require the grantee to perform services, provide facilities or meet eligibility criteria. In these cases, the Corporation recognises grant liabilities only to the extent that the services required have been performed or the eligibility criteria have been satisfied by the grantee.

In cases where grant agreements are made without conditions to be monitored, liabilities are recognised on signing the agreement.

1.7 Cash
Cash means notes and coins held and any deposits held with a bank or financial institution. Cash is recognised at its nominal amount. Interest is credited to revenue as it accrues.

1.8 Other Receivables
These receivables are recognised at the nominal amounts due.

1.9 Financial Liabilities
Trade creditors and accruals are recognised at their nominal amounts, being the amounts at which the liabilities will be settled. Liabilities are recognised to the

extent that the goods or services have been received (and irrespective of having been invoiced).

1.10 Unrecognised Financial Liabilities
At the time of completion of the financial statements, there were no 2004-05 contingent liabilities of which the Corporation was aware.

1.11 Acquisition of Assets
Assets are recorded at cost on acquisition. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken.

1.12 Property, Plant and Equipment (PP&E)
Asset Recognition Threshold
Purchases of property, plant and equipment are recognised initially at cost in the Statement of Financial Position, 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).

Revaluations
Basis
Land, buildings, plant and equipment are carried at valuation, being revalued annually with sufficient frequency such that the carrying amount of each asset class is not materially different, at reporting date, from its fair value. Valuations undertaken in each year as at 30 June.

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

Asset Class	Fair Value Measured at:
Land	Market selling price
Building	Market selling price
Plant & Equipment	Market selling price

Assets which are surplus to requirement are measured at their net realisable value. At 30 June 2005 the Corporation held no surplus assets. (30 June 2004: $0).

The Finance Minister's Orders require that all property, plant and equipment assets be measured at up-to-date fair values from 30 June 2005 onwards. Assets were revalued as at 30 June, 2004 and again at 30 June, 2005, to assist with the transition and adoption of the International Financial Reporting Standards from 2005-06.

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) and methods are reviewed at each reporting date and necessary adjustments are recognised in the current, or current and future reporting periods, as appropriate. Residual values are re-estimated for a change in prices only when assets are revalued.

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

	2005	2004
Buildings on freehold land	**40 years**	40 years
Plant and equipment	**3 to 10 years**	3 to 10 years

The aggregate amount of depreciation allocated for each class of asset during the reporting period is disclosed in Note 6D.

1.13 Impairment of Non-Current Assets
Non-current assets carried at up-to-date fair value at the reporting date are not subject to impairment testing.

Non-current assets carried at cost, are primarily held for business operations and have been tested for their recoverable amounts at the reporting date. The test compared the carrying amounts against the net present valued of future net cash inflows. No write-down to recoverable amount was required (2004:nil).

The non-current assets carried at cost have been assessed for indications of impairment. Where indications of impairment exist, the asset is written down to the higher of its net selling price and, if the entity would replace the asset's service potential, its depreciated replacement cost.

1.14 Taxation
The Corporation is exempt from all forms of taxation except fringe benefits tax, the goods and services tax (GST) and payroll tax.

Revenues, expenses and assets are recognized net of GST:
- except where the amount of GST incurred is not recoverable from the Australian Taxation Office; and
- except for receivables and payables.

1.15 Insurance
The Corporation has insured for risks through the Government's insurable risk managed fund, called 'Comcover'. Workers' compensation is insured through Comcare Australia.

Note 2:Adoption of Australian Equivalents to International Financial Reporting Standards from 2005-06.

The Australian Accounting Standards Board has issued replacement Australian Accounting Standards to apply from 2005-06. The new standards are the Australian Equivalents to International Financial Reporting Standards (AEIFRSs). The International Financial Reporting Standards are issued by the International Accounting Standards Board. The new standards cannot be adopted early. The standards being replaced are to be withdrawn with effect

from 2005-06, but continue to apply in the meantime, including reporting periods ending on 30 June 2005.

The purpose of issuing AEIFRS is to enable Australian reporting entities under the *Corporations Act 2001* to be able to more readily access overseas capital markets by preparing their financial reports according to accounting standards more widely used overseas.

For-profit entities complying fully with AEIFRS will be able to make an explicit and unreserved statement of compliance with International Financial Reporting Standards (IFRS) as well as a statement that the financial report has been prepared in accordance with Australian Accounting Standards.

AEIFRS contain certain additional provisions that will apply to not-for-profit entities, including not-for-profit Australian Government Authorities. Some of these provisions are in conflict with IFRS, therefore the Corporation will only be able to assert that the financial report has been prepared in accordance with Australian Accounting Standards.

AAS 29 *Financial Reporting by Government Departments* will continue to apply under AEIFRS.

Accounting Standard AASB 1047 *Disclosing the Impact of Adopting Australian Equivalents to International Financial Reporting Standards* requires that the financial report for 2004-05 disclose:

- an explanation of how the transition to AEIFRS is being managed;
- narrative explanations of the key policy differences arising from the adoption of AEIFRS;
- any known or reliably estimable information about the impacts on the financial report had it been prepared using the Australian equivalents to IFRS; and
- if the impacts of the above are not known or reliably estimable, a statement to that effect.

Where an entity is not able to make a reliable estimate, or where quantitative information is not known, the entity should update the narrative disclosures of the key differences in accounting policies that are expected to arise from the adoption of AEIFRS.

The purpose of this Note is to make these disclosures.

Management of the transition to AEIFRS

The Corporation has taken the following steps in preparation towards the implementation of AEIFRS:

- the Corporation's Audit Committee has been advised of these requirements and of its responsibility to monitor progress to AEIFRS. The Business Manager is tasked with oversight of the transition to and reporting of progress to the Audit Committee of the Australian Equivalents to IFRS.
- all major accounting policy differences between current AASB standards and AEIFRS have been identified.
- an assessment of Corporation assets and liabilities indicates that there are no adjustments due to the transition to AEIFRS.

- an AEIFRS compliant balance sheet as at 30th June 2005 was also prepared during the preparation of the 2004-05 statutory financial reports.
- The 2004-05 Balance Sheet under AEIFRS will be reported to the Department of Finance and Administration in line with their reporting deadlines.

Major changes in accounting policy

The Corporation believes that the first financial report prepared under AEIFRS ie at 30 June 2006, will be prepared on the basis that the Corporation will be a first time adopter under AASB 1 *First-time Adoption of Australian Equivalents to International Financial Reporting Standards.* Changes in accounting policies under AEIFRS are applied retrospectively i.e. as if the new policy had always applied except in relation to the exemptions available and prohibitions under AASB 1. This means that an AEIFRS compliant balance sheet has to be prepared as at 1 July 2004. This will enable the 2005-06 financial statements to report comparatives under AEIFRS.

A first time adopter of AEIFRS may elect to use exemptions under paragraphs 13 to 25E. When developing the accounting policies applicable to the preparation of the 1 July opening balance sheet, no exemptions were applied by the Corporation.

Changes to major accounting policies are discussed in the following paragraphs.

Management's review of the quantitative impacts of AEIFRS represents the best estimate of the impacts of the changes as at reporting date. The actual effects of the impacts of AEIFRS may differ from these estimates due to:

- continuing review of the impacts of AEIFRS on Corporation operations;
- potential amendments to the AEIFRS and AEIFRS Interpretations; and
- emerging interpretation as to the accepted practice in the application of AEIFRS and the AEIFRS Interpretations.

Property, plant and equipment

It is expected that the 2005-06 Finance Minister's Orders will continue to require property plant and equipment assets to be valued at fair value in 2005-06.

Impairment of Property, Plant and Equipment

The Corporation's policy on impairment of non-current assets is at Note 1.13.

Under AEIFRS these assets will be subject to assessment for impairment and, if there are indications of impairment, measurement of any impairment. The impairment test is that the carrying amount of an asset must not exceed the greater of (a) its fair value less costs to sell and (b) its value in use. 'Value in use' is the net present value of net cash inflows for cash generating units assets of the Corporation and depreciated replacement cost for other assets that would be replaced if the Corporation were deprived of them.

The most significant changes are that, for the Corporation's cash generating units, the recoverable amount is only generally to be measured where there is an indication of impairment. Previously all assets' recoverable amount was tested.

However, an impairment assessment of the Corporation's assets indicated that no adjustments will be required.

Employee Benefits

The provision for long service leave is measured at the present value of estimated future cash outflows using market yields as at the reporting date on national government bonds.

The 2003-04 Financial Report noted that AEIFRS may require the market yield on corporate bonds to be used. The AASB has decided that a deep market in high quality corporate bonds does not exist and therefore national government bonds will be referenced.

