



Australian Government

Cotton Research and
Development Corporation



ANNUAL REPORT 2002—2003

Cotton Research and Development Corporation



Cotton
RESEARCH & DEVELOPMENT



ANNUAL REPORT 2002—2003

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Cotton Research and Development Corporation 2003

ISSN 1039-3544

ISBN 1 876354 91 7

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Australian Government
Cotton Research and
Development Corporation

LETTER OF TRANSMITTAL

1 October 2003

Senator the Hon. Judith Troeth
Parliamentary Secretary to the Minister
for Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Senator Troeth

It is with pleasure I submit the Corporation's Annual Report 2002–2003, prepared in accordance with the provisions of section 28 of the *Primary Industries and Energy Research and Development Act 1989*, and of 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 the resolution of the directors.

Yours sincerely

A handwritten signature in blue ink, appearing to read 'Bridget Jackson'.

Bridget Jackson
CHAIR

Despite a continued grim production outlook, and the expected run down in the Corporation's reserves as a consequence, the 2002–2003 season has seen some outstanding successes.

The yield of lint has further improved, as measured on a per hectare basis as well as a per megalitre basis, and Australia continues to lead the world in this area. Even though some properties experienced lower yields than normal where falling levels of water storages meant water became a limiting factor, other properties achieved simply outstanding yields. These outcomes highlight the effects of improvements in plant breeding and the need for excellent crop management to keep Australia at the forefront of the international industry.



However, the industry cannot become complacent. With the introduction of Bollgard II™ and Roundup Ready® Cotton, together with developments in ultra narrow row production and the need to improve water use efficiency even further, the management of the crop on a field and landscape scale will continue to alter quite markedly. This has placed a heavy load on the research and extension community serving cotton and will continue to do so.

In terms of its quality, available data suggests that Australian cotton is continuing to compete favourably with other premium growths such as Californian SJV; however, further improvements in micronaire (fineness and maturity) and neps (short, tangled fibres) in particular could help to increase any quality premiums in the future. This is an area targeted for further research when funds permit.

During the year, the Corporation continued to maintain international ties. Joint funding by the Australian Cotton Cooperative Research Centre and the Corporation allowed 23 Australian participants to attend the International Cotton Research Conference in Cape Town in late 2002. The Corporation continued to fund overseas study tours and to work with industry on the issues of world trade liberalisation.

The Corporation, as at June 2003, has completed the five years covering its second five-year Research and Development Strategic Plan. The Corporation plans to publish a detailed assessment of its performance under this plan. The five-year plan to the year 2008, released in August 2003, has been simplified and, in order to obtain a more integrated approach to research and development, the number of programs has been reduced to six. The strategic framework focuses on achieving economic, environmental and social outcomes for the industry. This reflects a “triple bottom line” approach to planning and implementation reporting. The Corporation has continued to refine its performance indicators to ensure their relevance to the Australian Government's National Research Priorities and Rural Research and Development Priorities, as well as the Australian Cotton Growers Research Association industry objectives.

During the year the Corporation commissioned and accepted the second Environmental Audit of the industry. This assessed the industry's performance on the recommendations of an audit made for the industry in 1991, and recommended future improvements. The Environmental Audit was presented to stakeholders and the industry at Parliament House on 14 August 2003. Whilst the Corporation is generally pleased with the outcome of the report, there remains much research and extension work to be carried out, particularly in

the further development and use of the industry's Best Management Practice program. The audit found that areas where environmental improvements could be achieved are water management, pest management and pesticide use and waste management. Through the Australian Cotton Industry Council (ACIC), cotton industry organisations are collaborating to develop a strategic plan and action list to address these challenges.

The appointment of the Corporation's new Board was announced by the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Judith Troeth, in September 2002. The Corporation owes much to the retiring Board members, Dr. Jim Peacock and Mrs Bobbie Brazil. Dr. Peacock has provided invaluable and untiring professional advice over the life of the Corporation, and Mrs. Brazil has assisted the Corporation to shift the emphasis of its thinking to the longer term and environmental outcomes. Other members of the previous Board were reappointed, together with Ms Kathryn Adams and Dr TJ Higgins, who were formally welcomed at a Board meeting in December 2002.

The cotton industry works in a collaborative manner with the Corporation's work integrated into the industry's overall activities. Operations for the 2002–03 year are reported in this wider industry context wherever that gives a clearer picture of the role the Corporation is playing.



BRIDGET JACKSON
Chair

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A blue-tinted photograph of a frog sitting on a leaf next to a cotton boll. The frog is light-colored with dark spots and is looking towards the left. The cotton boll is large and textured, and is positioned to the right of the frog. The background is filled with leaves and stems, creating a natural, agricultural setting.

Report of Operations

Overview

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation

OUR OPERATING ENVIRONMENT 2002–2003

Executive Director's Report

The 2002–03 season provided the greatest operational shock since the Corporation's inception. Following relatively stable production of an average 3.2 million bales from 470,000 hectares in the preceding five years, the worst drought on record in this country saw Australian cotton production plummet to 1.62 million bales from 220,000 hectares, with prospects for the 2003–04 season even grimmer if significant rain is not received in the lead-up to planting.

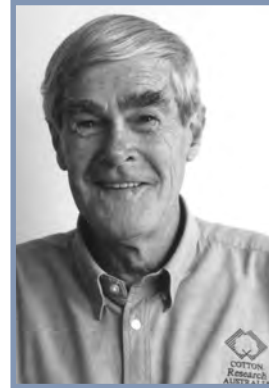
As the deterioration in the season unfolded, the Corporation focused on progressively reducing expenditure and was modestly successful in this regard. The final financial result was considerably better than expected. A major contributor to this was the quicker flow of farmer-paid levies to the Corporation than has historically been the case, due to the earlier harvest and shortened ginning period.

It is important to note, however, that this is money that has, in effect, been brought forward from the 2003–04 year. When combined with a continued deterioration in outlook for the coming season, 2003–04 income will probably fall to well below budgeted levels, meaning the Corporation will need to draw heavily on its reserves to maintain even a significantly reduced research and development program. These investments and reserves, to which the Australian Government does not contribute, are established for this purpose but it was not anticipated that they would need to be depleted so dramatically in a single year.

The impact of the financial situation is worsened by a 'double whammy' effect because of the activation of PIERD Act triggers that limit the Australian Government's contribution. Thus, the funds drawn from reserves will largely unmatched by the Government. Although this issue has been raised with the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry, and with the Australian Department of Agriculture, Fisheries and Forestry itself, the ineluctable nature of the PIERD Act regulations mean the Government has judged that it cannot alleviate the situation.

The research program for 2003–04 has been reduced to the point that the momentum of the overall research effort will falter, but the Corporation remains optimistic that it will recover when the funding position improves. However, as the drought continues to affect all cotton growing areas, an even greater reduction in research looks likely in the following year. The continuity of very important research may be lost and the value of research investments by the Corporation and Government significantly reduced.

Cutting the research and development program to suit the financial cloth causes ripples well beyond the operating year, creating uncertain futures for researchers. With much of the cotton research effort taking place in regional New South Wales and Queensland, managing research on a 'stop, start' basis means key researchers and support staff are lost, their families uprooted and their regional communities suffer economic and social loss. Although the Corporation cannot control the effect of the continuing drought or the impact of its funding formula, we will do all in our power to maintain funding for researchers, making the cuts as far as possible in the area of operating expenses within research projects and within the Corporation itself.



RALPH SCHULZÉ
Executive Director

COTTON INDUSTRY UPDATE

Today, farms on which cotton is grown are typically 500 to 2000 hectares in size, highly mechanised, capital intensive, technologically sophisticated and require high levels of management expertise. About 80 per cent of these farms are irrigated. Work continues to explore the viability of cotton growing in the north of Australia but for the present nearly all cotton is grown in northern New South Wales and southern Queensland. In recent years, cotton growing regions have also been established in the Lachlan and

Murrumbidgee regions in south western New South Wales.

Each of the cotton growing regions has unique conditions, presenting diverse challenges for the Corporation's research and development effort.

Australian cotton production has more than doubled since the early 1990s because of major industry expansion and increasing average crop yields. The expansion has been assisted by improved knowledge of crop management for a range of climatic

Figure 1: Cotton growing regions of Australia



conditions as well as the ongoing development of varieties suited to those conditions. Varietal development also delivered yield and fibre quality improvements, as did a better understanding of total farming systems and techniques.

The adoption of Integrated Pest Management strategies has enabled growers to reduce reliance on traditional chemical pesticides, while the industry's landmark Best Management Practices program has led Australian agriculture in the development and implementation of industry-wide environmental and risk management systems.

According to CRDC calculations, the five-year production average for 1998 to 2002 was 3.2 million bales from 470,000 hectares of cotton. The Australian Bureau of Agriculture and Resource Economics values the average Gross Value of Production for this period at \$1,570 million per year.

Planting in the 2002–03 season fell from over 400,000 hectares in 2001–02 to only 220,000 hectares. Overwhelmingly, the cause of the reduction was low water storage levels caused by the worst drought for more than a century. Cotton production fell to 1.62 million bales, compared with 3.2 million bales in 2001–02 and 3.4 million bales in 2000–01. Because cotton is grown in a relatively small part of Australia (compared with, for example, crops such as wheat which are grown in widely dispersed areas across the continent), it is particularly susceptible to adverse weather conditions such as drought.

Australian growers obtain some of the world's highest average yields: more than two and a half times the world average and more than double the average yields achieved in the United States (Source: International Cotton Advisory Committee).

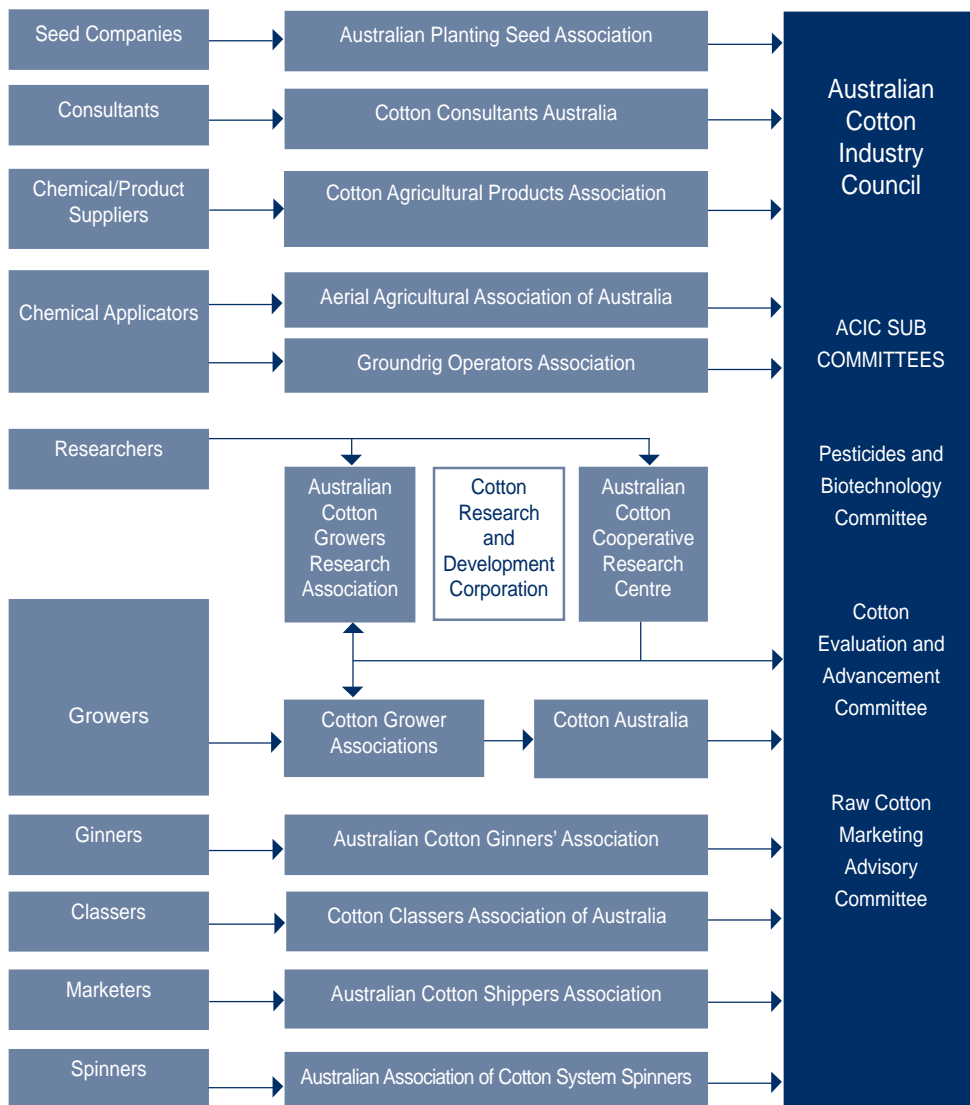
Australia, traditionally, is the third largest exporter of raw cotton in the world and Australian cotton normally accounts for approximately 13 per cent of the world trade. Up to 95 per cent of Australian raw cotton is destined for international markets (Source: International Cotton Advisory Committee). With the significant reduction in production in 2002–03 and similar problems likely in 2003–04, Australia is unlikely to retain its place as a major exporter in the short term.

Indonesia is the largest buyer of Australian cotton, taking about a third of our exports. Japan, Thailand, South Korea and Taiwan are other important markets (Source: Australian Bureau of Statistics) but reduced production could endanger some of Australia's markets.

The United States and China are the world's largest producers of raw cotton, with annual production averaging about 17 million bales in the US and 20 million bales in China. The US is the largest exporter of raw cotton and dominates world trade with a 30 per cent share of the market. China fluctuates between being a net importer and a net exporter of cotton (Source: International Cotton Advisory Committee).

The Centre for International Economics estimates that the aggregate income for Australian cotton producers would rise by an estimated \$42,000 per grower per year if the US were to lift barriers on textile imports and end subsidies for farmers. Worldwide, cotton producers and consumers would realise significant gains from this move. Consumption on textiles and clothing in the US was estimated to increase by 6.5 per cent, but consumers would spend \$20 billion less due to cheaper prices. (Source: *Trade Distortions and Cotton Markets*, CRDC, 2001)

Figure 2: Organisations within the Cotton Industry



STATUTORY AND INDUSTRY OBJECTIVES

Statutory Object <i>Section 3, PIERD Act 1989</i>	CRDC Linkage to Statutory Object	Relevant Industry Objectives <i>(ACGRA Strategic Plan)</i>
Increase economic, environmental and social benefits to the cotton industry and the community in general by improving production, processing, storage, transport or marketing of cotton	This objective provides a foundation and guide for the Corporation's entire research program. The three outputs – 'Sustainability', 'Profitability and Competitiveness' and 'People and Communities' – provide explicit linkages through to planned and actual activities.	Improve the sustainability of the cotton industry Improve the profitability of the cotton industry
Achieve sustainable use and sustainable management of natural resources	This priority is written into the Outcome statement and forms an integral part of the Corporation's research program. The 'Sustainability' Output relates primarily to ensuring a long-term future for the Australian cotton industry by protecting, maintaining and enhancing the natural resource base. The Corporation estimates some 49 per cent of research expenditure in the 2002–03 reporting year was directed towards the 'Sustainability' Output.	Improve the sustainability of the cotton industry
Make more effective use of the resources and skills of the community in general and the scientific community in particular	This object is written into the Outcome statement and addressed more explicitly through the 'People and Communities' Output. The Corporation consults widely regarding its research priorities, encourages timely technology transfer to industry and invests in programs to strengthen human and capital resources.	Create and support a strong, focused and committed research program

Statutory Object
Section 3, PIERD Act 1989

**CRDC Linkage to
Statutory Object**

**Relevant Industry
Objectives**
(ACGRA Strategic Plan)

Make more effective use of the resources and skills of the community in general and the scientific community in particular
(Continued)

Being positioned within the cotton industry and a regional community means that we can readily identify resources required by the industry and that appropriately skilled personnel are close at hand.

Create and support a strong, focused and committed research program
(Continued)

Improve accountability for expenditure upon research and development activities in relation to the cotton

This objective is addressed as an important part of the overall management strategy of the Corporation, through compliance with legislative reporting and accountability requirements. The Corporation's Statement of Principles' (page 12, *CRDC Strategic Plan 1998–2003: Outcome/Outputs Revision 2001*) includes several statements that outline our commitment to accountability and good corporate governance.

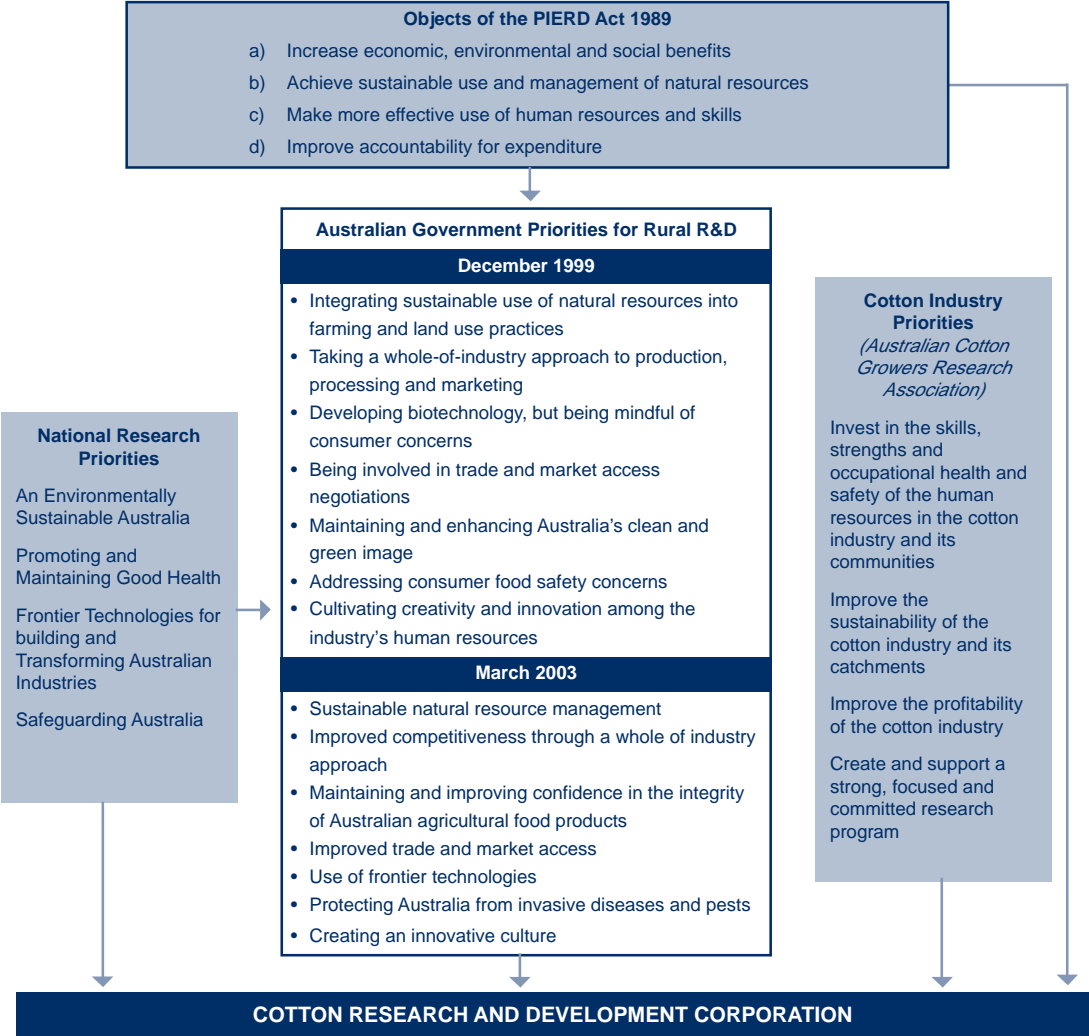
Invest in the skills and strengths of the human resources in the cotton industry

ADDRESSING STAKEHOLDER PRIORITIES

The Corporation’s Annual Operating Plan 2002–03 was formulated to take account of the Australian Government’s priorities for rural research and development, reiterated in May 2001 in a letter to the Corporation from Senator the Hon. Judith Troeth, Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry.

In March 2003 Senator Troeth wrote to the Research and Development Corporations to advise them of the Government’s revised priorities for rural research and development, formulated to ensure they are consistent with National Research Priorities (NRPs) released by the Prime Minister in December 2002. While the timing of their release meant they were not specifically addressed during the reporting year, they are included in the diagram below, to illustrate the evolution of Australian Government priorities. Similarly, the Corporation has reported below on how its 2002–03 program relates to the NRPs which, due to the timing of their release, have been specifically addressed in the Annual Operating Plan 2003–04.

Figure 3: Corporation Accountabilities



GOVERNMENT PRIORITIES

Rural Research and Development Priorities

Sustainable natural resource management

'Sustainability' remains a key Output for the Corporation. Improving sustainability, particularly of natural resources, is a core activity, and continues to account for about half the research budget. A central part of this effort has been the development and transfer to industry of sustainable field production systems which incorporate improved management of natural resources and the minimisation of negative impacts on neighbours, or on neighbouring or downstream environments.

Whole-of-industry approach

The Australian cotton industry operates in a free market environment and each link in the production chain is fully exposed to the signals of the world market. This means the industry as a whole has a strong grasp of consumer needs in terms of quantity, fibre quality, reliability of supply and other issues.

The Corporation keeps abreast of these issues through its involvement in the Australian Cotton Industry Council, and through the CRDC's role as secretariat to the Raw Cotton Marketing Advisory Committee, which allows it to maintain good communication links with processing, marketing and shipping organisations.

Following a growing awareness that the industry needs greater understanding of the impacts of processing on final fabric quality, the CRDC initiated and continues to support a major 'field-to-fabric' research program.

Biotechnology

Cotton is Australia's leading agricultural industry in terms of the commercialisation and field-application of modern

biotechnology techniques. The first industry to have commercial access to genetically-modified crop varieties, growers are well aware of the importance of this technology.

The introduction of the transgenic varieties followed extensive research and testing, regulatory approval processes and the development of industry-led resistance management protocols. The varieties feature built-in protection against key cotton pests and their introduction facilitated the adoption of new methods of crop management. These methods are delivering a broad range of benefits to the industry and the community, including improved pest management involving reduced usage of broad spectrum and residual chemicals. Support for the development of new transgenic and conventional varieties is continuing, with successful trials for varieties containing Bollgard II™ two-gene resistance technology in the 2002–03 season leading to the release of these varieties for the 2003–04 season.

Trade and market access

The world cotton market remains distorted by a range of trade barriers. Unlike growers in the world's largest cotton producing nations, Australian farmers do not receive government assistance in the form of income support or trade restriction. As reported last year, a CRDC-commissioned report on the issue *'Trade Barriers and Cotton Markets: Implications for Australian Producers'* was followed up by a second analysis of cotton price distortions as well as a report on the true impact of exchange rates.

The Corporation also recognises that trade barriers are increasingly non-tariff based. However, the industry's Best Management Practices program is a key tool to demonstrate to international markets the

Australian cotton industry's adherence to world's best practice and commitment to sustainable production.

Clean and green image

The Corporation has the ongoing task of developing and revising the industry's leading Best Management Practices program which provides growers with flexible guidelines for identifying on-farm risks as well as practical advice on how to manage those risks and constantly improve practices. A rigorous audit process gauges the efforts and progress of growers and will provide benchmarks for ongoing assessment of the BMP program and its impact on the industry.

BMP continues to widen in response to the requirements of farmers and government policy. A draft Land and Water Module, which seeks to incorporate the planning requirements proposed in both New South Wales and Queensland, has been developed and will be trialed by cotton growers in the coming year to determine its practicability.

Food safety

Cottonseed oil is used in a variety of food applications including margarines, blended vegetable cooking oils and in commercial deep fryers. The Corporation has been investing in a range of biotechnology research such as cotton with healthier cottonseed oil, genes associated with fibre development and genetic markers to assist plant breeding.

The CRDC keeps informed of developments in the oilseed market through the Australian Cotton Industry Council and direct communication with ginning organisations.

Human Resources

A continually improving culture of innovation and increased skill level in scientists, advisers and growers is

providing significant benefits to the cotton industry. This makes the support and development of the men and women who conduct research and transfer the knowledge gained from that research a high and continuing priority for CRDC. The Corporation's commitment to this priority is demonstrated by its selection of 'People and Communities' as a key Output. 'Human Resources' is also a research program that ensures this area has appropriate focus and expenditure, including direct training opportunities for people already in, or looking to enter, the cotton industry.

National Research Priorities

The release of National Research Priorities (NRPs) by the Prime Minister in December 2002 has added another layer of accountability to the Corporation's research and development activities.

Although the NRPs were not part of planning for the 2002–03 year due to the timing of their release, the Corporation's careful observance of the rural research and development priorities over the past decade means that the NRPs are very relevant to that year's research and development program. The NRPs were addressed explicitly in the Strategic Plan 2003–08 and Annual Operating Plan 2003–04.

Not all priority goals contained within each NRP fits within the scope of the cotton industry and its research and development activities and more than one research program contributes to each National Research Priority.

Sustainable Natural Resource Management

Sustainability of the natural resource base forms one of the three research and development Outputs in the Strategic Plan 1998–2003 (and thus the 2002–03 year), and this flows through to the Strategic Plan 2003–08. **Transforming the cotton**

industry in environmental terms has been a major task for the Corporation; a task dictated by government, the wider community and the industry itself.

During the course of the Strategic Plan 1998–2003, the Corporation introduced the Best Management Practice (BMP) Program, which has contributed greatly to addressing the major environmental impacts of cotton growing, such as pollution of waterways, chemical storage and handling, pesticide use and soil and water management.

Under its Strategic Plan 2003–08, the Corporation intends to build on the success of the BMP program by improving the capacity to further address environmental issues (particularly water) and to integrate the environmentally sensitive management of cotton farms into the wider effort to maintain the environmental health of catchments. To that end, we will be seeking to further extend collaborative activities with relevant water catchment management authorities and relevant research bodies.

Promoting and Maintaining Good Health

The priority goal with applicability to the work of the Corporation is **Preventive Healthcare**. Much of the work funded in the past by the Corporation has led to reduced pesticide use; particularly broad-spectrum pesticides such as organophosphates. This is of crucial importance to this priority, in addition to addressing sustainability. The future should see further reductions in pesticide, as further improvements to biotechnology available to the industry combines with improved management techniques.

The Corporation funded the development of a Managing Cotton Farm Safety manual, which is now being used in the course delivered by Farmsafe Australia in New South Wales and Queensland. This means

the cotton industry is well ahead of many other rural industries in implementing improved farm health and safety. It will be several years before it is possible to fully evaluate the effectiveness of this program. When the opportunity arises, the Corporation will look to provide further investment in farm health and safety, based on the evaluation of the current program.

The Corporation remains highly supportive of the Farm Health and Safety Joint Venture, involving other Rural Research and Development Corporations and managed by the Rural Industries Research and Development Corporation. This joint venture has just entered its second five-year strategic period and is addressing a range of issues concerning rural and farm health and safety.

Frontier Technologies for Building and Transforming Australian Industries

The NRP priority goal of **Frontier Technologies and New Industries** is of crucial importance to the cotton industry, which remains the only major agricultural industry in Australia that has used commercial applications of biotechnology, in the form of insect- and herbicide-tolerant varieties of cotton. The Corporation has been measuring the performance of INGARD® cotton, which contains a single gene that controls two key pests, for six years and the results clearly show that this technology enables cotton farmers to make major reductions in pesticide use. The industry has managed INGARD technology with great care and concern for the potential for resistance to develop. The Corporation has funded research to monitor pest populations for any signs of the development of resistance. To date, no significant change in resistance to the single gene in INGARD has been detected. This is important for the anticipated introduction of Bollgard II™, carrying two pest control genes instead of one.

Varieties carrying two pest control genes are much less prone to the development of resistance in key pests and the industry expects that this will allow a larger proportion of the crop area to be planted to Bollgard II™ than was possible with INGARD. If this eventuates, further large reductions in pesticide use across the industry are expected, with consequent environmental, health and economic benefits.

The Corporation has been investing in a range of biotechnology research such as cotton with healthier cottonseed oil, genes associated with fibre development and genetic markers to assist plant breeding. The science of biotechnology is a rapidly expanding and complex field and the Corporation has to be particularly vigilant that its investments are well targeted. To assist in forward planning, the Corporation will be commissioning a review of biotechnology and plant breeding early in 2004.

The Corporation also gives weight to the priority goal of **Advanced Materials**. Over the past decade, the Corporation's research lead to the development of Colana, a new fabric combining wool and cotton and delivering the best features of each. An Australian company now holds the patent for this product.

Research continues into fibre development and modification using biotechnology to alter characteristics such as fibre length, strength and cellulose structure. Looking further into the future, the Corporation believes this work may open up different specifications for the fibre with exciting new applications. CRDC will monitor the outcomes of such research closely, exploring any such potential applications.

Safeguarding Australia

Within this NRP, one priority goal is of importance to the work of the Corporation:

Protecting Australia from invasive diseases and pests. The cotton industry has already experienced the impact of an introduced, invasive pest. The silverleaf whitefly, thought to have been introduced to Australia about ten years ago, has become a problem in some northern cotton growing areas in central Queensland. Understanding how to manage this pest has required a significant collaborative investment by CRDC, GRDC and Horticulture Australia.

Preventing the incursion of such pests avoids the need for this expenditure, meaning the Corporation treats this priority goal very seriously. CRDC contributes, on behalf of the cotton industry, to Plant Health Australia as part of the national effort to keep pests and diseases out of Australia.

During 2003-04 the Corporation will be collaborating with Plant Health Australia to develop a biosecurity plan specific to the cotton industry.

PLANNING FOR THE FUTURE Strategic Plan 2003–2008

The Corporation's Strategic Plan 2003–2008, approved by the Parliamentary Secretary to the Minister for Agriculture, Fisheries and Forestry, Senator the Hon. Judith Troeth, on 1 July 2003, has been streamlined and adopts a more holistic, integrated and systematic approach to research and development.

The previous structure of 11 programs has been reviewed and integrated into six programs. This structure aims to improve linkages with the Australian Cotton Growers

Research Association and deliver enhanced economic, environmental and social outcomes to the industry and the broader community.

The revision of the Strategic Plan 1998–2003 into the required Outputs and Outcome model meant the Corporation was well placed for the transition to the new Strategic Plan. The Annual Operating Plan 2003–04, also approved by Senator Troeth on 1 July 2003, was formulated in accordance with this five year plan.

Strategic Plan 2003–2008: Program Objectives and Outcomes

PROGRAM 1: People and Knowledge

Objective

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, which creates viable rural communities

Outcome

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

PROGRAM 2: 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

Outcome

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

PROGRAM 3: 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.

Outcome

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

PROGRAM 4: Farming Systems

Objective

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

Outcome

A more sustainable and profitable cotton farming system

PROGRAM 5: Breeding and Biotechnology

Objective

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

Outcome

Continually improving cotton varieties

PROGRAM 6: Value Chain

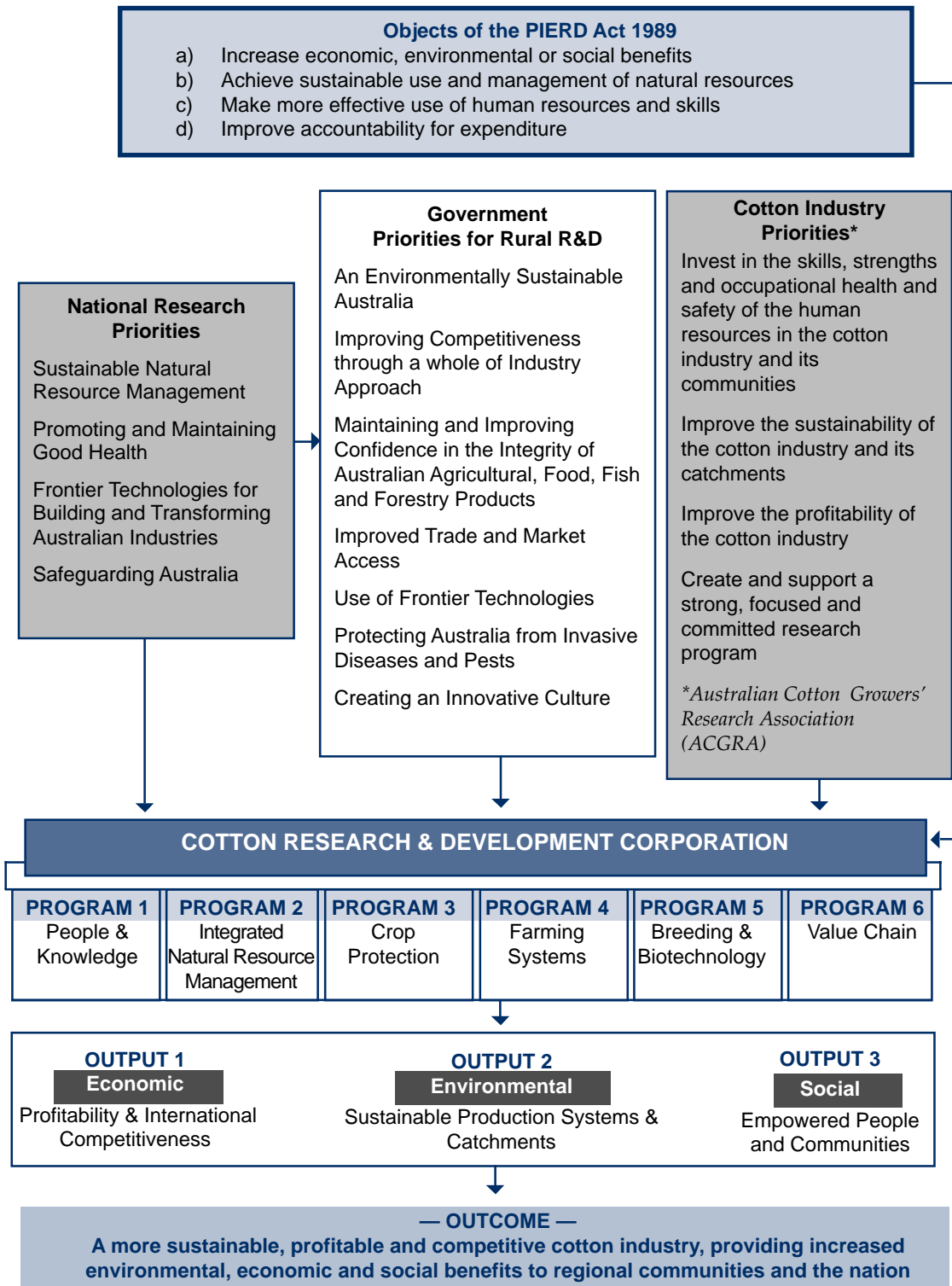
Objective

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

Outcome

High quality consumer-preferred Australian cotton in the world market place

Figure 4: Strategic Plan Flow Chart 2003–2008



CORPORATE FINANCIAL AND OPERATIONAL RESULTS

Revenue

CRDC does not receive a direct departmental or administered appropriation from the Australian Government.

Corporate revenue is drawn from a number of sources:

- ‡ Industry contributions of \$2.25 per 227kg of cotton (one bale) ex gin. The setting and collection of this levy is enabled by the *Cotton Levy Act 1982* and the *Primary Industries and Energy Research and Development (PIERD) Act 1989*;
- ‡ A matching contribution from the Federal Government up to a maximum value of 0.5 per cent of the gross value of production, or up to 50 per cent of expenditure, or not exceeding the industry contribution;
- ‡ Royalties on the domestic and international sale of planting seed from varieties developed through the CSIRO breeding program; and
- ‡ Interest on invested reserves.

Cotton is a summer crop that is harvested between March and June, depending on the variety, season and location. Initial processing of raw cotton (ginning) normally continues through to July and sometimes August. Ginning companies collect the levy, which is forwarded to the Federal Government. Anticipated Corporate revenues in 2002–03 were affected by the unfolding drought, although the final outcome was better than had been anticipated at the mid point of the reporting year. A smaller, earlier harvest meant almost all industry levies were received before the end of the financial year which, in turn, means the 2003–04 year will see a corresponding decrease in revenue.

Income from royalties provides a substantial revenue stream for the Corporation and flows from the Australian

cotton-breeding program conducted by the CSIRO with funding support by the Corporation. CSIRO-bred varieties are commercialised by the industry-owned company, Cotton Seed Distributors.

Corporation financial policy is to carry invested reserves to an approximate value of 70 per cent of one year's research and development expenditure. The Corporation maintains a range of short-, medium- and long-term investments. Reserves are used to supplement any shortfalls in the Corporation's income. Such supplementation was not necessary in the reporting year because of the additional levy receipts but CRDC anticipates an unprecedented use of these reserves in 2003–04. The Corporation anticipates income of \$8.33 million in 2003–04 and expenditure of \$12.82. These forecasts will have to be revised if cotton growing areas do not receive significant rainfall in the lead-up to planting of the crop.

Expenditure

Budgeted expenditure of \$17.014 million was reduced progressively throughout the reporting year as it became obvious that the drought would result in a decrease in income. This resulted in actual expenditure of \$15.662 million, which still represented an increase of almost seven per cent on the previous year.

Expenditure to achieve the three Outputs increased from the previous year, in line with this overall increase in expenditure, with the percentage of investment for each Output remaining almost identical. Expenditure attributed to Outputs includes a pro-rata representation of programs and even individual projects that contribute to more than one Output. It also includes Corporate management and support costs.

REVENUE

Figure 5: CRDC Revenue and Expenses 1990–2003

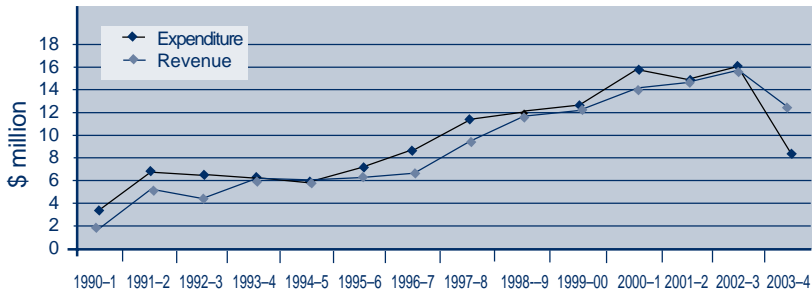


Figure 6: Cumulative Industry Levies and Australian Government Contributions

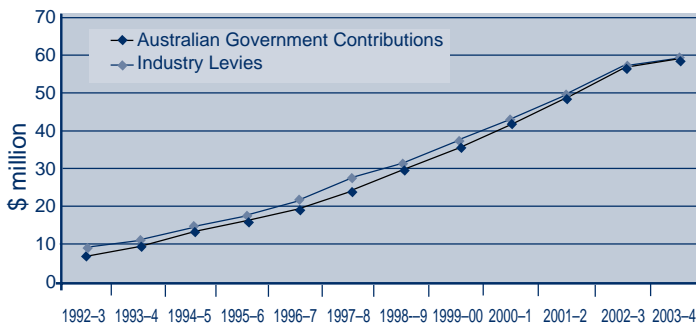
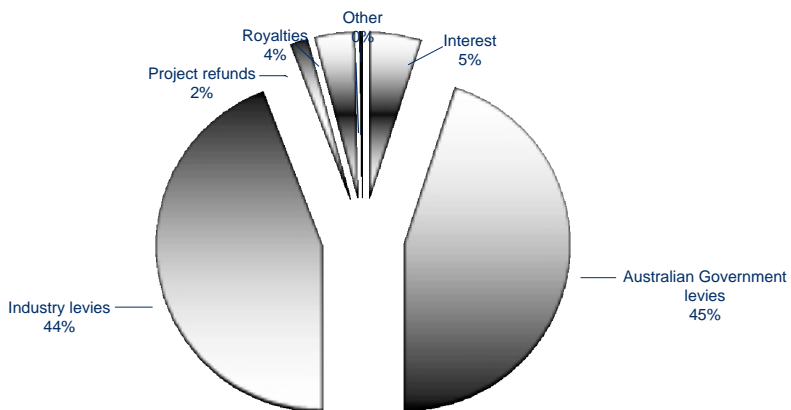


Figure 7: Revenue by Source 2002–2003



EXPENDITURE

Figure 8: Budget vs Actual Expenditure by Output 2002–2003

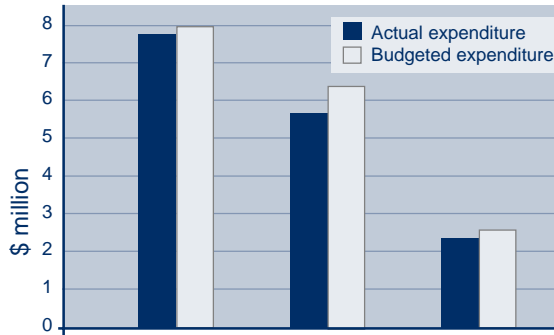


Figure 9: Expenditure by Output 2002–2003

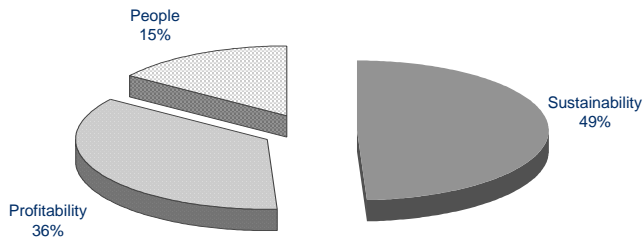
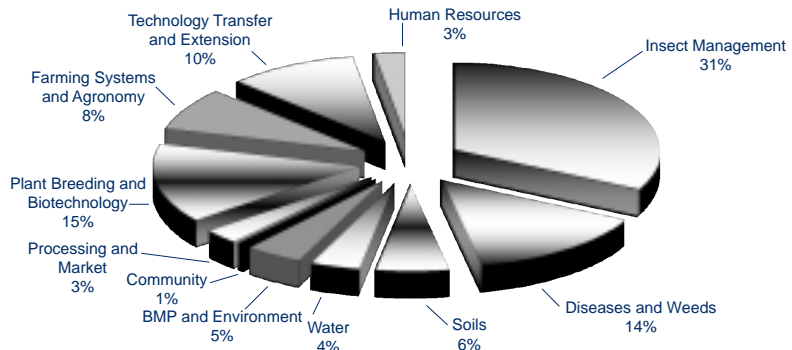


Figure 10: Research Expenditure by Program 2002–2003

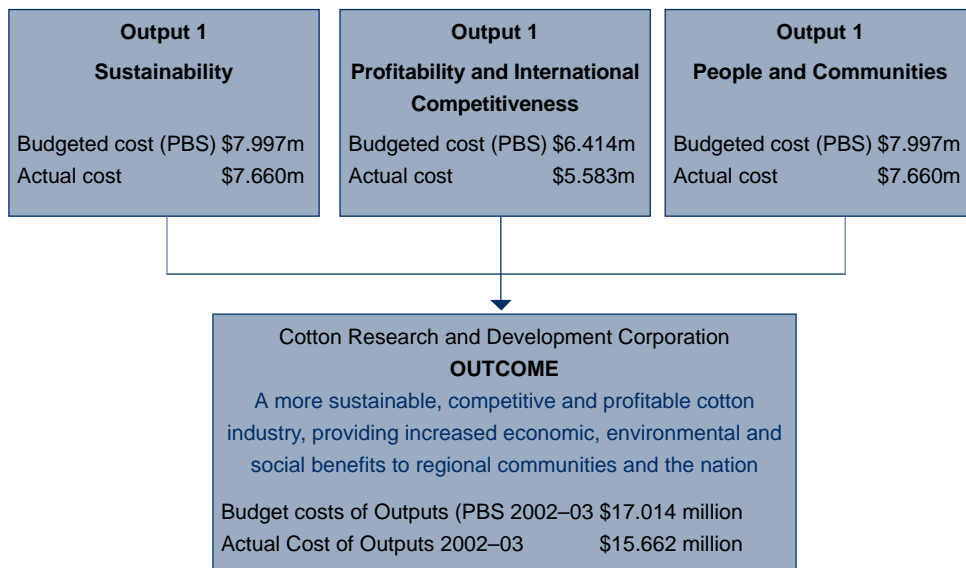


Outcome and Output Groups

The Corporation's Portfolio Budget Statement 2002–03 presents a single Outcome with three Output groups, reflecting the *Strategic Plan 1998–2003*. Further details about this structure can be found on pages 20 to 60. This Plan forms the basis for the Corporation's *Portfolio Budget Statement*. Key strategies have

been identified for each Output. Research programs and even individual projects may contribute to more than one Output and possibly to all three. The Corporation believes that it is most effective to measure progress by evaluating momentum across the broader research program in terms of the strategies and major Outputs.

Figure 11: Budgeted versus Actual Expenditure by Outputs and Outcome 2002–2003





Report of Operations

Research and Development

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation

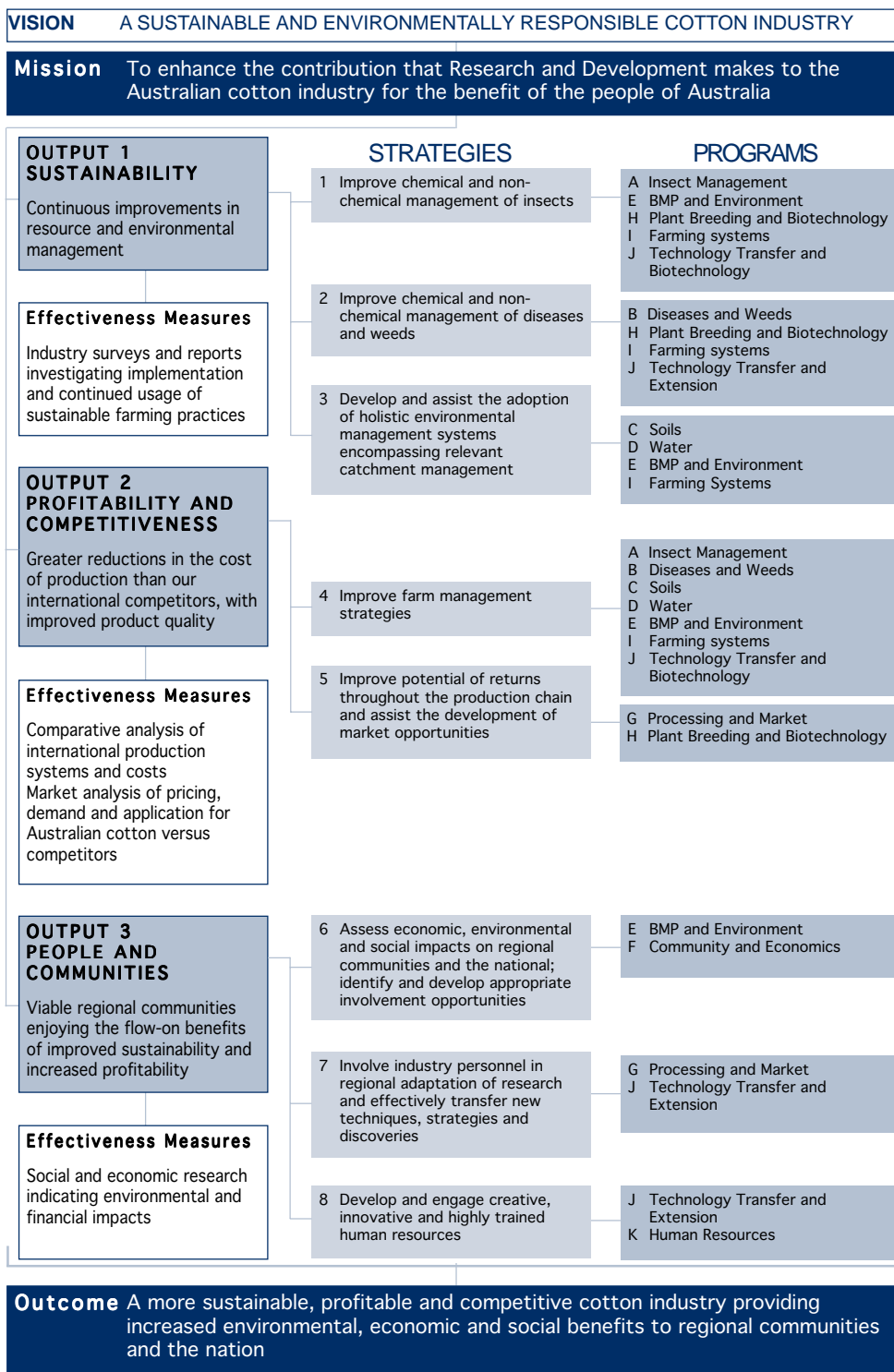
Research and Development Program 2002–2003

VISION:	A sustainable and environmentally responsible cotton industry
MISSION:	To enhance the contribution that Research and Development makes to the Australian cotton industry for the benefit of the people of Australia
OUTCOME:	A more sustainable, profitable and competitive cotton industry providing increased environmental, economic and social benefits to regional communities and the nation

The Corporation's research and development planning framework for 2002–03 was formulated in accordance with the *CRDC Strategic Plan 1998–2003: Outcome/Outputs Revision 2001*. One Outcome and three Outputs, 'Sustainability', Profitability and Competitiveness' and 'People and Communities', reflect a Triple Bottom Line approach to planning and reporting. This is complementary with the first three Objects of the *PIERD Act 1989*, with this report and other Corporation mechanisms for reporting performance addressing the fourth Object of the Act, Accountability. It is also consistent with the departmental portfolio Outcome of increasing the profitability, competitiveness and sustainability of Australian agricultural, food, fisheries and forestry industries.

The reporting year marks the final year of operation under the Strategic Plan 1998–2003. For this reason, the year's research and development program is reported within the context of the Strategic Plan's five years of operation where appropriate. The integrated nature of the research program means most of the eleven research areas contribute to more than one strategy and more than one Output.

Figure 12: Strategic Plan 1998–2003 Flow Chart



OUTPUT GROUP 1: SUSTAINABILITY

Research and development providing knowledge and products that promote continuous improvement in resource and environmental management

Overview

The Sustainability Output group continues to be the highest priority for the Australian cotton industry, and one where research and development is steadily contributing to the industry's performance. The Corporation estimates almost \$7.7 million or 49 per cent of actual expenditure was directed towards improving sustainability during the reporting year.

Sustainability strategies are:

Strategy 1 Improve chemical and non-chemical management of insects

Strategy 2 Improve chemical and non-chemical management of diseases and weeds

Strategy 3 Develop and assist the adoption of holistic environmental management systems encompassing relevant catchment management strategies

Seven of the 11 research programs have a direct impact on the achievement of this Output: Insect Management, Diseases and Weeds, Soils, Water, Best Management Practices and Environment, Plant Breeding and Biotechnology, and Farming Systems and Agronomy. The Technology Transfer and Extension program ensures research outcome from these programs are delivered to the cotton industry.

The cotton industry's second independent environmental audit, commissioned by the Corporation, was received in draft form towards the end of the reporting year. It was undertaken by a Sydney-based firm, GHD Pty Ltd, and overseen by Professor Ron Harris of the University of Guelph, Canada.

In the audit's Executive Summary the authors stated:

The Australian cotton industry has been subject to intensive environmental scrutiny, which, in part, was triggered by events such as fish kills from pesticides and, about five years ago, pesticide residues found in beef exports. There are ongoing concerns with the intensive use of pesticides and perceived high water use. As a result of these incidents and concerns, the cotton industry has developed and implemented a wide range of improvements in its operations and environmental management practices.

These improvements have been implemented over the last twelve years, since the inaugural environmental audit in 1991; however, the most significant and far-reaching environmental improvements have been implemented over the last five years.

There has been considerable investment by the industry into research and implementation to achieve long-term environmental outcomes. Some of the key areas of improvement have been:

- ‡ *Formulating and implementing a Best Management Practices (BMP) approach to cotton farming and environmental management. The BMP program has been a driving factor for the improved environmental management observed on cotton farms;*
- ‡ *Ongoing increases in water use efficiency, which have resulted in lower quantities of water applied per unit of production;*
- ‡ *Improved pest management, including less reliance on pesticides, through the adoption and implementation of Integrated Pest*

Management strategies of which the use of genetically modified cotton crops is a key component;

- ‡ *Improved spray application to more effectively target spray placement and minimise off-target drift;*
- ‡ *Introduction of increased chemical container recycling to reduce disposal in landfills;*
- ‡ *Improved land management through minimising erosion, identifying and managing salinity and reduced soil compaction;*
- ‡ *Development and adoption of farm management tools, directed to achieve environmentally positive outcomes (such as improved soil structure and health by implementing SOILpak); and*
- ‡ *Conducting a strong research, extension and development program. This has resulted in identification of environmental issues and introduction of improved management practices in pesticide use, pest management, water use, vegetation and land management, waste recycling and disposal, wildlife management and biodiversity.*

Although the cotton industry has vastly improved since the 1991 audit was conducted, there are still areas where significant environmental improvements could be achieved. The main environmental issues facing the cotton industry and opportunities for improved performance are in:

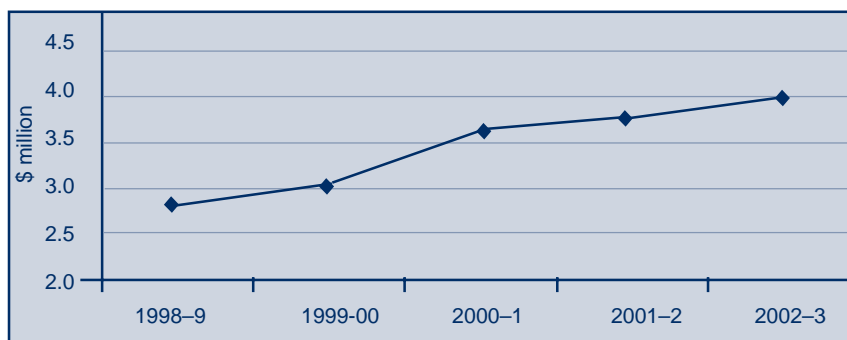
- ‡ *Water management;*
- ‡ *Pest management and pesticide use; and*
- ‡ *Waste management*

In response to the identification of these issues, cotton industry organisations, including the Corporation, are collaborating through the Australian Cotton Industry Council to develop a strategic plan and action list to further address these challenges.

Strategy 1: Improve chemical and non-chemical management of pests and beneficial insects

Two principal factors contributed to continued reductions in chemical insecticide usage in 2003–03: further improvements in Integrated Pest Management (IPM) and the better-managed use of genetically modified cotton varieties using single resistance gene INGARD® varieties.

Figure 13: CRDC expenditure on Insect Management: 1988–2003



Quantities of chemical applied per hectare did not vary significantly from year to year during the five seasons preceding the period of the Strategic Plan, but a trend towards increasing quantities of chemical per hectare was apparent, largely as a result of a steady increase in the resistance of *Helicoverpa armigera* to four of the six groups of insecticides available throughout this period. Following the warm, wet winter and spring of 1998, abundant weed growth led to an extreme insect and mite pest year in 1998–99, considered by many to be the worst experienced in fifteen years. However, since that season, chemical insecticide use per hectare has been declining rapidly in both conventional and INGARD cotton.

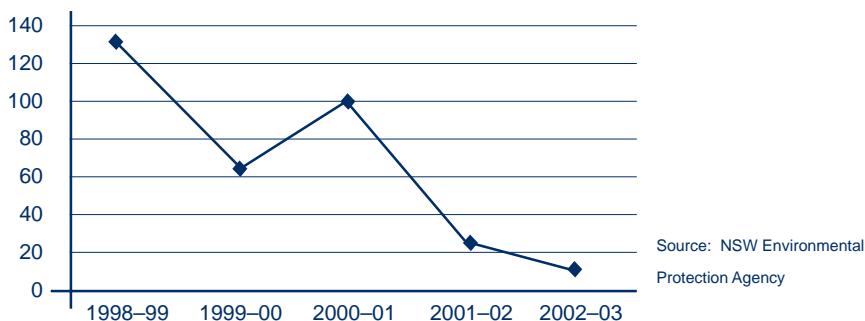
The rapid reduction in insecticide use since 1999 is a result of several factors operating together. These include:

- ‡ A major research and extension focus on IPM since 1998 leading to greater awareness, improved knowledge, confidence and skills which have contributed to changes in attitude and practice.
- ‡ The introduction of a number of new insecticides since 1998 (chemical and biological) that are applied at lower rates per hectare and are much more compatible with IPM than the chemical groups used prior to 1998.
- ‡ Improvements to the management of INGARD cotton that have contributed to the reduction in insecticide use, but have also improved grower confidence in IPM.



Figure 14: *Helicoverpa* (also known as *Heliothis*) is cotton's main pest and a major focus of research, development and extension

Figure 15: Cotton-related complaints to the NSW Environmental Protection Agency 1998–2003



The 2002–03 growing season saw a dramatic reduction in community complaints to the New South Wales Environmental Protection Agency. The total of ten complaints for the season, down from a high of 130 in the first year of the Strategic Plan (1998–99), indicates the effectiveness of the research and extension effort during the implementation of the Corporation's five year plan. It also gives a good indication of the determination of cotton farmers, researchers, consultants and other industry personnel to improve the industry's environmental performance.

INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) is a system for managing insects and mites that aims to access all potential control methods by choosing from effective non-chemical methods as first choice, narrowest spectrum (softest) chemical methods next and only using broad spectrum (hard) chemicals as a last resort.

IPM has been a major focus for research and extension efforts in cotton in Australia for many years; however, prior to 1998 there were no sufficiently effective alternatives to broad-spectrum chemicals to allow cotton growers to adopt IPM with confidence.

During the life of the CRDC Strategic Plan 1998–2003, a number of factors have converged to enable more rapid adoption of IPM practices and a significant reduction in chemical insecticide use:

- ‡ Introduction of a comprehensive set of IPM guidelines for cotton and the inclusion of IPM as a module in the cotton industry Best Management Practices Manual
- ‡ Improved management and performance of INGARD® cotton
- ‡ The introduction of several new narrow-spectrum or selective insecticides that are highly compatible with IPM and have low toxicity for animals
- ‡ Establishment of grower-driven Area Wide Management groups, which allow cotton growers to coordinate pest management on a regional basis, share information and benchmark practices about managing pests
- ‡ Increased availability and use of biological insecticides
- ‡ The development and introduction of an Integrated Pest Management short course for cotton growers

Figure 16: Cotton Growers extend their skills at an Integrated Pest Management Short Course



Cotton Integrated Pest Management Short Courses

One hundred growers from Emerald, St George, Goondiwindi, Dalby, Mungindi, Moree, Narrabri and Trangie have now attended the Australian Cotton CRC Integrated Pest Management short course, with about half electing to obtain a formal accreditation in IPM from the course. Accreditations are certified through either Murrumbidgee Agricultural College or Dalby Agricultural College, depending on the grower's location.

Further courses are planned for the 2003-04 season at Emerald, St George, Dirranbandi, Goondiwindi, Oakey, Narrabri, Warren and Hillston.

AREA WIDE MANAGEMENT

Area wide management is best considered as the extension of Integrated Pest Management from farm scale to a regional scale. It signifies a unified approach by a number of neighbouring farmers to achieving a reduction in pest numbers with minimal disruption to beneficial species, the environment or neighbouring farms.

The size of the area or region depends on the number of participating growers and while, theoretically, the larger the area covered by area wide management, the more effective it should be, this can also be achieved by a number of smaller grower groups working together within a region.

The Australian model of area wide management encourages cotton and grain growers in a region to work collaboratively to implement a range of practices strategically aimed at reducing *Helicoverpa armigera* numbers and encouraging the preservation of beneficial species that prey on *H. armigera* life stages. It is based on some knowledge and further assumptions that *H. armigera* populations, in most areas where a multitude of host crops is grown, will largely remain resident in those areas

by over-wintering under the late summer/autumn host crops and seeding the host crops in the next spring/early summer.

Demonstrable progress was evident in Area Wide Management up to and including the reporting year, with the number of Area Wide Management groups rising from three groups over three valleys in 1998 to forty groups covering all valleys in 2003.

The Corporation worked cooperatively with the Grains Research and Development Corporation in 2002–03, with a joint project on silverleaf whitefly management in the Emerald district and a Darling Downs project on *Helicoverpa* management on cotton and grains. CRDC also funded and supervised *Helicoverpa* egg collection to aid the development of an IPM-based resistance management strategy.

Through the support and facilitation of Area Wide Management groups provided by members of the cotton extension team (a number of whom are funded by the Corporation), it has become evident that groups identify different aims and objectives, including social, learning, communication, planning, benchmarking and trials. In general, growers are finding these groups to be effective in helping to adopt Integrated Pest Management on their farms and across their district.

GENETICALLY MODIFIED COTTON

Bt transgenic cotton varieties containing a CryIAc gene owned by Monsanto, and with the trade name INGARD®, have been grown commercially in Australia for seven consecutive seasons. INGARD has reduced chemical insecticide sprays for *Helicoverpa armigera* and *Helicoverpa punctigera* by an average of 56 per cent compared to conventional cotton.

In addition, yield potential and fibre quality have been maintained and in some cases significant yield increases have been documented. Not only has this delivered an economic dividend to cotton farmers, it has delivered an environmental dividend by reducing the use of chemicals on the crop.

INGARD cotton varieties were introduced gradually in staged releases, reaching the present cap of 30 per cent of the total cotton crop in 2000–2001. The staged releases reflect the cautious approach taken by Australian regulators to the first transgenic crop grown in Australia, while the establishment of a cap is a result of a

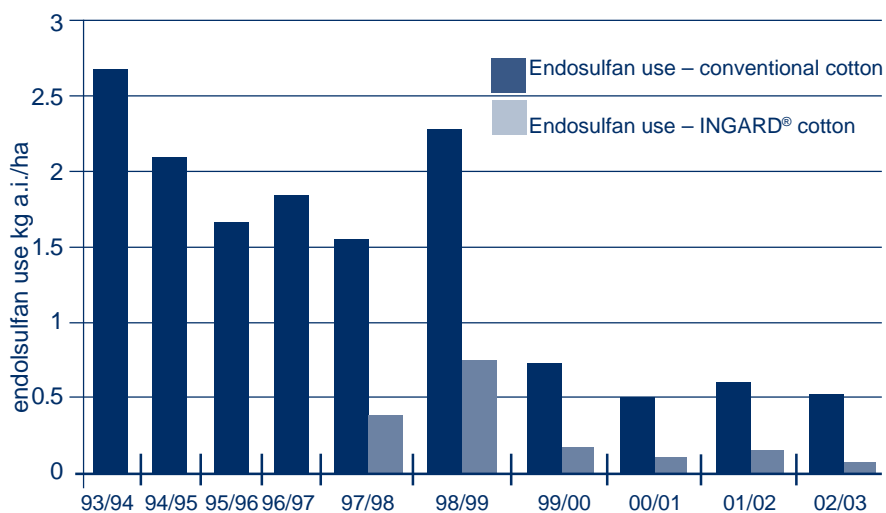
restriction imposed and supported by the industry, aimed at preventing the development of resistance to the single resistance gene in INGARD varieties.