AEIFRS also require that annual leave that is not expected to be taken within 12 months of balance date is to be discounted. After assessing the staff leave profile, the Corporation does not expect that any material amounts of the annual leave balance will not be taken in the next 12 months. Consequently, there are no adjustments for non-current annual leave.

Financial Instruments

AEIFRS include an option for entities not to restate comparative information in respect of financial instruments in the first AEIFRS report. It is expected that Finance Minister's Orders will require entities to use this option. Therefore, the amounts for financial instruments presented in the Corporation's 2004-05 primary financial statements are not expected to change as a result of the adoption of AEIFRS.

The Corporation will be required by AEFIRS to restate the carrying amount of financial instruments at 1 July 2005 to align with the accounting policies required by AEIFRS. It is expected that the carrying amounts of most financial instruments held by Corporation will be unaffected by this requirement.

Note 3: Economic Dependency
The Cotton Research and Development Corporation was established under the *Primary Industries and Energy Research and Development Act, 1989*.

The Corporation is dependent on appropriations from the Parliament of the Commonwealth being disbursed from the Department of Agriculture, Fisheries & Forestry as grant revenue for its continued existence and ability to carry out its normal activities.

Note 4: Events Occurring After Reporting Date
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.

	2005 $	2004 $
Note 5: Operating Revenues		
Note 5A: Revenues from Government		
Grant revenue from Related Entity	**4,318,349**	4,765,000
Total revenues from government	**4,318,349**	4,765,000
Note 5B: Interest Revenue		
Interest on deposits	**702,904**	754,906
Total interest revenue	**702,904**	754,906
Note 5C: Revenue from Sale of Assets		
Infrastructure, plant and equipment:		
Proceeds from disposal	1,586	4,400
Net book value of assets disposed	(6,076)	(3,883)
Write-offs		
Net gain / (loss) from disposal of infrastructure, plant and equipment	(4,490)	517
Note 5D: Reversal of previous asset write-downs		
Asset revaluation increment	**-**	54,053
Reversal of previous asset write-down	**-**	(27,192)
Net revaluation increment	**-**	26,861
Note 5E: Industry Contributions		
Industry contributions	**4,575,830**	2,579,347
Total Industry Contributions	**4,575,830**	2,579,347
Note 5F: Other Revenues		
Royalties	**1,641,885**	821,049
Project refunds	**465,848**	712,540
Levy penalties	**3,606**	1,871
Grants revenue	**214,000**	245,276
Other revenue	**23,440**	27,524
Total Other Revenue	**2,348,779**	1,808,260

	2005 $	2004 $
Note 6: Operating Expenses		
Note 6A: Employee Expenses		
Wages and Salaries	**922,022**	823,704
Superannuation	**120,331**	113,356
Leave and other entitlements	**64,840**	15,045
Total employee benefits expenses	**1,107,193**	952,105
Workers compensation premiums	**1,613**	1,795
Total employee expenses	**1,108,806**	953,900
Note 6B: Supplier Expenses		
Goods from external entities	**292,527**	228,778
Operating lease rentals	**48,321**	35,407
Total supplier expenses	**340,848**	264,185
Note 6C: Grants Expense		
The Corporation makes grants to support the research and development of issues relating to the Australian cotton industry.		
NON-PROFIT INSTITUTIONS		
Commonwealth organisations	**4,803,838**	4,528,219
State departments	**2,903,475**	3,243,240
Universities and colleges	**709,558**	660,649
Other research institutions	**1,886,174**	2,116,613
Corporate Activities	**365,149**	348,850
	10,668,194	10,897,571
COMMERCIAL ENTITIES		
Grants to commercial entities	**442,688**	450,022
Total grants expense	**11,110,882**	11,347,593
Note 6D: Depreciation		
Depreciation of property, plant and equipment	**33,157**	43,343
Total depreciation	**33,157**	43,434
The aggregate amounts of depreciation expensed during the reporting period for each class of depreciable asset are as follows:		
Buildings on freehold land	**5,908**	5,619
Plant and equipment	**27,249**	37,724
Total depreciation	**33,157**	43,343
Note 6E: Write-Down of Assets		
Plant & equipment – revaluation decrement	**17,710**	8,693
Total write-down of assets	**17,710**	8,693

	2005 $	2004 $
Note 7: Financial Assets		
Note 7: Receivables		
Commonwealth contributions receivable	**1,125,341**	1,079,645
Interest receivable	**332,138**	209,219
GST receivable	**267,002**	203,042
Other receivables	**1,113,442**	1,019,459
Total receivables (gross)	**2,837,923**	2,511,365
All receivables are current assets.		
Receivables (gross) are aged as follows:		
Not overdue	**2,837,923**	2,511,365
Total receivables (gross)	**2,837,923**	2,511,365

Accrued Interest
The interest rates range from 5.15% to 6.0% (2004: 5.15% to 5.75%) and the frequency of payments range from monthly to annual.

Note 8: Non-Financial Assets		
Note 8A: Land and Buildings		
Freehold land		
Valuation (2002 fair value)	**-**	73,753
2004 valuation (fair value) adjustment	**-**	26,247
Valuation (2005 fair value)	**100,000**	-
Total freehold land at fair value	**100,000**	100,000
Buildings on freehold land		
Valuation (2002 fair value)	**-**	224,674
2004 valuation (fair value) adjustment	**-**	5,326
Valuation (2005 fair value)	**250,000**	-
- Accumulated Depreciation	**-**	-
Total Buildings on freehold land at fair value	**250,000**	230,000
Total Land and Buildings	**350,000**	330,000
Note 8B: Infrastructure, Plant and Equipment		
Office Equipment		
Valuation (2002 fair value)	**-**	50,009
2004 valuation (fair value) adjustment	**-**	9,236
Valuation (2005 fair value)	**48,476**	-
- Accumulated Depreciation	**-**	-
Total Office Equipment at fair value	**48,476**	59,245

	2005 $	2004 $
Computer Equipment		
Valuation (2002 fair value)		63,570
2004 valuation (fair value) adjustment	**-**	(12,524)
Valuation (2005 fair value)	**30,725**	-
- Accumulated Depreciation	**-**	-
Total Computer Equipment at fair value	**30,725**	51,046
Fixtures & Fittings		
Valuation (2002 fair value)	**-**	42,962
2004 valuation (fair value) adjustment	**-**	-
Valuation (2005 fair value)	**32,720**	-
- Accumulated Depreciation	**-**	-
Total Fixtures & Fittings at fair value	**32,720**	42,962
Total Infrastructure, Plant & Equipment (non-current)	**111,921**	153,253

All revaluations are independent and are conducted in accordance with the revaluation policy stated at Note 1. Revaluations to fair values were conducted in both 2003-04 and 2004-05 by an independent registered valuer, Peter J. Spackman.

Movement in Asset Revaluation Reserve

Increment for land and buildings	**15,042**	16,332
Increment/(Decrement) for Property Plant and Equipment	**(10,530)**	10,529
	4,512	26,861

Note 8C: Analysis of Property, Plant & Equipment

Item	Land	Buildings	Office Equipment	Computer Equipment	Fixtures & Fittings	Total
	$	$	$	$	$	$
As at 1 July 2004						
Gross book value	**100,000**	**230,000**	**59,245**	**51,046**	**42,962**	**483,253**
Accumulated depreciation	-	-	-	-	-	-
Opening Net Book Value	**100,000**	**230,000**	**59,245**	**51,046**	**42,962**	**483,253**
Additions by purchase		10,866	5,386	13,563	1,284	31,099
Net revaluation increment/(decrement)		15,042	(9,985)	(11,099)	(7,156)	(13,198)
Depreciation		(5,908)	(6,170)	(16,709)	(4,370)	(33,157)
Write-down of assets						
Disposals				(6,076)		(6,076)
As at 30 June 2005						
Gross book value	**100,000**	**250,000**	**48,476**	**30,725**	**32,720**	**461,921**
Accumulated depreciation	-	-	-	-	-	-
Closing Net book value	**100,000**	**250,000**	**48,476**	**30,725**	**32,720**	**461,921**

	2005 $	2004 $
Note 9: Provisions		
Note 9: Employee Provisions		
Salaries and wages	**15,959**	11,652
Leave	**143,907**	164,360
Superannuation	**1,346**	918
Aggregate employee entitlement liability	**161,212**	176,930
Current	**74,659**	134,963
Non-current	**86,553**	41,967

Note 10: Payables

Note 10A: Supplier Payables		
Trade creditors	**79,283**	66,180
Total supplier payables	**79,283**	66,180

All supplier payables are current.

Trade creditors – settlement is usually made net 30 days

Note 10B: Grants Payables		
Commonwealth organisations	**374,615**	38,225
State departments	**779,066**	-
Universities and colleges	**96,463**	21,565
Other research organisations	**8,000**	-
Total grants payable	**1,258,144**	59,790

All grants payables are current.

This liability is recognized because grant recipients have not completed the conditions of the grants and are yet to be paid.

Note 10C: Other Payables		
Net payable to the ATO	**311,893**	58,226
Total other payables	**311,893**	58,226

All other payables are current.

Note 11: Equity
Note 11: Analysis of Equity

Item	Accumulated Results		Statutory Funds		Asset Revaluation Reserve		Total Contributed Equity		TOTAL EQUITY	
	2005 $	2004 $	**2005 $**	2004 $	**2005 $**	2004 $	**2005 $**	2004 $	**2005 $**	2004 $
Opening balance as at 1 July	**13,546,647**	16,229,139			**26,861**				**13,573,508**	16,229,139
Net surplus/deficit	**(670,031)**	(2,682,493)							**(670,031)**	(2,682,493)
Net Revaluation Increment					**4,512**	26,861			**4,512**	26,861
Closing balance as at 30 June	**12,876,615**	13,546,646			**31,373**	26,861			**12,907,989**	13,573,507

	2005 $	2004 $
Note 12: Cash Flow Reconciliation		
Note 12A: Reconciliation of Operating Surplus to Net Cash from Operating Activities:		
Reconciliation of operating surplus to net cash from operating activities:		
Operating surplus before extraordinary items	**(670,031)**	(2,682,493)
Non- Cash Items		
Depreciation and amortisation	**33,157**	43,343
Gain on disposal of assets	**4,490**	(517)
Net write down of non-current assets	**17,710**	(18,499)
Annual Leave	**(25,558)**	(674)
Long Service Leave	**5,106**	9,085
Changes in Assets and Liabilities		
(Increase) / decrease in receivables	**(326,558)**	555,727
Increase / (decrease) in employee provisions	**4,735**	(23,583)
Increase / (decrease) in supplier payables	**13,103**	33,434
Increase / (decrease) in grants payable	**1,198,354**	(26,109)
Increase / (decrease) in other payables	**253,667**	38,621
Net cash from / (used by) operating activities	**508,175**	(2,071,665)
Note 12B: Reconciliation of Cash		
Cash balance comprises:		
Cash on hand	**500**	500
Corporation	**3,668,109**	2,109,053
Deposits at call	**7,750,068**	8,830,462
Total cash	**11,418,677**	10,940,015
Balance of cash as at 30 June shown in the Statement of Cash Flows	**11,418,677**	10,940,015

Note 13: Contingent Liabilities and Assets

Remote Receivable

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 2004-05 Commonwealth contributions were capped to the GVP of $4,318,349, leaving a remote contingent receivable of $2,844,611. The probability of receiving this receivable is remote whilst cotton production and prices continue to remain low.

Note 14: Director Remuneration
The number of directors of the Corporation included in these figures are shown below in the relevant remuneration bands

	2005	2004
$ Nil - $ 9,999	**3**	2
$ 10,000 - $ 19,999	**5**	5
$ 30,000 - $ 39,999	**1**	-
$ 40,000 - $ 49,999	**-**	1
$110,000 - $119,000	**1**	-
$150,000 - $159,999	**1**	-
$190,000 - $199,000	**-**	1
Total number of Directors of the Corporation	**11**	9
	$	$
Aggregate amount of superannuation payments in connection with the retirement of directors	**-**	-
Other remuneration received or due and receivable by Directors of the Corporation	**391,655**	303,621
Total remuneration received or due and received by Directors of the Corporation	**391,655**	303,621

Note 15: Related Party Disclosures

Directors of the Corporation
The Directors of Cotton Research & Development Corporation during the year were:
Bridget Jackson (Chair)
Dick Browne (Vice-Chair)
Ralph Schulze (Executive Director) retired 31/8/ 2004
Bruce Finney (Executive Director) appointed as Director from 1/9/ 2004
Kathryn Adams
Jeff Bidstrup
Neil Forrester
TJ Higgins
Adam Kay
Graeme Hamilton – Government Director, resigned 19/11/04
Simon Smalley – Government Director, appointed 11/1/05

The aggregate remuneration of Directors is disclosed in Note 14 Director Remuneration

Other Transactions with Directors or Director related entities
Grants were made to CSIRO, a director related entity. They were approved under the normal terms and conditions of the Corporation. Following full disclosure of their relevant interests, the relevant Directors take part in any discussion but abstain from decisions of the Board.

	2005	2004
Grants to director related entities (CSIRO Entomology, Plant Industry, Land & Water, Textile and Fibre Technology)	**$4,803,838**	$4,528,219
Australian Centre for Intellectual Property in Agriculture	**$10,077**	-

Note 16: Remuneration of Officers

The number of executives who received or were due to receive total remuneration of $100,000 or more:

$100,000 - $109,999	**1**	1
$110,000 - $119,000	**1**	-
$130,000 - $139,999	**-**	1
$150,000 - $159,999	**1**	-
The aggregate amount of total remuneration of officers	**$366,295**	$229,639
The aggregate amount of separation and redundancy/termination payments during the year to officers shown above	**Nil**	Nil

The officer remuneration includes all officers concerned with or taking part in the management of the Corporation during 2004-05 except the Executive Director. Details in relation to the Executive Director have been incorporated into Note 14 Director Remuneration.

Note 17: Remuneration of Auditors

Remuneration to the Auditor- General for auditing the Financial statements for the reporting period	**$9,350**	$7,700

No other services were provided by the Auditor-General during the reporting period.

Note 18: Average Staffing Levels

The average staffing levels for the Corporation during the year were:	**11**	9.7

Note 19: Financial Instruments

Note 19A: Interest Rate Risk

Financial Instrument	Notes	Floating Interest Rate		Fixed Interest Rate Maturing In				Non-Interest Bearing		Total		Weighted Average Effective Interest Rate	
				1 Year or Less		1 to 2 Years							
		2005 $	2004 $	**2005 $**	2004 $	**2005 $**	2004 $	**2005 $**	2004 $	**2005 $**	2004 $	**2005 $**	2004 $
Financial Assets													
Cash on Hand	**12B**							**500**	500	**500**	500	**N/a**	N/a
Deposits at call	**12B**	**3,668,109**	2,109,053							**3,668,109**	2,109,053	**5.2**	5.15
Term deposits	**12B**			**5,750,068**	8,830,462	**2,000000**	-			**7,750,068**	8,830,462	**5.6**	5.00
Receivables For goods and services (gross)									-		-	**N/a**	N/a
Commonwealth contributions receivable	**7**							**1,125,341**	1,079,645	**1,125,341**	1,079,645	**N/a**	N/a
Accrued Interest	**7**							**332,138**	209,219	**332,138**	209,219	**N/a**	N/a
Other receivables	**7**							**1,380,444**	1,222,501	**1,380,444**	1,222,501	**N/a**	N/a
Total Financial Assets		**3,668,109**	2,109,053	**5,750,068**	8,830,462	**2,000,000**	-	**2,838,423**	2,511,865	**14,256,600**	13,451,380		
Total Assets										**14,718,521**	13,934,633		
Financial Liabilities													
Trade creditors	**10A**							**79,283**	66,180	**79,283**	66,180	**N/a**	N/a
Grants payable	**10B**							**1,258,144**	59,790	**1,258,144**	59,790	**N/a**	N/a
Other payables	**10C**							**311,893**	58,226	**311,893**	58,226	**N/a**	N/a
Total								**1,649,320**	184,196	**1,649,320**	184,196		
Total Financial Liabilities										**1,810,532**	184,196		

Note 19B: Net Fair Values of Financial Assets and Liabilities

	Notes	2005 Total Carrying Amount $	2005 Aggregate Net Fair Value $	2004 Total Carrying Amount $	2004 Aggregate Net Fair Value $
Financial Assets					
Cash on Hand	**12B**	**500**	**500**	500	500
Deposits at call	**12B**	**3,668,109**	**3,668,109**	2,109,053	2,109,053
Term Deposits	**12B**	**7,750,068**	**7,750,068**	8,830,462	8,830,462
Receivables for goods & services		**-**	**-**	-	-
Commonwealth contributions receivable	**7**	**1,125,341**	**1,125,341**	1,079,645	1,079,645
Accrued Interest	**7**	**332,138**	**332,138**	209,219	209,219
Other receivables	**7**	**1,380,444**	**1,380,444**	1,222,501	1,222,501
		14,256,600	**14,256,600**	13,451,380	13,451,380
Financial Liabilities					
Trade Creditors	**10A**	**79,283**	**79,283**	66,180	66,180
Grants payable	**10B**	**1,258,144**	**1,258,144**	59,790	59,790
Other payables	**10C**	**311,893**	**311,893**	58,226	58,226
		1,649,320	**1,649,320**	184,196	184,196

Financial Assets

The net fair values of cash, deposits on call and non-interest-bearing monetary financial assets approximate their carrying amounts.