The industry takes a responsible attitude to the prevention of resistance, backed by a major CRDC-funded research program to monitor for any early signs of resistance. Integrated pest management techniques such as pest ‘refuges’, crop residue destruction and designated planting windows are all mandatory components of that strategy.

Variability in performance of INGARD varieties at an individual field level has been a challenge to Australian cotton farmers but there is evidence from the 2000–01 and 2001–02 seasons that both INGARD performance and management of the technology improved as a result of the experience gained by growers and the results of CRDC investment in research.

Despite the benefits conferred on the cotton industry and local environments by INGARD, the industry is about to move to

Figure 17: Relative Endosulfan Use: conventional cotton and INGARD®



(Source: Cotton Consultants Australia Market Audit Survey 2003)

newer and even better technology with BOLLGARD II™ varieties, containing two pest resistance genes.

Following trials totalling about 5,000 hectares in 2002–03, varieties containing BOLLGARD II technology will be released commercially for the 2003–04 season. Farmers will be permitted to plant a combined maximum of 40 per cent of genetically modified cotton (BOLLGARD and INGARD), with the cap for INGARD set at 25 per cent of the crop.

The two-gene varieties will provide further improvements to efficacy, meaning the industry can expect even greater reduction in chemical insecticide requirement; however, their main purpose is to provide much greater resilience against the risk of resistance. A rapid transition to BOLLGARD II is planned, with INGARD varieties likely to be withdrawn after the 2003–04 season.

MANAGING RESISTANCE

The first detection of resistance to synthetic pyrethroids in *Helicoverpa armigera* in 1983 served as a driver for the cotton industry to develop and maintain a resistance management strategy for insecticides. The Australian cotton industry's Insecticide Resistance Management Strategy (IRMS) arose in 1983–84 from what was a world first attempt to develop and implement a nationwide resistance management program for cotton and grain crops.

While the cotton IRMS is voluntary, it is strongly supported by cotton growers and consultants. The industry also contributes to the development and annual review of the resistance management plan required as part of the licence to grow INGARD® cotton.

Prior to the implementation of the CRDC's 1998–2003 Strategic Plan, the industry practised a 'curative' response to the detection of target pest resistance to an

insecticide. The current preventative approach requires the pre-emptive implementation of resistance management practices for an insecticide before any resistance is detected.

CRDC has maintained a major focus on the monitoring, detection and management of resistance to insecticides, miticides and transgenic crops through research it funds and through active support of industry initiatives. This has included supporting the introduction of more preventative or pre-emptive approaches to minimise the development of resistance to new products in target pests. While the pre-emptive approach does not guarantee a zero risk of resistance developing, it does aim at slowing the rate at which resistance can develop.

Pre-emptive resistance management practices have been introduced for all major new insecticides introduced for control of *Helicoverpa* spp. since 1996, except for the biological insecticides derived from the *Helicoverpa* Nuclear Poly Hedrosis Virus (NPV). These are Gemstar®, introduced in 2000, and Vivus®, introduced in 2002.

The Australian cotton industry has become one of the most significant users of commercial NPV-based insecticides in the world. Although current consensus is that *Helicoverpa* spp. is unlikely to develop resistance to these viruses, CRDC has been supporting a research project examining whether any risk exists for the development of resistance to these important biological insecticides.

Review of Resistance Research and Management

In early 2002, the Corporation commissioned a review entitled *A Review of Research, Development, Extension and Management of Pesticide Resistance in Insect and Mite Pests of Cotton in Australia*,

conducted by experts in resistance monitoring, mechanisms and management, Dr Ian Denholm from IACR-Rothamstead, UK and Associate Professor Tim Dennehy of the University of Arizona. CRDC's Insect Program Consultant, Dr Vic Edge, accompanied the external reviewers as part of the review team.

Overall, the Corporation's research and management of resistance received a good report card; however, the review panel made a range of key recommendations for improvements in areas such as communications, reporting, egg collecting and *Helicoverpa* monitoring for resistance to conventional chemistry. CRDC has addressed all of these recommendations and will continue to monitor the effectiveness and appropriateness of the changes that have resulted.

The cotton industry established a committee in 1995 to oversee the management of pest resistance to insecticides, miticides and transgenic plants. Labelled the Transgenic and Insecticide Resistance Management Strategies Committee, it is known throughout the industry as TIMS.

In addition to CRDC, TIMS is made up of representatives from a wide range of groups within the industry: ACGRA members, consultants, researchers, chemical and seed industries and Monsanto. Recently, representatives from Pulse Australia and GRDC also joined the committee.

The TIMS committee has played an important role in guiding the successful management of resistance to the chemical insecticides and miticides used in cotton and grains crops as well as a key advisory and communications role in the management of transgenic crops.

TIMS provides recommendations to the Australian Pesticides and Veterinary

Medicines Authority on resistance management strategies for Bt cotton and Roundup Ready® cotton. The committee drives the annual process of review, development, consultation and communication each year to maintain the cotton industry's Insecticide Resistance Management Strategy (IRMS).

Recently, the TIMS committee has broadened its focus to include crop management strategies required for herbicide tolerant transgenic cottons and insecticides in grains crops. TIMS now seeks to include grains interests where resistance management is needed across the whole farming system.

TIMS has established three Technical Panels to provide advice on technical and scientific aspects of resistance and resistance management to conventional and biological insecticides, insect tolerant transgenic plants and herbicide tolerant transgenic plants.

In 2002–03, CRDC continued its central role in the operation of TIMS:

- ‡ assisting the coordination of technical review and advice to the committee
- ‡ coordinating and funding an annual Resistance Roadshow in all cotton growing districts to present resistance monitoring results and proposed changes to the IRMS
- ‡ publishing the annual IRMS guidelines approved by TIMS
- ‡ Coordinating *Helicoverpa* egg collecting programs to ensure researchers have sufficient material to test for resistance.

Strategy 2: Improve chemical and non-chemical management of diseases and weeds

COTTON DISEASES

The 2002–03 season marked the twentieth year of disease surveys of cotton in NSW, with a hot dry season unfavourable to most diseases.

Seedling mortality was higher than average, reflecting the adverse conditions and some rushed ground preparation. The main causes were compaction of soil due to drying out, Rhizoctonia seedling disease and Fusarium wilt. The Black Root Rot epidemic continued to expand. This disease is now present in all production areas of Queensland, and its severity increases with successive cotton crops.

Dry conditions meant Verticillium wilt had a slightly lower incidence. Its incidence in the Namoi Valley is increasing because of declining use of resistant varieties (at less than 50 per cent for the season).

Research shows that Verticillium can be controlled through crop rotations and planting of resistant cotton varieties. The incidence of Boll rots was the lowest on record, again due to the dry season and, similarly, Alternaria leaf spot was at low severity. No Cotton Bunchy Top was observed in any of the crops inspected.

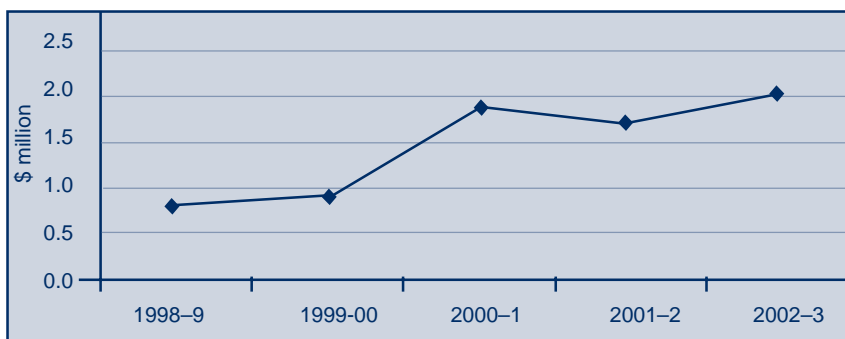
Sudden wilt was observed in a number of crops but experience shows that this disease does not recur in the same place the following year.

Fusarium Wilt

Fusarium wilt (*Fusarium oxysporum vasinfectum* or Fov) has emerged as the most serious disease threat for the Australian cotton industry. It is now widespread throughout New South Wales and Queensland and increasing rapidly, moving into new areas through human activity and floodwater. There were seven new reported occurrences on farms in NSW in the 2002-03 season, bringing the total count to 72 but the pathogen is almost certainly more widespread than reported. It is clear that an epidemic of Fusarium wilt is developing in NSW, with only the drought preventing the anticipated higher number of detections in the 2002–03 season. It is estimated that ninety per cent of farms in NSW will be affected by 2010 if the pathogen continues to spread at the same rate.

There are forms of Fusarium wilt that affect other agricultural and horticultural crops such as wheat and bananas, but research reveals that the two strains causing problems in cotton crops (with a third apparently evolving) are native to Australia and specific to cotton. The predominant Fusarium strain is strain 11 (the 'Downs strain'). Following the 2002–03 season,

Figure 18: CRDC Expenditure on Diseases and Weeds 1998–2003



strain 12 remained confined to a few fields close to Boggabilla NSW, with strain 11 also now present in many of those fields.

The Fusarium wilt research effort is coordinated through the Fusarium Wilt Research and Extension Coordinating Committee, FUSCOM, with the Corporation forming part of this committee. A FUSCOM workshop held at Toowoomba in February 2003 reviewed Fusarium-related research results, identified gaps and established collaborations. CRDC, the Cotton CRC and the grower-owned cooperative, Cotton Seed Distributors, had sponsored three plant pathologists from the USA. Dr Craig Rothrock, Dr Terry Kirkpatrick and Dr John D. Mueller undertook a nematode survey of Australian cotton soils and presented their findings at the workshop.

Some farm management practices, combined with the use of transgenic cotton, have been developed for use in the control of Fusarium wilt. If testing proves satisfactory, these techniques should be available in 2004. The ultimate aim is to develop this further into an integrated disease management strategy, with an extension plan already under development.

For the first time, FUSCOM also considered issues relating to Black Root Rot, a fungus that reproduces on cotton roots. Information included new control strategies, and Black Root Rot fungus not yet found outside cotton fields.

A CRDC-funded research project screened the susceptibility to Fusarium of 60 CSIRO and DeltaPine cotton varieties, including conventional and Bollgard II lines, in the 2002–03 season, with cotton breeders and pathologists monitoring thousands of nursery plots of conventional and GM cotton. The result is new conventional and genetically modified cottons for the coming season with significantly improved resistance to Fusarium, as measured by a new FUSCOM standardised ranking system.

Other Fusarium research directions include:

- ‡ The significance of rotation crops. This research indicates that Fusarium wilt severity is least after bare fallow and greatest after legume rotation
- ‡ The potential for biological control
- ‡ The actual infection process, and how and when plant defence responses occur
- ‡ Cotton genetically modified with genes from tobacco that produce antifungal proteins known as defensins
- ‡ Crossing Australian wild cotton species with resistance to Fusarium wilt with 'upland' (*Gossypium hirsutum*) cotton to enable future development of resistant varieties.

BETTER CONTROL OF WEEDS

A range of management practices is used for weed control in cotton, including residual herbicides, inter-row cultivation, hand chipping, shielded sprayers, selective herbicides and spot spraying. The Cotton Industry Benchmark Survey of the 1999–2000 season indicated that for many farmers producing irrigated cotton, spraying is not the first choice for weed control within the crop.

Results from a Weed Scoping study conducted in July 2001 on rainfall-grown cropping systems also indicated that alternative weed management practices for cotton production are being used more frequently, compared to the application of herbicides.

A comprehensive guide to integrated weed management in cotton, WEEDpak, was launched at the 2002 Australian Cotton Conference. WEEDpak had its origins in a challenge issued by CRDC at a Weed Management Workshop convened by the Corporation in 2001. Developed in a

collaborative project by CRDC and weeds agronomists funded by the Australian Cotton CRC, the guide is the most complete advisory document for weed management in cotton every produced in Australia.

Using transgenic cotton for weed control

The cotton industry was the first agricultural industry in Australia to plant transgenic glyphosate herbicide-tolerant cotton using Roundup Ready® technology from Monsanto. This has provided cotton farmers with a new tool to help manage weeds more efficiently, at less cost and with the use of less residual herbicide.

The effectiveness of Roundup Ready cotton, and the confidence growers have in the technology, can best be measured by how rapidly it has been adopted in the three seasons since its release. Roundup Ready cotton comprised an estimated 40 per cent of the total crop planted in the 2002–03 season. This technology has been applied to a range of crops other than cotton, raising concerns that it will cause plants to become herbicide-resistant

weeds. Such concerns appear to be of little relevance to cotton, which is not a ‘weedy’ plant, rarely spreading beyond field boundaries; nevertheless, ‘volunteer’ cotton plants are causing some concern on cotton farms and improved management will be required to minimise any risks in this area.

Figure 19: Percentage of Roundup Ready® Cotton Planted in Australia

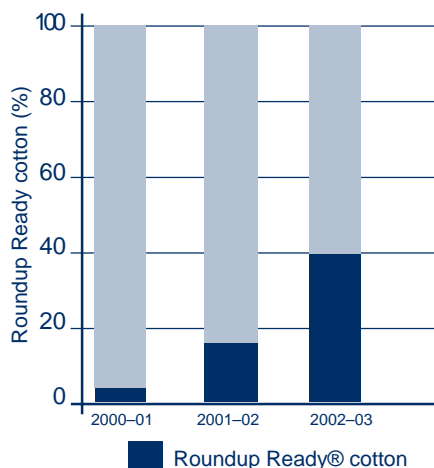
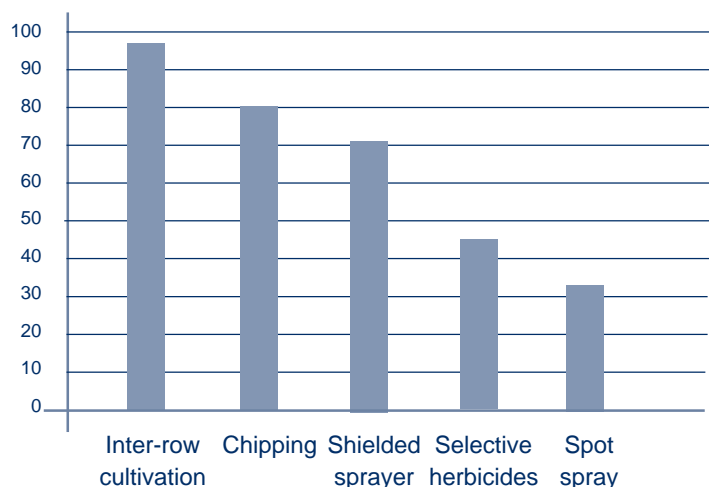


Figure 20: Cotton Industry Benchmark Survey of weed management practices



Strategy 3: Develop and assist the adoption of holistic environmental management systems encompassing relevant catchment management strategies

BEST MANAGEMENT PRACTICES

The Australian cotton industry's Best Management Practices (BMP) program, together with a cotton farmer-focused implementation strategy and associated voluntary audit, has led to an improvement in the way that cotton farmers manage chemical insecticides during the life of the CRDC Strategic Plan 1998–2003.

BMP had its origins in a joint research program funded by CRDC, Land and Water Australia (then the Land and Water Resources Research and Development Corporation) and the Murray-Darling Basin Commission, which sought to minimise the impacts of chemical insecticides on riverine and aquatic ecosystems in cotton-producing areas. This has led to reduced detections of chemical insecticides, particularly endosulfan, in the rivers in cotton growing areas of New South Wales and Queensland.

The BMP Manual allows cotton farmers to assess their operations against industry recommended practices, and then develop action plans to address issues identified during the self-assessment process. It provides farmers with a set of environmental management guidelines, together with a framework to document and plan the environmental management of their farming operations. Cotton farmers have also reported improved communications, both internally with staff and externally with contractors such as spray applicators.

To date, the BMP Manual covers application, storage and handling of chemical insecticides, integrated pest management, farm design and

management, including management of storm-water, farm hygiene and petrochemical storage and handling.

A land and water management module for the BMP Manual was drafted during the 2002–03 year and will be trialled on a range of cotton farms in different catchments over the next three years in a program funded by the department. The outcomes of this project are expected to contribute significantly to the ongoing development of the BMP program.

BMP is supported by detailed technical publications dealing with the various aspects of cotton growing. Existing information for land and water management includes SOILpak (soil management) and NUTRIpak and NutriLogic (nutrition management).

An integrated irrigation scheduling decision support system is currently under development to complement the existing soil water monitoring undertaken by cotton growers.

Figure 21: Cotton industry Best Management Practices logo



Implementation of the BMP Manual is the responsibility of Cotton Australia. Regular face-to-face contact between Cotton Australia's team and cotton farmers ensures that the growers fully understand the issues involved, how the manual works, and allows them to voice concerns or questions.

Auditing BMP

Corporation coordination and funding has established an audit component of the BMP program that recognises the need for objective verification of the on-farm implementation of best management practices. Farm audits verify the compliance of the farm's operations with the BMP Manual, providing an objective assessment for the cotton farmer, as well as advice on areas where improvements can be made. A dedicated audit office provides the interface between cotton farmers and auditors. A total of 352 audits had been conducted by June 2003, reaching a level of approximately 45 per cent of the cotton area planted in 2001 and 2002.

Coordination and Management of BMP

Development, coordination and management of the BMP program is a significant undertaking in its own right. CRDC plays a key role in providing support to the BMP Management Committee, an industry committee of cotton grower representatives who oversee the BMP program and set policy on implementation and the audit program. Management committee decisions are translated into action by a BMP working group, with active contribution provided by Corporation staff.



Figure 22: Chemicals are stored in accordance with BMP guidelines on this BMP-audited farm

DEVELOPING AN ENVIRONMENTAL MANAGEMENT PROGRAM

A project jointly funded by the Cotton Research & Development Corporation and the Murray-Darling Basin Commission will examine how to use the BMP Manual as the basis of a broader environmental program addressing the full range of natural resource management issues relevant to cotton production.

This pilot project has a number of aims, including:

- ‡ Equipping cotton farmers with the skills to ensure the continual improvement and sustainability of their management practices
- ‡ Development of natural resource management guidance materials
- ‡ Determining the linkage between the natural resource management guidance materials and catchment plans, objectives and targets
- ‡ Determining the appropriate balance between formal 'management system' approaches and practical information
- ‡ Determining the appropriate pace for introduction of new modules for any broader environmental management program
- ‡ Mapping the future of the cotton industry's BMP program.

In addition, as part of BMP's evolution into a more comprehensive Environmental Management Program, its new draft land and water management module addresses issues such as salinity, biodiversity, native vegetation, water quality and water use efficiency.

The development of this module is an excellent example of research and development collaboration between government and industry, involving CRDC, Cotton Australia, the Australian Cotton

Cooperative Research Centre (which provides technical support), the Environmental Management System National Pilot Program, which is funded by the Australian Government through the department and the Murray Darling Basin Commission. The World Wide Fund for Nature has provided an environmental perspective on the steering committee, which has heightened the holistic nature of the project.

Biodiversity Literature Review

During the reporting year, the Corporation commissioned Associate Professor Nick Reid of the University of New England to undertake a literature review of biodiversity research undertaken in cotton growing areas and compile a 'one-stop shop', which is now available to extension and research managers as a planning tool

Managing Riparian Land in the Cotton Industry

Riparian land is any land that adjoins, directly influences, or is influenced by, a body of water. Riparian land is important for the management and control of off-farm impacts, such as chemicals, sediment and fertilisers. Riparian lands and adjoining floodplains are also important for biodiversity because they are fertile, provide access to water, support a greater variety of species and corridors for the movement of wildlife.

CRDC identified riparian management and biodiversity on cotton farms as an area with little information available to assist growers. Together with Land and Water Australia, the Corporation has prepared a set of management guidelines for riparian lands in the cotton industry which includes case studies highlighting some of the outstanding improvements cotton growers have made in looking after their river banks

on-farm storage areas and natural billabongs. The guidelines, which will be available in late 2003, synthesise research material relevant to the cotton industry and cover topics such as:

- ‡ Tips on bank stabilisation and planting vegetation
- ‡ Trapping of nutrients and sediment
- ‡ Watercourse and channel stabilisation
- ‡ Management of pumps
- ‡ Managing lippia and other weeds
- ‡ Managing logs and snags in stream
- ‡ Managing blow out points
- ‡ Cattle grazing
- ‡ A summary of the complicated legislation regulating riparian zones

PERFORMANCE INFORMATION – OUTPUT 1: SUSTAINABILITY

Quality

All projects are assessed and performance reviewed by industry. Each year the CRDC's industry stakeholder, the Australian Cotton Growers' Research Association, reviews project applications received for consideration in the main round of funding, as well as reports from continuing projects. Recommendations from this review process are presented to the Corporation's Board prior to the project evaluation and budget meeting.

Research Input:

PBS 2002–03

Quantity: 75 projects*

Price: \$7.997 million

Actual 2002–03

Quantity: 91 projects*

Price: \$7.660 million

*The CRDC operates a comprehensive and integrated research program, with many research programs and even individual projects contributing to more than one Output. This figure represents a pro-rata of projects across the entire research program.

Workshops, Seminars, Conferences**

- ‡ TIMS Resistance Strategy 2002–03 Ratification meeting, July 2002
- ‡ Australian Cotton Conference, Brisbane, August 2002
- ‡ Spray Application Program review, Brisbane, August 2002
- ‡ Climate Change workshop, November 2002
- ‡ Australian Cotton CRC northern program review, Darwin, November 2002

- ‡ Growers' meetings with US Silverleaf Whitefly expert, Dr Peter Ellsworth, December 2002
- ‡ CSD Bollgard Basics Field Day, Wee Waa, December 2002
- ‡ Cotton Variety Trial Industry Development Officers inspection, Boggabri, January 2003
- ‡ ACGRA & Cotton CRC Diseases and Weeds Research Program Directions 2003 Meeting, Narrabri, January 2003
- ‡ WINCOTT Agronomy Field Day, Boggabri, February 2003
- ‡ FUSCOM Fusarium Workshop, Toowoomba, February 2003
- ‡ Visit by final year Agriculture students from University of Sydney and University of New England, March 2003
- ‡ Presentation to Industry of draft Second Australian Cotton Industry Environmental Audit Narrabri, April 2003
- ‡ Researcher Visit to CSIRO Canberra and Melbourne University, April 2003
- ‡ Decision Support Seminar for Gwydir and Namoi Valleys, Narrabri, April 2003
- ‡ Cotton Consultants meeting, Goondiwindi, May 2003
- ‡ Annual Resistance Roadshow, May 2003
- ‡ Researcher visit to Sydney University, May 2003
- ‡ WINCOTT native vegetation field day, Gunnedah, June 2003
- ‡ TIMS Resistance Strategy 2002–03 Ratification meeting, June 2003
- ‡ Sugar industry visit to cotton industry, Narrabri, Moree, Goondiwindi, June 2003
- ‡ Farming systems IPM Forum, Toowoomba, June 2003

**Direct funding and/or coordination

Other inputs

Australian Cotton Cooperative Research Centre Cotton Production Course, all year

Publications

These items are available from the Cotton Research and Development Corporation's office in Narrabri and, where appropriate, from www.crdc.com.au or the Technology Resource Centre at the Australian Cotton Research Institute and the Australian Cotton CRC's website, www.cotton.crc.org.au. This listing also includes contributions by CRDC personnel made on behalf of the Corporation to other publications. Publications produced by the CRDC are generally made available to the industry free of charge.

- ‡ Annual Report 2001-02
- ‡ Annual Operating Plan 2002-03
- ‡ Australian Cotton Conference Proceedings, August 2002
- ‡ Grower feedback on cotton BMP auditing. *The Australian Cotton Grower*, February/March 2003. Guy Roth and Rachel Holloway
- ‡ *Environmental audit: Part 2*. *The Australian Cotton Grower*, November/December 2002. Guy Roth and Rachel Holloway
- ‡ *CRDC reviews resistance research management*. *Australian Cotton Grower*, September/October 2002. Bruce Pyke
- ‡ *Australian Cotton Industry Best Management Practices Manual* Updated edition
- ‡ *Australian Cotton Industry Best Management Practices Manual: Storage and Handling of Petrochemicals*
- ‡ *BMP Management Committee Report*.

Australian Cotton Industry Council
Annual Report 2001–2002 Rachel
Holloway

- ‡ *Cotton Price Distortions: Building a Case for Reform*
- ‡ *Cotton Integrated Disease Management*
- ‡ *The effect of water stress and soil compaction on cotton canopy reflectance and temperature.* Australian Cotton Conference Proceedings, August 2002. Guy Roth
- ‡ *A guide to the INGARD® Resistance Management Plan*
- ‡ *Measuring the Sustainability of Cotton Production Systems* World Cotton Conference – 3, Capetown, Proceedings. Guy Roth
- ‡ Natural Resource Management posters
- ‡ *The Performance of INGARD® Cotton in Australia during the 2001/02 Season*
- ‡ *The Performance of Bt transgenic (INGARD®) cotton in Australia over six seasons.* World Cotton Conference – 3, Capetown, Proceedings. Bruce Pyke
- ‡ *Shields Ain't Shields: A CRDC-Funded Shielded Sprayer Study – 2002/03 Field and Laboratory Trial Results*
- ‡ *SPRAYpak: Cotton Growers' Spray Application Handbook* Second edition
- ‡ *Symptoms of diseases and disorders of cotton in Australia* (a companion to the Integrated Disease Management Guidelines)
- ‡ *2002–2003 Insecticide Resistance Management Strategy for Cotton* Pocket Cards
- ‡ *WEEDpak: a guide for the integrated management of weeds in cotton*

OUTPUT GROUP TWO: PROFITABILITY AND INTERNATIONAL COMPETITIVENESS

Research and development providing knowledge and products to enable greater reductions in the cost of production than our international competitors, with improved product quality

Overview

To achieve genuine ‘triple bottom line’ sustainability, the Australian cotton industry must maintain economic viability for growers, in addition to achieving environmental sustainability and adding to the economic and social fabric of its regional communities.

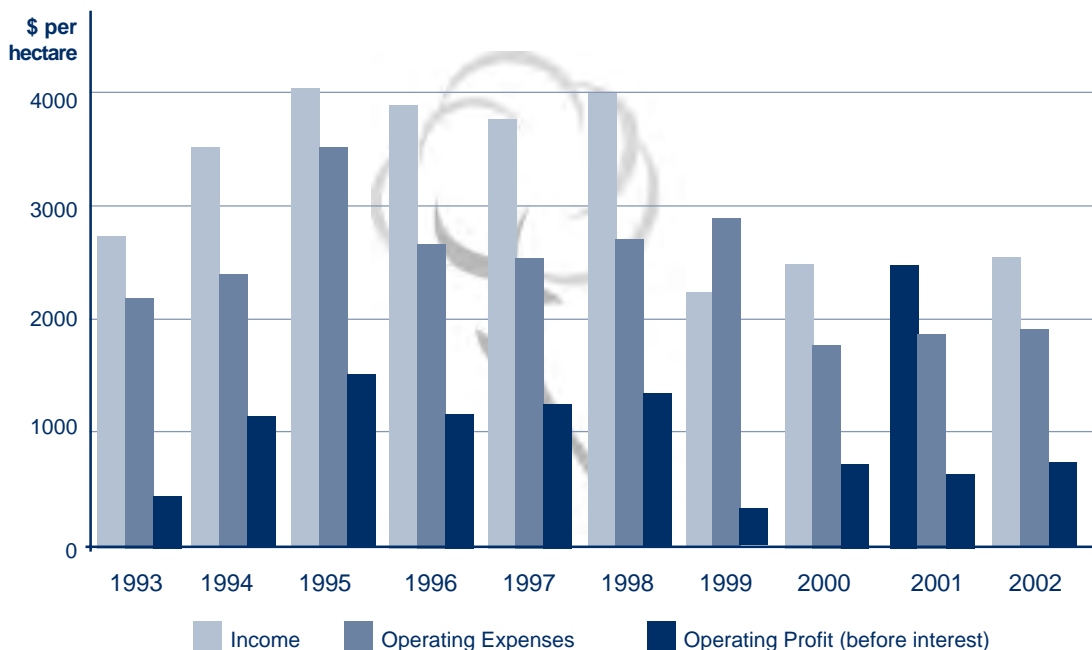
The gap between income and expenses continues to narrow steadily for Australian cotton growers who face ever-increasing costs in many areas of production, such as machinery (imported, and thus sensitive to

the value of the Australian dollar), water and freight costs. Over the past decade there has been a gradual increase in the costs of cotton production from about \$2,200 per hectare in 1993 to \$2,800 per hectare for the 2002 harvest. During this period, the value per bale of cotton has declined by about 10 per cent.

This assumes even more significance at a time when the income of cotton farmers is being hit hard by drought and associated shortage of water availability and makes CRDC-funded efficiency contributions such as improved water use efficiency, lower chemical use and higher yield from improved varieties vitally important for the continued economic sustainability of the industry.

In turn, the Corporation is fortunate to operate in an industry where growers are noted for early and eager adoption of research outcomes.

Figure 23: Australian Cotton Growers – Comparison of Average Income and Expense items



Source: Australian Cotton Comparative Analysis: 2002 Crop

In addition to input costs, profitability is also a product of prices achieved on the world market, as well as the fluctuating value of the Australian dollar.

As there is no intervention by the Australian Government in the growing or marketing of the Australian cotton crop, individual growers must become marketing experts, using the full range of market risk management tools such as forward selling, the use of New York Futures, commodity and currency hedging and participating in collective pools. Although they are subject to the vagaries of the international market, by these means they can protect themselves to some degree.

Despite these mitigating factors, cotton farmers are essentially price takers and must rely on the dividend from research and development, right through the growing and processing stages, that enables them to have increased yields, lower input costs and higher quality that attracts premiums in the world market.

Due to improvements in farming systems and cotton breeding, yield has increased by about 2.5 per cent per year over the past decade. The average yield of Australian cotton is the highest of any significant producing country in the world. In 2002–03, yield was approximately 7.37 bales per hectare, which was a surprisingly good result in the face of a severe shortage of irrigation water.

According to (UK-based) *Cotton Outlook* of 25 July, 2003, Australian cotton was selling at a significant premium compared to similar types of cotton throughout the world, making it the most valuable 'upland' cotton available in the international marketplace. Undoubtedly, it is increasing yield and the premium for quality that Australian cotton attracts in the world market that have enabled Australian cotton farmers to remain internationally competitive by maintaining their cost of production per bale produced,

even though their cost of production per hectare has increased.

The Corporation's activities under the Profitability Output address the statutory objective of increasing economic benefits for the industry and the community in general. The Corporation's key area of involvement is developing the quality of the Australian product to enable growers to maintain market access, deliver a product required by cotton purchasers and consumers and achieve premiums wherever possible. CRDC also continues to support the Australian Government and the Australian Cotton Industry Council in efforts to reduce price distortions and trade barriers around the world.

The broad range of research, development and technology transfer covers a number of the Federal Government's priorities for Rural Research and Development Corporations released in 1999, including taking a whole-of-industry approach, using biotechnology but being mindful of community concerns, being involved in trade and market access negotiations, maintaining and enhancing Australia's clean and green image, and food safety. In addition, this Output is very relevant to National Research Priorities defined by the Prime Minister during the reporting year.

Under the revised Strategic Plan 1998–2003 the Corporation identified two strategies to assist the industry improve profitability and increase competitiveness:

Strategy 4 Improve farm management strategies

Strategy 5 Improve potential for returns throughout the production chain and assist in the development of market opportunities.

Eight of CRDC's 11 research programs have direct impact on this Output: Insect Management, Diseases and Weeds, Soils, Water, Best Management Practices and Environment, Processing and Market, Plant

Breeding and Biotechnology, and Farming Systems and Agronomy. As with the Sustainability Output, the Technology Transfer and Extension program also provides support for the other activities to deliver technology to the industry.