The net fair value for listed interest-bearing and equity investments is the quoted market price at reporting date, adjusted for the transaction costs necessary for realisation.

Financial Liabilities

The net fair values for trade creditors, grants and other payables, all of which are short-term in nature, are approximated by their carrying amounts.

Note 19C: Credit Risk Exposures

The Corporation's maximum exposures to credit risk at reporting date in relation to each class of recognised financial assets is the carrying amount of those assets as indicated in the Statement of Financial Position.

The Corporation has no significant exposures to any concentrations of credit risk.

Note 20: Reporting of Outcomes

Note 20A: Outcomes of the Corporation

The Corporation is structured to meet one outcome:

"A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation."

Output 1: Economic – Profitability and International Competitiveness
Output 2: Environmental – Ecologically Sustainable Development
Output 3: Social – People and Communities

Note 20B: Net Cost of Outcome Delivery

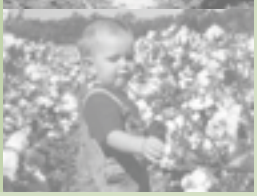
	2005	2004
	$	$
Operating expenses		
Employees	**1,108,806**	953,900
Suppliers	**340,848**	264,185
Grants	**11,110,882**	11,347,593
Depreciation	**33,157**	43,343
Write down of assets	**17,710**	8,693
Value of assets sold	**6,076**	3,833
Total Operating Expenses	**12,617,479**	12,621,597
Funded by:		
Revenue from Government	**4,318,349**	4,765,000
Industry contributions	**4,575,830**	2,579,347
Sale of goods and services	**-**	-
Revenue from sale of assets	**1,586**	4,400
Interest	**702,904**	754,906
Other	**2,348,779**	1,808,260
Total operating revenues	**11,947,448**	9,911,912

Note 20C: Corporation Revenues and Expenses by Output

	Output 1-Economic		Output 2-Environmental		Output 3 - Social	
	2005	2004	**2005**	2004	**2005**	2004
	$	$	**$**	$	**$**	$
Total Operating expenses	**5,356,884**	5,249,679	**4,557,910**	4,604,916	**2,702,685**	2,763,119
Funded by:						
Total Operating revenues	**5,072,415**	4,133,611	**4,315,870**	3,625,923	**2,559,163**	2,175,687

The Corporation's outcome and outputs are described at Note 20A.

Each research project and its corresponding funding contribute to one or more of the three outputs. Total research expenditure for each output is then calculated with the remaining expenditure being prorated accordingly.



Appendices and Index

Appendix One

Cotton Research and Development Corporation Selection Committee

Margaret Thomson
Presiding Member
CRDC Selection Committee
Griffith ACT 2603

29 June 2005

Senator Richard Colbeck
Parliamentary Secretary to the Minister
for Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Senator Colbeck

It is with pleasure that I submit to you an annual report of the CRDC Selection Committee as required under subsection 141(1) of the *Primary Industries Research and Development Act 1989* (PIERD Act).

Establishment of the Selection Committee

The CRDC Selection Committee was established under the PIERD Act for the purpose of nominating to the Parliamentary Secretary six persons for appointment as Directors of the CRDC Board.

The Parliamentary Secretary appointed Ms Margaret Thomson as the Presiding Member of the CRDC Selection Committee, commencing July 2004 (in accordance with sub-section 122(1) of the PIERD Act).

The Presiding Member was requested to commence the selection process on 15 March 2005 by the Parliamentary Secretary.

In accordance with 124 of the PIERD Act, nominations were sought by the Presiding Member from the representative organisation of the CRDC, the Australian Cotton Growers' Research Association and the following people were appointed by the Parliamentary Secretary in April 2005:

- Mr Ben Stephens;
- Mr Harley Bligh;
- Mr Hamish Millar; and
- Mr Robert Granger.

The Presiding Member did not submit any costs in undertaking this part of the selection process. It was with regret that the Presiding Member tendered her resignation to Senator Colbeck on 8 June 2005, having accepted a position with the Commonwealth Government.

Yours sincerely

Margaret Thomson

Appendix Two

Research and Development Portfolio

Research Providers

AAW	A&A Williams Pty Ltd
AKC	AKC Consulting Pty Ltd
ANU	Australian National University
AWA	Agriculture Western Australia
CLW	CSIRO Land and Water
CRC	Australian Cotton Cooperative Research Centre (pre July 2005)
CRC	Cotton Catchment Communities Cooperative Research Centre (post July 2005)
CRDC	Cotton Research and Development Corporation
CSE	CSIRO Entomology
CSP	CSIRO Plant Industry
CTFT	CSIRO Textile and Fibre Technology
DAN	New South Wales Department of Primary Industries (formerly New South Wales Agriculture)
DAW	Department of Primary Industries, Queensland
DNR	Department of Natural Resources and Mines, Queensland
DPIF	Department of Primary Industries and Fisheries, Northern Territory
FCRC	Cooperative Research Centre for Freshwater Ecology
GCRC	Cooperative Research Centre for Greenhouse Accounting
HEX	Hexima Ltd
MU	Melbourne University
NEC	National Centre for Engineering in Agriculture
RIR	Rural Industries Research and Development Corporation
UA	University of Adelaide
ULA	La Trobe University
UNE	University of New England
UQ	University of Queensland
UTS	University of Technology, Sydney
US	University of Sydney

Australian cotton is recognised as being world leader in quality.

2004/2005 R&D Program

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
Program 1: People & Knowledge					
CRC22C	National Cotton Extension Coordinator	Ingrid Christiansen	1/07/2000	31/12/2004	$60,000
CRC35C	IPM Training Coordinator.	Mark Hickman	1/01/2002	30/06/2005	$114,966
CRC54C	Cotton Industry Development Officer – Griffith	Scott Vaesson	1/07/2003	30/06/2005	$94,500
CRC58	Cotton Industry Development Officer – Gwydir	Julie O'Halloran	1/07/2004	30/06/2005	$30,000
CRDC190C	Farm Health and Safety R & D Program	Bruce Pyke	1/07/2002	30/06/2007	$20,000
CRDC244C	Sponsorship of New South Wales Young People's River Health Conference	Dallas Gibb	1/07/2004	31/08/2004	$0
CRDC246	Wincott Inc – Womens Industry Network Cotton	Helen Dugdale	1/09/2004	30/08/2006	$11,000
CRDC247	Postgraduate and Community Sponsorship to the 12th Australian Cotton Conference 2004	Bruce Pyke	1/05/2004	31/12/2004	$3,831
CRDC253	Travel: 63rd Plenary Meeting of the International Cotton Advisory Committee (ICAC) Mumbai November 2004	Gary Fitt	1/07/2004	30/06/2005	$2,600
CRDC254	Travel: David Midgley – 10th International Symposium on Microbial Ecology, Cancun-Mexico (18/8/04-29/8/04)	David Midgeley	18/08/2004	29/08/2004	$1,855
CRDC256	DAFF – Industry Partnerships Corporate Governance for Rural Women	David Burg	1/07/2004	30/06/2005	$5,439
CRDC257	IP Training for ACGRA, September 2004 (Commissioned)	Jodi McLean	1/07/2004	30/06/2005	$18,651
CRDC259	Community Research Project – Phase One (Cotton Australia)	Cotton Australia	15/09/2004	31/01/2005	$40,000
CRDC260	Sponsorship of 2004–05 Summer Scholarships – M Whitehouse and B Duggan/C Kilby	Mary Whitehouse/ Brian Duggan	1/01/2005	30/06/2005	$4,000
CRDC261	2005 Extension Review	Bruce Pyke	1/01/2005	30/06/2005	$44,702