Almost \$5.6 million or 36 per cent of the Corporation’s actual expenditure was directed towards improving profitability during the reporting year.

Strategy 4: Improve farm management strategies

Decision Support Systems

During the life of the Strategic Plan 1998–2003, the CRDC-funded cotton crop management software CottonLOGIC has proved itself as an advanced management tool for cotton producers. CottonLOGIC aids cotton farmers in decision-making, in particular for managing insects, pests and crop nutrition. CSIRO field evaluations of CottonLOGIC, when compared to commercial insect management, have demonstrated that it saves cotton growers an average of 1.3 sprays each season and up to \$1000 in software expenses.

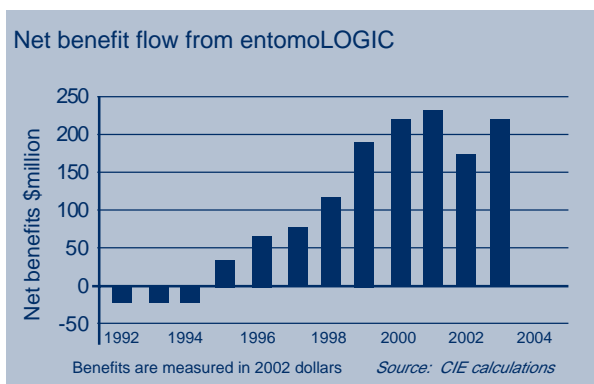
October 2002 saw a significant advance in the use of CottonLOGIC, with the release

of the program on PALM Pilot. This followed Corporation funding for related issues such as a review of the science in CottonLOGIC, industry feedback and guidance, field-testing and trial analysis. Growers can now record insect populations, run insect models and report on insect densities and predictions in the field. Once the data is collected it is easily uploaded to CottonLOGIC on the desktop by the press of a button.

CottonLOGIC software is available free to cotton growers and has been adopted by more than 1000 growers and farm consultants since its inception in 1998. It was developed by CSIRO Plant Industry, is distributed by the Australian Cotton Cooperative Research Centre and has been endorsed by the industry as ‘best management’ for insect pest control. It incorporated earlier decision support systems, pest management decision support system EntomoLOGIC, and NutriLOGIC, which assists interpretation of soil and petiole nitrate tests and gives optimal nitrogen recommendations to maximise yield.

CottonLOGIC provides support for rotation and refuge crops, identifies user-definable

Figure 24: Calculations of entomoLOGIC benefits by the Centre for International Economics (see Strategy 5)



INGARD thresholds and weather data entry for operations. It can also forecast Temperature Data Entry for more accurate *Helicoverpa* pressure prediction and provides a comprehensive range of cotton pest and beneficial insect pictures.

Looking to the future, the Corporation will consider the best direction to take in decision support, given new developments in technology such as broadband and the internet. Unfortunately, despite the fact that cotton farmers are very high users of computers and the internet, most cotton growers are unable to access broadband without a significant investment in satellite technology. If this situation continues, it may be a limiting factor in the development of decision support tools.

Figure 25: A history of cotton Decision Support tools

1976	SIRATAC prototype developed, containing several simulation models and a spraying decision model
1984	25 per cent of area planted to cotton in Australia managed by SIRATAC
1992	EntomoLOGIC replaced SIRATAC (containing <i>Helicoverpa</i> life cycle)
1998	CottonLOGIC replaces EntomoLOGIC, combining EntomoLOGIC with nutriLOGIC
2002	CottonLOGIC for the Palm Pilot released in response to consumer demand
2003–04	HydroLOGIC to be released (see page 43)

USING WATER TO GROW COTTON

Background

Sound water management is fundamental to the health of our environment, our rural communities and agricultural industries and basic to the current success of the cotton industry as one of Australia's top rural export earners. Nationally, the irrigated cotton crop consumes over two million megalitres of irrigation water annually (presuming full availability of water to fill quotas). This equates to about nine per cent of Australia's irrigation water, but the cotton industry generates about 35 per cent of the value of total Australian irrigated crop exports. The economic benefit of irrigation water in the cotton industry is \$500 to \$800 per megalitre, which compares well with other major irrigated crops in Australia and is high for cotton internationally.

While water use efficiency in the Australian cotton industry compares well with overseas cotton industries, achieving further efficiency gains remains a major challenge for the cotton industry. The current water reform-related reductions in ground water allocation and the requirements for environmental flows have imposed additional pressures on cotton farmers, and hence on research and development, to achieve further improvements in water use efficiency in the cotton industry.

Water Use Efficiency

Whole farm water use efficiency is determined by farming systems issues such as soil type, farm design, water storage management and water distribution infrastructure. Measuring actual water use across a property is important, allowing the farmer to assess what areas of their system and aspects of their management present most scope for improvements in water use efficiency.

Approximately 80 per cent of Australia's cotton is grown under irrigation, with the remainder grown using water from rainfall alone. Increasingly, with uncertain irrigation water availability, farmers producing irrigated cotton are choosing to integrate dryland farming principles into their overall management decisions.

With the cotton industry in the grip of drought in the 2002–03 season, the Corporation updated and republished the successful manual, *Cotton Production During Drought*. The publication had proved very popular with growers in previous seasons of lower than normal water availability.

September 2003 will see the release of new water management computer-based decision support tools, the CSIRO's HydroLOGIC, which incorporates a water use efficiency calculator.

The research that underpinned HydroLOGIC included rigorous 'ground-truthing' (proving that the computer simulation closely matches the reality in the field). During 2002–03, a series of workshops conducted by the researcher, together with a cotton extension officer, received very positive feedback from

farmers. This sets an excellent environment for the acceptance of HydroLOGIC when it is released.

Research by CSIRO Plant Industry, funded by CRDC, surveyed the water use efficiency of 25 farms in the 1998 to 2000 seasons, involving almost 300 cotton crops. This study found that, on average, the whole-farm water application efficiency was 57 per cent. However, there was a wide range of results, with some properties showing very good performance. The most frequent score was between 60 and 70 per cent, which matches the standards for similar systems set by the Food and Agriculture Organisation of the United Nations. A CRDC-funded project will revisit these farms in the 2003–04 season to update results and measure water use efficiency changes since the original research was completed.

Furrow irrigation is the most common water application method for growing irrigated cotton, but there is increasing interest in alternative application systems such as subsurface drip irrigation and low pressure overhead systems, such as a Lateral Move machine (*pictured below*) which waters by sprinklers, rather than by the crop furrows,

Figure 26: Lateral move machines are among alternative water delivery methods attracting more interest



as is more common. Where they can be installed economically, these alternative systems can improve water use efficiency by reducing water logging and deep drainage.

Water Quality

In 2002–03, the Corporation invested considerable funds into the effect of varying water quality on crop yield in various cotton districts. Some of the Corporation-supported deep drainage research is measuring the influence of varying water quality on the amount of water that passes through the root-zone of a crop into the water table. The research is also looking at how water quality can affect the availability of nutrients to the plant.

FARMING SYSTEMS FORUM

In December 2002, the Corporation brought together farmers and researchers at its annual Farming Systems Forum held in Narromine, New South Wales, exploring the topics of salinity, sodicity and hard-setting soils.

Participants met in groups for discussions on detecting, monitoring and managing these conditions and identifying research and extension gaps. Some of the forum's conclusions were that:

- ‡ Soil structure decline, plant nutrition and long-term sustainability of the cotton industry can all be affected by these problems.
- ‡ Research into the limitations caused by salinity, sodicity and hard-setting soils is critical for the sustainable long-term development of the cotton industry in Australia
- ‡ Short term solutions include a strategy involving a public awareness program and a review of the literature on key issues such as gypsum/lime amelioration

- ‡ Long term solutions require the establishment of field trials at a range of sites investigating deep drainage and soil chemistry interactions with a range of soil types.

The conclusions of the forum were very useful to the Corporation in formulating and reviewing current research and extension projects in these areas. Following the forum, a project on quantifying deep drainage under cotton fields began in January 2003.

SOIL HEALTH

The Farming Systems Forum in December 2001 concentrated on soil health issues, in response to industry concerns about the impact these were having on yield and quality. This led to the establishment of five new projects in the 2002–03 year looking at the influence of beneficial soil fauna on cotton production: particularly the diversity of VAM fungi in soil health, the development of measures of soil health, the effect of genetically modified cotton on the rhizosphere and maintaining profitability and soil quality. The forum also resulted in an informal communications network between all scientists working on cotton soil ecology which has led to a sharing of ideas and knowledge and, in some cases, resources.

PRECISION AGRICULTURE

CRDC-funded research on precision agriculture has shown that significant variability in soil physical and chemical properties within individual cotton fields is being reflected by considerable yield differences within the field. While current uniform nitrogen application practices are satisfactory for fields where variability is minor, they are unable to cater for greater variability within a single field. As well as being environmentally undesirable, this causes growers economic loss. The research demonstrated that yield maps

from a series of years for a single field can be combined to create potential management zones where each zone delineates a part of the field with relatively similar yield potential.

Following on from this research the Corporation funded a project, completed in 2002–03, on optimising inputs of fertilisers within a field by managing in-field variability. The prospects for site-specific nitrogen management appear good, with research demonstrating that a management zone approach is an effective method of subdividing a field for nitrogen fertiliser purposes.

SALINITY

With the increasing pressures on water resources and expectations from the community regarding natural resource management, salinity is an important area of research for the Corporation. Over the last ten years, CRDC-funded projects have aimed to identify where salinisation has occurred, identify the processes that have caused that salinisation and identify where improvements can be made in natural resource management.

In 2002–03, this research reached its third phase: implementation and management. CRDC funding was matched by funds obtained from the Natural Heritage Trust. The focus of the year's research was initial consultation with community groups to ensure research projects developed were consistent with natural resource management issues in each of the major cotton growing areas of central and northern New South Wales and south east Queensland and collection of electromagnetic and soil information at the field and district scale.

Response to local priorities meant, for example, that deep drainage risk maps were produced in the lower Gwydir and Macquarie valleys in New South Wales.

These maps have led to a greater understanding of where improvements in water use efficiency can be made, particularly in relation to location or relocation of water storage reservoirs and supply channels.

The Corporation's investment, along with the matching funds from the Natural Heritage Trust, allowed the project to expand from two research positions to five, enabling significant training and extension of the project's long-term benefits to growers, farm managers and the irrigation community in general.

Dr John Triantafilis, who has undertaken doctoral and post-doctoral research, funded by CRDC, into understanding the salinity threat in the irrigated cotton growing areas of northern NSW has moved on to research salinity in a wider context, which extends the benefits beyond the cotton industry to other Australian agricultural systems and the wider community.

CROP NUTRITION

Research in 2002–03 into rotation crops looked into the effectiveness of using the green manure crop, vetch. Research results indicate that when vetch is added to a continuous cotton system, savings in nitrogen fertiliser applications, as well as increases in yield potential, are brought about by improvement in soil condition. These dividends more than pay for the cost of sowing and green-manuring the vetch crop. The choice of rotation crop will always be dependent on each farm's specific circumstances. In some cases nitrogenous crops such as vetch will be more appropriate, but research indicates that where there is no specific need for a leguminous crop, wheat may be the best rotation.

Strategy 5: Improve potential for returns throughout the production chain and assist in the development of market opportunities

The CRDC-supported CSIRO cotton plant breeding has brought enormous benefits to the Australian cotton industry. To quantify those benefits, CSIRO and CRDC commissioned the Centre for International Economics (CIE) in 2002 to undertake a benefit cost analysis of the breeding program, as well as several decision support management tools for cotton farmers and their advisers. These tools include SIRATAC, used from 1984 to 1989, entomoLOGIC, released in 1994 and more recently, CottonLOGIC.

CIE's economic analysis shows that CSIRO'S cotton research has provided significant economic benefits to the Australian community, as well as to cotton farmers, returning a net benefit of over \$5 billion since 1973, with a benefit:cost ratio of 51 and internal rate of return of 31 per cent.

Most of the benefit has come from the cotton breeding program – a major focus of CRDC's research and development funding – which has returned net benefits of \$4.9 billion, with a benefit:cost ratio of 86 and internal rate of return of 34. The present

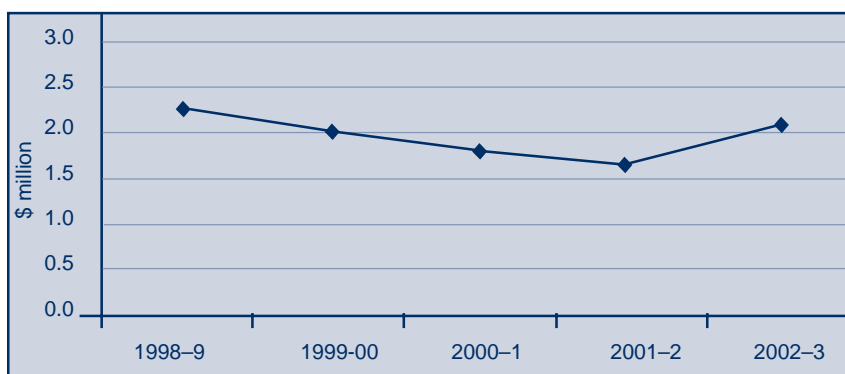
value of net benefits from CSIRO's award-winning decision support software, entomoLOGIC and CottonLOGIC, was estimated at just over \$200 million, with a benefit:cost ratio of 18.5.

Much of the CSIRO cotton breeding research focused on producing high yielding, high quality and better-adapted varieties, with increased resistance to pests and disease. It is beyond doubt that the breeding program has played a significant role in reducing the number of insecticide sprays and use of chemicals on cotton crops, providing a significant economic benefit. In comparison to the varieties grown a decade ago, the new varieties are also at least 11 per cent more water-use efficient.

The introduction of genetically monitored cotton varieties using Monsanto's INGARD® single resistance gene has been an important part of the CSIRO cotton breeding program. These varieties been very successful in reducing chemical insecticide sprays for *Helicoverpa*, which is fully reported under Output One, Strategy One.

The use of INGARD cotton varieties has also delivered a significant economic dividend to growers through reduced use of insecticides and increased yields; a

Figure 27: CRDC Expenditure on Processing and Market 1998–2003



dividend that was not necessarily expected when these varieties were first planted seven seasons ago.

Following trial plantings totalling about 5,000 hectares in 2002–03, varieties containing BOLLGARD II™ technology with two resistance genes will be released commercially for the 2003–04 season.

Based on the trial results, cotton farmers may achieve a 70 per cent reduction in insecticide applications with BOLLGARD varieties compared to conventional cotton: a significant increase on average reductions achieved with INGARD varieties.

Figure 28: Financial benefit cotton farmers received from INGARD® cotton 1996–2002

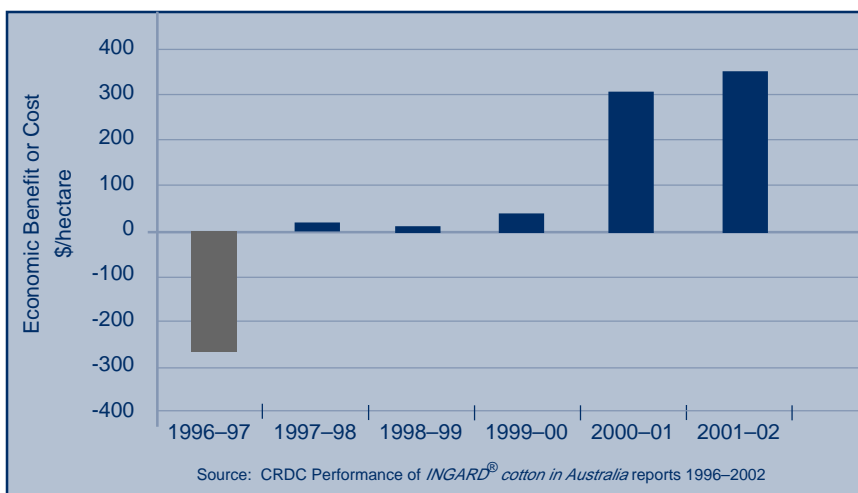
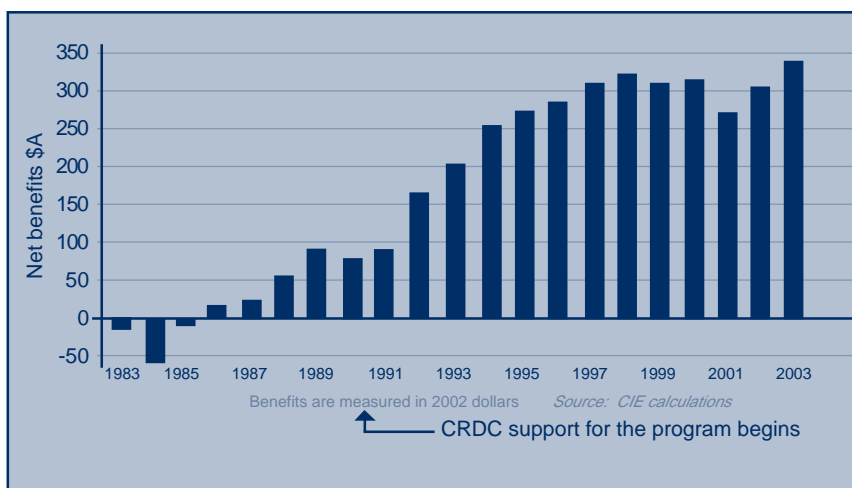


Figure 29: Net benefit flow from CSIRO breeding program



AUSTRALIAN COTTON IN THE MARKETPLACE

Following on from a major focus on 'field to fabric' issues at the Australian Cotton Conference in August 2002, the Corporation organised a Field to Fabric workshop in Narrabri in April 2003. The workshop was timed to coincide with a visit to Australia by executive members of the Spinners' Committee of the International Textile Manufacturers' Federation and was attended by senior members of the Australian cotton industry. The views expressed by the international spinners precipitated an industry-wide recognition that it needs to focus on fibre quality and strengthen research in this area. As a consequence, a major 'Focus on Quality' program will commence in the 2003–04 year.

A higher than usual proportion of high micronaire cotton caused concern to the industry in the past two seasons. High micronaire cotton is coarser and thus less sought after by spinners and subject to price discounts. Research has focused on assessing what proportion of this problem was caused by environmental factors as opposed to genetic factors within cotton varieties. Using 20-year-old cold storage seeds in plot trials as a control against new varieties, scientists discerned some small genetic factors but, overwhelmingly, the problem had been caused by environmental factors such as high temperature in the crop's micro-climate during the period of boll maturation. This will affect future crop management, particularly for Bollgard II varieties, which fruit earlier. It also signals a need to select plant breeding material that is less sensitive to environmental variability.

High micronaire has two manifestations. Over-mature cotton may have intrinsically fine fibre but with a particularly thick fibre wall. Other cotton can be intrinsically

coarse but not fully mature. Each of these forms of high micronaire produces its own set of 'downstream' problems in areas such as dyeing, so it is important to distinguish between the two. CSIRO Textile and Fibre Technology in Geelong, supported by CRDC funding, is developing equipment that can differentiate between maturity and fineness, using both Siroilan-Laserscan and polarised light microscopy technology, with the latter project some one to two years further away from development. The Laserscan project saw the development of a prototype in 2002–03 which has moved to the testing phase of the project in 2003–04.

**PERFORMANCE INFORMATION –
OUTPUT 2: PROFITABILITY AND
INTERNATIONAL COMPETITIVENESS**

Quality

All projects assessed and performance reviewed by industry. Each year the CRDC's industry stakeholder, the Australian Cotton Growers' Research Association, reviews project applications received for consideration in the main round of funding, as well as reports from continuing projects. Recommendations from this review process are presented to the Corporation's Board prior to the project evaluation and budget meeting.

Research Input

PBS 2002–03

Quantity: 53 projects*
Price: \$6.414 million

Actual 2002–03

Quantity: 61 projects*
Price: \$5.583 million

*CRDC operates a comprehensive and integrated research program, with many research programs and even individual projects contributing to more than one Output. This figure represents a pro-rata of projects across the entire research program.

Workshops, Seminars, Conferences**

- ‡ Australian Cotton Conference, Brisbane, August 2002,
- ‡ Spray Application Program review, Brisbane, August 2002
- ‡ CRDC Variety Protocol meeting, August 2002
- ‡ Murray Darling Basin Commission and Cotton Australia salinity workshop, Narrabri, October 2002
- ‡ Climate Change workshop, November 2002
- ‡ Australian Cotton CRC northern program review, Darwin, November 2002

- ‡ CSD Bollgard Basics Field Day, Wee Waa, December 2002
- ‡ Cotton Variety Trial Industry Development Officers inspection, Boggabri, January 2003
- ‡ WINCOTT Agronomy Field Day, Boggabri, February 2003
- ‡ Visit by final year Agriculture students from University of Sydney and The University of New England, March 2003
- ‡ World Cotton Research Conference – 3, Capetown, March 2003
- ‡ Presentation to Industry of draft Second Australian Cotton Industry Environmental Audit Narrabri, April 2003
- ‡ Researcher Visit to CSIRO Canberra and Melbourne University, April 2003
- ‡ DeltaPine Cotton Variety Trial Picking, Boggabri, April 2003
- ‡ Ultra Narrow Row Cotton Harvester Field Day, April 2003
- ‡ Decision Support Seminar for Gwydir and Namoi Valleys, Narrabri, April 2003
- ‡ Cotton Consultants meeting, Goondiwindi, May 2003
- ‡ Annual Resistance Roadshow, May 2003
- ‡ Researcher visit to Sydney University, May 2003
- ‡ Australian Cotton Trade Show, Moree, May 2003
- ‡ Extension Skills/Soils workshop, ACRI, May 2003
- ‡ Wincott Cotton Classing Tour, Australian Cotton Classing Centre, Wee Waa, June 2003
- ‡ CSD Information Tour, Gunnedah, June 2003
- ‡ WINCOTT native vegetation field day, Gunnedah, June 2003
- ‡ Sugar industry visit to cotton industry, Narrabri, Moree, Goondiwindi, June 2003
- ‡ Farming systems Integrated Pest Management Forum, Toowoomba, June 2003

**Direct funding and/or coordination

Other inputs

Australian Cotton Cooperative Research Centre Cotton Production Course, all year

Publications

These items are available from the Cotton Research and Development Corporation's office in Narrabri and, where appropriate, from www.crdc.com.au or the Technology Resource Centre at the Australian Cotton Research Institute and the Australian Cotton CRC's website, www.cotton.crc.org.au. This listing also includes contributions by CRDC personnel made on behalf of the Corporation to other publications. Publications produced by CRDC are generally made available to the industry free of charge.

- ‡ *CRDC Annual Report 2001-02*
- ‡ *CRDC Annual Operating Plan 2002-03*
- ‡ *Australian Cotton Conference Proceedings, August 2002*
- ‡ *Australian Cotton Industry Best Management Practices Manual* Updated edition
- ‡ *Australian Cotton Industry Best Management Practices Manual: Storage and Handling of Petrochemicals*
- ‡ *Cotton Industry Benchmarking Study 2001: A review*. Australian Cotton Conference Proceedings, August 2002. Geoff McIntyre, Bruce Pyke, Helen Dugdale and others
- ‡ *Cotton Price Distortions: Building a Case for Reform*
- ‡ *Cotton Integrated Disease Management*
- ‡ *Cotton Production during Drought*
- ‡ *CRDC reviews resistance research management*. The Australian Cotton Grower, September/October 2002. Bruce Pyke
- ‡ *Dryland Cotton Production*. Third edition
- ‡ *The effect of water stress and soil*

compaction on cotton canopy reflectance and temperature. Australian Cotton Conference Proceedings, August 2002. Guy Roth

- ‡ *Environmental audit: Part 2*. The Australian Cotton Grower, November/December 2002. Guy Roth and Rachel Holloway
- ‡ *Farming Systems Forum Proceedings: Salinity, Sodicity and Hard Setting Soils*
- ‡ *Grower feedback on cotton BMP auditing*. The Australian Cotton Grower, February/March 2003. Guy Roth and Rachel Holloway
- ‡ *A guide to the INGARD® Resistance Management Plan*
- ‡ *Measuring the Sustainability of Cotton Production Systems*. World Cotton Research Conference – 3, Capetown, Proceedings. Guy Roth and others
- ‡ *Natural Resource Management posters*
- ‡ *The Performance of INGARD® Cotton in Australia during the 2001–02 Season*
- ‡ *The Performance of Bt transgenic (INGARD®) cotton in Australia over six seasons*. World Cotton Research Conference – 3, Capetown, Proceedings. Bruce Pyke
- ‡ *Schooling the Australian Cotton Industry*. World Cotton Research Conference – 3, Capetown, Proceedings. Guy Roth and others
- ‡ *Shields Ain't Shields: A CRDC-Funded Shielded Sprayer Study – 2002/03 Field and Laboratory Trial Results*
- ‡ *SPRAYpak: Cotton Growers' Spray Application Handbook*. Second edition
- ‡ *2002–2003 Insecticide Resistance Management Strategy for cotton* Pocket Cards
- ‡ *WEEDpak: a guide for the integrated management of weeds in cotton*

Output Group 3: People and Communities

Research, Development and Technology Transfer to ensure maximum benefit for the industry and the community

The cotton industry recognises this Output as an important part of its triple bottom line sustainability. Since its establishment, the industry has contributed significantly to its local economies. As well as the employment it provides, a large number of firms provide products and services to the cotton industry. In addition, the concentration of research personnel in cotton growing areas adds to the sustainability of, for example, local schools, sporting groups and community organisations.

In longer established cotton regions such as the Namoi and Gwydir valleys, cotton has greatly affected the entire local economic structure. Undoubtedly, this has brought great benefits to these communities but it also means that it is important to ensure the industry's continued viability to ensure regional economic stability. Research and development has an important role in achieving this objective.

At the heart of this Output group lie the Statutory Objective of making more effective use of human resources and skills and the Rural Research and Development priority of cultivating creativity and innovation among the industry's human resources.

Three strategies in the revised Strategic Plan 1998–2003 address this Output:

Strategy 6 Assess economic, environmental and social impacts on regional communities and the nation; identify and develop appropriate involvement opportunities

Strategy 7 Involve industry personnel in regional adaptation of research and effectively transfer new techniques, strategies and discoveries

Strategy 8 Develop and engage creative, innovative and highly trained human resources.

Almost \$2.4 million, or 15 per cent of actual expenditure, went towards achieving this Output. Contributions are drawn from five research programs: Best Management Practices and Environment, Community and Economics, Processing and Market, Technology Transfer and Extension and Human Resources.

Strategy 6: Assess economic, environmental and social impacts on regional communities and the nation; identify and develop appropriate involvement opportunities

During the reporting year the Corporation commissioned the Institute for Rural Futures at The University of New England to undertake a scoping study on socioeconomic indicators for the cotton industry.

The final report should become available to CRDC in late 2003 and will provide a framework for monitoring the socioeconomic impacts of the cotton industry on people and communities in cotton growing areas. More than that, it will provide information for planning future research and development to achieve the newly-commenced Strategic Plan 2003–08 Output of 'Empowering People and Communities' and its Outcome of 'A more sustainable, profitable and competitive cotton industry, providing increased environmental, economic and social benefits to regional communities and the nation'.

AUSTRALIAN COTTON CENTRE

The Australian Cotton Centre, located at Narrabri, NSW, conveys key industry messages with interactive and informative exhibits that were developed and constructed by the National Science and Technology Centre, Questacon. Almost 8,000 people visited the centre in its first year of operation.

The Centre has served as a valuable information and educational resource centre for the national cotton industry while simultaneously encouraging regional economic development and job creation. It is playing a key role in the development of tourism in the Narrabri district, encouraging tourists to stay longer and spend money in the local community.

Funding from CRDC was used for two of the Centre's exhibits: the Wheel of Life and Better Breeding exhibits. The Wheel of Life

exhibit allows visitors to investigate the *Helicoverpa* spp. life cycle and corresponding farm management practices. The Better Breeding exhibit means visitors can undertake a virtual experiment in crossing cotton plant varieties to produce a high yielding plant with high tolerance to insect attack.

The information provided in these hands-on exhibits brings home in an entertaining and interactive way the message that research has played a significant role since the commencement of the industry in the 1960s and it manages this while avoiding technical jargon and utilising novel delivery mechanisms.

An educational pack for students identifies includes worksheets specifically developed to link the information found within the exhibits to the educational curriculum.

Figure 30: Australian Cotton Centre staff deliver the story of cotton and local communities



The cotton industry message:

“The Australian cotton industry is committed to developing and improving the competitiveness, profitability and sustainability that ultimately leads to economic development and job creation in rural and regional Australia”

OCCUPATIONAL HEALTH AND SAFETY ON COTTON FARMS

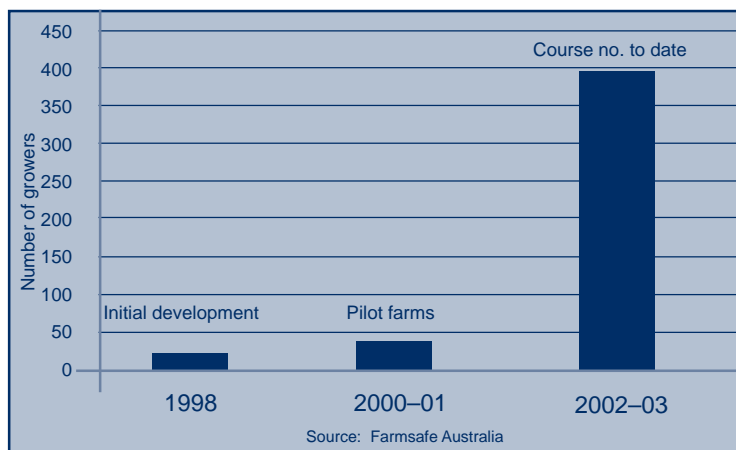
The Corporation funded production of the *Managing Cotton Farm Safety Manual*, which was released to the cotton industry during the first half of 2002. This is now being used as the training manual for the Managing Cotton Farm Safety course for cotton growers that is being delivered by FarmSafe Australia. Demand for the course has been high, delivering a very satisfactory return on the Corporation's investment.

BENCHMARKING THE ECONOMICS OF GROWING COTTON

For the second year running, the Corporation commissioned BOYCE Chartered Accountants to produce an

industry benchmark for the economics of cotton growing in Australia. The *Australian Cotton Comparative Analysis: 2002 Crop* can be downloaded from the CRDC website and used by cotton growers, consultant agronomists and cotton Industry Development Officers. Many farmers have now implemented Best Management Practices in growing their cotton; this report has provided a management tool to allow them to develop 'best practice' in financial management as well. It provides a valuable benchmarking tool against which growers can measure their own cotton farming operation's performance and identify strengths and weaknesses. It is then up to individual growers to use this knowledge to develop and implement specific action plans to reach new goals.

Figure 31: Participation rates in the Managing Cotton Farm Safety Course



Strategy 7: Involve industry personnel in regional adaptation of research and effectively transfer new techniques, strategies and discoveries

The Australian Cotton CRC's National Extension Network consists of extension and Industry Development Officers located in all cotton growing regions and is significantly assisted by funding from the Corporation.

Industry Development Officers undertake regional trials, facilitate area wide management groups, organise field days and workshops and coordinate local data collection to aid the research effort. They also provide feedback from growers and consultants to researchers about research needs in each valley. The activities they undertake each season are based on the interests and needs expressed by the local industry in each region.