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
CRDC262	Travel: David McKenzie – Field Workshop, France	David McKenzie	1/05/2005	30/06/2005	$2,700
CRDC264	CCA Qualitative Surveys including 2004–05 Bollgard® and Roundup Ready® Performance Surveys	Jon-Marie Baker	1/07/2004	30/06/2005	$32,500
CRDC265	Travel: David Nehl – Plant Pathology Research Visit to USA	David Nehl	19/05/2005	16/07/2005	$1,829
CRDC266	Travel: Bill Tyrwhitt – Plant Pathology Research Visit to USA	Bill Tyrwhitt	27/05/2005	16/07/2005	$4,535
CRDC267	Soil Health Issues Survey	Gus Shaw	1/06/2005	31/08/2005	$5,000
CRDC268	Analysis of Benefits/Costs to Cotton Industry of Change in Classification of Cotton Gin Trash	Ingrid Christiansen	20/06/2005	8/07/2005	$2,686
CRDC269	CCA – Review of Industry Use and Needs of Decision Support Tools: Stage One	Jon-Marie Baker	27/06/2005	29/07/2005	$10,000
CSP151C	Support development and independent evaluation of cotton management packages	Michael Bange	1/07/2002	30/06/2005	$100,000
CSP153C	ACRI Computing Support	Tony Pfeiffer	1/07/2002	30/06/2005	$132,000
CSP163C	Delivering science to Agribusiness – novel decision support tools	Michael Bange	1/07/2003	30/06/2005	$109,807
CSP164	Delivering science to agribusiness: Smart approaches to cotton irrigation management	Dirk Richards	1/07/2004	30/06/2007	$215,876
CSP172	Travel: Greg Constable – ACSA meeting in Jakarta	Greg Constable	14/06/2005	19/06/2005	$2,378
CTFT13	Travel: Stuart Gordon – ACSA Export Market Development Tour, Indonesia	Stuart Gordon	14/06/2005	18/06/2005	$1,935
DAN167C	Cotton Industry Development Officer – Lower Namoi	Annie Johnson	1/07/2002	30/06/2005	$83,237
DAN169C	Cotton Industry Development Officer – Macquarie	Kirrily Rourke	1/07/2002	30/06/2005	$80,250
DAN180	Water Use Efficiency Officer	Penny van Dongen	1/07/2004	30/06/2005	$0
DAN182	Travel: Chris Anderson – Fusarium 2005 Workshop, Kansas USA	Chris Anderson	25/06/2005	17/07/2005	$8,478

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
DAQ114C	Cotton Industry Development Extension Officer – Border Rivers	Rebecca Smith	1/07/2001	30/06/2005	$93,591
DAQ115C	Cotton Industry Development Extension Officer – Dirranbandi and St George	(was Steve Ginns)	1/07/2001	4/03/2005	$90,000
DAQ128	Extension agronomy for cotton production in CQ – Emerald IDO	Doug Sands	1/07/2004	30/06/2005	$50,000
DAQ129	Travel: David Murray – 2005 Beltwide Cotton Conference, New Orleans, USA	David Murray	2/01/2005	8/01/2005	$2,000
RIR9	Australian Rural Leadership Program – Course 12	Steve Clark	1/07/2004	30/11/2006	$23,000
UA14	Travel: Damien Lightfoot – 2005 Genetics Society of Australasia Conference, New Zealand	Damien Lightfoot	18/06/2005	25/06/2005	$880
UA15	Travel: John Humphries – 2005 Genetics Society of Australasia Conference, New Zealand	John Humphries	18/06/2005	25/06/2005	$880
UNE38	Travel: 12th Australian Cotton Conference Gold Coast – Dr Lily Pereg Gerk	Lily Pereg-Gerk	10/08/2004	12/08/2004	$1,000
US70	Travel: Stella Loke – 10th International Symposium on Microbial Ecology	Stella Loke	18/08/2004	13/09/2004	$3,000
US71	Travel: Angus Crossan – 2005 Beltwide Conference and Scientific Exchange	Angus Crossan	3/01/2005	12/02/2005	$5,260
				Total Funds Program One	$1,514,366
Program 2: Integrated Natural Resource Management					
AAW4C	Sustainable natural resource management for the Australian Cotton Industry using the Best Management Practices Manual (CRDC Component)	Allan Williams	1/07/2002	30/06/2005	$113,000
ANU7C	Development of a decision support system for water allocation in the Gwydir and Namoi valleys	Rebecca Letcher	1/09/2002	31/08/2005	$120,000
ANU8C	Postgraduate: Karen Ivkovic – Development of a decision support system for water allocation in the Gwydir and Namoi Valleys	Karen Ivkovic	1/09/2002	31/03/2006	$15,000
CLW1C	Environmental Impacts of genetically modified cotton on soil biological processes-effects of farming systems	Vadakkatu Gupta	1/07/2001	31/10/2004	$0

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
CLW3C	Rhizosphere biological functions as influenced by GM cotton	Oliver Knox	1/07/2002	30/06/2006	$140,000
CRC47C	Quantifying deep drainage using lysimetry	Anthony Ringrose-Voase	1/01/2003	30/06/2006	$130,000
CRC57C	Postgraduate: Leah MacKinnon – Insectivorous bats, irrigated cotton, indigenous vegetation remnants and intensive production landscapes	Leah MacKinnon	1/01/2004	30/06/2006	$4,000
CRC59	Understanding salinity threat: Phase IV Interpretation/Extension	John Triantafilis	1/07/2004	30/06/2005	$60,000
CRC61	Development of a field method for measuring deep drainage potential	Alex McBratney	1/07/2004	30/06/2006	$18,000
CRDC258	Australian Cotton Comparative Analysis – Boyce Chartered Accountants	David Newnham	1/07/2004	30/06/2005	$25,000
DNR4C	Recording, analysing and mapping of biodiversity in cotton areas of the Emerald Irrigation Area	Bill Wilkinson	1/07/2002	30/11/2004	$0
FCRC1C	Postgraduate: Susan Lutton – Aquatic biodiversity and the ecological value of ring-tank water storages on cotton farms	Susan Lutton	11/10/2004	11/10/2007	$27,325
GCRC4C	Reducing losses of nitrogen from cotton rotation systems	Peter Grace	1/07/2003	30/06/2006	$95,369
LWA2C	National Program for Sustainable Irrigation project (NSPI)	Graham Harris	1/07/2003	30/06/2005	$100,000
NEC10	Precision placement of irrigation water with LEPA for Centre Pivots and Lateral Moves	Joseph Foley	1/07/2004	30/06/2006	$114,500
US62C	Postgraduate: Sam Buchanan – Hydrological impacts of irrigation in the Bourke district	Sam Buchanan	1/01/2002	31/07/2005	$44,203
US68C	Post-Doc: Dr A Crossan – Management of risk for chemicals used in cotton production	Angus Crossan	1/07/2003	30/06/2005	$44,785
				Total Funds Program Two	$1,051,182

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
Program 3: Crop Protection					
CRC18C	Postgraduate: Florian Yan – Cotton soil health: Influences on cotton root diseases	Florian Yan	1/07/2000	26/08/2004	$0
CRC29C	Postgraduate: John Harvey – Diversity and pathogenicity of Thielaviopsis basicola (Black Root Rot).	John Harvey	1/02/2001	13/02/2005	$14,500
CRC30C	Postgraduate: Ingrid Rencken – Role of native vegetation in harboring beneficial insects and reducing insect pest damage in cotton	Ingrid Rencken	1/01/2002	31/03/2006	$30,500
CRC31C	Postgraduate – Richard Kent: The role of weeds as alternative hosts of Fusarium wilt in cotton	Richard Kent (deceased)	1/01/2002	31/12/2004	$0
CRC60	Managing *Helicoverpa* spp. on cotton with semiochemicals	Chris Moore	1/07/2004	30/06/2005	$54,000
CRDC152C	Dog training for detection of heliothis pupae in cotton fields	Craig Murray	1/07/2001	30/09/2004	$3,738
CRDC252	Impact on predation on emerging cotton pests)	Mary Whitehouse	1/07/2004	30/06/2005	$89,883
CRDC263	*Helicoverpa* Genome Project Business Plan	John Sandow, GRDC	1/01/2005	30/06/2005	$5,000
CSE102C	Monitoring Bt resistance	Sharon Downes/Ray Akhurst	1/07/2002	30/06/2005	$207,000
CSE107C	Ecology of *Helicoverpa* in relation to transgenic cotton and the efficiency of refuge crops	Geoffrey Baker	1/07/2003	30/06/2006	$138,369
CSE108C	Genetics of Bt resistance in H. armigera: Resistance to Cry2Ab	Rod Mahon	1/07/2003	30/06/2006	$156,929
CSE109	Fitness and mechanism of resistance to Cry2Ab in *Helicoverpa* armigera	Rod Mahon	1/07/2004	30/06/2007	$243,035
CSE110	Determination of factors influencing sticky cotton in Emerald	Paul de Barro	1/01/2005	30/06/2005	$159,877
CSP147C	Incorporating aphids, insecticides and early season plant compensation in Integrated Pest Management (IPM)	Lewis Wilson	1/07/2002	30/06/2005	$178,000