The 2002-03 year saw the Cotton Extension Network plan and adopt a tighter and more focused approach, including a more interactive system of planning activities that integrates regional priorities and activities into a national framework. Reference groups met in most regions to set local extension priorities. Planning frameworks were introduced, encouraging the cotton extension network to consider the four key groups of techniques that they utilise and to maximise the benefit through linkages between the activities of:

- ‡ Information delivery through means such as newsletters, the internet and field days
- ‡ Working with groups such as Area Wide Management groups
- ‡ Trials and demonstrations
- ‡ Education.

The new planning system will lend itself to better measurement of outputs and outcomes, with evaluations threaded through the program.

The CRDC-funded role of the National Cotton Extension Coordinator has evolved in response to the emerging interests of industry and the changing dynamic of the cotton extension network and roles and responsibilities of the extension focus teams have been clarified.

With new staff becoming more established in their regional roles, the focus teams are taking an active role in addressing technical issues in their field of expertise. Focus teams have been given opportunities to plan their activities and engage the rest of the extension network in their activities.

Management of silverleaf whitefly in central Queensland

Australia's first major outbreak of the silverleaf whitefly occurred in the Emerald region in the 2001-2002 season. This pest attacks a number of agricultural and horticultural crops, including cotton. Whitefly excretes a high sugar-content honeydew waste product that affects cotton fibre quality during the spinning process.

Management of this pest provided an excellent example of CRDC, researchers and extension staff working cooperatively to achieve an excellent outcome for the cotton industry. Within twelve months the Corporation was able to direct resources and coordinate activities that helped cotton farmers in Central Queensland to successfully manage a pest that took five years or more to overcome to the same degree in the USA. CRDC's input included:

- ‡ lodging permit applications with the Australian Pesticides and Veterinary Medicines Authority for insecticides to control silverleaf whitefly
- ‡ organising a silverleaf whitefly study tour to the USA for growers, consultants, researchers and extension officers
- ‡ bringing US expert, Dr Peter Ellsworth, to Australia
- ‡ convening a whitefly research workshop with Horticulture Australia Limited.

NATIONAL EXTENSION TEAM

Figure 32: National extension team techniques

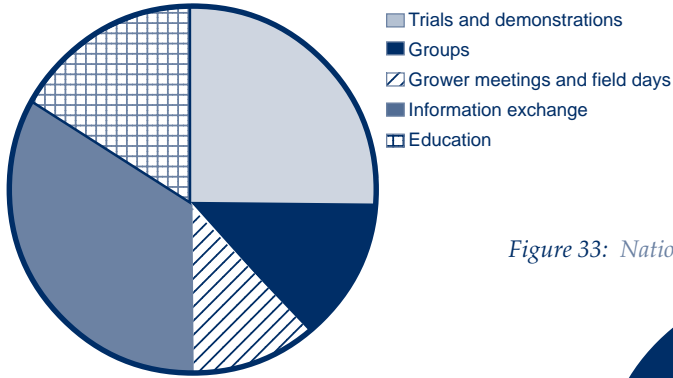


Figure 33: National extension team balance

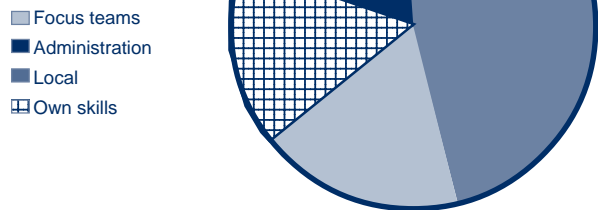


Figure 34: Industry Development Officers

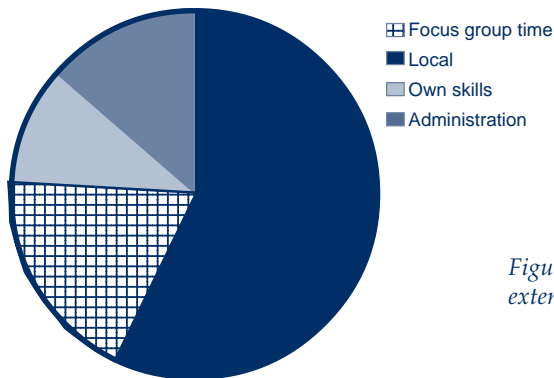
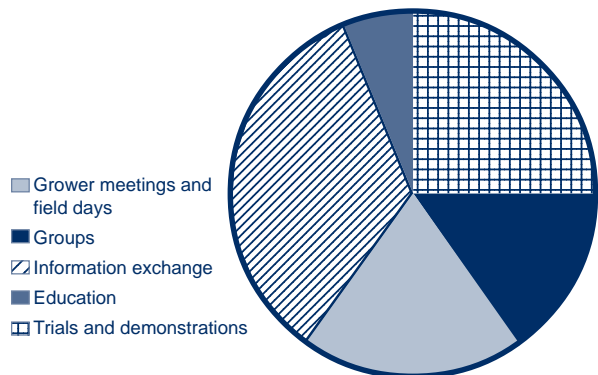


Figure 35: Industry Development Officer extension methods



Strategy 8: Develop and engage creative, innovative and highly trained human resources

A continually improving culture of innovation and increased skill level in scientists, advisers and growers is providing significant benefits to the cotton industry and to regional communities. This makes the support and development of the men and women who conduct research and transfer the knowledge gained from that research a high and continuing priority for CRDC.

CRDC conducts research reviews of programs by independent international research scientists periodically, to ensure opportunities are not overlooked. Reviews such as the 2002 reviews of insect and mite pesticide resistance research, development, extension and management by Drs Ian Denholm (Rothamstead) and Tim Dennehy (Arizona), of Australian Fusarium wilt research by Dr Pat Collyer, Chair of the USA Cotton Disease Council, and reviews of spray application research and extension by British research scientist, Dr Steve Parkin, were largely undertaken in the 2001–2002 year, but finalised during the reporting year.

CRDC provides support for researchers and extension personnel to travel overseas to gain a better insight into particular issues facing the Australian cotton industry, such as disease and pest management. The Corporation sponsored five researchers to join a study tour to gain further knowledge of silverleaf whitefly, in response to a major outbreak in some areas of Central Queensland in 2001–02. The group was able to consult with producers, researchers, extension staff, cotton consultants and aerial operators in regions of the USA that had experienced similar problems.

The latest World Cotton Research Conference was held in Capetown in late

2003. Joint funding by CRDC and the Australian Cotton CRC made it possible for a group of 23 cotton researchers to participate. Apart from the benefits of information transfer, participation in the World Conference showcases Australian science on the world stage and benefits developing nations who do not have the same research capacities.

CRDC also sponsored researchers to attend and present papers at other international conferences such as the US cotton Disease Council Colloquium on Fusarium wilt in Australia and the Beltwide Cotton Conference in Nashville, USA. CRDC provides opportunities for Australian researchers to spend time overseas on study exchanges.

Some 1200 growers, researchers and industry personnel attended the biennial Australian Cotton Conference, held in Brisbane in August 2002. Cotton growers demonstrated their high level of interest in research by maintaining excellent attendance levels at a time when the industry was suffering the worst drought on record. The Corporation was one of the founding sponsors of the biennial Australian Cotton Conference and funds publication of the proceedings of the conference.

Growers and researchers mix together freely in sessions and seminars at the conference and are able to exchange views and information and ensure that research remains relevant to the needs of the industry. For organisations such as CRDC and the Australian Cotton Cooperative Research Centre, it is an unparalleled opportunity to promote the very latest in research to the end users.

The cotton industry was the first agricultural industry to make its main gathering a research conference and is delighted that this effective model is beginning to serve as an example for other agricultural industries.

Figure 36: CRDC funding for human resource development 1998 to 2003

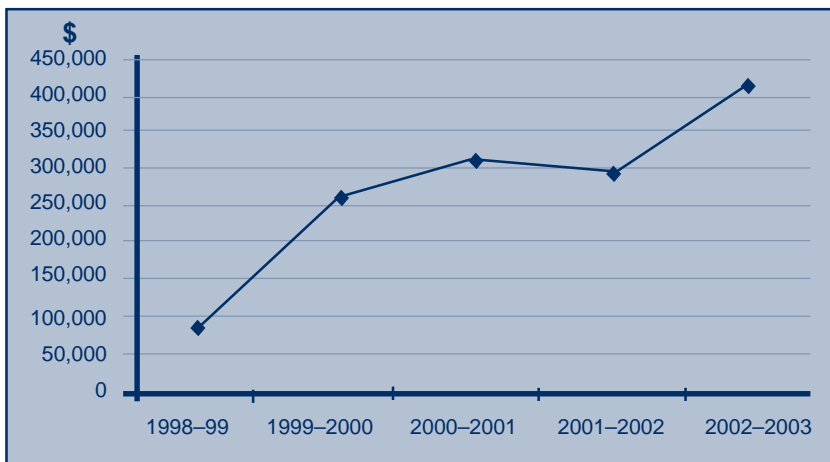


Figure 37: CRDC postgraduate awards 1998 to 2003

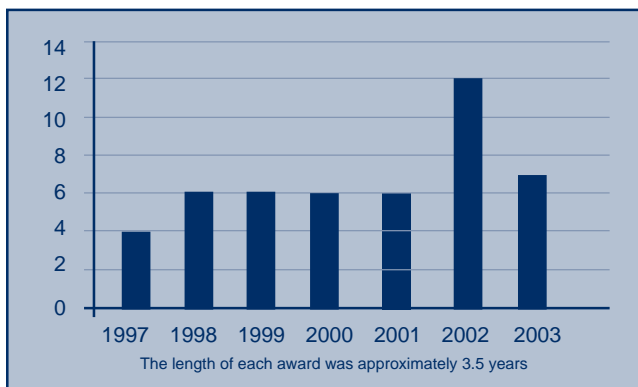
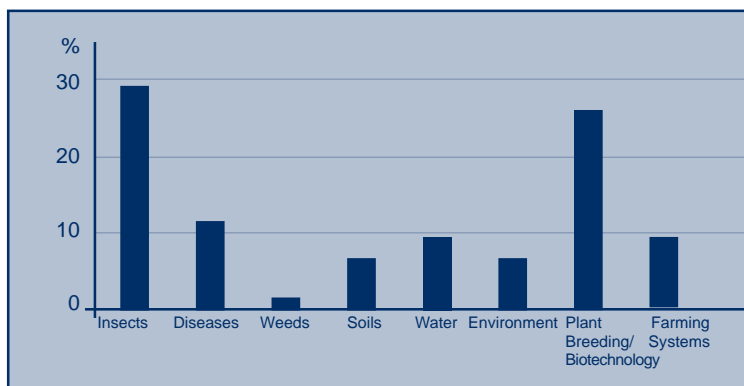


Figure 38: Disciplines of CRDC-supported postgraduate students 1998 to 2003



WOMEN IN COTTON

Women are involved in many sectors of the cotton industry and are often active within family farming enterprises. With other agricultural industries, such as dairying, having established groups to provide support and opportunities for women, women in cotton established Wincott – the Womens Industry Network Cotton.

The Corporation is providing seed funding for Wincott, but the organisation aims to become self funding by the end of the 2003–2004 financial year.

Wincott went from strength to strength in 2002–03, providing women in the cotton industry with information and resources that encourage and empower them to attain skills and confidence and have an informed voice in the agricultural sector. Women attended information days, general interest field days and opportunities for skill building

within the industry. Feedback is enthusiastic, reflecting how much women feel they gain from Wincott membership.

The 2002–03 year saw events such as an insect control field day at Boggabri and a briefing on cotton classing and important associated issues, such as why cotton receives premiums and discounts in the market. Six workshops on subjects as diverse as legislation updates, personal development and financial planning were held at the Annual General Meeting in March this year.

A major challenge for Wincott is the sheer distances separating some cotton valleys, making it difficult for the women to get together. An ever-increasing number of events will be held in different cotton districts to help overcome the problem.

Figure 39: Wincott women are using opportunities like this field day at Boggabri to increase their skills and knowledge



PERFORMANCE MEASURES**OUTPUT 3: PEOPLE AND COMMUNITIES****Quality**

All projects assessed and performance reviewed by industry . Each year the CRDC's industry stakeholder, the Australian Cotton Growers' Research Association, reviews project applications received for consideration in the main round of funding, as well as reports from continuing projects. Recommendations from this review process are presented to the Corporation's Board prior to the project evaluation and budget meeting.

Research Input**PBS 2002–03**

Quantity: 35 projects*

Price: \$2.603 million

Actual 2002–03

Quantity: 51 projects*

Price: \$2.379 million

= The CRDC operates a comprehensive and integrated research program, with many research programs and even individual projects contributing to more than one Output. This figure represents a pro-rata of projects across the entire research program.

Workshops, Seminars, Conferences**

- ‡ Cotton Variety Trial Industry Development Officers inspection, Boggabri, January 2003
- ‡ WINCOTT Agronomy Field Day, Boggabri, February 2003
- ‡ WINCOTT Annual General Meeting and associated workshops, March 2003
- ‡ Rotary Youth Cotton Group careers visit, Narrabri, March 2003
- ‡ Visit by final year Agriculture students from University of Sydney and University of New England, March 2003
- ‡ World Cotton Research Conference – 3, Capetown, March 2003
- ‡ Advancing Regional Careers: Marsden, Narrabri, Wee Waa high schools Sydney/country exchange, April 2003
- ‡ Researcher Visit to CSIRO Canberra and Melbourne University, April 2003
- ‡ Decision Support Seminar for Gwydir and Namoi Valleys, Narrabri, April 2003
- ‡ Cotton Consultants meeting, Goondiwindi, May 2003
- ‡ Annual Resistance Roadshow, May 2003
- ‡ Researcher visit to Sydney University, May 2003
- ‡ Australian Cotton Trade Show, Moree, May 2003
- ‡ Extension Skills/Soils workshop, ACRI, May 2003
- ‡ Wincott Cotton Classing Tour, Australian Cotton Classing Centre, Wee Waa, June 2003
- ‡ CSD Information Tour, Gunnedah, June 2003
- ‡ *WINCOTT native vegetation field day*, Gunnedah June 2003
- ‡ TIMS Resistance Strategy 2002–03 Ratification meeting, July 2002
- ‡ Australian Cotton Conference, Brisbane August 2002
- ‡ Australian Cotton CRC northern program review, Darwin November 2002
- ‡ Growers' meetings with US silverleaf whitefly expert, Dr Peter Ellsworth, December 2002
- ‡ CSD Bollgard Basics Field Day, Wee Waa, December 2002

- ‡ Sugar industry visit to cotton industry, Narrabri, Moree, Goondiwindi June 2003
- ‡ Farming systems IPM Forum, Toowoomba June 2003

**Direct funding and/or coordination

Publications

These items are available from the Cotton Research and Development Corporation's office in Narrabri and, where appropriate, from www.crdc.com.au or from the Technology Resource Centre at the Australian Cotton Research Institute and the Australian Cotton CRC's website, www.cotton.crc.org.au. This listing also includes contributions by CRDC personnel made on behalf of the Corporation to other publications. Publications produced by CRDC are generally made available to the industry free of charge.

- ‡ Annual Report 2001-02
- ‡ Annual Operating Plan 2002-03
- ‡ Australian Cotton Conference Proceedings, August 2002
- ‡ *Cotton and the Community* posters
- ‡ *Dryland Cotton Production* Reprint
- ‡ *Extension in the Australian cotton industry: a team approach*. World Cotton Research Conference – 3 Proceedings, Bruce Pyke and others
- ‡ *Schooling the Australian Cotton Industry*. World Cotton Research Conference – 3, Proceedings. Guy Roth and others



Corporate Governance

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation

CORPORATION BACKGROUND

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

The Corporation is a major contributor to the public research effort for the cotton industry, and often CRDC input is used to leverage monies from other funding sources in both the public and private sectors. The Corporation sees this as an extremely positive outcome for the industry and the community as limited research budgets can be effectively extended as far as possible. Where appropriate, the use of joint funding arrangements also helps to build partnerships between research, government and industry organisations.

The Corporation seeks to maintain strong lines of communication with the Australian Government and the Australian cotton industry. This ensures industry, community and national priorities are addressed, areas of need are understood and gaps within the research program are filled. Partnerships across the research community and industry in general ensure information is shared freely wherever possible and duplication within the overall research and development effort is avoided.

Apart from the investment in and management of its research program, the Corporation provides a range of products and services. A key role for the CRDC is to act as a formal and informal information source for stakeholders and client groups. This is facilitated through its location in a cotton growing centre, through general industry media activities as well as through the Corporation's website, www.crdc.com.au.

Researchers are encouraged to be actively involved in the dissemination of research results and are assisted by the CRDC-supported National Cotton Extension Team. Where necessary the Corporation funds and coordinates the development of technical and nontechnical documents, guides and other information tools. Another important role for the Corporation is a coordinator of workshops, seminars and field days for a range of purposes including research review and progression, information sharing or technology transfer to industry. And of course the CRDC produces a range of publications which include both general and specific information about Corporate activities and operations and the results of the ongoing research effort.

The Corporation takes a coordinating role with the cotton industry to oversee research efforts, to ensure important areas of research are addressed and to facilitate the extension of research outcomes to the industry. Frequent and detailed communication with industry and research organisations helps to identify gaps or overlaps in the research program, and the development of strategies to gain maximum benefit for each dollar invested.

Location of Offices

The Corporation has one office, located at 2 Lloyd Street, Narrabri, NSW, 2390. Since the building was purchased in October

2001, meeting facilities established on the first floor have provided a valuable venue, with many research and development-related meetings taking place at the Corporation.

CRDC is unique among the rural Research and Development Corporations as it is based in rural Australia in the heart of one of Australia's major cotton-growing areas, rather than a capital city. This location means the Corporation and its management and staff are part of a cotton community and fully aware of the entire range of industry and community issues. The Narrabri district is also the home of a key industry research facility, the Australian Cotton Research Institute. The Institute is a collaborative research site and headquarters of the Australian Cotton Cooperative Research Centre, of which the CRDC is a core partner.

Being positioned physically within the industry enables the Corporation to develop and maintain, on a day-to-day basis, important relationships with cotton growers, researchers, processors and members of the general community.

Legislation

The Cotton Research and Development Corporation began operations on October 1, 1990 by way of a regulation made under section 8 of the *Primary Industries and Energy Research and Development (PIERD) Act 1989*. The setting and collection of levies on the cotton industry is enabled by the *Cotton Levy Act 1982* and the *Primary Industries Levies and Collections Act 1991*. Accountability and reporting requirements are set out in the *Commonwealth Authorities and Companies (CAC) Act 1997*.

Functions

As set out in Section 11 of the PIERD Act, the legislative functions of the Corporation include:

- ‡ investigating and evaluating the cotton industry's requirements for research and development, and the preparation, review and revision of an R&D Plan on that basis;
- ‡ preparing an Annual Operational Plan for each financial year;
- ‡ coordination and funding of R&D activities consistent with current planning documents;
- ‡ monitoring, evaluating and reporting to Parliament, the Minister for Agriculture, Fisheries and Forestry, and to industry on R&D activities coordinated or funded by the Corporation; and,
- ‡ facilitating the dissemination, adoption and commercialisation of research and development results in relation to the cotton industry.

Powers

Described in Section 12 of the PIERD Act, and subject to the stipulations of the Act, the Corporation has the power to do all things necessary and convenient to be done for, and in connection with, the performance of its function including but not restricted to:

- ‡ entering into agreements for the carrying out of R&D activities;
- ‡ applying for patents, either solely or jointly;
- ‡ charging for work done, services rendered, and goods and information supplied;
- ‡ acquiring, holding and disposing of real or personal property; and,
- ‡ anything incidental to any of its powers.

Ministers

The Corporation is accountable to the Australian Parliament through Senator the Hon. Judith Troeth, Parliamentary

Secretary to the Minister for Agriculture, Fisheries and Forestry.

The Minister's powers and responsibilities, as outlined under various sections of the PIERD Act, include:

- ‡ appointing the Corporation's Chair and Directors;
- ‡ the option to terminate the appointment of the Chair or any Director under certain conditions;
- ‡ approving the Corporation's Research and Development (Five Year) Plan and any variations;
- ‡ approving the Corporation's Annual Operating Plans and any variations;
- ‡ appointing a person as Presiding Member of the Corporation's Selection Committee, and other members of that Committee; and
- ‡ transferring to the Corporation any assets held by the Commonwealth that the Minister considers appropriate and which would assist the performance and function of the Corporation.

RESEARCH ACCOUNTABILITIES

The Corporation is accountable to the Australian people through the Australian Government and to the cotton industry through its industry representative body, the Australian Cotton Growers' Research Association. In August 1998 the Corporation became subject to the *Commonwealth Authorities and Companies (CAC) Act 1997* which provided new levels of accountability as well as a new planning and reporting framework. The *Strategic (Five Year) Plan 1998-2003*, revised in 2002 into the Outcome/Outputs framework required under the *CAC Act*, formed the basis of CRDC's *Portfolio Budget Statement 2002-03*. This marked the last year of operation under that strategic plan, with the *Annual Operating Plan 2003-04*

compliant with the framework requirements of the new *Strategic Plan 2003-08*.

The Corporation's stakeholders set broad objectives, which the Corporation addresses through the *Strategic (Five Year) Plan* and the *Annual Operating Plan*. The Corporation has used these objectives as a basis for the development of its Outcome and the identification of necessary key Outputs.

CORPORATE GOVERNANCE PRACTICES STATEMENT

The Cotton Research and Development Corporation plans for the highest levels of corporate governance. This commitment has been written into the Statement of Principles for the Board, Management and Staff of the Corporation.

Following appointment to the Board, each Director is provided with an induction package designed to provide them with an appropriate level of information regarding the Corporation, its history and operations, and the rights, responsibilities and obligations of Directors. Copies of the relevant legislation are also included in the package. The induction process for Directors includes visiting the Corporation's offices in Narrabri to meet with management and staff for a comprehensive overview of corporate activities and practices, and tours of key industry research facilities. Where necessary and appropriate, the Corporation sources training for Directors, either individually or as a group. The Board generally establishes the need for such training. During the year, some Directors attended a combined Rural Research and Development Corporations workshop on Understanding Financial Statements.

The Corporation has developed a Risk Management Plan as part of its approach to identifying and managing areas of significant business risk. The process also

involves consulting widely and participating in appropriate industry, Rural Research and Development Corporation and Government forums to keep fully informed about the environment in which the Corporation operates. Situations involving even minor business risk are fully discussed at a Board level with policy developed through consensus. Management and staff have responsibility for implementing policy as directed by the Board.

The Board has instituted a policy of holding a focused and facilitated strategic review sessions in conjunction with Board meetings wherever possible. These focus on a specific issue or area of research. Depending on the topic, a variety of speakers and industry participants may also be invited to attend, to enable broad discussion and to expose risks and opportunities for the Corporation and the industry. Two strategic review sessions were held in the first half of 2003: a session on Strategic Planning 2003–2008 in February and a session on Biotechnology, Best Management practices and Weeds in May.

Responsibility for the establishment and maintenance of appropriate ethical and financial management standards rests with the Corporation's Audit Committee, in consultation with the Board. It is the practice of the Chair to review the performance of Directors during the year. Due to the number of new Directors taking up appointment, this review has been delayed until the 2003–04 reporting year.

The Corporation's reporting processes include the presentation of a formal report to its industry stakeholder, the Australian Cotton Growers' Research Association. Part of this presentation includes an opportunity for Board decisions to be questioned and debated. At least one member of the Corporation's staff attends all ACGRA meetings.

BOARD OF DIRECTORS

The Corporation has a nine-member Board, of which six are nominated by an independent Selection Committee established by legislation. Appointment to the Board is subject to Ministerial approval. The Minister nominates and appoints the Chair and the Government Director. The Board selects the Executive Director who becomes its ninth member.

Appointment

The Chair has been reappointed to September 2004. The Government Member holds office at the Minister's pleasure and the Executive Director at the Corporation's pleasure. Directors other than the Executive Director and the Government Director are appointed for a term not exceeding three years. Six new Board appointments were made during the reporting year. Nominations were forwarded to the Parliamentary Secretary on 13 August 2002 and the appointments notified by her on 11 September 2002 for a term commencing 1 October 2002 and ending on 30 September 2005. On the advice of the department, the Presiding Member reported these appointments in the Selection Committee Report in the Corporation's Annual Report 2001–2002. Final details are given in the Selection Committee Report on page 80.

Expertise

Directors are selected from across the industry business and research communities and together they bring expertise in cotton production, processing, marketing, science, research and development, business management, technology transfer, conservation and management of natural resources, economics and environmental and ecological matters.

Directors' Responsibilities

The Board keeps in close contact with the senior management of the Corporation and takes a hands-on approach to ensure research projects are properly focused and meet contractual requirements. The Directors are responsible for ensuring that the affairs of the Corporation are properly managed and for setting the strategic directions for the Corporation to follow.

The Board's function include:

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

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

At the first meeting following the Directors' appointments in 1999, the Board assigned each Director with a research program of key responsibility based on the individual's expertise. Under this structure, Directors review the project applications and reports for the each program of responsibility and make subsequent recommendations to the full Board. Directors are also available to advise and work with research program coordinators and other staff.

Directors seek advice and assistance in carrying out their duties on an informal and case-by-case basis. It is the intention of the Corporation to move quickly to put in place procedures that allow Directors to seek independent advice in relation to their duties, at the Corporation's expense.

Program Code	Funding Program	Director	Supporting Director
A	Insect Management	Neil Forrester	Graeme Hamilton
B	Diseases and Weeds	TJ Higgins	Adam Kay
C	Soils	Adam Kay	Dick Browne
D	Water	Dick Browne	Kathryn Adams
E	BMP and Environment	Kathryn Adams	Jeff Bidstrup
F	Community and Economics	Bridget Jackson	Graeme Hamilton
G	Processing and Market	Ralph Schulzé	Jeff Bidstrup
H	Plant Breeding and Biotechnology	TJ Higgins	Graeme Hamilton
I	Farming Systems and Agronomy	Jeff Bidstrup	Dick Browne
J	Technology Transfer and Extension	Adam Kay	All
K	Human Resources	Bridget Jackson	Ralph Schulzé

Directors as at June 30, 2002

Chair BRIDGET JACKSON

BScAg, MBus

Appointed November 1999. Member of the Audit, Remuneration and Strategic Planning Committees

Director, Cameron Agriculture Pty Ltd, Sydney, NSW.

Ms Jackson is an agricultural consultant with extensive experience in irrigated agriculture and the management of private farmer-group projects. Ms Jackson represents CRDC on the Board of the Australian Cotton CRC and as a director of the Australian Cotton Industry Council. She is the Director responsible for Community and Economics and Human Resources.



Vice-Chair RICHARD BROWNE

Reappointed November 2002. Chair of the Audit Committee and member of the Remuneration Committee

Mr Browne worked in the cotton industry for 35 years, most of that at a senior management level in corporate agriculture involving production and processing of cotton. His main interest has been promoting research and development for the benefit of the industry. Mr Browne was Chair of the CRC for Sustainable Cotton Production for the life of the organisation and Chair of the Australian Cotton Growers' Research Association for three terms. He was previously a member for the Cotton Research Council, the forerunner of the CRDC. He is the Director responsible for Water and Supporting Director for Soils and Farming Systems.



JEFF BIDSTRUP

Reappointed November 2002

Cotton and Grain Farmer, "Prospect", Warra, Qld.

Mr Bidstrup operates a cotton and grain property with a strong emphasis on sustainability and Integrated Pest Management issues. He also has experience in downstream processing and marketing.

He is the Director responsible for Farming Systems and Supporting Director for Best Management Practices and Environment, and Process and Marketing.



KATHRYN ADAMS

BSCAgr (Hone), LLM, M Env Stud, M Bus

Appointed October 2002. Member of the Intellectual Property Committee

Executive Director of Planning for the Queensland Environment Protection Authority.

Ms Adams has served on several R&D Corporations and has particular expertise in environmental planning, business management, technology law and microbiology. She is the Director responsible for Best Management Practices and Environment and Supporting Director for Water.



TJ HIGGINS

BScAg, MAgSc, PhD

Appointed October 2002. Chair of the Intellectual Property Committee

Assistant Chief of Plant Industry at CSIRO

Dr Higgins is a distinguished research scientist and has been involved in plant research for 30 years, specialising in gene technology for a range of Australian agricultural ecosystems. He has been involved in the production of new cotton varieties and is experienced in administrating R&D and gene technology. He is the Director responsible for Diseases and Weeds, and Plant Breeding and Biotechnology.



NEIL FORRESTER

BScAg. (Hons), PhD

Reappointed November 2002. Member of the Audit and Intellectual Property Committees until March 2003

Director – Special Projects and New Markets, Delta and Pine Land

Dr Forrester has extensive field and laboratory research and extension experience with Pest Management and Resistance Management issues in a broad range of field crops, specialising in cotton for the last 20 years. He is the Director responsible for Insect Management.



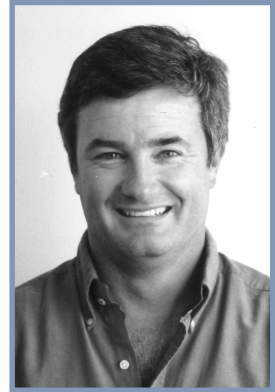
ADAM KAY

BScAg, DipEd., Grad Cert Rural Science (Cotton Production)

Reappointed November 2002. Member of the Intellectual Property and Strategic Planning Committees, Alternate Member of the Audit Committee

General Manager, Cotton Seed Distributors, Wee Waa, NSW.

Mr Kay is an experienced extension agronomist who prior to his current position spent 12 years based in the Macquarie Valley with NSW Agriculture. Mr Kay is a graduate of the Australian Rural Leadership Program (Course 2) and during the early 1990s he was awarded a Churchill Scholarship to study cotton soil management. He is the Director responsible for Soils and Extension and the Supporting Director for Diseases and Weeds.

**Government Director GRAEME HAMILTON**

PhD, DIC

Appointed May 2001 . Member of the Strategic Planning, Remuneration and Intellectual Property Committees

Director, Australian Plague Locust Commission, Australian Government Department of Agriculture Fisheries and Forestry.

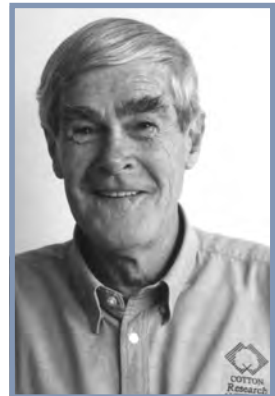
Having begun professional life as a cotton entomologist, Dr Hamilton has worked with horticulture and grains industries both here and overseas and now directs the joint Commonwealth/States approach to locust control. He advises the Corporation on Government policy processes, public administration issues and strategic management and is the Supporting Director for Insect Management, Community and Economics, and Plant Breeding and Biotechnology.

**Executive Director RALPH SCHULZÉ**

HDA (Hons)

Appointed October 1990. Observer to the Audit Committee

Prior to his appointment at the Corporation Mr Schulzé was an agronomist based in Narrabri with a background in vertically integrated cotton production and a Director of the Cotton Research Council. He is currently a Director of Cotton Seed Distributors Ltd and a member of the management committee of the Australian Cotton CRC. With Chair Ms Jackson, Mr Schulzé represents the Corporation on the Australian Cotton Industry Council. He is the Director responsible for Processing and Market, and Supporting Director for Human Resources.



Appointments after the reporting year

No further appointments have been made.

Conflicts of Interest

In accordance with Section 131 of the *Primary Industries and Energy Research and Development Act 1989*, Directors are appointed on the basis of their expertise and do not represent any particular organisation or interest group. The Board recognises that a Director's connection with any particular organisation or interest group does not necessarily imply a conflict of interest, and that it may wish to avail itself of Directors' individual skills and make use of their expertise.