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
CSP156C	The potential for native Fusarium to give rise to new cotton field pathogens	Bo Wang	1/01/2004	31/12/2006	$165,284
CSP162C	Damage syndromes, economic thresholds and tolerance of cotton green mirids	Brian Duggan	1/07/2003	30/06/2006	$138,631
CSP165	Aphids – control, ecology and CBT resistance	Lewis Wilson	1/07/2004	30/06/2007	$108,236
DAN153C	Managing Black Root Rot of Cotton	Om Jhorar	1/07/2001	30/09/2004	$10,000
DAN160C	Impact and Role of Novel insecticides in Integrated Pest Management	Viliami Heimoana	1/07/2002	30/06/2005	$157,000
DAN162C	Insecticide resistance management in B-biotype Bemisia tabaci	Robin Gunning	1/07/2002	30/06/2005	$125,000
DAN163C	Insecticide Resistance Management in cotton aphid (Aphis gossypii) and cotton mite (Tetranychus urtice)	Grant Herron	1/07/2002	30/06/2005	$113,000
DAN164C	Mechanisms of insecticide resistance in the cotton aphid, Aphis gossypii	Emma Cottage	1/07/2002	30/06/2005	$28,333
DAN172C	Biochemical mechanisms of resistance to Bacillus thuringiensis endotoxins in *Helicoverpa* armigera	Robin Gunning	1/07/2003	30/06/2005	$33,191
DAN173C	Insecticide resistance in *Helicoverpa* spp. and the role of IPM/ Area Wide Management in Resistance Management	Louise Rossiter	1/07/2003	30/06/2005	$148,892
DAN174C	Expanding WEEDpak: developing integrated weed management packages for the cotton farming systems	Graham Charles	1/07/2003	30/06/2006	$106,337
DAN175C	Reducing weed control costs by better understanding the biology and ecology of problem weeds	Stephen Johnson	1/07/2003	18/03/2005	$71,834
DAN176C	Severity factors in Fusarium wilt of cotton	David Nehl	1/07/2003	30/06/2006	$79,520
DAN177	Diseases of Cotton VIII	David Nehl	1/07/2004	30/06/2007	$160,000
DAN178	Insecticide resistance management in *Helicoverpa* Spp.	Robin Gunning	1/07/2004	30/06/2005	$108,996
DAQ105C	Improved application and formulation of viral biopesticides against *Helicoverpa*	Andrew Reeson	1/07/2000	28/02/2005	$0

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
DAQ111C	New biopesticides against emerging sucking pests	Damien Cupitt	19/06/2002	30/06/2005	$100,000
DAQ123C	Best weed management strategies for dryland cropping systems with cotton	Hanwen Wu	1/07/2002	30/06/2005	$39,000
DAQ126C	Heliothis egg collections for resistance testing from the Darling Downs and South Burnett in southern Queensland	Hugh Brier	1/11/2002	30/04/2005	$25,443
DAQ130	Management of Fusarium wilt of cotton	Joe Kochman	1/07/2004	30/06/2007	$409,123
DAQ131	Improved understanding of the damage, ecology and management of mirids and stinkbugs in Bollgard II ®	Moazzem Khan	1/07/2004	30/06/2007	$125,000
DAQ133	Calibration and application of pupae detection dog	Greg Horrocks	1/11/2004	30/06/2007	$44,777
DAQ134	Postgraduate: Jamie Hopkinson – Managing cotton aphids with parasitoids	Jamie Hopkinson	1/07/2005	30/06/2008	$0
MU2C	Postgraduate: Christina Hall – Defence mechanisms of cotton against Fusarium oxysporum f.sp. vasinfectum and control of Fusarium wilt	Christina Hall	26/03/2002	30/06/2005	$30,500
UNE37	Molecular factors determining Thielaviopsis basicola–cotton interactions leading to Black Root Rot disease	Lily Pereg-Gerk	1/07/2004	30/06/2007	$27,500
UQ35C	Population genetics of heliothis migration, recruitment and origins	Kirsten Scott	1/07/2003	30/06/2005	$80,000
UQ36	Postgraduate: Joy Conroy – Investigating the roles of toxins and pathogenicity factors of Fusarium oxysporum f.sp. vasinfectum	Joy Conroy	14/02/2005	13/02/2008	$19,000
				Total Funds Program Three	$3,735,427
Program 4: Farming Systems					
CRC33C	Postgraduate: Simon Speirs – Characterising soil structural stability and form of sodic soil used for cotton production	Simon Speirs	3/09/2001	30/04/2005	$14,000
CRC45C	Maintaining profitability and soil quality in cotton farming systems	Nilantha Hulugalle	1/07/2002	30/06/2005	$117,000
CRC48C	Optimising field and farm scale Water use efficiency for cotton farming systems	Phil Goyne	1/07/2003	30/06/2005	$0

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
CRC52C	Nutritional constraints to efficient cotton production	Ian Rochester	1/07/2003	30/06/2006	$213,901
CRC56C	Postgraduate: Kylie Dodd – The Impact of Sodicity on Cotton Cropping Systems	Kylie Dodd	15/09/2003	15/09/2006	$12,500
CRC62	Irrigation surveys	Mitch Carter	1/07/2004	30/06/2005	$2,000
CRDC158C	Water relations of the cotton plant (CSP)	James Neilsen	1/01/2002	30/06/2006	$99,000
CSE103C	The impact of Area Wide Management (AWM) on beneficial Anthropod and *Helicoverpa* populations	TBA (was Martin Dillon)	1/07/2002	30/06/2005	$168,000
CSP122C	CSIRO Field Experiments at ACRI	Greg Constable	1/07/2000	30/06/2005	$75,000
CSP141C	Postgraduate: Rose Roche – Training in crop physiology – Functional responses of cotton to environment mediated via internal nitrogen dynamics	Rose Roche	1/07/2001	30/06/2005	$16,000
CSP161C	Physiology of high retention cotton crops	Steve Yeates	1/07/2003	30/06/2006	$148,342
CSP166	Cotton crop management for improved fibre quality	Michael Bange	1/07/2004	30/06/2007	$118,142
DAN166C	Operational Costs for Cotton Experiments	Tony Meppem	1/07/2002	30/06/2005	$87,000
DAN179	Conservation and utilisation of beneficial insects and natural pest control agents for IPM in cotton: A Farming Systems Approach	Robert Mensah	1/07/2004	30/06/2007	$140,000
DAQ113C	Postgraduate: Amanda Cleary – The effect of cereal stubble on *Helicoverpa* activity in early season cotton	Amanda Cleary	1/08/2001	30/08/2004	$0
DAQ120C	Area-wide monitoring and cultural control of key cotton pests in central Queensland	Richard Sequeira	1/07/2002	30/06/2005	$115,000
DAQ122C	Development of novel pest management options for cotton in central Queensland	Paul Grundy	1/07/2002	30/06/2005	$103,000
DAQ127C	Managing Bollgard II ® cotton farming systems in southern Queensland	Brad Scholz	1/07/2003	30/06/2006	$105,474
DAQ132	Facilitating adoption of IPM in northern region broadacre farming systems	Melina Miles	1/07/2004	30/06/2007	$50,000

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
DAQ135	Central Queensland Time of Planting Trials 2004	Richard Sequeira	1/07/2004	30/06/2005	$10,000
NEC8C	Postgraduate: Simon White – Partial root zone drying and regulated deficit irrigation for cotton using large mobile irrigation schemes	Simon White	1/09/2002	31/08/2005	$33,200
NEC9C	Extension and Development to support the adoption of centre pivots and lateral moves in the Australian cotton Industry	Joseph Foley	1/07/2003	22/10/2004	$0
UNE39	Postgraduate: Subhadip Ghosh – Effect of organic amendments on soil quality and profitability in cotton farming systems	Subhadip Ghosh	1/08/2004	30/06/2007	$12,900
US64C	Development of measures of soil health	Peter McGee	1/01/2003	31/12/2005	$86,000
US65C	Postgraduate: Stella Loke – Diversity of VAM fungi in soil health	Stella Loke	1/01/2003	31/12/2006	$30,500
US72	Postgraduate: Lisa Lee – Minimising the economic impact of water market reform for the New South Wales Cotton Industry	Lisa Lee	1/01/2005	31/12/2007	$3,831
US73	Postgraduate: Nicola Cottee – Development of a method to identify genetic variability in cotton's ability to withstand abiotic stress	Nicola Cottee	14/03/2005	14/03/2008	$11,000
US74	Honours: Nigel Roberts – Predicting potassium availability using soil and plant analyses	Nigel Roberts	1/01/2005	31/12/2005	$4,500
UTS5	Electrical imaging of furrow irrigation	Bryce Kelly	1/11/2004	30/06/2005	$19,110
				Total Funds Program Four	$1,795,400
Program 5: Breeding and Biotechnology					
CRC43C	Postgraduate: Derek Collinge – Gene silencing technologies to control *Helicoverpa* armigera	Derek Collinge	1/07/2002	30/06/2006	$30,500
CSP121C	CSIRO Plant Breeding Fibre Quality Laboratory	Greg Constable	1/07/2000	30/06/2005	$78,707
CSP135C	Postgraduate – Saara Kate Bowen: Molecular analysis and manipulation of terpene biosynthesis in cotton.	Saara Kate Bowen	1/01/2002	30/09/2004	$0