The Board reaffirmed in November 1999 to follow section 54 of the *Primary Industries and Energy Research and Development Act* and section 21 of the *Commonwealth Authorities and Companies Act 1997* regarding disclosure of interests. A Director who considers that he/she may have a direct or indirect pecuniary or non-pecuniary interest in a matter to be discussed by the Board must disclose the existence and nature of the interest before the discussion. Depending on the nature and significance of the interest Directors may be required to absent themselves from the Board's deliberations. The Board has a standing notice of Director's interests, which was renewed at the meeting in December 2002. It is an agenda item at each Board Meeting and is updated as necessary.

The Board is very aware of its responsibilities regarding conflict of interest and duty of care, and has adopted a very cautious approach. This approach has been successful and no difficulties have been encountered.

Indemnities

The Board has taken the necessary steps to ensure adequate insurance cover is in

place for Directors and Officers of the Corporation. The Corporation's insurance cover is provided through Comcover. The insurance contract prohibits the CRDC from disclosing the nature or limit of the liabilities covered, or the amounts of premiums paid.

COMMITTEES

During 2001-2002 the Board operated four committees – the Audit, Intellectual Property Remuneration, and Strategic Planning Committees. The number of subcommittee meetings is not a reflection of the committee workload. Much of the work of the subcommittees is conducted via email and telephone, rather than through formal meetings. The Corporation finds this arrangement to be both effective and productive.

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

Mr Richard Browne is Chair of the Audit committee. Membership of the committee includes the Corporation's Chair, Ms Bridget Jackson, and two non-executive Directors, Mr Browne and Dr Neil Forrester, with Mr Adam Kay as Dr Forrester's alternate. The Executive Director Mr Ralph Schulzé and the Business Manager Mrs Robin Logan attended the meetings as observers. The Committee met six times during the year.

Intellectual Property Committee

The role of this committee is to review the Corporation's Intellectual Property policy and make recommendations to the Board for any updates. The committee is also responsible for making recommendations and reporting to the Board on any Intellectual Property actions including commercialisation issues surrounding any of CRDC-funded research and development activities. The membership of the committee includes the Chair Ms Bridget Jackson and three non-executive directors, Dr Neil Forrester, Mr Adam Kay Dr Graeme Hamilton and Dr TJ Higgins. The Committee met once during the year.

Remuneration Committee

This committee consists of the Chair Ms Bridget Jackson, and two non-executive Directors, Mr Richard Browne and Dr Graeme Hamilton. The Remuneration Committee advises the Board on the Executive Director's remuneration and staff remuneration adjustments. The Committee met once during the reporting year.

Strategic Planning Committee

The committee is normally responsible for conducting an annual review of the Strategic Plan and making any recommendations to the Board for alterations; however, during the reporting year it worked on a revised Strategic Plan 2003–2008.

The committee includes the Chair Ms Bridget Jackson, the Government Director Dr Graeme Hamilton and non-executive Director, Mr Adam Kay. Senior Corporation management and the Communications Manager attend the committee's meetings. The Committee met three times during the year.

Meetings

During the reporting year the Board continued its policy of holding meetings away from the Corporation's office in Narrabri whenever it was appropriate and practical. The Board uses the opportunities presented by meetings to tour cotton-production areas, meet local growers and researchers and be updated on the varying research requirements throughout the industry. Meetings also present opportunities for Director training and education regarding specific issues of relevance and to meet with representatives of the Corporation's stakeholders.

Directors' attendance at Board and Committee Meetings

During 2002-03 the Board held 6 meetings: in Brisbane, Queensland, on 13 August 2002; in Sydney, NSW, on 21 September 2002; in Narromine, NSW, on 9 December 2002; in Theodore, Queensland, on 4 February 2003; in Narrabri, NSW, on 24 and 25 March, 2003; and in Moree, NSW, on 15 May 2003. The following chart shows Board meetings and committee meetings attendance of each director.

Figure 40: Board members' attendance at meetings

YEAR ENDED 30 JUNE 2003	BOARD		AUDIT		INTELLECTUAL PROPERTY		REMUNERATION		STRATEGIC PLANNING	
	Meetings Attended	Meetings Eligible to Attend	Meetings Attended	Meetings Eligible to Attend	Meetings Attended	Meetings Eligible to Attend	Meetings Attended	Meetings Eligible to Attend	Meetings Attended	Meetings Eligible to Attend
Ms Bridget Jackson (Chair)	6	6	6	6			1	1	3	3
Mr Richard Browne (Deputy Chair)	6	6	6	6			1	1	3	3
Mr Jeff Bidstrup	6	6							3	3
Ms Kathryn Adams*	3	4	1	1	1	1		2	3	
Dr Neil Forrester	6	6	5	5	1	1			3	3
Dr Graeme Hamilton	4	6			0	1	1	1	2	3
Mr Adam Kay	6	6	1	1	1	1			3	3
Dr TJ Higgins*	4	4			1	1			3	3
Mr Ralph Schulzé	5	6			0	1			2	3
Ms Roberta Brazil**	2	2								
Dr Jim Peacock**	2	2								
* Appointed October 2002										
** Retired September 2002										

KEY ISSUES IN CORPORATE PERFORMANCE

Corporate Planning

In accordance with the *Primary Industries and Energy Research and Development (PIERD) Act 1989* and the *Commonwealth Authorities and Companies (CAC) Act 1997*, the Corporation prepares a *Strategic (Five Year) Plan* as well as an *Annual Operating Plan* for each financial year. The Corporation submitted the Annual Operating Plan 2003–2004 to Senator Troeth on the 29 April 2003 and the *Strategic Plan 2003–2008* on 30 April 2003. Written advice of approval for both plans was received from Senator Troeth on 1 July 2003.

Service Charter

The Corporation does not provide services direct to the general public and does not have a service charter; however, the Corporation has a Statement of Principles for the Board, Management and Staff that embodies the set of values underlying our decisions, actions and relationships.

The Board, Management and Staff of the Cotton Research and Development Corporation:

- 1 are committed to excellence and productivity;
- 2 are committed to providing the highest levels of accountability to stakeholders;
- 3 will act legally, ethically, professionally and responsibly in the performance of their duties;
- 4 strive to maximise return on investment of industry and public funds invested through our Corporation;
- 5 strive to make a difference in improving the knowledge base regarding cotton production in Australia;
- 6 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;

- 7 value the contribution, knowledge and expertise of the people within our organisation and that of our contracted consultants, external program coordinators and research providers;
- 8 promote active, honest and effective communication;
- 9 are committed to the future of rural and regional Australia;
- 10 comply with and promote best practice in corporate governance; and,
- 11 are committed to meet all statutory obligations and accountability requirements in a comprehensive and timely manner.

Staff

Staff are employed under Section 87 of the *PIERD Act 1989*, which provides that the terms and conditions of employment are to be determined by the Corporation. Including the Executive Director there were seven full-time and five part-time employees as at 30 June, 2003.

Executive Director

Ralph Schulz , appointed 1991

Research and Extension Manager

Bruce Pyke, appointed 1993

Research Program Manager

Guy Roth, appointed October 2001

Business Manager

Robin Logan, appointed September 1999

Communications Manager (part-time)

Elizabeth Tout, appointed April 2003

Program Manager

Ruth Farwell, appointed January 2002

Executive Assistant

Dianne Purcell, appointed July 1998

Administrative Assistant

Margaret Wheeler, appointed September 2001

Administrative Assistant (part-time)

Karen Larsen, appointed early 1998

Research Program Coordinator: Soils, Water, Farming Systems and Agronomy (part-time)

Helen Dugdale, appointed July 2001

Research Program Coordinator: BMP and Environment (part-time)

Rachel Holloway, appointed January 2001

Research Program Coordinator: Diseases and Weeds, Plant Breeding and Biotechnology (part-time)

Jodi McLean, appointed November 2002

Other Staff during the reporting year

Communications Manager, Tim Lester, who was appointed in June 1999, resigned in November 2002 and was replaced by Lauren Pearce who resigned in April 2003.

Appointments after the reporting year

Kara Taylor was appointed as Program Manager in July 2003, following the resignation of Ruth Farwell.

Guy Roth resigned in August 2003 and will be replaced by Greg Kauter on 3 November 2003.

Training

During the reporting year the Corporation spent \$2,114.54 on training and recruitment. In addition, activities such as Directors' attendance at a Rural Research and Development Corporations workshop on "Understanding Financial Statements", the attendance of staff members at workshops and meetings held by Wincott and internal staff training on Occupational Health and Safety occurred at no additional cost to the Corporation.

Throughout the year, Corporation Directors and Staff participate in a wide range of activities relating to the operations of the Corporation which provide valuable experience and additional training for the personnel involved.

Contractors and Consultants

The Corporation employs consultants and contractors on a case-by-case needs basis, and after background checks to ensure proposed appointees have necessary skills and experience. During the reporting year the Corporation spent \$54,354 to remunerate consultants and contractors. It is Corporation policy not to disclose amounts paid to individual consultants due to privacy and confidentiality arrangements.

Figure 41: Gender breakdown of CRDC-related personnel

	Females	Males	Total
CRDC Board of Directors	2	9	11
CRDC Staff	9	5	14
Australian Cotton CRC Extension Team	17	27	44
CRDC Industry Development Officer and Extension Coordinators	9	5	14
CRDC Funded Projects 2002–03: senior researcher	44	158	202
Totals	81	204	285

Figure 42: CRDC organisational structure

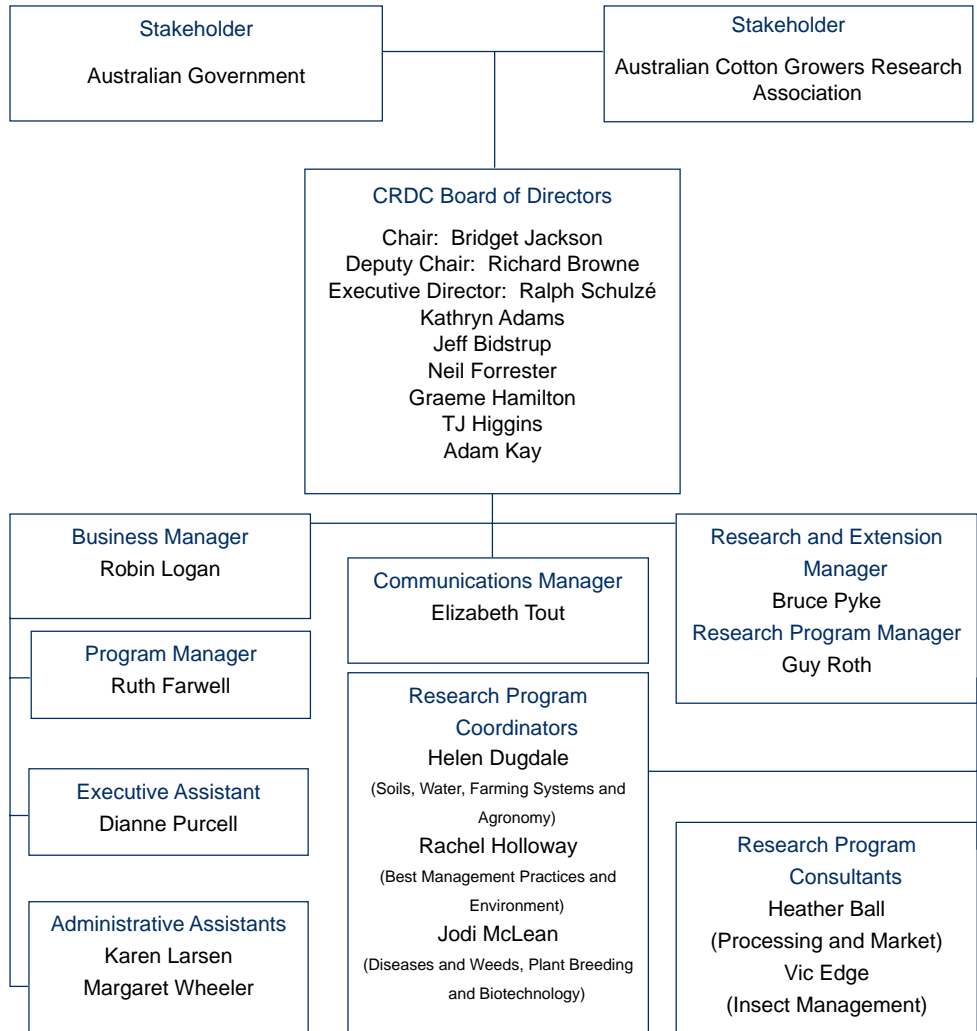


Figure 43: Contractors and consultants

Contractor/Consultant	Service
J&J Baker Ag Services	Administration of the Cotton Industry Best Management Practices Audit Office
Vic Edge	Program Coordination
Heather Ball	Program Coordination
Geoffrey Hutchinson	Information Technology support

Equal Employment Opportunity

The Corporation is committed to a merit-based, non-discriminatory recruitment and promotion policy. Scientists undertaking CRDC-funded research are of diverse backgrounds. The gender analysis for 2002–03 is shown in figure 41.

Fraud Control

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

The Audit Committee endorses, monitors and reviews the Corporation's Fraud Control Plan. The Corporation's Fraud

Control Plan is read in conjunction with the Risk Management Plan and the Code of Conduct for Directors and Staff.

As a small agency with the equivalent of 10.8 full-time employees, the Corporation does not have a fraud investigation unit. The Corporation's Audit Committee, Executive Director and Business Manager, the nominated fraud control officer, collectively carry out the functions of a fraud investigation unit as described in the Commonwealth Fraud Investigation Model. The support of the Australian Federal Police would be sought if the Corporation felt there was a *prima facie* case of fraud and further investigation was required.

Occupational Health and Safety

During the reporting year the Corporation's Occupational Health and Safety function and structure were reviewed to meet the *Occupational Health and Safety Act 2001*

Figure 44: Categories of Documents held by CRDC

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

C: Documents customarily made available

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

legislative requirements for small businesses. Commencing in March 2003, Occupational Health and Safety meetings were attended by staff every two months. At these meetings, relevant issues were discussed, including whether any reportable incidents had occurred, and appropriate policies developed or reviewed. The Board of Directors approved a new Occupational Health and Safety Plan which reflected principles for protecting all staff and other that might be affected by the work of the Corporation.

CRDC had no incidents to report in 2002–03, as defined in Section 86 of the *Occupational Health and Safety (Commonwealth Employment) Act 1991*.

Freedom of Information

General enquiries regarding access to documents or other matters relating to Freedom of Information should be made to the Business Manager. No requests made under the *Freedom of Information Act 1982* were received by the Corporation during the reporting year. Facilities for access to the documents are available to the Corporation.

Procedures and Information Sources

Funding information on individual projects funded by the Corporation is available on request. Information about CRDC projects is also available through the Australian Rural Research in Progress (ARRIP) database, which can be accessed through the Internet and through most Australian research and public libraries.

Ecologically Sustainable Development and Environmental Performance

The principles of ecologically sustainable development under the *Environment Protection and Biodiversity Conservation Act 1999* apply to the Corporation.

These include:

- ‡ integrating long-term and short-term economic, environmental, social and equitable considerations into decision making processes;
- ‡ not using lack of full scientific certainty as a reason to postpone a measure to prevent environmental degradation if there is the threat of serious or irreversible environmental damage;
- ‡ maintaining or enhancing the health, diversity and productivity of the environment for future generations;
- ‡ ensuring the conservation of biological diversity and ecological integrity is a fundamental consideration in decision-making; and
- ‡ promoting valuation, pricing and incentive mechanisms.

The Corporation has integrated these principles into its planning framework. The three Output groups – Sustainability, Profitability and International Competitiveness, and People and Communities – were a reflection of the need to factor ‘triple-bottom-line’ environmental, economic and social considerations into all decisions.

Almost half the Corporation’s budget is directed towards issues improving the industry’s Sustainability, encompassing natural resource management and biodiversity. CRDC continued to fund a specific research program (Best Management Practices and the Environment) designed to minimise environmental impacts.

The development and adoption of the Best Management Practices program is providing environmental benefits for the industry. The Corporation commissions Cotton Consultants Australia Inc. (CCA),

the peak body for cotton field advisors and agronomists, to surveys its membership annually. Results for the 2002–2003 season show further significant falls in the use of pesticides on both genetically engineered and conventional cotton crops. This result is reported more fully elsewhere in this publication.

Commonwealth Disability Strategy

Corporation working conditions and procedures for employees are compliant with the Commonwealth Disability Strategy.

Significant Events

Under section 15 of the *Commonwealth Authorities and Companies (CAC) Act 1997*, the Corporation is required to notify the Minister of ‘significant events’. Such events include proposals to:

- ‡ form or participate in the formation of a company;
- ‡ participate in significant partnerships, trusts, unincorporated ventures or similar arrangements;
- ‡ acquire or dispose of significant shareholding in a company;
- ‡ acquire or dispose of a significant business;
- ‡ commence or cease a significant business activity; and
- ‡ make a significant change in the nature or extent of interests in a significant partnership, trust, unincorporated venture or similar arrangement.

The Corporation had no significant events during the reporting year.

Significant Changes in the State of Affairs

The continuing drought was a major factor affecting the cotton industry, and the work of the Corporation, during the reporting period. With established cotton growing areas in Queensland and New South Wales

officially drought declared at the end of the reporting period, the drought shows all signs of continuing to be a major factor affecting the Corporation’s income and, thus, its research and development program, not only in 2003–2004 but also in 2004–2005. The Parliamentary Secretary was briefed on these matters on 18 December 2002, both in writing and in a personal meeting that took place in Melbourne.

Political Disclosures

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

Payment to Representative Bodies

The Corporation’s industry representative body is the Australian Cotton Growers’ Research Association. The CRDC makes no payments to the Growers’ Research Association except for the purposes of producing the proceedings of the biennial Australian Cotton Conference. The most recent Conference was held in Brisbane in August 2002, with the next Conference to be held on the Gold Coast in August 2004.



Selection Committee Report

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation

Ms Margaret Thomson
Presiding Member
CRDC Selection Committee
PO Box 56
YARRALUMLA ACT 2600

9 September 2003

Senator the Hon Judith Troeth
Parliamentary Secretary to the Minister for
Agriculture, Fisheries and Forestry
Parliament House
CANBERRA ACT 2600

Dear Senator Troeth

Last year's Selection Committee Report summarised the activities relating to the appointment of six new Board appointments, with the nominations forwarded to the Parliamentary Secretary on 13 August 2002. The appointments were notified by the Parliamentary Secretary on 11 September 2002 for a term commencing 1 October 2002 and ending on 30 September 2005. These appointments were: Ms Kathryn Adams, Mr Jeffrey Bidstrup, Mr Richard Browne, Dr Neil Forrester, Dr TJ Higgins and Mr Adam Kay. No further appointments have taken place since that time.

At the time of reporting, costs relating to the appointment of these directors had not been finalised. Accordingly, I now present the final accounts for this process.

Costs

The figures below represent the final accounting of administrative costs and expenses for these Board appointments:

Item	\$ (GST Inclusive)
Advertising	5,065
Travel and Accommodation	8,275
Secretarial and Administration	1,631
Presiding Member's Fees	4,480
	19,451

Yours sincerely

MARGARET THOMSON

Presiding Member
Cotton Research and Development Corporation Selection Committee



Financial Statements

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation



INDEPENDENT AUDIT REPORT

To the Minister for Agriculture, Fisheries and Forestry

Matters relating to the Electronic Presentation of the Audited Financial Report

This audit report relates to the financial report of the Cotton Research and Development Corporation for the year ended 30 June 2003 included on the Cotton Research and Development Corporation's web site. The members of the Board of the Corporation are responsible for the integrity of the Cotton Research and Development Corporation's web site.

The audit report refers only to the statements named below. It does not provide an opinion on any other information which may have been hyperlinked to/from the audited financial report.

If the users of this report are concerned with the inherent risks arising from electronic data communications they are advised to refer to the hard copy of the audited financial report to confirm the information included in the audited financial report presented on this web site.

Scope

I have audited the financial statements of the Cotton Research and Development Corporation for the year ended 30 June 2003. The financial statements comprise:

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

The members of the Board are responsible for the preparation and presentation of the financial statements and the information they contain. I have conducted an independent audit of the financial statements in order to express an opinion on them to you.

OFFICE OF CAMBERA ACT 2001
Cambera House 18 Fife Street, Cambera
SOUTH AUSTRALIA
Phone (011) 852-7300 Fax (011) 852-7777

The audit has been conducted in accordance with Australian National Audit Office Auditing Standards, which incorporate the Australian Auditing Standards, to provide reasonable assurance as to whether the financial statements are free of material misstatement. Audit procedures included examination, on a test basis, of evidence supporting the amounts and other disclosures in the financial statements, and the evaluation of accounting policies and significant accounting estimates. These procedures have been undertaken to form an opinion as to whether, in all material respects, the financial statements are presented fairly in accordance with Accounting Standards and other mandatory professional reporting requirements in Australia and statutory requirements so as to present a view which is consistent with my understanding of the Corporation's financial position, its financial performance and its cash flows.

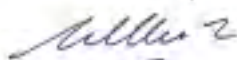
The audit opinion expressed in this report has been formed on the above basis.

Audit Opinion

In my opinion the financial statements:

- have been prepared in accordance with Finance Minister's Orders made under the *Commonwealth Authorities and Companies Act 1997*; and
- give a true and fair view, in accordance with applicable Accounting Standards and other mandatory professional reporting requirements in Australia and the Finance Minister's Orders, of the financial position of the Cotton Research and Development Corporation as at 30 June 2005 and its financial performance and cash flows for the year then ended.

Australian National Audit Office



Willie Tan
Senior Director

Delegate of the Auditor-General

Canberra
10 September 2005

COTTON RESEARCH AND DEVELOPMENT CORPORATION

STATEMENT BY DIRECTORS

In our opinion, the attached financial statements for the year ended 30 June 2003 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 Cotton Research and Development Corporation will be able to pay its debts as and when they become due and payable.

Signed



Bridget Jackson
Chair

10 September 2003



Ralph Schulze
Executive Director

10 September 2003

STATEMENT OF FINANCIAL PERFORMANCE

for the year ended 30 June 2003

	Notes	2003	2002
REVENUE			
Revenues from ordinary activities			
Revenue from Government	4A	7,280,000	7,208,067
Contributions	4B	7,136,220	6,004,553
Goods and Services	4C	2,445	978
Interest	4D	802,389	705,840
Other	4E	952,079	907,267
Revenues from ordinary activities		16,173,133	14,826,705
EXPENSES			
Expenses from ordinary activities			
Employees	5A	938,363	831,048
Suppliers	5B	253,604	317,555
Grants	5C	14,400,602	13,401,977
Depreciation and amortisation	5D	29,471	25,178
Write-down of assets	5E	–	33,599
Expenses from ordinary activities		15,622,040	14,609,357
Operating surplus from ordinary activities		551,093	217,348
Net surplus		551,093	217,348
Total changes in equity other than those resulting from transactions with owners as owners		551,093	217,348

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

STATEMENT OF FINANCIAL POSITION

As at 30 June 2003

	Notes	2003	2002
ASSETS			
Financial Assets			
Cash	11B	1,314,350	1,436,437
Deposits at Call	11B	11,701,580	11,528,858
Receivables	6A	3,067,092	2,825,196
Total financial assets		16,083,022	15,790,491
Non Financial Assets			
Land and buildings	7A,C	298,427	300,000
Infrastructure, plant and equipment	7B,C	156,541	132,875
Total non-financial assets		454,968	432,875
Total assets		16,537,990	16,223,366
LIABILITIES			
Provisions			
Employees	8	207,426	161,754
Total provisions		207,426	161,754
Payables			
Suppliers	9A	15,526	80,682
Grants	9B	85,899	302,884
Total payables		101,425	383,566
Total liabilities		308,851	545,320
EQUITY			
Accumulated surpluses		16,229,139	15,678,046
Total Equity		16,229,139	15,678,046
Current assets		15,583,022	12,840,491
Non-current assets		954,968	3,382,875
Current liabilities		236,489	490,273
Non-current liabilities		72,362	55,047

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

STATEMENT OF CASH FLOWS*for the year ended 30 June 2003*

	Notes	2003	2002
OPERATING ACTIVITIES			
Cash received			
Goods and Services		2,703	665
Appropriations		14,072,660	12,109,322
Interest		703,150	709,540
GST recovered		1,020,694	1,187,569
Other		1,494,364	946,722
Total cash received		17,293,571	14,953,818
Cash used			
Employees		(699,104)	(602,383)
Suppliers		(263,814)	(1,103,283)
Grants		(16,228,454)	(13,980,325)
Total cash used		(17,191,372)	(15,685,991)
Net cash from operating activities	11A	102,199	(732,173)
INVESTING ACTIVITIES			
Cash used			
Purchase of property, plant and equipment		(51,564)	(421,899)
Total cash used		(51,564)	(421,899)
Net cash from investing activities		(51,564)	(421,899)
FINANCING ACTIVITIES			
Cash received			
Cash used			
Net cash from financing activities		—	—
Net increase in cash held		50,635	(1,154,072)
Cash at the beginning of the reporting period		12,965,295	14,119,367
Cash at the end of the reporting period	11B	13,015,930	12,965,295

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

SCHEDULE OF COMMITMENTS*As at 30 June 2003*

BY TYPE	Notes	2003	2002
Capital Commitments		–	–
	–	–	
OTHER COMMITMENTS			
Operating leases		37,533	48,901
Other commitments		21,751,721	26,408,328
Total other commitments		21,789,254	26,457,229
COMMITMENTS RECEIVABLE		1,980,841	2,405,203
Net Commitments		19,808,413	24,052,026
BY MATURITY			
Operating lease commitments			
One year or less		31,683	26,293
From one to five years		5,850	22,608

NB: Commitments are GST inclusive where relevant

Operating leases included are effectively non-cancellable and comprise of agreements for the provision of motor vehicles for senior executives.

As at 30 June 2003, 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.

SCHEDULE OF CONTINGENCIES*As at 30 June 2003*

	Notes	2003	2002
Contingent assets			
Royalty Revenue	12	120,000	–
Total Contingent Assets		120,000	

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

NOTES TO AND FORMING PART OF THE FINANCIAL STATEMENTS

for the year ended 30 June 2003

Note Description

1	Summary of Significant Accounting Policies
2	Economic Dependency
3	Events Occurring After Reporting Date
4	Operating Revenues
5	Operating Expenses
6	Financial Assets
7	Non-Financial Assets
8	Provisions
9	Payables
10	Equity
11	Cash Flow Reconciliation
12	Contingent Assets
13	Director Remuneration
14	Related Party Disclosures
15	Remuneration of Officers
16	Remuneration of Auditors
17	Average Staffing Levels
18	Financial Instruments
19	Reporting of Outcomes

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 [Financial Statements for reporting periods ending on or after 30 June 2003] Orders);
- ‡ Australian Accounting Standards and Accounting Interpretations issued by the Australian Accounting Standards Board; and
- ‡ Consensus Views of the Urgent Issues Group.

The Cotton Research & 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 Statements 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 0).

Revenues and expenses are recognised in the Corporation's Statements 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 Changes in Accounting Policy

The accounting policies used in the preparation of these financial statements are consistent with those used in 2001-02.

1.3 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 proportional basis taking into account the interest rates applicable to the financial assets.

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 contracts. The stage of completion is determined according to the proportion that costs incurred to date bear to the estimated total costs of the transaction.

Revenues from Government – Output Appropriations

The full amount of the appropriation for departmental outputs for the year is recognised as revenue.

Resources Received Free of Charge

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

Contributions of assets at no cost of acquisition or for nominal consideration are recognised at their fair value when the asset qualifies for recognition.

1.4 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, sick leave are measured at their nominal amounts. Other employee benefits expected to be settled within 12 months of their reporting date are also to be measured at their nominal amounts.

The nominal amount is calculated with regard to the rates expected to be paid on settlement of the liability. This is a change in accounting policy from last year required by initial application of a new Accounting Standard AASB 1028 from 1 July 2002.

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 2003. 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 Cotton Research & Development Corporation are members of the Public Sector Superannuation Scheme. The liability for their superannuation benefits is recognised in the financial statements of the Commonwealth and is settled by the Commonwealth in due course.

The Corporation makes employer contributions to the Commonwealth at rates determined by the actuary to be sufficient to meet the cost to the Commonwealth 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.

1.5 Leases

A distinction is made between finance leases, which effectively transfer from the lessor to the lessee substantially all the risks and benefits incidental to ownership of leased non-current assets, and operating leases, under which the lessor effectively retains substantially all such risks and benefits.

Operating lease payments are expensed on a basis which is representative of the pattern of benefits derived from the leased assets. The net present value of future net outlays in respect of surplus space under non-cancellable lease agreements is expensed in the period in which the space becomes surplus.

1.6 Borrowing Costs

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

1.7 Grants

The Corporation recognises grant liabilities as follows.

Most grant agreements require the grantee to perform services or provide facilities, or to meet eligibility criteria. In these cases, liabilities are recognised 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 of the agreement.

1.8 Cash

Cash means notes and coins held and any deposits held with a bank or financial institution.

1.9 Financial Instruments

Accounting policies for financial instruments are stated at Note 18.

1.10 Acquisition of Assets

Assets are recorded at cost on acquisition except as stated below. The cost of acquisition includes the fair value of assets transferred in exchange and liabilities undertaken.

Assets acquired at no cost, or for nominal consideration, are initially recognised as

assets and revenues at their fair value at the date of acquisition.

1.11 Property (Land, Buildings and Infrastructure), Plant and Equipment

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

Land, buildings, infrastructure, plant and equipment are carried at valuation. Revaluations undertaken up to 30 June 2002 were done at fair value.

Asset Class	Fair Value Measured at:
Land	Market selling price
Building	Market selling price
Leasehold Improvements	Depreciated replacement cost
Plant & Equipment	Market selling price

Under fair value, assets which are surplus to requirement are measured at their net realisable value. At 30 June 2003 the Cotton Research & Development Corporation held no surplus assets. (30 June 2002: \$0)

Frequency

Freehold land, buildings on freehold land are revalued progressively on a geographical basis. The current cycle commenced in 2001-02.

Plant and equipment assets, furniture and fittings and all information technology assets, were revalued in 2001-2002.

Assets in each class acquired after the commencement of a revaluation cycle are not captured by the progressive revaluation then in progress.

Conduct

All valuations are conducted by an independent qualified valuer.

Recoverable Amount Test

From 1 July 2002, Schedule 1 no longer requires the application of the recoverable amount test in AAS 10 *Recoverable Amount of Non-Current Assets* to the assets of authorities when the primary purpose of the asset is not the generation of net cash inflows.

No property plant and equipment assets have been written to recoverable amount per AAS 10. Accordingly the change in policy has had no financial effect.

Depreciation and Amortisation

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. Leasehold improvements are amortised on a straight-line basis over the lesser of the estimated useful life of the improvements or the unexpired period of the lease.

Depreciation/amortisation rates (useful lives) and methods are reviewed at each balance 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 and amortisation rates applying to each class of depreciable asset are based on the following useful lives:

	2003	2002
Buildings on freehold land	40 years	40 years
Leasehold improvements	–	Lease term
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 5D.

1.12 Taxation

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

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.

1.13 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 ECONOMIC DEPENDENCY

The Cotton Research & 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 for its continued existence and ability to carry out its normal activities.

NOTE 3 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.