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
CSP137C	Development of a unigene set of cotton clones for general microarray analysis of gene expression in cotton plants.	Yingru Wu	1/07/2001	30/09/2004	$0
CSP146C	Postgraduate: Adriane Machado – Gene discovery in cotton fibre initiation and development by comparing cotton lintless mutants to wild type on cotton ovule cDNA microarrays (IP)	Adriane Machado	1/07/2002	30/09/2006	$30,500
CSP149C	Isolation of Novel Cotton Promotors to drive the Robust Expression of useful Genes in Transgenic Cotton	Danny Llewellyn	1/07/2002	28/02/2005	$78,666
CSP154C	Nutritional improvement in cottonseed oils through genetic removal of palmitic acid	Qing Liu	1/07/2002	15/09/2004	$0
CSP155C	AFLP diversity of Fov in cultivated cotton fields and genotyping of G.hirsutum X G.sturtianum backcross lines	Curt Brubaker	1/10/2002	30/09/2004	$0
CSP159C	Breeding improved cotton varieties	Greg Constable	1/07/2003	30/06/2006	$827,600
CSP160C	Development and evaluation of cottonseed oils with improved nutritional and functional properties	Qing Liu	1/11/2003	30/10/2004	$0
CSP167	Cotton Biotechnology: Core Project	Danny Llewellyn	1/07/2004	30/06/2007	$333,290
CSP168	Unravelling the molecular basis for cotton fibre quality	Todd Collins	1/07/2004	30/06/2007	$83,519
CSP169	Development of cottonseed oils with improved nutritional and functional properties	Qing Liu	1/07/2004	30/06/2006	$75,000
CSP170	Capital Item: Uster HVI	Greg Constable	1/07/2004	30/06/2007	$67,000
UA8C	Postgraduate: Sven Delaney – Development of gene promoters for cotton fibre improvement	Sven Delaney	12/02/2001	26/09/2004	$14,500
UA11C	Postgraduate: Damien Lightfoot – Fibre improvement through modulation of transitions in cotton development.	Damien Lightfoot	18/03/2002	18/09/2005	$22,250

Project Number and Title		Researcher	Start Date	Cease Date	Funding 2004–05
UA12C	Postgraduate: John Humphries – Analysis of TTG1 homologues in cotton for roles in fibre initiation	John Humphries	18/03/2002	18/09/2005	$22,250
UA13	Evaluation of transgenic cotton with altered fibre traits	Sharon Orford	1/07/2004	30/06/2006	$43,684
				Total Funds Program Five	$1,707,466
Program 6: Value Chain					
CRDC251	EMS Pathways project	Allan Willliams	1/06/2004	30/09/2007	$190,488
CSP171	Capital Item: Lummus laboratory gin	Greg Constable	1/07/2004	30/06/2005	$13,537
CTFT7C	Interlaboratory trials for fibre maturity reference samples	Geoffrey Naylor	1/07/2003	30/06/2006	$36,020
CTFT8C	Instrumentation for Cotton Fineness and Maturity measurement	Geoffrey Naylor	1/07/2003	30/06/2005	$230,000
CTFT9	Improved quality of ginned Australian cotton: Development of new gin machinery	Stuart Gordon	1/07/2004	30/06/2006	$64,241
CTFT10	Textile Processing of Variety Trials 2004	Rene van der Sluijs	1/12/2004	31/12/2005	$56,317
CTFT11	Fibre to Fabric Training Course	Geoffrey Naylor	1/12/2004	1/12/2005	$0
CTFT12	Standardisation of Classing	Rene van der Sluijs	1/01/2005	30/09/2005	$0
				Total Funds Program Six	$590,603
				TOTAL PROJECT FUNDING for 2004–05	$10,394,444
					Plus
				CRC Cash contribution	$350,000
				BMP – Audit Office	$1,289
				TOTAL R&D 2004-05	$10,745,733

Appendix Three

CRDC Publications and Activities

Corporate publications

Annual Report 2003–2004

Annual Operating Plan 2005–2006 (published on www.crdc.com.au)

Magazines

Three editions of CRDC *SPOTLIGHT* magazine

Bi-monthly *Research Review* in The Australian Cottongrower

Publications funded or contributed to by CRDC

Taking Responsibility for our Future—The Australian Cotton Industry Action Response to the Second Cotton Industry Environmental Audit 2003

WATERpak

BMP Land and Water Management Module

12th Australian Cotton Conference Proceedings
(also available on CD Rom)

Boyce Cotton Comparative Analysis—2003 Crop

Media Releases
(all published on www.crdc.com.au/mediaarchive.html)

WATERpak Launch Welcomed By Cotton Growers

CRDC Mirids in Cotton Workshop

Cotton Analysis Shows Best Practice Benefits

Cotton Industry Investigates Eco-Labelling Possibilities

Cotton industry agrees on environmental marketing strategy

Guide to Bollgard II® Resistance Management Plan

Innovative New Research Program For Cotton

Cotton Industry Welcomes Government Research Commitment

$9 Million Cotton Research Program Announced

Insecticide Resistance Management Strategy Fine Tuned

New Report Shows Greener Cotton 10 Years On

Fibre to Fabric Workshops

Second Environmental Audit—Cotton Industry Responds
Dallas Gibb joins CRDC team

CRDC Recruits new Communications Manager

Dirranbandi hosts women's cotton meeting

CRDC's Cuppa Research is hot Stuff at Moree Trade Show

Government gives thumbs up to CRDC's R&D plans

Other Activities funded or contributed to by CRDC

Conferences and Trade Shows

12th Australian Cotton Conference, Gold Coast

International Congress of Entomology, Brisbane

River Health Conference, Narrabri

Australian Cotton Trade Show, Moree

Reviews

Review of Extension and Education

CRDC External Review of I.T

CRDC External Review of OH&S

CRDC External Intellectual Property Review

Workshops, Presentations, Launches and Meetings

FUSCOM Fusarium wilt committee, Narrabri

EMS Pathways workshops (x 2), Sydney

WATERpak launch, Narrabri

National Cotton Extension Team Annual Workshop, Narrabri

Farming Systems Forum on Crop Nutrition, Narrabri

Research and Extension in Resistance Forum, Narrabri

Managing Herbicide Damaged Cotton Workshop, Narrabri

Deep Drainage Coordination Meeting, Narrabri

BMP management committee meetings

Taking Responsibility for our Future—Industry Response to the Second Australian Cotton Industry Environmental Audit and BMP Land and Water Module launch, Narrabri

Wincott field days, Gold Coast, Warren, Narrabri x 2, Dirranbandi

Soil Health Forum, Narrabri

Final Project Reports Received

Travel: 12th Australian Cotton Conference Gold Coast	Dr Lily Pereg-Gerk
Travel: David Midgley—10th International Symposium on Microbial Ecology, Cancun-Mexico	Dr David Midgley
Travel: David Murray—2005 Beltwide Cotton Conference, New Orleans, USA	Mr David Murray
Travel: Angus Crossan—2005 Beltwide Conference and Scientific Exchange	Dr Angus Crossan
Community Research Project—Phase One (Cotton Australia)	Mr Phil Russell
2005 Extension Review	CRDC
Cotton Industry Development Officer—Lower Namoi	Annie Johnson
Extension and Development to support the adoption of centre pivots and lateral moves in the Australian cotton Industry	Mr Joe Foley
Postgraduate—Saara Kate Bowen: Molecular analysis and manipulation of terpene biosynthesis in cotton	Saara Kate Bowen
Development of a unigene set of cotton clones for general microarray analysis of gene expression in cotton plants.	Dr Yingru Wu
AFLP diversity of Fov in cultivated cotton fields and genotyping of G.hirsutum X G. sturtianum backcross lines	Dr Curt Brubaker
Travel: Amanda Cleary – 2004 Beltwide Cotton Conference	Amanda Cleary
Development of a 5-10 Year Business Plan for the Cotton Industry's Decision Support Program	Don Kerr
Application of crop simulation within the Australian cotton industry.	Dirk Richards
Extension Agronomy for Cotton Production in CQ.	David Kelly
Management of herbicide effects on soil biological processes essential for plant health and nutrition	Vadakattu .V.S.R. Gupta
Measuring the influence of water quality on drainage through irrigated cotton soils.	Naidu Bodapati
Whole farm salinity management strategies for cotton production in the Macquarie Valley	David Mitchell
Assessing a program for post emergent control of problem weeds in cotton using shielded sprayers	John Rochecouste
Postgraduate—Mark Wade: Biology, ecology and utilisation of the Damsel Bug as a predator in cotton—towards real IPM	Mark Wade
The comparison of spider communities in cotton around Australia.	Mary Whitehouse
Ecology of Trichogramma egg parasites in the Ord River Irrigation Area and their role in cotton IPM	Myron Zalucki
Postgraduate—Andrew Davies: Ecology of the Trichogramma egg parasites in the Ord River Irrigation Area and their role in cotton IPM	Andrew Davies
Development of sustainable pest management practices for Bollgard II® production in the Kimberley	Amanda Annells
Postgraduate: Characterisation of a potential new insecticidal transgene	Erica Crone

Australian native cottons as sources of resistance and new pathotypes of Fusarium wilt	Bo Wang
Cotton Industry Codex representation and regulatory support.	Kevin Bodnaruk
Resistance of helicoverpa armigera to cry2A	Ray Akhurst
High level Cry1Aac resistance in *H. armigera*	Ray Akhurst
Potential for the evolution of resistance to Bt by *Helicoverpa armigera*	Rod Mahon
Identification and management of Bunchy Top syndrome in cotton	Lewis Wilson
Improving understanding of the ecology and management of cotton aphid.	Lewis Wilson
Managing Black Root Rot of Cotton	Om Jhorar
Ecology and development of management strategies for Fusarium wilt in cotton.	Joe Kochman
Pest status and management of shield bugs in cotton	Moazzem Khan
Assessment of the potential for resistance to Gemstar	Caroline Hauxwell
Aphid bio-control in cotton.	Bernard Franzmann
Postgraduate—Sam Lowor: Pheromones for occasional pests of cotton	Samuel Lowor
Refining crop agronomy for dry season cotton production in NW Australia.	Brian Duggan
Agronomic aspects of Bt efficacy in transgenic cotton	Ian Rochester
The impact of temperature extremes on cotton performance	Michael Bange
Integrated farm water management for cotton production	Sunil Tennakoon
Conservation and utilisation of beneficial insects and other biological control agents for IPM in cotton II	Robert Mensah
Heliothis management in south Queensland farming systems	Melina Miles
The influence of beneficial soil fauna on cotton production and its pests and diseases	Geoffrey Baker
Post Doctorate: Discovery of genes involved in the expression of cotton resistance responses to Fusarium wilt by the application of microarray technology	Helen McFadden
Australian native cottons as sources of resistance and new pathotypes of Fusarium wilt	Bo Wang
Genetic characterisation of homoeologous recombination and chromosome inheritance in G. hirsutum x K genome alien chromosome addition lines	Augusto Becerra
Postgraduate: Potassium status and mineralogy of soil in relation to premature senescence in cotton in Northern New South Wales	Sevag Bedrossian
Post-Doc – Sharon Orford: Genetic manipulation of fibre quality in Australian cotton	Sharon Orford
Improving the efficiency of embryogenesis in elite cotton cultivars	Mr Simon Poon
Cotton Biotechnology: Core Program	Danny Llewellyn
Transgenic cotton for the control of Fusarium wilt	Robyn Heath

Appendix Four

Acronyms and Terminology

CRDC aims to minimise the use of acronyms or technical terms, or to explain their meaning in context. The following is a list of acronyms and technical terms used in the cotton industry that may appear in this publication

AAAA	Aerial Agricultural Association of Australia
ABARE	Australian Bureau of Agricultural and Resource Economics
ACC	Australian Cotton Centre
ACGRA	Australian Cotton Growers' Research Association
ACIC	Australian Cotton Industry Council
ACIPA	Australian Centre for Intellectual Property in Agriculture
ACCRC	Australian Cotton Cooperative Research Centre (also Cotton CRC)
ACRI	Australian Cotton Research Institute
AFFA	Agriculture Fisheries and Forestry – Australia. Now the Australian Government Department of Agriculture, Fisheries and Forestry
ANAO	Australian National Audit Office
APVMA	Australian Pesticides and Veterinary Medicines Authority, formerly the National Registration Authority for Agricultural and Veterinary Chemicals
ARLP	Australian Rural Leadership Program
ARRIP	Australian Agricultural Research in Progress database
AWA	Agriculture Western Australia (Department of)
AWM	Area Wide Management
Bollgard II ®	Cotton varieties contain two genes resistant to *Helicoverpa* spp.
BMP	Best Management Practice
BRS	Bureau of Rural Sciences
Bt	*Bacillus thuringiensis* (crystal protein gene expressed in INGARD® and Bollgard II ® cotton varieties)
CA	Cotton Australia
CAC Act	*Commonwealth Authorities and Companies Act 1997*
CCA	Cotton Consultants Australia Inc.
Cotton CRC	Australian Cotton Cooperative Research Centre
CCC CRC	Cotton Catchments Communities Cooperative Research Centre
CMA	Catchment Management Authority

CRC	Cooperative Research Centre
Corporation, the	Cotton Research and Development Corporation
CRDC	Cotton Research and Development Corporation
CSD	Cotton Seed Distributors Ltd (a grower-owned cooperative)
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Department, the	refers to the Australian Government Department of Agriculture, Fisheries and Forestry
DIPNR	Department of Infrastructure, Planning and Natural Resources, New South Wales
DLWC	Department of Land and Water Conservation, New South Wales, now part of the Department of Infrastructure, Planning and Natural Resources
DNR	Department of Natural Resources, Queensland
DPI	Department of Primary Industries, New South Wales
DOFA	Australian Government Department of Finance and Administration
ESD	Ecologically Sustainable Development
EPA	Environmental Protection Agency, New South Wales
EPBC Act	*Environmental Protection and Biodiversity Conservation Act 1999*
GMAC	Genetic Manipulation Advisory Committee
GOA	Groundrig Operators Association
GRDC	Grains Research and Development Corporation
Heliothis	Insect pest, more properly known as *Helicoverpa* spp. (*H. armigera* and *H. punctigera*)
ICAC	International Cotton Advisory Committee
OGTR	Office of the Gene Technology Regulator
INGARD®	Cotton varieties containing one Bt gene resistant to *Helicoverpa* spp.
IP	Intellectual Property
IPM	Integrated Pest Management
LWA	Land and Water Australia
MDBC	Murray-Darling Basin Commission
MLA	Meat and Livestock Australia
MP	Member of Parliament
NFF	National Farmers' Federation
NHT	Natural Heritage Trust
NPSI	National Program for Sustainable Irrigation
NRA	National Registration Authority for Veterinary and Agricultural Chemicals. Now known as the Australian Pesticides and Veterinary Medicines Authority (APVMA)

NRM	Natural Resource Management
NSW Agriculture	Department of Agriculture, New South Wales, now the Department of Primary Industries
PIERD Act	*Primary Industries and Energy Research and Development Act 1989*
Pima cotton	*Gossypium barbardense*. Related to Egyptian cotton, having extra long and fine stapes. Limited Australian production in the Darling region.
QDPI	Department of Primary Industries, Queensland
RCMAC	Raw Cotton Marketing Advisory Committee
RIRDC	Rural Industries Research and Development Corporation
RRDCC	Rural Research and Development Chairs' Committee
TIMS	Transgenic and Insect Management Strategy Committee
TRC	Technology Resource Centre (at the Australian Cotton Research Institute)
Upland cotton	*Gossypium hirsutum*. Comprises the vast majority of the Australian cotton crop

One bale of cotton can produce 249 pairs of jeans, 4,321 pairs of socks or 681,000 cotton balls. (Source—CA, 2005)

Appendix Five

Legislative Compliance Index

Commonwealth Authorities and Companies Act 1997, section 9

A. Report of operations

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Appendix Six

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