	2003 \$	2002 \$
NOTE 4: OPERATING REVENUES		
Note 4A: Revenues from Government		
Commonwealth Contributions	7,280,000	7,208,067
Total revenues from government	7,280,000	7,208,067
Note 4B: Contributions		
Industry Levies	7,136,220	6,004,553
Total Contributions	7,136,220	6,004,553
Note 4C: Sales of Goods and Services		
Goods	2,445	978
Total sales of goods and services	2,445	978
Provision of goods to:		
External entities	2,445	978
Total sales of goods	2,445	978
Note 4D: Interest Revenue		
Deposits	802,389	705,840
Total interest revenue	802,389	705,840
Note 4E: Other		
Royalties	611,297	717,093
Project refunds	289,413	183,105
Levy penalties	11,369	-
Grants revenue	40,000	-
Other revenue	-	7,069
Total Other Revenue	952,079	907,267

	2003 \$	2002 \$
NOTE 5 OPERATING EXPENSES		
Note 5A: Employee Expenses		
Wages and Salaries	806,595	706,775
Superannuation	103,033	98,150
Leave and other entitlements	27,569	24,974
Total employee benefits expenses	937,197	829,899
Workers compensation premiums	1,166	1,149
Total employee expenses	938,363	831,048
Note 5B: Supplier Expenses		
Supply of goods and services	216,619	276,068
Operating lease rentals	36,985	41,487
Total supplier expenses	253,604	317,555
Note 5C: 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	5,679,961	4,863,923
State departments	3,776,878	3,786,231
Universities and colleges	1,369,074	1,477,202
Other research institutions	2,267,490	2,314,295
Corporate activities	525,149	603,713
	13,618,552	13,045,364
Grants to commercial entities	782,050	356,613
Total grants expense	14,400,602	13,401,977
Note 5D: Depreciation and Amortisation		
Depreciation of property, plant and equipment	29,471	24,507
Amortisation of leased assets	–	671
Total depreciation and amortisation	29,471	25,178
The aggregate amounts of depreciation or amortisation expensed during the reporting period for each class of depreciable asset are as follows:		
Buildings on freehold land	5,736	–
Leasehold improvements	–	671
Plant and equipment	23,735	24,507
Total depreciation and amortisation	29,471	25,178

	2003 \$	2002 \$
Note 5E: Write-Down of Assets		
Plant & equipment – revaluation decrement	–	33,599
Total write-down of assets	–	33,599
 NOTE 6 FINANCIAL ASSETS		
Note 6A: Receivables		
Goods and services	2,275	393,832
<i>Less:</i> Provision for doubtful debts	–	–
	2,275	393,832
Appropriations receivable	1,079,645	503,522
<i>Less:</i> Provision for doubtful debts	–	–
Interest receivable	293,101	190,292
GST receivable	286,074	95,887
Other receivables	1,405,997	1,641,663
Total receivables (gross)	3,067,092	2,825,196
All receivables are current assets		
Receivables (gross) are aged as follows:		
Not overdue	3,067,092	2,335,477
Overdue by:		
Less than 30 days		489,719
Total receivables (gross)	3,067,092	2,825,196

	2003 \$	2002 \$
NOTE 7: NON-FINANCIAL ASSETS		
Note 7A: Land and Buildings		
Freehold land		
Freehold land – at cost		83,667
Freehold land – 2002 valuation adjustment		(9,914)
Freehold land (fair value)	73,753	
Total freehold land	73,753	73,753
Buildings on freehold land		
Buildings on freehold land – at cost		246,074
Buildings on freehold land – 2002 valuation adjustment		(19,827)
Buildings on freehold land - 2002(fair value)	230,410	
Accumulated depreciation	(5,736)	–
Total buildings	224,674	226,247
Leasehold Improvements	–	34,555
Accumulated amortisation	–	(34,555)
Total Leasehold improvements	–	–
Total Land & Buildings (non-current)	298,427	300,000
Note 7B: Infrastructure, Plant and Equipment		
Office equipment		
Office Equipment – 2002 (fair value)	55,457	68,106
Accumulated depreciation	(5,448)	(19,517)
Total Office Equipment	50,009	48,589
Computer equipment		
Computer Equipment – 2002 (fair value)	77,083	87,738
Accumulated depreciation	(13,513)	(51,188)
Total Computer Equipment	63,570	36,550

FINANCIAL STATEMENTS

	2003 \$	2002 \$
Fixtures & Fittings		
Fixtures & Fittings – 2002(fair value)	47,736	61,434
Accumulated depreciation	(4,774)	(13,698)
Total Fixtures & Fittings	42,962	47,736
Total Infrastructure, Plant and Equipment (non-current)	156,541	132,875

All revaluations are independent and are conducted in accordance with the revaluation policy stated at Note 1. In 2001–2002, the revaluations were conducted by an independent valuer, Peter J. Spackman Pty. Ltd.

NOTE 7C: ANALYSIS OF PROPERTY, PLANT AND EQUIPMENT**TABLE A - Reconciliation of the opening and closing balances of property, plant and equipment**

Item	Land	Building on Freehold Land	Building Leasehold Improvements	Office Equipment	Computer Equipment	Fixture & Fittings	TOTAL
	\$	\$	\$	\$	\$	\$	\$
As at 1 July 2002							
Gross book value	73,753	226,247	34,355	48,589	36,550	47,736	467,230
Accumulated depreciation/ amortisation	n/a		34,355				34,355
Net book value	73,753	226,247	-	48,589	36,550	47,736	432,875
Additions by purchase		4,163	-	6,868	40,533	-	51,564
Depreciation/amortisation	n/a	(5,736)	-	(5,448)	(13,513)	(4,774)	(29,471)
As at 30 June 2003							
Gross book value	73,753	230,410	-	55,457	77,083	47,736	484,439
Accumulated depreciation /amortisation	n/a	(5,736)	-	(5,448)	(13,513)	(4,774)	(29,471)
Net book value	73,753	224,674	-	50,009	63,570	42,962	454,968

FINANCIAL STATEMENTS

	2003 \$	2002 \$
NOTE 8: EMPLOYEE PROVISIONS		
Salaries and wages	47,909	30,014
Leave	155,949	128,380
Superannuation	3,568	3,360
<i>Aggregate employee entitlement liability</i>	207,426	161,754
Current	135,064	106,707
Non-current	72,362	55,047
	207,426	161,754
NOTE 9 PAYABLES		
Note 9A: Supplier Payables		
Trade creditors	15,526	80,682
Total supplier payables	15,526	80,682
All supplier payables are current.		
Note 9B: Grants Payable		
Commonwealth organisations	405	33,000
State departments	1,121	119,900
Universities and Colleges	40,703	82,035
Other research organisations	43,670	67,949
Total grants payable	85,899	302,884
All grants payable are current.		

NOTE 10: ANALYSIS OF EQUITY

Item	Accumulated Results		Statutory Funds		Asset Revaluation Reserve		Total Contributed Equity		TOTAL EQUITY
	2003	2002	2003	2002	2003	2002	2003	2002	
Opening balance as at	15,678,046	15,460,698					15,678,046	15,460,698	
Net surplus/deficit	551,093	217,348	-	-	-	-	551,093	217,348	
Closing balance as at 30 June	16,229,139	15,678,046					16,229,139	15,678,046	

	2003 \$	2002 \$
NOTE 11 CASH FLOW RECONCILIATION		
Note 11A: 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	551,093	217,348
Non- Cash Items		
Depreciation and amortisation	29,471	25,178
Net write down of non current assets	–	33,599
Changes in Assets and Liabilities		
(Increase) / decrease in receivables	(241,896)	(1,091,631)
Increase / (decrease) in employee provisions	45,672	31,438
Increase / (decrease) in supplier payables	(65,156)	(32,234)
Increase / (decrease) in grants payable	(216,985)	84,129
Net cash from / (used by) operating activities	102,199	(732,173)
Note 11B: Reconciliation of Cash		
Cash balance comprises:		
Cash on hand		
Corporation	1,314,350	1,436,437
Deposits at call	11,701,580	11,528,858
Total cash	13,015,930	12,965,295
Balance of cash as at 30 June shown in the Statement of Cash Flows	13,015,930	12,965,295
NOTE 12 CONTINGENT ASSET	120,000	–

The amount represents an estimate of possible previously unpaid royalties

NOTE 13 DIRECTOR REMUNERATION

The number of directors of the Corporation included in these figures are shown below in the relevant remuneration bands

	2003	2002
\$ Nil - \$ 9,999	4	2
\$ 10,000 - \$ 19,999	5	5
\$ 20,000 - \$ 29,999		1
\$ 30,000 - \$ 39,999	1	
\$150,000 - \$159,999		1
\$160,000 - \$169,999	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	271,523	257,112
Total remuneration received or due and receivable by directors of the Corporation	271,523	257,112

NOTE 14 RELATED PARTY DISCLOSURES**Directors of the Corporation**

The Directors of the Corporation during the year were:

Bridget Jackson – Chair

Dick Browne – Vice-Chair (reappointed 1st October, 2002)

Ralph Schulze – Executive Director

Kathryn Adams (appointed 1st October, 2002)

Jeff Bidstrup (reappointed 1st October, 2002)

Roberta Brazil (retired 30th September, 2002)

Neil Forrester (reappointed 1st October, 2002)

Graeme Hamilton – Government Director

T.J. Higgins (appointed 1st October, 2002)

Adam Kay (reappointed 1st October, 2002)

Jim Peacock (retired 30th September, 2002)

The aggregate remuneration of Directors is disclosed in Note 13.

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.

	2003	2002
Grants to director related entities (CSIRO Entomology, Plant Industry, Land & Water, Textile and Fibre Technology)	5,674,565	4,573,807

NOTE 15 REMUNERATION OF OFFICERS

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

	2003	2002
\$110,000 - \$119,999	1	1

The officer remuneration includes all officers concerned with or taking part in the management of the economic entity during 2002-03 except the Executive Director. Details in relation to the Executive Director have been incorporated into Note 13: Director Remuneration.

NOTE 16 REMUNERATION OF AUDITORS

	2003	2002
	\$	\$
Remuneration to the Auditor-General for auditing the financial statements for the reporting period.	7,700	7,150

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

NOTE 18 FINANCIAL INSTRUMENTS

Note 18A: Terms, Conditions and Accounting Policies

Financial Instrument	Notes	Accounting Policies and Methods (including recognition criteria and measurement basis)	Nature of Underlying Instrument (including significant terms and conditions affecting the amount, timing and certainty of cash flows)
<i>Financial Assets</i>			
Financial assets are recognised when control over future economic benefits is established and the amount of the benefit can be reliably measured.			
Cash	11B	Deposits are recognised at their nominal amounts. Interest is credited to revenue as it accrues.	Temporarily surplus funds are placed on deposit at call with the Corporation's banker. Interest is earned on the daily balance at the prevailing daily rate for money on call and is paid at month end.
Receivables for goods and services	6A	These receivables are recognised at the nominal amounts due less any provision for bad and doubtful debts. Provisions are made when collection of the debt is judged to be less rather than more likely.	Credit terms are net 14 days (2002: 14 days)
Appropriations receivable	6A	These receivables are recognised at the nominal amounts due.	Balance of departmental appropriations made by the Parliament to the Corporation which has not been drawn down by the Corporation at the reporting date.
Accrued interest	6A	Interest is accrued as it is earned.	The interest rates range from 2.0% to 6.05% (2002: 2.8% to 7.2%) and the frequency of payments range from monthly to maturity.
Term deposits	11B	Term deposits are recognised at cost. Interest is accrued as it is earned.	Term deposits are with various financial institutions as per the Corporation's Investment Policy.
<i>Financial Liabilities</i>			
Financial liabilities are recognised when a present obligation to another party is entered into and the amount of the liability can be reliably measured.			
Trade creditors	9A	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).	Settlement is usually made net 30 days.
Grants payable	9B	This payable is recognised as the amount outstanding on the amount to be paid in accordance with the terms of the grants.	Grants range in maturity from six months to two years. Amounts are payable when the conditions of the grants are met.

NOTE 18B: INTEREST RATE RISK

Financial Instrument	Notes	Floating Interest Rate		Fixed Interest Rate Maturing In			Non-Interest Bearing		Total		Weighted Average Effective Interest Rate	
		2003	2002	1 Year or Less	1 to 2 Years	2002	2003	2002	2003	2002	2003	2002
		\$	\$	\$	\$	\$	\$	\$	\$	\$	%	%
Financial Assets												
Cash on hand	11B	-	-	-	-	-	500	500	500	500	N/a	N/a
Deposits at call	11B	1,313,850	1,435,937	-	-	-	-	-	1,313,850	1,435,937	4.75	3.9
Term deposits	11B	-	-	11,201,580	8,578,858	500,000	2,950,000	-	11,701,580	11,528,858	5.4	5.3
Receivables for goods and services	6A	-	-	-	-	-	-	2,275	393,832	393,832	N/a	N/a
Appropriations receivable	6A	-	-	-	-	-	-	1,079,645	1,079,645	503,522	N/a	N/a
Accrued interest	6A	-	-	-	-	-	-	293,101	293,101	190,292	N/a	N/a
Other receivables	6A	-	-	-	-	-	-	1,692,071	1,692,071	1,737,550	N/a	N/a
Total		1,313,850	1,435,937	11,201,580	8,578,858	500,000	2,950,000	3,067,592	16,083,022	15,790,491		
Total Assets									16,537,990	16,223,366		
Financial Liabilities												
Trade creditors	9A	-	-	-	-	-	-	15,526	15,526	80,682	N/a	N/a
Grants payable	9B	-	-	-	-	-	-	85,899	85,899	302,884	N/a	N/a
Total								101,425	101,425	383,566		
Total Financial Liabilities									308,851	545,320		

NOTE 17 AVERAGE STAFFING LEVELS

The average staffing levels for the consolidated entity and the Corporation during the year were: **10.8** 9.8

Note 18C: Net Fair Values of Financial Assets and Liabilities

		2003	Aggregate	2002	Aggregate
	Notes	Total Carrying Amount \$	Net Fair Value \$	Total Carrying Amount \$	Net Fair Value \$
Financial Assets					
Cash on hand	11B	500	500	500	500
Deposits at call	11B	1,313,850	1,313,850	1,435,937	1,435,937
Term deposits	11B	11,701,580	11,701,580	11,528,858	11,528,858
Receivables for goods and services	6A	2,275	2,275	393,832	393,832
Appropriations receivable	6A	1,079,645	1,079,645	503,522	503,522
Accrued interest	6A	293,101	293,101	190,292	190,292
Other receivables	6A	1,692,071	1,692,071	1,737,550	1,737,550
		16,083,022	16,083,022	15,790,491	15,790,491
Financial Liabilities					
Trade creditors	9A	15,526	15,526	80,682	80,682
Grants payable	9B	85,899	85,899	302,884	302,884
		101,425	101,425	383,566	383,566

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 values of the term deposits are based on discounted cash flows using current interest rates for assets with similar risk profiles.

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.

Other than for listed financial assets, none of the classes of financial assets are readily traded on organised markets in standardised form.

Financial Liabilities

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

Other than for Bills and notes payable, none of the classes of financial assets are readily traded on organised markets in standardised form.

Note 18D: Credit Risk Exposures

The economic entity'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 economic entity has no significant exposures to any concentrations of credit risk. All figures for credit risk referred to do not take into account the value of any collateral or other security.

NOTE 19 REPORTING OF OUTCOMES

Note 19A: Outcome 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.

Only one Output is identified for the Outcome.

	Outcome	
	Output	
	2003	2002
	\$	\$
Operating expenses		
Employees	938,363	831,048
Suppliers	253,604	317,555
Grants	14,400,602	13,401,977
Depreciation and amortisation	29,471	25,178
Write-down of assets	-	33,599
Total operating expenses	15,622,040	14,609,357
Funded by:		
Revenues from Government	7,280,000	7,208,067
Industry contributions	7,136,220	6,004,553
Sale of goods and services	2,445	978
Interest	802,389	705,840
Other	952,079	907,267
Total operating revenues	16,173,133	14,826,705



Appendixes

ANNUAL REPORT 2002–2003

Cotton Research and Development Corporation

APPENDIX A

THE RESEARCH PROGRAM

During the reporting year the Corporation supported over 200 research, development, travel, technology transfer, seminar and workshop projects. Agreements for the carrying out of research and development activities are made under Sections 13 and 14 of the *Primary Industries and Energy Research and Development Act 1989*. Corporation grant agreements are contracts entered into with research providers and are established on a whole-of-project-life basis.

The project number assigned to each project indicates the organisation undertaking the research. Research providers funded during the 2002–03 year are listed below.

RESEARCH PROVIDERS 2002–2003

AAW	A&A Williams Pty Ltd	GCRC	Cooperative Research Centre for Greenhouse Accounting
AKC	AKC Consulting Pty Ltd	HEX	Hexima Ltd
ANU	Australian National University	MU	Melbourne University
AWA	Agriculture Western Australia	NEC	National Centre for Engineering in Agriculture
CLW	CSIRO Land and Water	RIR	Rural Industries Research and Development Corporation
CRC	Australian Cotton Cooperative Research Centre	UA	University of Adelaide
CRDC	Cotton Research and Development Corporation	UNE	University of New England
CSE	CSIRO Entomology	UQ	University of Queensland
CSP	CSIRO Plant Industry	US	University of Sydney
CTFT	CSIRO Textile and Fibre Technology	UWS	University of Western Sydney
DAN	NSW Agriculture		
DAW	Department of Primary Industries, Queensland		
DNR	Department of Natural Resources and Mines, Queensland		
DPIF	Department of Primary Industries and Fisheries, Northern Territory		

Project	Title	Researcher	Phone No.	Start Date	Cease Date	Payments 2002–03
PROGRAM A: INSECT MANAGEMENT						
AKC1C	Cotton industry Codex representation and regulatory support	Mr Kevin Bodnaruk	02 9499 3833	1-07-2002	30-06-2004	\$22,480.76
AWA2C	Defining an integrated pest management (IPM) system for INCARD cotton in north-western Australia	Dr Amanda Annells	08 9166 4061	1-07-1999	30-09-2002	\$0.00
AWA3C	Development of sustainable pest management practices for Bollgard IITM production in the Kimberley	Dr Amanda Annells	08 9166 4061	1-07-2002	31-12-2003	\$105,239.00
CRC17C	Post Doc – Sarah Mansfield: Enhancing the impact of early season predation on <i>Helicoverpa</i> spp.	Dr Sarah Mansfield	02 6799 1500	16-01-2001	16-01-2004	\$156,632.00
CRC30C	Postgraduate – Ingrid Rencken: Role of native vegetation in harbouring beneficial insects and reducing insect pest damage in cotton	Ms Ingrid Rencken	02 6773 2403	1-07-2001	30-04-2006	\$21,750.00
CRC36C	Managing <i>Helicoverpa</i> spp. on cotton with semio(signalling)–chemicals	Dr Chris Moore	07 3362 9482	1-07-2001	30-06-2004	\$93,353.00
CRC40C	The comparison of spider communities in cotton around Australia	Dr Mary Whitehouse	02 6799 1500	1-03-2002	30-09-2003	\$0.00
CRC43C	Postgraduate – Derek Collinge: Gene silencing technologies to control <i>Helicoverpa armigera</i>	Derek Collinge	02 6246 4164	1-01-2003	31-12-2005	\$14,500.00
CRDC151C	INGARD survey (performance report) #5	Mr Bruce Pyke	02 6792 4088	1-07-2001	30-06-2003	\$20,909.10

CRDC179C	Australian Cotton Research Institute expansion of insectary	Mr Bruce Reddan	02 6799 1508	1-07-2001	30-06-2003	\$0.00
CRDC183C	Introduction of the exotic parasitoid, <i>Eretmocerus hayati</i> to improve control of silverleaf whitefly	Dr Paul De Barro	07 3214 2811	11-02-2002	30-06-2003	\$105,294.00
CRDC207C	Workshop – Thrips Identification at ACRI on 3 October 2002 (Dr Laurence Mound)	Dr Lewis Wilson	02 6799 1550	19-08-2002	3-10-2002	\$2,007.27
CRDC216C	Selected Application issues for the Cotton Industry	Dr Jamie Nicholls	07 5460 1292	1-10-2002	30-09-2003	\$229,910.00
CRDC218C	Ground Application Extension Project	Mr Bill Gordon	07 4697 6565	1-10-2002	30-06-2003	\$129,595.00
CRDC224C	Sticky Cotton Analyses	Dr Paul De Barro	07 3214 2811	1-08-2002	30-06-2003	\$690.00
CRDC228C	Insecticide Resistance in <i>Helicoverpa</i> spp and the role of IPM–Area Wide Management in Resistance Management (Continues as DAN173C)	Dr Louise Rossiter	02 67991500	1-09-2002	30-06-2003	\$140,157.84
CSE82C	Postgraduate – Erica Crone: Characterisation of a potential new insecticidal transgene	Ms Erica Crone	02 6246 4159	15-03-1999	14-03-2003	\$17,166.00
CSE84C	Insect pest resistance and the role of induced responses to damage in Australian cottons	Dr Geoffrey Baker	02 6246 4406	1-07-1998	30-06-2003	\$105,574.00
CSE88C	Postgraduate – Michael Zuckerman: Protease resistant insecticidal proteins for controlling <i>Helicoverpa</i> species	Mr Michael Zuckerman	02 6246 4124	1-07-2000	30-06-2003	\$22,713.75
CSE89C	Genetics of Bt resistance in <i>Helicoverpa Armigera</i> : Understanding Bt resistance	Dr Rod Mahon	02 6246 4082	1-07-2000	30-06-2003	\$140,989.00

CSE90C	Ecological studies of <i>Helicoverpa</i> populations related to the successful implementation of IPM systems based on Bt transgenic cottons	Mr Colin Tann	02 6799 1500	1-07-2000	30-06-2003	\$146,111.00
CSE96C	Resistance of <i>helicoverpa armigera</i> to cry2A	Dr Ray Akhurst	02 6246 4082	1-07-2001	30-06-2004	\$89,950.00
CSE101C	High level Cry1Aac resistance in <i>Helicoverpa armigera</i>	Dr Ray Akhurst	02 6246 4123	1-07-2002	30-06-2004	\$92,500.00
CSE102C	Monitoring Bt resistance	Dr Ray Akhurst	02 6246 4123	1-07-2002	30-06-2005	\$206,722.00
CSE103C	The impact of Area Wide Management (AWM) on beneficial Anthropod and <i>Helicoverpa</i> populations	Mr Martin Dillon	02 6799 1518	1-07-2002	30-06-2005	\$161,134.00
CSE104C	Potential for the evolution of resistance to Bt by <i>Helicoverpa armigera</i>	Dr Rod Mahon	02 6246 4123	1-07-2002	30-06-2004	\$129,788.00
CSP145C	Improving understanding of the ecology	Dr Lewis Wilson	02 6799 1500	1-09-2001	30-06-2004	\$87,265.05
CSP147C	Incorporating aphids, insecticides and early season plant compensation in Integrated Pest Management (IPM)	Dr Lewis Wilson	02 6799 1500	1-07-2002	30-06-2005	\$171,111.05
DAN138C	Insecticide Resistance Management in <i>Bemisia tabaci</i> type B (Silverleaf Whitely SLW)	Dr Robin Gunning	02 6763 1128	1-07-1999	30-09-2002	\$0.00
DAN139C	Pesticide Resistance in Cotton Aphid and Twospotted Mite	Dr Grant Herron	02 4640 6333	1-07-1999	31-03-2003	\$0.00
DAN140C	Management of Resistance to Conventional Chemicals in <i>Helicoverpa</i> spp.	Dr Robin Gunning	02 6763 1128	1-07-1999	30-06-2004	\$100,000.00

DAN151C	Conservation and utilisation of beneficial insects and other biological control agents for IPM in cotton II	Dr Robert Mensah	02 6799 1525	1-07-2001	30-06-2004	\$156,088.00
DAN152C	Resistance monitoring and management of transgenic Bt cotton	Dr Ho Dang	02 6799 1500	1-07-2001	30-09-2002	\$0.00
DAN158C	Post Doc – Emma Cottage: Mechanisms of insecticide resistance in the cotton aphid, <i>Aphis Gossypii</i>	Dr Emma Cottage	02 6763 1130	1-10-2001	15-08-2002	\$0.00
DAN160C	Impact and Role of Novel insecticides in Integrated Pest Management	Mr Viliami Heimoana	02 6799 1516	1-07-2002	30-06-2005	\$150,000.00
DAN161C	Biochemical mechanisms of resistance to <i>Bacillus thuringiensis</i> endo-toxins in <i>Helicoverpa armigera</i>	Dr Robin Gunning	02 6763 1128	1-07-2002	30-06-2003	\$35,000.00
DAN162C	Insecticide resistance management in B-biotype <i>Bemisia tabaci</i>	Dr Robin Gunning	02 6763 1128	1-07-2002	30-06-2005	\$107,102.00
DAN163C	Insecticide Resistance Management in cotton aphid (<i>Aphis gossypii</i>) and cotton mite (<i>Tetranychus urticae</i>)	Dr Grant Herron	02 4640 6333	1-07-2002	30-06-2005	\$106,278.00
DAN164C	Mechanisms of insecticide resistance in the cotton aphid, <i>Aphis gossypii</i>	Dr Emma Cottage	02 6763 1130	1-07-2002	30-06-2004	\$81,860.00
DAQ105C	Improved application and formulation of viral biopesticides against <i>Helicoverpa</i>	Dr Andrew Reeson	07 3896 9362	1-07-2000	30-06-2004	\$117,815.00
DAQ110C	Pest status and management of shield bugs in cotton	Dr Moazzem Khan	07 4160 0705	1-07-2001	30-06-2004	\$133,664.00
DAQ111C	New biopesticides against emerging sucking pests	Mr Damien Cupitt	07 3896 9363	19-06-2002	30-06-2005	\$0.00

DAQ112C	Heliopsis management in south Queensland farming systems	Dr David Murray	07 4688 1326	1-07-2001	30-06-2004	\$73,401.00
DAQ113C	Postgraduate – Amanda Cleary: The effect of cereal stubble on <i>Helicoverpa</i> activity in early season cotton	Ms Amanda Cleary	07 4688 1262	1-08-2001	30-08-2004	\$38,000.00
DAQ116C	Assessment of the potential for resistance to Gemstar	Dr Caroline Hauxwell	07 3896 9362	1-07-2001	30-06-2004	\$76,166.00
DAQ120C	Area-wide monitoring and cultural control of key cotton pests in central Queensland	Dr Richard Sequeira	07 4983 7410	1-07-2002	30-06-2005	\$144,651.00
DAQ121C	Aphid bio-control in cotton	Mr Bernard Franzmann	07 4688 1313	1-07-2002	30-06-2004	\$93,630.00
DAQ122C	Development of novel pest management options for cotton in central Queensland	Dr Paul Grundy	07 4992 9172	1-07-2002	30-06-2005	\$103,395.00
DAQ125C	Utilising parasitoids in south Queensland cotton	Dr Brad Scholz	07 4688 1312	1-07-2002	30-06-2003	\$60,000.00
DAQ126C	Heliopsis egg collections for resistance testing from the Darling Downs and South Burnett in southern Qld	Mr Hugh Brier	07 4160 0740	1-11-2002	30-04-2005	\$23,983.00
UNE33C	Postgraduate – David Britton: Studies of slow-release formulations for semiochemicals in cotton pest management	Mr David Britton	02 6773 3021	1-08-1999	30-09-2003	\$14,000.00
UNE36C	Postgraduate – Sam Lowor: Pheromones for occasional pests of cotton	Mr Samuel Lowor	02 6773 3021	1-01-2002		
		30-06-2004	\$3,625.34			

UQ26C	Ecology of Trichogramma egg parasites in the Ord River Irrigation Area and their role in cotton IPM (Project started Jan 2000)	Prof Myron Zalucki	07 3365 1747	1-07-1999	28-02-2003	\$8,349.00
UQ28C	Postgraduate – Andrew Davies: Ecology of the Trichogramma egg parasites in the Ord River Irrigation Area and their role in cotton IPM	Mr Andrew Davies	07 3365 1747	28-02-2000	31-08-2003	\$29,000.00
UQ29C	Postgraduate – Mark Wade: Biology, ecology and utilisation of the Damselfly Bug as a predator in cotton – towards real IPM	Mr Mark Wade	07 3365 7995	28-02-2000	31-08-2003	\$29,300.00
UQ30C	Understanding the behaviour of egg laying Helicoverpa moths: New designs for integrated control in cotton	Dr Paul Cunningham	07 3365 1876	1-08-2000	30-06-2003	\$98,122.00
UQ31C	The Impact of LDP Spray Application upon the Biological Efficacy of Cotton Insecticides	Dr Jamie Nicholls	07 5460 1292	1-07-2000	30-09-2002	\$0.00
UQ32C	Population Genetics of Heliothis Migration, Recruitment and Origins	Mr Glenn Graham	07 3365 1863	1-07-2000	30-06-2003	\$104,846.00
UWS3C	Evaluation of mineral oils for cotton IPM	A-Prof Andrew Beattie	02 45701287	1-07-2001	30-06-2003	\$123,033.00
Program A: Insect Management						Total Funds \$4,424,850.16
PROGRAM B: DISEASES AND WEEDS						
ANU6C	Testing the tomato I-2 resistance gene for its ability to confer Fusarium resistance in cotton	Dr David Jones	02 6125 4192	1-01-2000	27-09-2002	\$0.00

CRC18C	Postgraduate – Florian Yan: Cotton soil health: Influences on cotton root diseases	Ms Florian Yan	0403 033 867	1-07-2000	30-06-2004	\$29,000.00
CRC29C	Postgraduate – John Harvey: Diversity and pathogenicity of <i>Thielaviopsis Basicola</i> (Black Root Rot)	Mr John Harvey	07 3366 1442	1-02-2001	31-01-2004	\$40,395.00
CRC31C	Postgraduate – Richard Kent: The role of weeds as alternative hosts of <i>Fusarium wilt</i> in cotton	Mr Richard Kent	02 6773 3961	1-01-2002	31-12-2004	\$37,900.00
CRDC208C	Sponsorship for visiting researcher from USA – training on nematode problems in cotton in conjunction with CRC & CSD	Mr David Allen	02 6332 2934	16-02-2003	1-03-2003	\$360.00
CRDC209C	Assessing a program for post emergent control of problem weeds in cotton using shielded sprayers	Mr John Rochecouste	07 4635 0824	1-07-2002	1-08-2003	\$60,765.00
CRDC225C	<i>Fusarium oxysporum</i> infected cottonseed– Grainco	Mr Patrick Wilson	07 4639 9222	1-01-2003	30-06-2003	\$20,000.00
CSP113C	Australian native cottons as sources of resistance and new pathotypes of <i>fusarium wilt</i>	Dr Bo Wang	02 6246 5205	1-01-2001	31-12-2003	\$146,875.05
CSP114C	Post Doc – Dr. Helen McFadden: Discovery of genes involved in the expression of cotton resistance responses to <i>Fusarium wilt</i> by the application of microarray technology	Dr Helen McFadden	02 6246 5377	1-07-2000	30-09-2003	\$153,040.00
CSP115C	Targeted expression of genes for manipulation of the systemic acquired resistance responses of cotton for improved tolerance to fungal pathogens	Dr Helen McFadden	02 6246 5377	1-07-2000	30-06-2003	\$135,203.05

CSP143C	Identification and management of Bunchy Top syndrome in cotton (Year 2 and 3 of CRDC121C)	Dr Lewis Wilson	02 6799 1500	1-07-2001	30-06-2004	\$195,562.85
CSP148C	Pilot studies to determine the feasibility of potential new directions for work with <i>Fusarium oxysporum</i> f.sp. <i>vasinfectum</i>	Dr Helen McFadden	02 6246 5377	1-07-2002	30-06-2003	\$27,000.00
CSP155C	AFLP diversity of <i>Fov</i> in cultivated cotton fields and genotyping of <i>G. hirsutum</i> X <i>G. sturtianum</i> backcross lines	Dr Curt Brubaker	02 6246 5085	1-10-2002	30-09-2004	\$70,845.05
DAN153C	Managing Black Root Rot of Cotton	Dr Om Jhorar	02 6799 1531	1-07-2001	30-06-2004	\$161,037.00
DAN154C	Diseases of Cotton VII	Dr David Nehl	02 6799 1500	1-07-2001	30-06-2004	\$142,753.00
DAN156C	Weed management packages for cotton	Mr Graham Charles	02 6799 1524	1-07-2001	31-10-2002	\$0.00
DAN165C	Capital Funding – Germination-plant growth cabinets	Dr Ian Taylor	02 6799 2409	1-07-2002	30-06-2003	\$52,400.00
DAN171C	Managing problem weeds of irrigated cotton production	Mr Graham Charles	02 6799 1524	1-10-2002	30-06-2003	\$85,883.00
DAQ107C	Ecology and development of management strategies for fusarium wilt in cotton	Dr Joe Kochman	07 4688 1245	1-07-2000	30-06-2004	\$394,162.00
DAQ123C	Best weed management strategies for dryland cropping systems with cotton	Dr Han Wen		1-07-2002	30-06-2005	\$40,000.00
MU2C	Postgraduate – Christina Hall: Defence mechanisms of cotton against <i>Fusarium oxysporum</i> f.sp. <i>vasinfectum</i> and control of fusarium wilt	Ms Christina Hall	03 8344 5039	26-03-2002	31-12-2004	\$29,000.00

UNE32C	Ecology and management of Bladder Ketmia (<i>Hibiscus trionum</i>) and other emerging problem Malvaceae weeds	Dr Stephen Johnson	02 6799 2438	1-01-2000	30-06-2003	\$116,248.00
US48C	Postgraduate – Fiona Ballard: Identification and characterisation of genes for resistance to bacterial blight in the cotton plant	Ms Fiona Ballard	02 9351 4477	1-03-1999	30-01-2004	\$23,395.12
Total Funds: \$1,961,824.12						
PROGRAM C: SOILS						
CLW1C	Environmental impacts of genetically modified cotton on soil biological processes – effects of farming systems	Dr V. V.S.R. Gupta	08 8303 8579	1-07-2001	30-06-2004	\$69,826.00
CLW3C	Rhizosphere biological functions as influenced by GM cotton	Dr Oliver Knox	08 8303 8507	1-07-2002	30-06-2006	\$46,935.00
CRC19C	Identification and remediation of nutritional stresses in cotton crops	Dr Ian Rochester	02 6799 1520	1-07-2000	30-06-2003	\$175,122.00
CRC33C	Postgraduate – Simon Speirs: Characterising soil structural stability and form of sodic soil used for cotton production	Mr Simon Speirs	02 9351 2944	3-09-2001	31-12-2004	\$29,000.00
CRC44C	Understanding the salinity threat in irrigated cotton growing areas of Australia – Phase IV – Interpretation and extension	Dr John Triantafyllis	02 9351 2398	1-07-2002	30-06-2003	\$100,000.00
CRC45C	Maintaining profitability and soil quality in cotton farming systems	Dr Nilantha Hulugalle	02 6799 1533	1-07-2002	30-06-2005	\$130,000.00

CRC46C	Cotton Gin Trash and Agroforestry for Sustainable Soil Management	Dr Nilantha Hullugalle	02 67991500	1-07-2002	31-12-2003	\$40,000.00
CRDC156C	Cotton trash: hazardous waste	Dr Ivan Kennedy	02 9351 3546	31-05-2002	30-06-2003	\$0.00
CSE105C	The influence of beneficial soil fauna on cotton production and its pests and diseases	Dr Geoffrey Baker	02 6246 4406	1-07-2002	30-06-2005	\$50,000.00
SLM2C	Management of herbicide effects on soil biological processes essential for plant health and nutrition	Dr V. V.S.R. Gupta	08 8303 8579	1-07-2000	30-06-2003	\$70,205.00
US56C	Postgraduate – Sevag Bedrossian: Potassium status and mineralogy of soil in relation to premature senescence in cotton in Northern NSW	Mr Sevag Bedrossian	02 9351 2917	1-01-2000	30-06-2003	\$30,080.00
US64C	Development of measures of soil health	Dr Peter McGee	02 9351 3392	1-07-2002	30-06-2005	\$50,400.00
US65C	Postgraduate – Stella Loke: Diversity of VAM fungi in soil health	Ms Stella Loke	02 9351 4472	1-01-2003	31-12-2005	\$14,500.00
Program C: Soils						\$806,068.00
PROGRAM D: WATER						
ANU7C	Development of a decision support system for water allocation in the Gwydir and Namoi valleys	Dr Rebecca Letcher	02 6125 8132	1-09-2002	31-08-2005	\$130,719.50
ANU8C	Postgraduate – Karen Ivkovic: Development of a decision support system for water allocation in the Gwydir and Namoi Valleys (in conjunction with ANU7C)	Ms Karen Ivkovic		1-09-2002	31-03-2006	\$7,500.00

CRC37C	Measuring the influence of water quality on drainage through irrigated cotton soils	Dr Naidu Bodapati	07 3224 2149	1-07-2001	30-06-2004	\$131,844.00	
CRC47C	Quantifying deep drainage using lysimetry	Dr A. Ringrose-Voase	02 6246 5956	1-01-2003	30-06-2006	\$55,000.00	
CRDC158C	Water relations of the cotton plant (CSP)	Mr James Neilsen	02 6799 1500	1-01-2002	12-01-2006	\$0.00	
CRDC215C	Sub Surface Drip and Furrow Irrigation Experiment in Emerald	Mr Jack McHugh	07 4987 9336	25-09-2002	30-06-2003	\$6,600.00	
CSP116C	Developing integrated farm water management for cotton production	Dr Sunil Tennakoon	02 6799 1536	1-07-2000	30-06-2003	\$117,290.00	
NEC8C	Postgraduate – Simon White. Partial root zone drying and regulated deficit irrigation for cotton using large mobile irrigation schemes	Mr Simon White	07 4659 8831	1-09-2002	31-08-2005	\$35,200.00	
US62C	Postgraduate – Sam Buchanan: Hydrological impacts of irrigation in the Bourke district	Mr Sam Buchanan	02 9351 2398	1-01-2002	31-12-2004	\$38,840.00	
US63C	Capital Item– FIA 5000 Automatic flow analyser for anions	Dr Willem Vervoort	02 9351 8744	1-07-2002	30-06-2003	\$14,250.00	
Program D: Water						Total Funds	\$537,243.50
PROGRAM E: BEST MANAGEMENT PRACTICES AND ENVIRONMENT							
AAW4C	Sustainable natural resource management for the Australian Cotton Industry using the Best Management Practices Manual (CRDC Component)	Mr John Williams	02 93608500	1-07-2002	30-06-2005	\$72,500.00	

CRC20C	Bioremediation enzyme for endosulfan sulphate	Dr John Oakeshott	02 6246 4157	1-07-2000	30-06-2003	\$69,814.00
CRDC189C	Biodiversity in the Australian Cotton Industry: A literature review	A-Prof Nick Reid	02 6773 2759	18-04-2002	31-10-2002	\$0.00
CRDC203C	Multiple-pesticide and odorous degradation product air monitoring in an urban centre surrounded by intensive cotton production	Dr Keith Bentley	02 6260 4094	1-07-2002	1-04-2004	\$32,225.00
CRDC206C	Riparian Guidelines (in association with LWA)	Dr Siwan Lovett		15-07-2002	30-06-2003	\$55,000.00
CRDC210C	Australian Cotton Comparative Analysis – BOYCE Chartered Accountants	Mr Philip Thompson	02 6752 7799	1-07-2002	30-06-2003	\$35,053.60
CRDC219C	Industry Environmental Audit – GHD Pty Ltd	Mr Ian Garrard	02 9462 4700	26-09-2002	30-06-2003	\$98,170.58
DAQ98C	Improved pesticide application performance	Mr Peter Hughes	07 4688 1564	1-07-1999	30-12-2002	\$0.00
DNR4C	Recording, analysing and mapping of biodiversity in cotton areas of the Emerald Irrigation Area	Mr Bill Wilkinson	07 4987 9308	1-07-2002	30-06-2004	\$79,480.00
GCRC3C	Baseline assessment of greenhouse gas emissions in cotton based farming systems	Dr Peter Grace	07 3311 3021	1-07-2002	30-06-2003	\$80,000.00
UQ27C	Optimisation of large droplet placement (LDP) technology for the aerial application of insecticides in cotton	Dr Jamie Nicholls	07 5460 1292	1-07-1998	30-09-2002	\$0.00
UQ33C	Laboratory and field evaluation of the narrow spectrum Unimizer Nozzle	Mr Gary Dorr	07 5460 1173	1-12-2001	30-11-2002	\$0.00

US66C	Postgraduate – Leah MacKinnon: The biology of insectivorous bats, as predators of pests in cotton fields, and associated woodland or forest remnants	Ms Leah MacKinnon	02 6799 1537	1-01-2003	30-06-2004	\$1,500.00
Program E: Best Management Practices and Environment						\$523,743.18
PROGRAM F: COMMUNITY AND ECONOMICS						
CRDC190C	Farm Health and Safety R & D Program	Mr Bruce Pyke	02 6792 4088	1-07-2002	30-06-2005	\$20,000.00
CRDC196C	Wincott Inc – Womens Industry Network Cotton	Ms Helen Zilm	02 6752 9167	1-07-2002	30-06-2004	\$30,005.00
CRDC226C	Socio-Economic Scoping Study	Mr Ian Reeve	02 6773 5145	1-01-2003	30-06-2003	\$22,650.00
Program F: Community and Economics						\$72,655.00
PROGRAM G: PROCESSING AND MARKET						
CTFT2C	Cotton fineness and Maturity Measurement using the Sirolan-Laserscan	Dr Geoffrey Naylor	03 5246 4000	1-01-2002	30-06-2003	\$91,864.00
CTFT3C	Participation in an international interlaboratory trial to develop standard reference cotton samples for fibre fineness and maturity	Dr Geoffrey Naylor	03 5246 4000	1-07-2001	30-06-2003	\$59,688.00
CTFT6C	Improved Quality of Ginned Australian Cotton	Dr Stuart Gordon	03 5246 4000	1-07-2002	30-06-2004	\$59,213.05
CWT6C	Measuring cotton fibre maturity using polarised light microscopy	Dr Stuart Gordon	03 5246 4000	1-07-2000	30-06-2003	\$125,263.05

NEC7C	Field to Fabric research program	Dr Grant Roberts	07 4631 1394	1-07-2000	30-06-2003	\$37,500.00
Program G: Processing and Market						
PROGRAM H: PLANT BREEDING AND BIOTECHNOLOGY						
CSE70C	Postgraduate – Constanza Angelucci: Binding sites for the Cry 1 Ac delta-endotoxin of <i>Bacillus Thuringiensis</i> in <i>Helicoverpa Armigera</i>	Ms Constanza Angelucci	02 6246 4124	1-07-1997	31-12-2002	\$373,528.10
CSP102C	Isolation of Novel Cotton Promotors to drive the Robust Expression of useful Genes in Transgenic Cotton	Dr E. Faivre-Nitschke	02 6799 1522	1-07-1998	31-08-2002	\$0.00
CSP117C	Development and evaluation of cottonseed oils with improved nutritional and functional properties	Dr Qing Liu	02 6246 4919	1-11-2000	30-10-2003	\$112,000.00
CSP118C	Manipulating genes to enhance cotton fibre elongation and cellulose synthesis	Dr Yong-Ling Ruan	02 6246 5470	1-09-2000	3-12-2003	\$103,843.75
CSP120C	Genetic characterisation of homoeologous recombination and chromosome inheritance in <i>G. hirsutum</i> x K genome alien chromosome addition lines	Dr Augusto Becerra	02 6246 4984	1-01-2001	3-01-2004	\$117,977.05
CSP121C	CSIRO Plant Breeding Fibre Quality Laboratory	Dr Greg Constable	02 6799 1522	1-07-2000	30-06-2005	\$83,223.05
CSP122C	CSIRO Field Experiments at ACRI	Dr Greg Constable	02 6799 1522	1-07-2000	30-06-2005	\$88,681.05
CSP135C	Postgraduate – Saara Kate Bowen: Molecular analysis and manipulation of terpene biosynthesis in cotton	Ms Saara Kate Bowen	02 6246 5041	1-01-2002	27-10-2005	\$29,000.00

CSP136C	Cotton Biotechnology: Core Program	Dr Danny Llewellyn	02 6246 5470	1-07-2001	30-06-2004	\$315,581.05
CSP137C	Development of a unigene set of cotton clones for general microarray analysis of gene expression in cotton plants	Dr Danny Llewellyn Dr Yingru Wu	02 6246 4914	1-07-2001	30-09-2004	\$106,451.00
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	Mrs Adriane Machado	02 6246 4942	1-07-2002	30-06-2005	\$29,000.00
CSP149C	Isolation of Novel Cotton Promoters to drive the Robust Expression of useful Genes in Transgenic Cotton	Dr R. Amarashinge	02 6246 5277	1-07-2002	28-02-2005	\$73,997.25
CSP154C	Nutritional improvement in cottonseed oils through genetic removal of palmitic acid	Dr Qing Liu	02 6246 4919	1-07-2002	15-09-2004	\$111,616.00
CSP96C	Breeding Improved Cotton Varieties	Dr Greg Constable	02 6246 5395	1-07-1998	30-06-2003	\$345,299.15
DAQ89C	Cotton Strain and Cultivar testing in Queensland	Mr Gavin Mann	07 4992 9123	1-07-1998	30-06-2003	\$149,811.00
HEX1C	Improving the efficiency of embryogenesis in elite cotton cultivars	Dr Simon Poon	03 8344 4008	1-07-2002	30-06-2005	\$93,272.00
MU1C	Transgenic cotton for the control of Fusarium Wilt	Dr Robyn Heath	03 8344 4272	28-02-2002	28-02-2006	\$69,765.00
UA7C	Post-Doc – Sharon Orford: Genetic manipulation of fibre quality in Australian cotton	Dr Sharon Orford	08 8303 3013	1-07-2000	30-06-2004	\$61,990.00
UA8C	Postgraduate – Sven Delaney: Development of gene promoters for cotton fibre development	Mr Sven Delaney	08 8303 3013	1-02-2001	31-12-2003	\$37,000.00

UA11C	Postgraduate – Damien Lightfoot: Fibre improvement through modulation of transitions in cotton development	Mr Damien Lightfoot	08 8303 3013	1–03–2002	28–02–2005	\$30,000.00
UA12C	Postgraduate – John Humphries: Analysis of TTG1 homologues in cotton for roles in fibre initiation	Mr John Humphries	08 8303 3013	11–02–2002	11–02–2005	\$30,000.00
Program H: Plant Breeding and Biotechnology						Total Funds \$1,988,507.35
PROGRAM I: FARMING SYSTEMS						
CRC34C	Agronomic aspects of Bt efficacy in transgenic cotton	Dr Ian Rochester	02 6799 1520	1–07–2001	30–06–2004	\$95,902.00
CSP123C	Applying cotton crop physiology to production issues	Dr Stephen Milroy	02 6799 1500	1–07–2000	30–06–2003	\$138,865.05
CSP124C	Predicting and enhancing cotton compensation following pest damage	Dr Tom Lei	02 6799 1500	1–07–2000	30–06–2003	\$186,487.05
CSP138C	Refining crop agronomy for dry season cotton production in NW Australia	Dr Brian Duggan	08 9166 4059	1–07–2001	30–06–2004	\$157,449.00
CSP139C	Application of crop simulation within the Australian cotton industry	Mr Dirk Richards	02 6799 1500	1–07–2001	30–06–2004	\$127,274.00
CSP140C	The impact of temperature extremes on cotton performance	Dr Michael Bange	02 6799 1540	1–07–2001	30–06–2004	\$97,233.05
CSP141C	Postgraduate – Rose Roche: Training in crop physiology – Functional responses of cotton to environment mediated via internal nitrogen dynamics	Ms Rose Roche	02 67991500	1–07–2001	30–06–2004	\$30,000.00
CSP142C	Phosphorus and potassium nutrition of cotton	To be appointed	02 6799 1520	1–07–2001	30–06–2003	\$89,574.00

CSP150C	Capital – Leaf chamber fluorometer	Dr Tom Lei	02 6799 1500	1–07–2002	30–06–2003	\$18,000.00
DAN166C	Operational Costs for Cotton Experiments	Mr Dallas Gibb	02 6799 1547	1–07–2002	30–06–2005	\$84,797.00
DAQ104C	GRDC2C – Using seasonal climate forecasts for more effective grain–cotton production systems (joint project)	Mr Graham Harris	07 46398886	1–07–1999	30–12–2003	\$0.00
DNR3C	Integrated Area Wide Management (AWM) in rural landscapes	Mr Bill Wilkinson	07 4987 9308	1–09–2001	1–09–2002	\$0.00
DPIF2C	Investigation of cotton growing at different sites under different farming systems in the Northern Territory	Mr Andrew Dougall	08 8973 9728	1–07–2001	31–12–2003	\$80,234.00

Program I: Farming Systems Total funds \$1,105,815.15

PROGRAM J: EXTENSION

CRC21C	Cotton production systems for Southern NSW (Griffith IDO)	Dr Scott Hardwick	02 6960 1547	1–07–2000	30–06–2003	\$92,900.00
CRC22C	National Cotton Extension Coordinator	Ms Ingrid Christiansen	07 4688 1398	1–07–2000	30–06–2005	\$121,755.00
CRC35C	IPM Training Coordinator	Mr Mark Hickman	02 6741 8379	1–01–2002	30–06–2004	\$151,834.00
CRC41C	NSW Industry Development Officer (IDO, Trainee)	Ms Penny van Dongen	02 6799 1500	1–01–2002	30–06–2004	\$80,800.00
CRC42C	Qld Industry Development Officer (IDO, Trainee)	Mr Steve Ginns	07 4983 7400	1–01–2002	30–06–2004	\$70,877.00
CRDC174C	An evaluation of the changes in practices and attitudes to Integrated Pest Management (IPM) and Area Wide Management (AWM)	Ms Ingrid Christiansen	07 4688 1398	1–07–2001	30–06–2003	\$4,500.00

CSP125C	Continued development and field evaluation of microcomputer cotton management packages	Dr Michael Bange	02 6799 1540	1-07-2000	30-06-2003	\$139,056.00
CSP151C	Support development and independent evaluation of cotton management packages	Dr Michael Bange	02 6799 1540	1-07-2002	30-06-2005	\$97,757.05
DAN167C	Cotton Industry Development Officer – Lower Namoi	Ms Annie Spora	02 6391 3219	1-07-2002	30-06-2005	\$103,580.00
DAN168C	Cotton Industry Development Officer – Upper Namoi	Mr Mark Hickman	02 6741 8379	1-07-2002	30-06-2003	\$120,000.00
DAN169C	Cotton Industry Development Officer – Macquarie	Ms Kirrily Rourke	02 6847 4507	1-07-2002	30-06-2005	\$103,580.00
DAQ100C	Extension Agronomy for Cotton Production in central Qld	Mr David Kelly	07 4983 7411	1-07-1999	30-06-2004	\$98,914.00
DAQ114C	Cotton Industry Development Extension Officer – Border Rivers	Ms Anne Sullivan	07 4983 7400	1-07-2001	30-06-2004	\$114,523.00
DAQ115C	Cotton Industry Development Extension Officer – Dirranbandi and St. George	Ms Rebecca Smith	07 4620 8113	1-07-2001	30-06-2004	\$92,636.00

Program J: Extension Total Funds \$1,392,712.05

PROGRAM K: HUMAN RESOURCES

CLW2C	Travel – Dr V. Gupta: Dr Stotzky's Lab, New York, USA	Dr V. V.S.R. Gupta	08 8303 8579	19-10-2001	1-10-2002	\$0.00
CRDC181C	Travel – Emma Tiller: Visit to ACRI Narrabri	Ms Emma Tiller	02 6125 4759	9-02-2002	30-09-2002	\$0.00

CRDC191C	Travel – Whitefly Study Tour to USA – R. Sequeria, H. Millar, D. Parlatto, D. Kelly, P. Grundy	Dr Richard Sequeira	07 4983 7410	30-05-2002	31-07-2002	-\$1,214.37
CRDC200C	CRC Research Meeting Toowoomba (Postgraduates)	Mr Bruce Pyke	02 6792 4088	31-05-2002	31-07-2002	\$0.00
CRDC201C	Community Sponsorship to Australian Cotton Conference, Brisbane Aug 2002	Mr Bruce Pyke	02 6792 4088	1-07-2002	31-08-2002	\$5,725.45
CRDC202C	Travel – Dr JK Kochman to attend Conference at the US Cotton Disease Council Colloquium on Fusarium wilt in Australia	Dr Joe Kochman	07 4688 1245	4-01-2003	12-01-2003	\$8,485.00
CRDC204C	Travel – Participation to attend New Zealand Conference	Mr Ralph Schulze	02 6792 4088	1-07-2002	30-06-2003	\$3,338.19
CRDC205C	Postgraduates – Sponsorship to Brisbane Cotton Conference, 13 –15 August 2002	Mr Ralph Schulze	02 6792 4088	13-08-2002	15-08-2002	\$7,573.11
CRDC211C	Travel: World Cotton Research Conference, Cape Town 9-13 March 2003	Mr Ralph Schulze	02 6792 4088	1-07-2002	30-03-2003	\$49,231.36
CRDC212C	Triple Bottom Line Report: Scoping Study	Dr John Wolfenden	02 6773 2420	9-09-2002	8-11-2002	\$7,330.00
CRDC213C	Travel – Dr Brian Duggan : Beltwide Cotton Conference, Nashville USA	Dr Brian Duggan	08 9166 4059	4-01-2003	13-01-2003	\$0.00
CRDC214C	Travel – Dr Phil Goyne : Beltwide Cotton Conference, Nashville USA	Dr Phil Goyne	07 4661 2944	5-01-2003	11-01-2003	\$1,600.00
CRDC217C	Transport and accommodation for Dr Ellsworth (Univ of Arizona) – December 2002	Mr Bruce Pyke	02 6792 4088	1-12-2002	15-12-2002	\$3,190.66

CRDC220C	Benefit-cost analysis of CSIRO Plant Industry Research for the Cotton Industry	Mr Ralph Schulze	02 6792 4088	21-10-2002	31-12-2002	\$7,500.00
CRDC221C	CRC Leadership and Career Development Course 2002 – Mark Wade & Emma Cottage	Mr Ralph Schulze	02 6792 4088	30-10-2002	30-11-2002	\$4,400.00
CRDC222C	AFFA – Industry Partnerships – corporate governance for rural women	Mr Ralph Schulze	02 6792 4088	1-11-2002	30-06-2003	\$5,396.10
CRDC223C	Travel – US Workshop Denver, Colorado, Allan and John Williams	Mr Allan Williams	02 6793 5301	6-01-2003	9-01-2003	\$4,966.52
CRDC227C	Travel – Stuart Gordon: ACSA China Promotion Trip	Dr Stuart Gordon	03 5246 4000	16-02-2003	27-02-2003	\$2,022.00
CRDC231C	UNE Course fees for Marije Balfe	Dr Robin Gunning	02 6763 1128	1-06-2003	30-06-2004	\$1,120.80
CSE106C	Travel: Dr. Ray Akhurst to travel to International Conference on Bacillus thuringiensis, Iguassu, Brazil	Dr Ray Akhurst	02 6246 4123	1-07-2002	30-06-2003	\$3,300.00
CSP128C	Enhancing Access to climate and weather data	Dr Michael Bange	02 6799 1540	1-07-2000	30-06-2003	\$48,699.05
CSP152C	Travel : Helen McFadden – Attend 8th International congress on Plant Pathology Christchurch NZ	Dr Helen McFadden	02 6246 5377	1-07-2002	30-06-2003	\$2,500.00
CSP153C	ACRI Computing Support	Mr Tony Pfeiffer	02 6799 1500	1-07-2002	30-06-2005	\$130,363.05
DAN150C	Safety at Harvest (Video Production)	Mr Gus Shaw	02 6742 9236	1-03-2001	30-09-2002	\$0.00
DAN170C	Travel: Dr. David Nehl to travel to 8th International Congress of Plant Pathology, Christchurch NZ	Dr David Nehl	02 6799 1500	1-07-2002	30-06-2003	\$4,515.00

DNR5C	Travel: Bill Wilkinson to travel to Australian Cotton Conference Brisbane	Mr Bill Wilkinson	07 4987 9308	1-07-2002	30-06-2003	\$2,120.00	
RIR8C	Australian Rural Leadership Program – Mr John Quantrill Course 9, 10, 11, 12	Mr John Quantrill	02 6281 0680	1-07-2001	30-06-2005	\$42,500.00	
US55C	Undergraduate Scholarship Program – Sydney Uni	Prof Les Copeland	02 9351 2935	1-07-1999	30-06-2004	\$7,100.00	
US61C	Sponsor prize: Proficiency in fourth year agronomy in the B.Sc.Agr. degree program	Dr Lindsay Campbell	02 9351 2941	1-07-2001	30-06-2004	\$500.00	
Program K: Human Resources						Total Funds	\$352,261.92

GRAND TOTAL 2002-2003

\$13,539,208.53

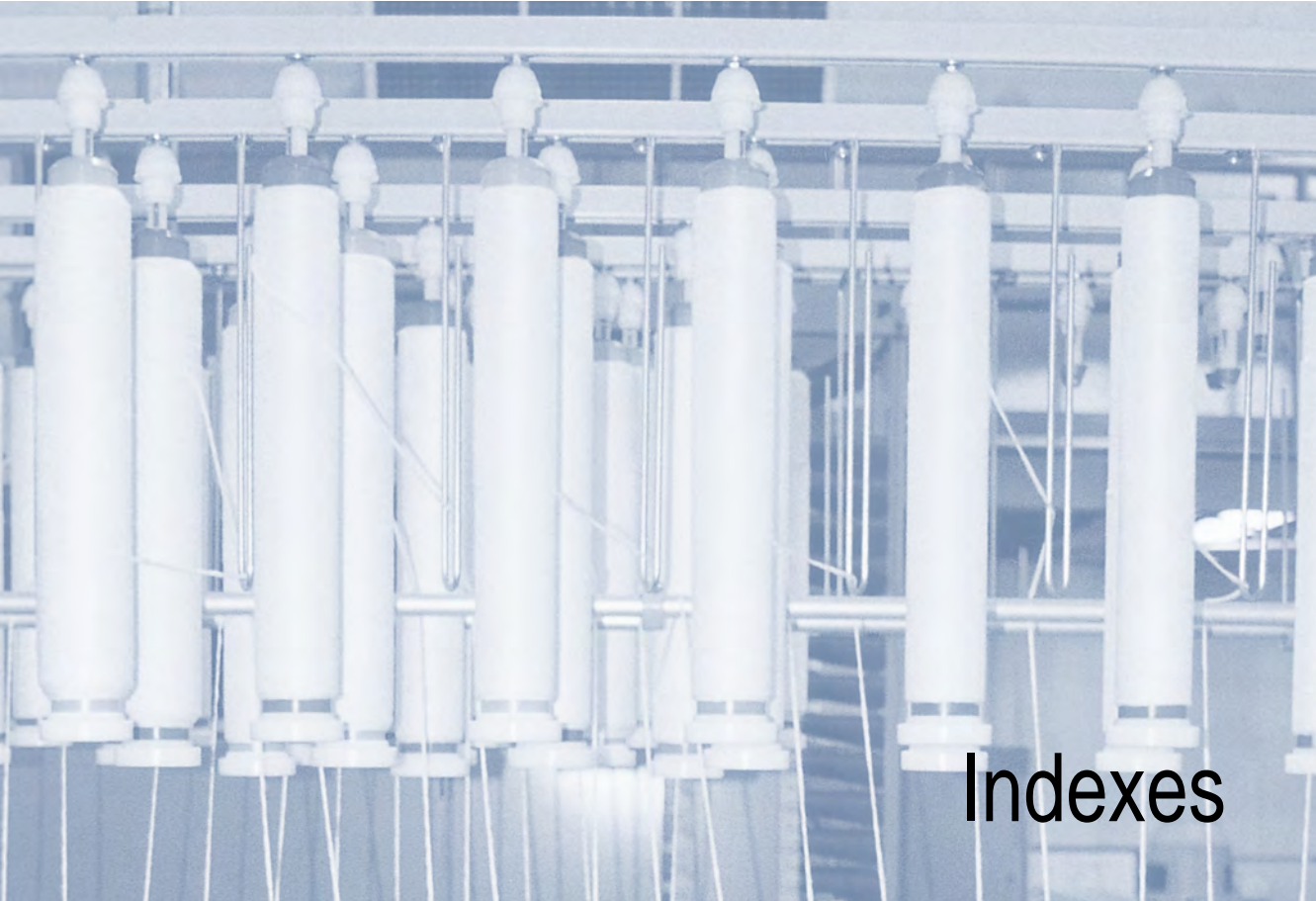
APPENDIX B

ACRONYMS AND ABBREVIATIONS

In the interests of readability and ease of use, the Corporation attempts to avoid acronyms and those abbreviations that are not self-explanatory wherever possible. However, some times it is unavoidable. Following is a list of acronyms that are used in the cotton industry or by Government and 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
ACCRC	Australian Cotton Cooperative Research Centre (also Cotton CRC)
ACRI	Australian Cotton Research Institute (located near Narrabri, NSW)
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
BMP	Best Management Practice
BRS	Bureau of Rural Sciences
Bt	<i>Bacillus thuringiensis</i> (crystal protein expressed in Ingard® Cotton)
CAC Act	<i>Commonwealth Authorities and Companies Act 1997</i>
CCA	Cotton Consultants Australia Inc.
CRC	Cooperative Research Centre
Corporation, the	Cotton Research and Development Corporation
CRDC	Cotton Research and Development Corporation
CSD	Cotton Seed Distributors
CSIRO	Commonwealth Scientific and Industrial Research Organisation
department, the	refers to the Department of Agriculture, Fisheries and Forestry
DLWC	Department of Land and Water Conservation, New South Wales
DNR	Department of Natural Resources, Queensland
DOFA	Department of Finance and Administration (Australian Government)
ESD	Ecologically Sustainable Development

EPA	Environmental Protection Agency (NSW)
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
GMAC	Genetic Manipulation Advisory Committee
GOA	Groundrig Operators Association
GRDC	Grains Research and Development Corporation
HRDC	Horticulture Research and Development Corporation (now Horticulture Australia Ltd)
ICAC	International Cotton Advisory Committee
OGTR	Office of the Gene Technology Regulator
IP	Intellectual Property
IPM	Integrated Pest Management
LWA	Land and Water Australia
LWRRDC	Land and Water Resources Research and Development Corporation (now Land and Water Australia)
MDBC	Murray-Darling Basin Commission
MLA	Meat and Livestock Australia
MP	Member of Parliament
NFF	National Farmers' Federation
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 Ag	New South Wales Agriculture (Department of)
PIERD Act	<i>Primary Industries and Energy Research and Development Act 1989</i>
Pima cotton	<i>Gossypium barbadense</i> . Related to Egyptian cotton, having extra long and fine staples. 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	<i>Gossypium hirsutum</i> . Comprises the vast majority of the Australian crop



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“The Australian cotton industry is committed to developing and improving the competitiveness, profitability and sustainability that ultimately leads to economic development and job creation in rural and regional Australia”

THE AUSTRALIAN COTTON CENTRE, Narrabri, NSW

